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INTEGRATED NOXIOUS WEED MANAGEMENT PLAN

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ENVIORNMENTAL ASESSMENT

REGION 8

MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS

MAY 1993

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INTEGRATED NOXIOUS WEED MANAGEMENT PLAN

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Montana Department of Fish, Wildlife and Parks

May 1993

TABLE OF CONTENTS

APPENDICES

List f Figures

List of Tables

Environmental Assessment follows the Integrated Noxious Management Plan

Environmental Assessment
Table of Contents

List of Figures

List of Tables

I. NOXIOUS WEED PROGRAM GUIDANCE and OBJECTIVES

The purpose of Region 8's Noxious Weed Management Plan (Plan) is to describe the adminstrative and management framework for implementing a weed management program to stabilize and control noxious weeds on lands managed by Region 8 of the Montana Department of Fish, Wildlife and Parks (DFWP). The Plan provides an integrated approach to weed management by employing a variety of treatment methods and management strategies that meet overall DFWP goals and Montana's environmental statutes and policies. An environmental assessment (EA) accompanies this Plan and is often referenced. Once finalized the EA will be considered the framework for the Plan.

Overall direction for Region 8's Noxious Weed Management Program is provided by DFWP's recently adopted Vision document (DFWP 1992) which describes the direction that the Department is heading and how the goals articulated within that document will be reached. The basic Mission is:

> "to provide for the stewardship of the fish, wildlife, parks and recreational resources of Montana, while contributing to the quality of life for present and future generations."

The Montana Department of Fish, Wildlife and Parks adopted a Weed Control Program for lands managed by the Department in 1983. This document (Appendix A of the EA) provided the basis for Region 8's Plan. The objective of the DFWP weed control program is:

> "to prevent, to the greatest extent possible, the reproduction, proliferation, and distribution of agriculturally undesirable plant species throughout department lands or from department lands onto adjacent lands."

A key element for all DFWP programs is to consider how policies and programs affect adjacent lands and, in turn, how adjacent lands affect DFWP properties. This perspective is based in a strong commitment to public involvement in all management decisions. This tradition will be continued in the drafting and implementation of Region 8's Plan. The Plan is based on the premise that it will guide Region 8's noxious weed management program with reconsiderations in scope and appropriate adjustments made every five years.

The County Noxious Weed Control Act of 1979 (MCA 7-22-2101 *et seq.*,as amended 1991, Appendix 1) states that "it is unlawful for any person to permit any noxious weed to propagate or go to seed on his [or her] land" (7-22-2115) and encourages landowners to file weed control plans (7-22-2116). This law is administered at the county level and requires counties to develop weed control districts to plan and implement weed control efforts. County commissioners appoint a district weed board that is responsible for administration and enforcement of the district's noxious weed program. The law provides for the promulgation of rules to list statewide noxious weeds and allows for county-wide listing of additional species.

This law also gives specific direction to counties for cooperation with state and federal-aid programs.

> " The [county district weed] board is empowered to cooperate with any state or federal-aid program that becomes available. Under such a plan of cooperation, the direction of the program shall be under the direct supervision of the board of the district in which the program operates." (7-22-2150)

Region 8's specific program objectives are derived from statutory requirements, DFWP policies and goals, as well as ecological considerations:

- Control of plants declared as noxious weeds by the State, Broadwater, Jefferson, and Lewis & Clark County Weed Boards, and Region 8.
- Develop an integrated approach to noxious weed management and a strategy to prioritize treatment areas.
- Attempt to contain, reduce or eradicate weed populations, depending on the location and density of infestations.
- Prevent the introduction of new weed species.
- Work cooperatively with adjacent landowners and the county weed boards to enable consistent and sound weed control efforts.
- Conduct treatments in the best way to protect and maintain fish, wildlife and vegetation resources and protect human health and safety.
- Involve the public in the planning process.

Other state and federal laws, policies, and programs that will affect Region 8's activities are listed Appendix 2 and are briefly discussed in the EA.

In addition to adjacent private land owners, Region 8 's program will require close coordination with several agencies and entities on one or more of its properties. Those listed below have or are developing weed management plans that will directly affect Region 8's program. These include:

Weed Control Boards for Lewis & Clark, Broadwater, and Jefferson counties

"War on Weeds" projects that may be implemented with funds approved through the State Noxious Weed Trust Fund Grant process: For example, the Canyon Ferry Cabin Lease Project sponsored by the Canyon Ferry Recreation Association and Bureau of Reclamation is pending approval.

U.S. Department of Interior - Bureau of Land Mangement (Butte Division)

U.S. Department of Agriculture - Forest Service (Helena and Deerlodge National Forests)

U.S. Department of Interior - Bureau of Reclamation (Canyon Ferry Reservoir)

Montana Department of Transportation

Helena Valley Irrigation District

Region 8 has worked with the Bureau of Reclamation (Reclamation) to develop a weed management plan for Canyon Ferry Reservoir which includes the Canyon Ferry Wildlife Management Area and other parcels under DFWP management responsibility. Reclamation's site specific work plans have been included in this document.

II. SETTING AND OVERVIEW

Region 8 was created in 1989 and includes portions of Lewis & Clark, Broadwater, and Jefferson counties. Region 8 administers or manages 12 properties or property groups (Figure 1). Table 1 lists the size, ownership, and management authority within the department for each property. Noxious weed inventories have been completed for the Canyon Ferry Reservoir area (OEA Research, Inc. 1991) which includes the recreation sites and the wildlife management area and on the remaining eleven properties in 1992 (OEA Research, Inc. 1992). The DFWP resource staff also inventory noxious weed infestations on the properties. Each site is discussed in detail, includes an assessment of the weed problems on each property, and gives site specific management recommendations for the first-year of program implementation (see Section VII).

Noxious weeds are defined by Administrative Rules (ARM 4.5.201 through 4.5.204, Appendix 1). Appendix 3 briefly describes each species. In Region 8, weed populations vary by species as well as level of infestation on each property. Of the fifteen State declared noxious weeds, eight occur on Region 8 properties (Table 2). These are spotted knapweed, diffuse knapweed, Russian knapweed, field bindweed, leafy spurge, Dalmatian toadflax, white top, and Canada thistle. Each site had at least one noxious weed species where infestations were moderately dense to dense on at least some part of the property. Spotted knapweed occurs on eleven sites, Canada thistle on ten sites, diffuse knapweed and Dalmatian toadflax on five sites, white top on four sites, leafy spurge on three sites, Russian knapweed on two sites, and bindweed on one property. Infestations were typically light to moderate. However, in several locations dense infestations were found. The infestations that will be most difficult to control are the Canada thistle, leafy spurge, and spotted knapweed populations because they occur in riparian communities and Dalmatian toadflax because of its high rate of spread and resistance to traditional control methods.

Other noxious weeds found in Lewis & Clark County that are potential threats to Region 8 properties include purple loosestrife and sulfur cinquefoil. Purple loosestrife has been reported in two locations (Hoffman 1992). This species is an aggressive aquatic weed that rapidly overtakes desirable wetland habitats. The state as well as the counties have taken a very aggressive approach on inventory andcontrol of purple loosestrife. Because many of the Region 8 properties are on water or have wetlands, DFWP will work with the Montana Department of Agriculture to control and eradicate this weed. Sulfur cinquefoil, which has recently been identified in Lewis & Clark County, rapidly invades rangelands, and therefore,

Table 1. Properties Managed Under the DFWP Region 8 Noxious Weed Plan

Property Name	Acreage	Ownership/ Administration*	DFWP Management Division
Black Sandy State Park	43	State of Montana	Parks
Spring Meadow Lake State Park	56	State of Montana	Parks
Lake Helena Wildlife Management Area	157	State of Montana	Wildlife
Canyon Ferry Reservoir**	~3000	Reclamation***	Parks
Canyon Ferry Reservoir Wildlife Management Area	5000	Reclamation***	Wildlife
Helena Valley Reservoir	450	Reclamation***	Parks
Lake Helena Causeway Fishing Access Site	1	State of Montana	Parks
York Bridge Fishing Access Site	10	State of Montana	Parks
Deepdale Fishing Access Site	16	State of Montana	Parks
Toston Fishing Access Site	37	leased private land	Parks
Townsite of Elkhorn	0.25	State of Montana	Parks
Custer Ave. Warehouse	5	State of Montana	Administration
Capitol Grounds	55	State of Montana	Parks

* Management authority has been turned over to DFWP under a Memorandum of Understanding or lease agreement with the landowner

** Lands other than Wildlife Management Area managed by Region 8 Wildlife or Parks Division; includes lease sites, recreation areas, public campgrounds, concessionaires, open lands.

*** U.S. Department of Interior Bureau of Reclamation

Table 2. State of Montana Listed Noxious Weeds and Presence on DFWP Region 8 Properties

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		LEWIS & CLARK COUNTY								BROADWATER COUNTY		BROADWATER and LEWIS & CLARK COUNTIES		JEFFERSON COUNTY
Common Name	Scientific Binomial	Black Sandy SP	Spring Mdw Lake SP	Lake Helena WMA	Helena Val Res	Causeway FAS	York FAS	Custer Ave. Warehouse	Capitol Grounds	Deepdale FAS	Toston FAS	CFR Recreation	CFR WMA	Town of Elkhorn
Category 1*														
White top	Cardaria draba			X						#		X	X	
Diffuse knapweed	Centaurea diffusa			X	X					X		X	X	
Spotted knapweed	Centaurea maculosa	X	X	X	X		X	X	X	X	X	X	X	X
Russian knapweed	Centaurea repens											X	X	
Canada thistle	Cirsium arvense	#	X	X	X		X			X	X	X	X	X
Field bindweed	Convolvulus arvensis											X		
Leafy spurge	Euphorbia esula									#		X	X	
St Johnswort+	Hypericum perforatum													
Dalmatian toadflax	Linaria damatica	#				X	X	X				X		
Category 2*														
Dyers woad+	Isatis tinctoria													
Purple loosestrife^	Lythrum salicaria													
Sulfur cinquefoil^	Potentilla recta													
Category 3*														
Yellow starthistle+	Centaurea solstitialis													
Rush skeletonweed+	Chondrilla juncea													
Common crupina+	Crupina vulgaris													

* County Noxious Weed Act designations:
Category 1 = currently established and generally widespread
Category 2 = recently introduced to the state or are rapidly spreading
Category 3 = not yet detected in the state or are found only in scattered, localized infestations

X observed in 1991 and 1992 inventories
not observed in '91 or '92 inventories but listed by weed district spray record
^ limited occurrence in Lewis & Clark County
+ does not occur in Lewis & Clark or Broadwater counties

should be monitored by Region 8. It may be more prevalent than suspected since it is very similar in appearance to several native cinquefoils thus making it difficult to identify. Also, the public has not been alerted to its presence or the consequences of its taking hold (Hoffman 1992).

Additional species declared noxious by Broadwater County include burdock, common tansy, henbane, houndstongue, musk thistle, perennial sowthistle, poison hemlock, water hemlock, and yellow toadflax. An assessment of the occurrence of these species on Region 8 properties has not been done. These species would be targetted for treatment when found in association with Category 1 or 2 weeds (Table 2).

Three other species not declared as noxious weeds, but of special concern to Region 8 include perennial pepperweed, Eurasian watermilfoil, tamarisk (salt cedar), and yellow mignonette. Perennial pepperweed is a problem in the Helena area and often occurs in moist and wet areas. This species is a declared noxious weed in all adjacent states. It was noted at the Lake Helena Wildlife Management Area (WMA) and is found at Canyon Ferry Reservoir.

Eurasian watermilfoil has not been identified east of the Continental Divide, but this species is an extremely aggressive water weed found in Oregon, Washington, Alberta. It is making in-roads into Idaho along the Columbia River system and has been observed in the Missoula area (D. Workman 1992). It invades shallow shoreline areas, especially reservoirs, however it is not clear whether this species could survive the typically more severe climate of eastern Montana.

Tamarisk has taken over many riparian corridors in the arid southwest. It has been observed along the Tongue River near Decker. A few plants can be seen locally as landscape plants in Helena gardens and one plant was found at the York fishing access site. Again, it is not clear how severe a threat this plant poses for infestations in Region 8.

Yellow mignonette is currently being condsidered for listing as a noxious weed in Montana. It is not known to occur in this area.

Weed control efforts have been varied on each of the properties. As shown in Table 1, the Parks and Wildlife Divisions have been responsible for separate areas. Mowing, hand-pulling, herbicide applications, and, indirectly, landscaping have been the primary control methods. Herbicides have been used for control of lawn weeds on the Capitol Complex grounds (DFWP 1991) for a number of years. Since 1992, herbicide use on the other properties has been limited to non-chemical methods pending completion of environmental analysis of the Region 8 weed control program. Picloram and 2,4-D were used to treat spotted knapweed, Dalmatian toadflax, and Canada thistle on some properties (Rauser 1992, Hohn 1992,

Hoffman 1992). Prior to 1991, for most sites, limited herbicide applications have been conducted by contracted services as funding has allowed.

III. WEED MANAGEMENT STRATEGY

A. General Approach

The primary goal is to use an Integrated Pest Management Approach (IPM). The IPM is defined as a systems approach to reduce pest damage to tolerable levels through a vaiety of techniques, including natural predators and parasites, genetically resistant hosts, environmental modifications and when necessary and appropriate, chemical pesticides (herbicides). The IPM strategies generally rely on a combination of methods for weed management.

Using IPM, there are several ways to address noxious weed control priorities. These approaches can include species-specific directives, control objectives based on size or location of weed infestations, special management areas (zones) which require modification of general (area-wide) treatment techniques and policies, and planning units based on watershed or logical political boundaries. Region 8 has adopted an approach which utilizes several of these concepts. This approach is consistent with state law, noxious weed plans developed by the counties, and the weed plan proposed by Reclamation (1993) for Canyon Ferry State Park which inlcudes Canyon Ferry WMA. This approach also allows for the most flexibility for managing noxious weeds as site conditions change, control techniques improve, and funding opportunities arise.

The IPM approach will require different levels or intensities of weed control throughout each site. For this reason, different control objectives will be used, based on noxious weed species, population size, and environmental concerns associated with the location and habitat of noxious weeds.

B. Species Priorities

Control objectives (discussed below) for species listed by the state (Table 2 and Appendix 3) will generally follow the broad goals set forth in rules (ARM 4.5.201:204 Appendix 1). Site specific conditions will warrant some changes. St. Johnswort and dyers woad do not occur in the vicinity of Region 8 so would be watch (Category 3) species. Canada thistle infestations on Region 8 lands occur most extensively in moist, riparian communities which will limit the use of traditional control methods. Also it does have some food and cover value for wildlife. Therefore, key control objectvies will be containment and tolerance. Nuisance species, declared noxious by Broadwater County, pose some threat to the land base but are not as competitive as other noxious weeds. They will be treated when found in conjunction with other priority species.

Also a supplemental watch list, developed by Montana State University (Zamora 1991), will be updated (Appendix 4). The list contains weed species that have been declared noxious in neighboring regions such as Idaho, counties east of the continental divide, and the western provinces of Canada.

C. Control Objectives

Control objectives are targets that give direction for the intensity of control actions. These definitions are given below (USDA-Forest Service 1989; USDI-Bureau of Reclamation 1993):

Prevention
Prevention means activities such as inspection, sanitation, regulation, and education that will minimize the possibility of the introduction of noxious weeds into an area. Attempts will be made to prevent the entry of a new noxious weed species onto or establishment of new infestations on Region 8 properties. This is accomplished through education and early detection, and by implementing activities or programs that ensure that weeds are not transported onto or around Region 8 lands. This approach will have highest priority for DFWP.

Prevention methods that will be considered include but are not limited to the following:

- Regulating and limiting the use of vehicles and livestock that could spread and carry noxious weed seeds into the area.
- Requiring or promoting the use of weed seed free materials for landscaping, revegetation, and construction activites. These include topsoil, gravel, hay, mulch, and seed mixes.
- Requiring the thorough cleaning of all heavy equipment used on Region 8 lands to ensure weed seeds are not introduced to the area.
- Educating the public concerning the problems caused by noxious weed invasion, how weeds spread, and how the spread can be prevented.

Eradication
Eradication is an attempt to totally eliminate a noxious weed species from Region 8 properties. Eradication is preferred where small populations exist. However, it is recognized that this approach has limitations: long term efforts may be required where the seed source is established; current control technologies may not be adequate or practical; total eradication efforts may result in unacceptable environmental consequences. When appropriate, eradication efforts would continue as long as detectable levels of the weed were present.

Reduction or Suppression
Reduction or suppression is an attempt to prevent seed production throughout the treatment area and reduce the coverage of the weed. Reduction will prevent the weed from dominating the vegetation of the area but will require the public and land managers to accept noxious weed presence at low levels. Reduction is the preferred method in most instances when light to moderate noxious weed populations exist in accessible areas.

Containment
Containment is an attempt to prevent the spread of the weed beyond the perimeter of the treatment area or infestation area. Managers and the public must tolerate weeds within established infestations. Encroachments outside those areas would be suppressed or eradicated. Containment is the preferred approach when infestations have grown so large that reduction is not practical or possible. In some situations, weeds may exist in settings where all methods of treatment are either unaccepatble or ineffective so that containment is the only practical course of action.

Tolerance

Tolerance is to accept the continued presence of established infestations and the probable spread to ecological limits for a particular species. Tolerance should only be used in the context of containment. Tolerance is only acceptable if noxious weeds are contained within an area and not allowed to spread beyond the ecosystem. Like containment, tolerance situations usually exist where noxious weeds are beyond control or are in environments where all methods ot treatment are either unacceptable or ineffective. The manager must identify these situations and try to exclude new invasions through preventive practices.

Management priorities may be modified for special areas of concern or surrounding control projects, or specific properties. Also, small new infestations of lower priority weeds may be treated as high priority if eradication is considered feasible. Noxious weed priorities and control ojectives for each species or infestation area will be reviewed annually by the Region 8 resource staff to determine if particular species should be managed differently. Site specific management plans will be amended to reflect these changes.

D. Treatment Methods

The methods for noxious weed management are listed below with specific agents identified. Additional agents, methods, and techniques for weed management will be considered as they become available.

Manual

Manual methods involve grubbing with hand tools (shovel, hoe, pulaski, etc.), topping (shears, clippers, and "weed-whackers"), and hand-pulling to control noxious weeds. These methods can be effective in controlling weeds in small or light infestations of annual or biennial plants. Periodic re-treatment is required. Because these methods are labor intensive, their application would be mostly limited to environmentally or culturally sensitive areas.

Mechanical

Mechanical methods include burning, mowing, tilling and reseeding, and grazing. These methods can be effective in controlling some noxious weeds, although implementation is often limited by topography and access. These methods can also be costly and time consuming.

Burning as a weed control measure is generally considered to be of limited effectiveness. However, burning may be conducted in conjunction with wildlife area management to enhance wildlife forage or to decrease fire hazards. To this end, burning may help to control certain noxious weeds and undesirable shrubs as well as reduce decadent plant cover. Burning may be conducted in combination with chemical treatments and will require follow-up provisions for reseeding. Burning plans and operations would be coordinated with the Air Quality Bureau and Department of State Lands.

Mowing and tilling can be effective in preventing noxious plants from producing seeds when treated in the bud stage or earlier. Repeated efforts during the growing season can deplete the underground food supply of some perennials. These methods would need to be repeated over at least a five-year period to attain satisfactory control. These methods may also serve to weaken non-target species. Mowing and tilling are often limited because of steep slopes and rugged terrain.

Mowing would be considered on level and nearly level slopes, where suitable soils exist and where a small percentage of the vegetation consists of shrubs. Mowing is also an alternative in environmentally sensitive areas where other treatment methods would be unsuitable.

Tilling would be considered only for areas that had previously been or are currently under cultivation because ground disturbance may increase the likelihood of weed infestation beyond the potential benefits of tilling. However, tilling combined with a reseeding program would be considered when economically feasible. Other control methods would also be considered in conjunction with tilling such as alternate cropping systems, grazing systems, or chemical applications.

Sheep and goats have been effective in controlling the spread of leafy spurge in Montana and North Dakota. Other weed species are often selected early in the growing season since they tend to green up earlier than native plants. The infestations of leafy spurge on the Region 8 properties occur in patches where careful herding and/or installation of temporary fences would be necessary. This method has been successfully used in Gallatin County (Petroff 1993). When considering this treatment method, the effect of grazing on soils, water, and riparian areas will be considered.

Biological

Biological control methods include the introduction of insects or pathogens which are natural enemies to weed species. Biological control agents can be very effective in stressing noxious weeds, severely reducing seed production and viability. Use of biological agents will not eliminate the species, but can reduce the population to a tolerable level, particularly when used in combination with other control methods. Biological control methods may be the only treatment possible in inaccessible areas.

Control agents are currently being developed and screened by universities and the USDA Animal and Plant Health Inspection Service (APHIS). Several biological agents have been released in Lewis & Clark and Broadwater Counties Appendix 5 lists the currently available bio-control agents. Releases of all biological control agents will be in cooperation with the counties and the Montana Agricultural and Experiment Station at Montana State University and APHIS. For some agents the only costs associated with this method are the collection and release of new agents and monitoring to insure spread and

infection. This would work for the knapweeds. The DFWP can also work with USDA/APHIS as a test area for releases. There are also commercial sources for a number of agents.

In a biological control program, it is necessary to maintain a viable host population for the biological control organism. Areas selected for release of these agents will be screened carefully with respect to location and plant community composition. These areas may preclude eradication objectives and the use of herbicides.

Chemical

The herbicides 2,4-D, picloram, dicamba, glyphosate (Roundup® and Rodeo® formulation), metsulfuron, MCPA, and clopyralid will be used on Region 8 properties (Table 3). These herbicides may be used alone or in combination. Appendix 6 contains a summary of herbicide formulations with control guidelines for target species. Appendix 7 contains the label instructions for use of these herbicides in Montana. Other herbicides, which have been approved by the Environmental Protection Agency and have been licensed for use in Montana, may be considered in the future following hazard assessment by DFWP resource staff.

Table 3. Herbicides Proposed for Use on Region 8 Lands

Common Chemical Name	Registered Trade Name	Application Rates*
2,4-D amine	Weedar 64, various	1 - 3 qts
picloram	Tordon 22K	1 pt - 2 qts
dicamba	Banvel	1/2 pt - 6 qts
glyphosate	Rodeo**	3 - 7 1/2 pts
glyphosate	Roundup**	2 - 5 qts
clopyralid	Stinger	1/4 - 1 1/3 pts
metsulfuron	Ally***	1/10 oz
clopyralid + 2,4-D	Curtail	2 - 2 2/3 pts
MCPA amine****	various	1 - 4 pts

* Per Acre basis; taken from manufacturer label recommendations for general weed control on rangelands/pasture unless otherwise noted.
** Glyphosate is a non-selective herbicide. The Rodeo formulation of glyphosate can be used near water because toxicity to fish is relatively low.
*** Ally is proposed for use on white top.
**** MCPA is proposed for use on rangelands.

Herbicides would be applied according to label directions and the management area guidelines and constraints contained in this Plan. Changes in application rates recommended by selected research

institutions will be considered if these rates do not exceed label directions. Chemical applications will be supervised or conducted by an applicator licensed by the State of Montana.

Site-specific plans will be developed for all proposed herbicide treatments as part of the treatment area planning process. Several factors are considered when developing herbicide treatments. The use of herbicides will depend on the treatment objective, season of application, stage of plant growth, topography, species present, expected cost, equipment limitations, and potential environmental impacts. Rates of herbicide application will depend on the target species, other vegetation present including culturally significant plants, soil type, human occupation, wildlife, and presence of surface waters, wetlands, shallow groundwater or groundwater recharge areas.

Vehicle-mounted sprayer (hand gun, boom, injector, or other appropriate equipment) applications will be used primarily in open areas that are readily accessible by vehicle and where vehicle operation will not damage soil or vegetation. The boom will be used only to treat concentrated weed infestations. The hand gun will be used for spot treatment of weeds. Sprays will be applied in a manner that gives the best possible coverage with the least amount of drift.

Hand applications will utilize backpack spraying and wiper application. Backpack sprayers will be used on small or scattered patches in rough terrain or environmentally sensitive areas. Contact systemic herbicides such as glyphosate will be used to treat individual plants and for seedbed preparation.

Aerial herbicide applications are not being considered as an application method at this time, but may be utilized in the future if the need develops. Other implementation guidelines and precautions for herbicide use will include at a minimum:

- During application periods, weather conditions would be monitored hourly by contractors and weed management personnel to ensure effectiveness of the application and to reduce drift. As a general precaution, spraying would cease when rainfall is expected within 24 hours, air temperatures exceed 85° F., or wind speeds exceed 8 m.p.h.
- Calibration checks would be conducted at the beginning of the spraying season and then at least weekly throughout to ensure that equipment is functioning correctly and that the desired application rates are being sprayed.
- To reduce excessive drift, it is recommended that spray equipment be designed to deliver a median drop diameter of 200 to 800 microns.
- Herbicides will be applied at the optimum stage of plant growth for maximum control, thereby encouraging minimum use of herbicide. Usually this is in the spring and/or fall when adequate soil moisture is available for plant growth and herbicide uptake. Herbicides would not be applied during drought or when plants are dormant. This factor will require flexibility and close monitoring since each weed species develops differently from site to site and year to year.

- When feasible, a dye will be mixed with the herbicide solution to aid in identifying where spraying has occurred. This should prevent "double-spraying" and provide a method to check coverage for monitoring purposes.

- When picloram is applied to dense stands of noxious weeds (i.e. broadcast method), follow-up treatments with 2,4-D or dicamba will be used in successive years to prevent overuse of a persistent chemical capable of leaching into ground water.

- Label requirements would be followed for all herbicide applications. Further precautions may be determined to be necessary during the pre-treatment review process.

The herbicide program will be evaluated annually as part of the overall weed monitoring and evaluation program.

IV. MANAGEMENT ZONE GUIDELINES

The following management zones (MZs) were developed because they are of special concern and require special management or protection. These management zones will be considered when developing site-specific weed control plans. The current management direction is to protect the quality and values of these areas based on their recreational, environmental and economic importance to DFWP. The Integrated Pest Managment approach is key to ensuring effective and safe weed control efforts, but because of the senstive nature of these special management zones, herbicide use will be somewhat limited. Management objectives and guidelines are given for each MZ.

A. Critical Surface and Ground Water Zones

Description. Sensitive surface and ground water zones include wetlands, flood plains, riparian areas, lakes, marshes, springs, streams, rivers, ponds, and other areas where aquatic vegetation, shallow ground water, ground water recharge areas, and surface water occur. This MZ occurs on most of Region 8's properties. These aquatic or riparian environments are valuable for fishery and wildlife habitats, recreation and livestock foraging areas. Because of their high moisture content and abundant nutrients, these environments are usually highly productive areas supporting diverse and high density vegetation. Noxious weeds occur on and threaten many sensitive surface and ground water areas.

Sensitive ground water zones would be defined using a procedure developed for the Lewis & Clark County Conservation District (Lacey 1991). Risk factors include depth to seasonal or permanent water table, soil permeability, organic matter content, flooding hazard, and percent slope. A risk index was calculated on a scale of 1 to 100 and divided into 4 classes. Risk factors and classes were assigned to each soil map unit. Mapping was completed for much of the Helena Valley. Where mapping did not occur for Region 8 sites, the same procedure was used to identify sensitive ground-water areas. Table 5 shows the rating system used.

Using this approach, some portions of eight of the twelve Region 8 properties would be susceptible to potential ground-water contamination. Recommendations as shown inTable 4 would be followed as would the additional guidelines listed below.

Table 4. Groundwater Risk Classes used to Identify Sensitive Ground-Water Areas*

Numerical Value	Risk Class	Example of Soils
100+	1- Very high	Soils with water tables within 3 ft, moderately rapid to very rapid permeability; herbicide use not recommended on these sites.
80-99	2 - High	Soils with water tables within 3-6 ft, moderate to rapid permeability, no flooding or soils with water tables within 15 ft., moderately rapid to very rapid permeability, high flooding risk, and low organic matter; spot treatments with herbicides may be utilized in some areas; reduced herbicide rates and application frequency will decrease contamination risk; low leach potential, short residual herbicides recommended for any large scale applications.
60-79	3 - Moderate	Soils with water tables within 6 -10 ft. and moderately slow to very slow permeability; or soils with water tables within 15 ft. and rapid to very rapid permeability; these soils often occur in association with high water table soils; Herbicides can be used for spot treatments on these sites; large broadscale applications with high herbicide rates not recommended; decrease application frequency to reduce risk.
40-59	4 - Slight	Soils with water tables within 15-25 ft., moderate to moderately rapid permeability, occur on similar landscapes as high water table soils but not in association with these soils. May be located on benches and terraces adjacent to perennial or intermittent streams; few restrictions for herbicide use.

* After Lacey (1991).

Areas where fractured bedrock lies close to the soil surface are also of concern. Portions of the Black Sandy State Park and along the northwest shore of Canyon Ferry Reservoir do have shallow soils over fractured bedrock. Large, broadscale applications with high herbicide rates are not recommended on these sites. Decreasing application frequencies would also reduce contamination risks.

Management objective. Protect riparian areas and wetlands from encroachment by noxious weeds while maintaining uncontaminated water supplies for humans, wildlife, livestock, fish, and other aquatic life.

Management Guidelines.

1) Manual and mechanical treatments will be encouraged under favorable conditions for controlling weeds and creating desirable habitat in this MZ.

2) Noxious weed infested areas which threaten sensitive surface and ground water environments will be targetted.

3) Herbicide treatments will be scheduled and designed to have the least impact on fish, wildlife, non-target vegetation, and water quality.

4) Herbicide mixing and loading will be conducted off-site as much as possible. If mixing occurs on site then it would be conducted at least 500 feet from open water or shallow ground water. The water source for tank mixing will be from off-site. Each project will be evaluated to determine the best place for mixing and loading.

5) The herbicides 2,4-D amine (less volatile), clopyralid, and glyphosate (Rodeo ® formulation) are proposed for use in riparian areas.

6) No herbicide will be applied directly to standing or running water. Label restrictions will be followed for application methods and other considerations near water bodies. Wiper and other hand application methods which target individual plants using contact systemic herbicides (glyphosate, Rodeo® formulation) can be used up to the existing high water line. More restrictive buffer zones will be established as on site conditions dictate.

7) Picloram will not be applied on floodplains, the immediate banks of a water body, below the high water level of a water body, or in very high or high ground water risk class areas (Table 5). More restrictive buffer zones may be established as on site conditions dictate.

8) Boom sprayers will not be used in sensitive surface and groundwater environments where weeds are closely intermingled with desirable woody vegetation. Wiper and other hand-application methods that target individual plants, mechanical, and manual methods are preferred in these areas.

9) If other data are not available, water quality samples will be taken at predetermined locations before and after herbicide treatment in sensitive aquatic environments particularly where herbicides may have the potential to accumulate in standing water or shallow groundwater.

10) Picloram or 2,4-D may be considered for use in this MZ within 25 to 500 feet of the ordinary high water mark and where ground treatments are proposed. Only 2,4-D amine applied by hand methods that target individual plants would be used within the 25 foot zone to the ordinary high water mark. At the discretion of Region 8's fisheries biologists, sites where these herbicides would be used within 500 feet of the ordinary high water mark would undergo analyasis to determine that the Expected Environmental Concentration (EEC) from storm runoff could not exceed the No Observed Effect Level (NOEL) for trout. This procedure is taken from the Lolo National Forest Noxious Weed Management Draft EIS (1989) and is reproduced in Appendix 9.

11) Areas where fractured bedrock lies close to the soil surface, such as portions of the Black Sandy State Park and along the northwest shore of Canyon Ferry Reservoir , would require targetting individual plants. Large, broadscale applications with high herbicide rates are not recommended on these sites. Care in tracking herbicide application frequencies would be essential to minimize the risk of ground water contamination.

B. Sensitive Wildlife Zones

Description. Sensitive wildlife zones possess physical and biological features essential to the conservation or survival of wildlife species. They include areas which provide vital habitat for threatened and endangered wildlife, big game winter range and elk calving areas outside of aquatic environments, and other rare, unique, or critical habitats. Noxious weeds threaten and occur on many sensitive wildlife areas, especially big game winter ranges at lower elevations.

Management objective. Protect existing, diverse wildlife habitats from encroachment by weeds while ensuring that threatened, endangered, rare, or unique species are not adversely affected by weed treatments.

Management guidelines.

1) Manual, some mechanical and spot herbicide treatments will be encouraged when conditions are favorable for controlling weeds and creating desirable habitat in sensitive wildlife zones.

2) Weed control will be targeted on weed-infested areas which threaten sensitive wildlife zones and before weed populations become established.

3) Herbicide treatments will be scheduled and designed so as to have the least impact on wildlife and non-target vegetation.

4) Sensitive wildlife areas will be determined for each project, regardless of treatment methods proposed. As necessary, Buffer Zones will be established on a site-specific basis for each sensitive wildlife zone identified by the Region 8 Biologists. Additional guidelines may be provided during the site review.

5) Any treament activity that would occur near bald eagle or peregrine falcon nests will be coordinated with Region 8 biologists to ensure minimum disturbance. The type of treatment used and the time it is implemented are key elements in this determination. Additional guidelines may be established during the site review.

6) Boom sprayers will not be used in sensitive wildlife zones where weeds are closely intermingled with desirable woody vegetation.

7) Revegetation or rehabilitation of treated wildlife areas will be considered as part of the treatment plan to ensure that desirable ground cover is established.

8) The occurrence of sensitive plants and habitat will be determined for each project, regardless of treatment methods proposed. Restrictions in addition to the above guidelines may be provided during the site review.

High Human Use Areas

Description. High human use areas include all areas which have concentrated recreationist or department employee use. These areas often have the more serious noxious weed infestations. Also, because the amount of ground disturbance associated with these areas or activity levels tend to be high, these areas are very susceptible to rapidly spreading noxious weeds.

Management Objective. Prevent, reduce, and eradicate (when possible), noxious weeds from areas which are continually or heavily used by people, while ensuring public health and safety.

Management Guidelines.

1) Prevention is a key treatment method for this MZ. Also, education and awareness of weed problems and control will be promoted.

2) Manual, mechanical and spot herbicide treatments are the preferred methods for controlling weeds.

3) Herbicide treatments will be considered on a project-by-project basis. All recreation areas will be closed to public use during herbicide spraying applications and for 24 hours after spraying. Signs will be posted in campgrounds and other day use areas prior to herbicide application. Re-entry dates will be posted. Telephone numbers will also be listed for those desiring further information from Region 8.

4) In situations where herbicides are applied within 10 feet of picnic tables, grills or other surfaces that people would use for food handling, residues will be removed by washing with detergent and rinsing prior to allowing people to re-enter the site.

5) Picloram will be used on a limited basis, such as along roadways, in this MZ. Glyphosate, clopyralid, and 2,4-D, with label designation for use in human occupation areas, will be the preferred herbicides for use in this MZ.

6) Workers who handle and apply herbicides will wear appropriate protective clothing and follow all label requirements.

V. TREATMENT AREA PLANNING AND MONITORING

Funding for weed treatmtents on Region 8 properties come from different sources (Division budgets), so each Region 8 property would be treated as a separate planning unit. Canyon Ferry State Park would be further divided into the sub-units as proposed by the Bureau of Reclamation (Reclamation 1993). These subunitsare described in Section VII and are based primarily on the current management responsibility (Figure 2).

Pre-treatment reviews will be conducted on each proposed treatment area to evaluate potential impacts on the environment and other resources, treatment options and costs, and requirements for project implementation. Individual treatment area plans will then be prepared and assigned a priority ranking. Ranked treatment area plans will be consolidated into a proposed yearly treatment plan and presented to the appropriate Region 8/DFWP personnel (Appendix 10) for review and approval.

Post-treatment monitoring will be conducted on each treated area to evaluate project effectiveness, environmental impacts, and the need for retreatment, corrective measures or mitigation. Review should be conducted at three time intervals: 1) within a few days after spraying to verify the location and extent of

applications as evidenced by the dye (if used); 2) two to three weeks after application to verify spraying effectiveness (wiltling and die-back); 3) in the following spring to note 'long term' control and to note residual control where picloram was sprayed.

VI. PUBLIC INVOLVEMENT PROCESS

Public involvement has two aspects. The first aspect is presenting Region 8's proposed overall plan and annual site specific treatment program and encouraging public partcipation in these planning processes. The DFWP policies and MEPA provide guidance for public participation in decision making.

The second aspect is developing a noxious weed awareness and education program for the public. This also serves the purpose of highlighting the MDFWP's active role in weed control. Information can be dispersed through many avenues. Some of these include the following: development/distribution of a noxious weed pamphlet, interpretive signs/displays at each site, public service announcements (radio and TV); newpaper articles; displays in sporting good stores, libraries, banks, etc.; education programs in schools for all ages; quarterly newlstter; presentations at local events (4-H, county fairs, outdoor sports organizations, etc.); weed pulling events and other activites that directly involve the public; and workshops.

VII. SITE SPECIFIC PLANNING

A. General Guidance

A site-specific IPM plan will be developed for each property or group of properties. First-year recommendations are given below. These would become part of the 'treatment area units' described previously. These plans would be reviewed annually to:

1. Reassess the extent of infestations at each site and evaluate control effort success. A large scale topographic map base (i.e. 1 inch = 1000 feet) will be developed for each site with overlays to track infestations and herbicide and other treatment activities. Canyon Ferry State Park will be done at a scale of 1 inch = 2000 feet. Special Management Zones will be identified on overlays and verified yearly.

2. Identify new or emerging public concerns, department policies, or environmental concerns.

3. Reestablish contact with local, state, and federal weed control agencies and coordinate efforts.

4. Develop treatment schedules for the year.

5. Reassess the effectiveness of weed management techniques and determine how these or new control efforts will be implemented.

6. Evaluate the budget and make adjustments to meet current year needs.

Region 8's monitoring program will contain the following elements:

1. Sampling a vegetation transect(s) in selected areas at each site to estimate percent coverage

2. Photo points

3. Narrative descriptions of weed management observations at specific sites.

4. Maintaining a treatment log that specifies any and all particulars (i.e. dates, times, rates, locations for herbicide applications; bio-control species, release points, dates; etc.)

5. Mapping updates as mentioned previously.

B. First-Year Site Assessments and Management Recommendations

Black Sandy State Park

Black Sandy State Park, administered by the Parks Division, includes about 43 acres on the west side of Hauser Lake. Picnic areas, toilets, and parking are provided between the lake and the Hauser Dam Road. This area is sparsely vegetated with native and non-native species. Above the road, the area is undeveloped. The slopes are steep with shaly soils and bedrock outcrops. Several trails cross the area that are used by wildlife and hikers. There is also evidence of motorized trailbike use. This area is vegetated with grass/shrub communities and open ponderosa pine and Douglas-fir communities.

Weed Infestations

Spotted knapweed was the only noxious weed observed. Dense populations occur along the Park's shoreline. Low to medium-level infestations occur throughout the developed portions of the Park. Scattered plants are found along the Hauser Dam Road and lower slope. Plants also occur at the lower ends of the trails leading upslope from the picnic areas. The DFWP spray records for May 1991 show that Canada thistle and Dalmatian toadflax were targeted in addition to spotted knapweed, however, these species were not observed in the 1992 inventory.

Nuisance weed species weeds observed include wooly mullein and thistles.

Past Weed Control

Weed control has included mowing and spraying based on plans submitted to the Lewis & Clark County Weed District. Typically, herbicide spraying has been contracted through the weed district. The most recent control efforts were conducted in May, 1991. Curtail (mix of picloram and 2,4-D) was sprayed.

Site Constraints

Black Sandy is in a High Human Use MZ. Shallow soils to bedrock occur on the steep slope portions of the site preclude the use of picloram. This area is also very susceptible to disturbance. The developed area is in a slight ground-water risk class (4). Picloram should not be used within 25 feet of the high water mark along Hauser Lake. Nesting bald eagles and/or peregrine falcons may occur in the vicinity so timing of treatment activities should be coordinated with Region 8's Biologist. If herbicides are used on the steep slopes, a survey for rabbit-foot crazyweed and divide bladderpod should be conducted.

Weed Management Strategy

The main strategy will be to prevent weeds from invading the uninfested areas particularly the steep slopes west of the access road through the Park or otherwise spreading from the property. The presence of the powerline running along the upper property boundary and the Hauser Dam Road are obvious

corridors for weed spread but at present are weed-free. Weeds to monitor include: diffuse knapweed and Dalmatian toadflax which are established in the Lake Helena area and are potental invaders to Black Sandy. As mentioned above, Dalmatian toadflax and Canada thistle may already be present. A public education/awareness campaign for this site would be developed. Where feasible, infestations of knapweed will be sprayed to reduce the size and density of weeds to allow competition by desirable vegetation.

Weed Management Work Plan

Prevention: Develop a trail system for the steep slope area to discourage uncontrolled hiking on these erodible soils. Ensure that ATV's and trailbikes do not use this area. Monitor weed invasions along corridors such as the powerline, the road, and the 'volunteer' trails. Monitor grass reseeding efforts in the picnic area.

Education: Develop an interpretative sign in the two main use areas. Encourage the public to pull knapweed around the site.

Mechanical: Use late spring mowing along the shoreline to prevent knapweed from going to seed if herbicide use is not effective or feasible. Hand pull around desirable trees and shrubs and along the shoreline.

Biological: This area is too small to establish knapweed predators effectively. Also, other methods may be more effective at this time.

Chemical: Hand spot-spray knapweed by backpack or truck mounted tank with picloram or picloram/2,4-D mix, at label recommendations, in all areas except around desirable shrubs and trees and within 25 feet of the shoreline. Within 25 feet of the shore use a 2,4-D product, such as Weedar 64, labeled for use near water. Alternatively, clopyralid (Transline) could be used throughout.

Spring Meadow Lake State Park

The Spring Meadow Lake Recreation Area, administered by the Parks Division, covers about 56 acres and is located just west of the City of Helena between Highway 12 West, Country Club Ave. and Broadwater Ave. The site has developed facilities including boat ramps, swimming dock, picnic areas, parking areas, toilets, and nature trail system. Dense riparian communities line most of the shoreline. On the north end, where most of the development has occurred, lawns and native grass areas have been planted. On the east side of the lake, part of the area is disturbed while part is in native range grasses and shrubs. A small area has been planted with introduced grasses.

Weed Infestations

Noxious weeds found on the site include spotted knapweed and Canada thistle. Heavy spotted knapweed infestations are found in the disturbed area at the east end of the Lake and throughout the property at the south end of the lake between Montana Powder and Equipment and the Old Kessler Brewery. Knapweed and Canada thistle are well-established in the riparian fringe along the west and south shoreline. Surrounding lands to the east nd south are also heavily infested. Nuisance species include bull thistle, wooly mullein, and baby's breath.

Past Weed Control

Weed control has included mowing in the level grassy areas. Records of past herbicide treatments were not found.

Site Constraints

Spring Meadow Lake is in High Human Use and Sensitive Surface and Ground Water MZs. Most of the site is in a high ground-water risk class and therefore, precludes the use of picloram. Dense riparian vegetation occurs along the shoreline. Swimming is a primary use of the Park. If herbicides are used on the east side of the Park, a survey for lesser mushy milkvetch should be conducted.

Weed Management Strategy

The main strategy will be to contain and reduce spotted knapweed on the property and to develop a coordinated effort with Lewis and Clark County Weed District and adjacent property owners. Canada thistle and knapweed are well established within the dense riparian cover immediately surrounding the lake, so at this time, their presence in these areas will be tolerated. A public education/awareness campaign for this site would be developed. Infestations of knapweed will be sprayed to reduce the size and density of weed populations along trails , the roadway, and open areas provided that proximity of ground or surface water or riparian vegetation is not a constraint.

Weed Management Work Plan

Prevention: Monitor weed invasions along the access road, parking area and the trail system. Monitor grass reseeding efforts in the picnic area.

Education: Develop an interpretative sign describing the weeds to be found and how to minimize their spread (vehicles, clothing, pets). Encourage the public to pull knapweed around the areas they may use; develop and 'adopt-a-trail' program.

Mechanical: Use mowing along the shoreline to prevent knapweed from going to seed if herbicide use is not effective or feasible. Hand pull around desirable trees and shrubs and along the shoreline when possible. Develop additional reseeding efforts in tandem with herbicide treatments for disturbed areas.

Biological: This area is too small to establish knapweed predators effectively. Also, other methods may be more effective at this time. However, since the Canada thistle infestation is intermingled with desirable riparian vegetation, inroduction of bio-control agents (Appendix 5) may be effective.

Chemical: Hand spot-spray knapweed by backpack or truck mounted tank with 2,4-D/clopyralid mix (Curtail) along the parking area, trails, road and open areas (where riparian vegetation is not dense) at label recommendations. Concentrate containment efforts in the disturbed open area on the east side of the lake. Alternatively, clopyralid (Transline) could be used. Avoid all chemical use within 25 feet of the shoreline since swimming and wading are such prevalent activities.

Lake Helena Wildlife Management Area

The Lake Helena WMA, administered through the Wildlife Division, covers about 157 acres and is located at the west end of the lake. The area is undeveloped except for a recently installed access road and parking area located south of County Road 453 near the junction with Ferry Road. The majority of the property is open water and wetlands. Wildlife protection, wildlife viewing, and waterfowl hunting access are the primary uses of this area. The access/parking area is on the north edge of the WMA, much of which has been disturbed in the past. Soils are silt loams and silty clay loams with a high salt content. They are mucky when wet and susceptible to compaction. A variety of upland and water-tolerant plants occur. Most are adapted to salty soil conditions as well.

Weed Infestation

Noxious weed species observed were confined to the access/parking area, especially between the access road and the County road. Weeds present include Canada thistle, diffuse knapweed, and white top. Nuisance species were prevalent and included burdock and perennial pepperweed. Weeds have been well-controlled in the highway right-of-way. Adjacent property to the west of the access area has light infestations of diffuse knapweed. The ditch that enters near Ferry Road is a weed seed source and conveyance to the lake, and a threat to shoreline weed spread.

Past Weed Control

Weed control efforts have been initiated in consideration of site constraints and consisted of hand-pulling of knapweed in 1992. Reseeding of disturbed areas was planned when the access site was developed in 1991-92.

Site Constraints

Lake Helena WMA is in Sensitive Surface and Ground Water MZ. Portions to the east may be in a Sensitive Wildlife Zone. Disturbance of nesting waterfowl and a heron rookery nearby may affect timing of treatment activities. The entire site is in very high and high ground water risk classes. This would preclude the use of picloram on the site. Other herbicides could be used on the Class 2 portions (drier areas).

Weed Management Strategy

Since weed infestations are small and confined to the less wet areas of the property, the primary goal would be to reduce if not eradicate diffuse knapweed and white top from this site. Canada thistle would be contained. Focus weed control efforts along the canal and perimeter of the property. A secondary goal would be to work closely with adjacent landowners to control seed sources which are adjacent to the WMA.

Weed Management Work Plan

Prevention: No special provisions are suggested.

Education: Post an interpretative sign informing users of the specific weed problem, control strategies and constraints. Encourage users to pull diffuse knapweed.

Mechanical: Continue to monitor and reseed the newly disturbed areas, if necessary. Consider reseeding the currently infested areas in tandem with limited herbicide use.

Biological: Since there is an opportunity to control diffuse knapweed on this site, bio-control is not recommneded at this time. However, the Canada thistle infestation may be more effectively treated with bio-control agents (Appendix 5).

Chemical: Utilize limited but focused spot-spraying of diffuse knapweed. Use a backpack or truck mounted tank with 2,4-D/dicamba mix along road and perimeter fence. Treat the whitetop patches with metsulphuron or 2,4-D/dicamba mix at label recommendations. Avoid all chemical use within 25 feet of the shoreline and where the water table is within 3 feet of the surface (risk class 1).

Helena Valley Reservoir

The Helena Valley Reservoir, administered by the Parks Division, covers about 450 acres and is located between the City of Helena and the south end of Hauser Lake on County Road 280, known as York Road. It is a holding reservoir for water pumped from the Missouri River at Canyon Ferry Dam which is then fed to the Helena Valley irrigation canal system. Developments are confined to the northwest side of the reservoir and near the dam and includes a campground, picnic areas, toilets, fishing access sites, and a model airplane field. The remaining area provides for dispersed recreation, including wildlife viewing and fishing. The area is primarily in native range with some old farming and past livestock grazing evident. The shoreline area has a well developed riparian community. A few small wetland areas also occur. Canada geese may nest along the east shore of the reservoir. One ranch and several rural residences adjoin the south and east sides of the reservoir.

Weed Infestations

Noxious weeds observed included spotted knapweed, Canada thistle, and diffuse knapweed. Spotted knapweed and Canada thistle are established along the northwest and northern shoreline and intermingled among the riparian community understory. They are also found along the Helena Valley Canal where it enters the reservoir. There are also scattered populations in uplands at the north end of the Lake. Diffuse knapweed is present but occurs as small scattered patches at the north end of the reservoir and on the southwest end near the dam. The eastern half of the Reservoir property is relatively weed-free with only Canada thistle established along several narrow fingers of the reservoir. Nuisance weeds include wild licorice, mullein, kochia, and cheatgrass.

This site is a seed source for adjacent properties, especially to the west and north. On the other hand, the diffuse knapweeed found at the south end of the reservoir appears to be coming from the adjacent property and the Helena Valley Canal is a seed source where it enters the property.

Past Weed Control

No recent weed control efforts were identified at this site.

Site Constraints

The northwest portion of the Helena Valley Reservoir is in the High Human Use MZ. The narrow drainage outlet below the dam is in the Sensitive Surface and Ground Water MZ (ground water risk class 3). A narrow band of dense riparian vegetation occurs along the shoreline.

Weed Management Strategy

The main strategy will be to contain and reduce spotted and diffuse knapweed on the property and to

develop a coordinated effort with Lewis and Clark County Weed Distric, adjacent property owners, and the Helena Valley Irrigation District. Canada thistle and knapweed are well established within the dense riparian cover immediately surrounding the lake, so at this time, their presence in these areas will be tolerated. Infestations of spotted and diffuse knapweed in the upland areas will be sprayed to reduce the size and density of weed populations along trails, the roadway, picnic areas, and open areas provided that proximity oto riparian vegetation is not a constraint. A public education/awareness campaign for this site would be developed.

Weed Management Work Plan

Prevention: Monitor weed invasions along the access road, parking area, and specilly the east hal ot he Reservoir property. Ensure that any reconstruction/improvement projects include revegetaion plans.

Education: Develop an interpretative sign describing the weeds to be found and how to minimize their spread (vehicles, clothing, pets). Encourage the public to pull knapweed around the areas they may use.

Mechanical: Hand pull around desirable trees and shrubs and along the shoreline when possible.

Biological: This area could support bio-control agents for the knapweeds and Canada thistle especially along the shoreline where weeds are intermingled with desirable riparian vegetation. It is recommended that a variety of organisms (Appendix 5) be introduced to thls area.

Chemical: Hand spot-spray knapweed by backpack or truck mounted tank with 2,4-D/clopyralid mix (Curtail) along the parking area, trails, road and open areas (where riparian vegetation is not dense) or picloram/2,4-D mix in the uplands at label recommendations. 2,4-D with a label for use near water could be used within 25 feet of the shoreline where riparian vegetation is not present. Work with the Weed District and the Irrigation District to establish the feasibility of herbicide use along the canal.

Lake Helena Causeway Fishing Access Site

The Lake Helena Causeway FAS, administered by the Parks Division, covers 1.2 acres on the east end of the causeway that separates Lake Helena from an arm of Hauser Lake. Facilities include parking, a few picnic tables, and a toilet. The site is vegetated with salt-tolerant species such as halogeton, foxtail barley, and inland saltgrass. Salt crusting on the soil surface is common.

Weed Infestations

Dalmatian toadflax was the only noxious weed observed on the site. Kochia, a nuisance weed, is extensive. Scattered spotted knapweed plants occur in the road right-of-way. There are developed home sites immediately adjacent to the area. Across the causeway to the southeast, native range and irrigated haylands dominate. Diffuse knapweed is a problem farther south as well as on the north side of Lake Helena.

Past Weed Control Efforts

Recent weed control efforts were not identified at this site.

SiteConstraints

The area is in the Sensitive Ground and Surface Water (Risk Class 2) and High Human Use MZs.

Weed Management Strategy

Because of the high salt content of the soils and the proximity of the water table at this site, weed establishment and spread is slow. Handpulling would be the preferred treatment method here. Interpretive signs and very selective spraying would also be recommended.

Weed Management Work Plan

Prevention: Monitor the spread of toadflax and the knapweeds.

Education: Post a small interpretive sign encouraging public help in controlling weed spread by pulling identified species.

Mechanical: Hand pull toadflax to prevent it from going to seed.

Biological: Infestation levels are not high enough to warrant introduction of bio-control agents.

Chemical: Using a spot spray technique, apply a mix of picloram/2,4-D, at label recommendations, one time to try to eradicate the toadflax. Follow-up with pulling.

York Bridge Fishing Access Site

The York Bridge FAS, administered by the Parks Division, covers about 10 acres and is located on the west shore of Hauser Lake just before the York bridge. FWP developed the site in 1988. Boat launch ramps, parking, and toilet facilites are provided. Picnicing and camping are not common uses. Limited shoreline fishing occurs. The access road from the highway is fairly long and crosses rolling terrain before reaching the boat launch area. This area is relatively undisturbed with native grass and shrub communities. The area along the shore is flat and receives the most intensive use. This area is mostly unvegetated but there are grassy spots and shoreline cover. A portion of the shoreline area has been revegetated with hardy, dry-site grasses, but most of the area is dominated by weedy species.

Weed Infestations

Noxious weeds found here include spotted knapweed, Canada thistle, and Dalmatian toadflax. The toadflax infestation is limited to scattered plants in the parking areas and the hillsides. Knapweed and Canada thistle are well-established along the shoreline. Knapweed also occurs along the access road. The revegetated area is practically weed-free.

A number of nuisance weeds are also present, especially along the shoreline. These include wild licorice, kochia, burdock, other thistles, houndstongue, and wooly mullein. One tamarisk shrub was found on the hillside at the north end of the site.

Property in the immediate vicinity is generally weed free, although knapweed and toadflax are managed in the highway right-of-way and toadflax is beginning to encroach onto the upslope areas. Upstream of this site along the lakeshore is a large area, known as Devil's Elbow, that has been disturbed and is highly infested with spotted and diffuse knapweed and Dalmatian toadflax. This area is a serious seed source.

Past Weed Control

Weed control here has been intermittent over the years. Herbicide treatments have been coordinated with and contracted to the Lewis & Clark County Weed District. The most recent treatment occurred in may 1991. Curtail was used.

SiteConstraints

The York FAS is in the Sensitive Ground and Surface Water (Risk Class 4) MZ. Picloram should not be used within 25 feet of the high water mark along Hauser Lake. Nesting bald eagles and/or peregrine falcons occur in the vicinity so timing of treatment activities should be coordinated with Region 8's

Biologist. If herbicides are used on the slopes above the paved area, a survey for rabbit-foot crazyweed and divide bladderpod should be conducted.

Weed Management Strategy

Because the noxious weed infestations are not too high on this site, weed containment and possible eradication should be the goal. Handpulling would be the preferred treatment method along the shore. Interpretive signs and selective spraying are alsorecommended.

Weed Management Work Plan

Prevention: Monitor the spread of toadflax and the knapweeds. Detect diffuse knapweed early and take steps to eradicate immediately. Ensure that ATVs and trailbikes do not go off established roadways.

Education: Post a small interpretive sign.

Mechanical: Hand pull toadflax to prevent it from going to seed. Hand pull knapweed and dig thisIte along the shoreline. Cut down and uproot the tamarisk shrub. The shoreline area would be a good candidate area to attempt an intensive revegetation project. Reseeding efforts completed on the site to date, show that this method can work as a control measure.

Biological: Infestation levels are generally not high enough to warrant introduction of bio-control agents. however, since toadflax is a major threat from surrounding areas an is somewhat difficult to control with herbicides, the introduction of the defoliating moth (*Calophasia lunula*) would be recommended.

Chemical: To control spotted and diffuse knapweed, spot spray along the access road and in the parking area with a mix of picloram/2,4-D, 2,4-D or banvel, at label recommendations. Follow-up with 2,4-D in year-two.

Deepdale Fishing Access Site

The Deepdale FAS is administered by the Parks Division and covers about 16 acres. It is located in Broadwater County about 4 miles south of Townsend along the east side of the Missouri River. Facilities include picnic areas and over-night pull-ins. Vegetative cover is mainly a well developed riparian community. Areas not often used for picnicking are very densely vegetated. The more developed areas, including a boat launching area, are more sparsely vegetated or bare and have compacted, but sandy soils. Osprey use and nest in this reach of the Missouri River.

Weed Infestations

Canada thistle and diffuse knapweed occur sparsely throughout the property. Moderate to heavy concentrations occur on the banks of the river. Canada thistle is extensive throughout the dense riparian understory. The access road crosses private property that is heavily infested with Canada thistle, diffuse knapweed and to a lesser extent spotted knapweed. Nuisance weed species noted include wild licorice, bull thistle, musk thistle, burdock, and common tansy.

Past Weed Control

In the past, DFWP has contracted with Broadwater County Weed District to spray this site. The county subcontracted herbicide spraying most recently in June 1990. Weedar 64 (2,4-D) was used to target the knapweeds, leafy spurge, and white top (A. Rauser 1993). Leafy spurge and white top were not observed during the inventory. Ms. Rauser said she could not confirm that white top or spurge occur on this site. She thought it was unlikely that spurge was there but that white top presence was possible.

Of the nine additional species that Broadwater County lists musk thistle, burdock, and common tansy were observed on the property.

SiteConstraints

The Deepdale FAS is in the Sensitive Ground and Surface Water (Risk Classes 3 and 4) and High Human Use MZs. Picloram should not be used within 25 feet of the high water mark along the Missouri River. If herbicides are used, a survey for Austin's knotweed should be conducted.

Weed Management Strategy

Cooperation with the adjacent landowner and the Broadwater County Weed District will be essential for managing weeds on this property because the adjacent property has such high infestation levels. Canada thistle and spotted knapweed control in the riparian community and along the banks of the Missouri will be difficult. Interpretive signs and selective spraying in areas other than the riparian community are alsorecommended.

Weed Management Work Plan

Prevention: Monitor the spread of the knapweeds. Detect spotted knapweed early and take steps to eradicate immediately.

Education: Post an interpretive sign.

Mechanical: Hand pull knapweed and dig thistle along the shoreline. Encourage FAS users to pull diffuse knapweed in the areas that they may use. The shoreline area would be a good candidate area to attempt an intensive revegetation and bank stabilization project.

Biological: Infestation levels are generally not high enough to warrant introduction of bio-control agents. Although introduction of Canada thistle predators in the riparian cover could be tried.

Chemical: To control diffuse knapweed, spot spray along the access road and in the parking area with 2,4-D or clopyralid, at label recommendations. Consider using a 2,4-D formulation labelled for use near water (Weedar 64) and spot spray along the banks above the high water mark to 'knock back' the knapweed in year one. Follow-up with hand pulling. If whitetop is found on the site, spray with dicamba or metsulphuron at label recommendations, provided no site constraints are encountered.

Toston Fishing Access Site

The Toston FAS, administered by the Parks Division, is located in Broadwater County where the Toston Bridge crosses the Missouri River on U.S. Highway 87. The property, acquired recently by DFWP, covers about 37 acres on the west side of the River. The highway cuts through the south end, bisecting the property into unequal parts. The one-to-two acre piece southeast of the highway has been a 'volunteer' fishing access site and boat launch point for a long time. No facilities are provided at this time.

The smaller 1-2 acre piece has been disturbed over the years; first as the location of an old sawmill and more recently as a 'volunteer' fishing access site. The soil is dry and compacted. Vegetative cover is sparse but includes a variety of native and non-native grasses and shrubs. The large piece on the west side of the highway is needlegrass and blue grama rangeland that has been used as pasture. Along the banks of the Missouri is a dense riparian community with cottonwoods, willow, red-osier dogwood and other shrubs.

Weed Infestations

Spotted knapweed occurs in dense but scattered patches in the 1-2 acre piece. Canada thistle is present throughout this area but is sparse and short. Canada thistle is well established in the understory of the riparian vegetation lining the banks of the Missouri River along the whole length of the property. On the west side of the highway, the property is largely weed-free. Along the highway right-of-way fenceline and in a small area that has been disturbed, the knapweed infestation is moderate. Knapweed also occurs within the highway right-of-way. Nuisance weeds include common tansy and wild licorice.

Past Weed Control

It appears that there has been no weed control on this property. The Broadwater County Weed District has sprayed the highway right-of-way, generally using 2,4-D amine due to the gravelly soils and proximity to water.

SiteConstraints

The 1-2 acre portion of the Toston FAS is in the Sensitive Ground and Surface Water (Risk Classes 4) MZ. Picloram should not be used within 25 feet of the high water mark along the Missouri River. If herbicides are used on the property, a survey for Austin's knotweed should be conducted.

Weed Management Strategy

The smaller parcel is a weed seed source for the surrounding areas which are relatively weed-free. Therefore, FWP control efforts should be high priority here. Except for the riparian corridor, the infestation level is controllable and could possibly be eradicated in the long-term. A combination of

judicious spraying and pulling (especially of knapweed) would be recommended. Coordination with Broadwater County Weed District is necessary.

Weed Management Work Plan

Prevention: Monitor the spread of the knapweeds. Detect diffuse knapweed early and take steps to eradicate immediately.

Education: Post an interpretive sign.

Mechanical: Hand pull knapweed and dig thistle along the shoreline. Encourage FAS users to pull spotted knapweed.

Biological: Introduce of Canada thistle predators in the riparian cover along the Missouri.

Chemical: To control spotted knapweed, spot spray with a 2,4-D formulation labelled for use near water (Weedar 64). Follow-up with hand pulling.

Town of Elkhorn

The Town of Elkhorn is located in Jefferson County at the south end of the Elkhorn Mountains. The DFWP owns two buildings, Fraternity Hall and Gilham Hall (Lots 14 and 15 of Block 2), which front on the main street. The ghost town is a National Historic Site, but a number of people live there in refurbished buildings or in new houses.

Weed Infestations and Past WeedControl

Canada thistle is present at a moderate level around both buildings. Spotted knapweed is sparse. Few weeds were present on adjacent properties. Older FWP photographs show fairly dense stands of knapweed and thistle around the buildings at some time in the past. Apparently weed control efforts have been somewhat successful in Elkhorn. The Jefferson County Weed District attempts to treat weeds in the town of Elkhorn annually (P. Kountz 1992).

SiteConstraints

Proximity of homes and frequent visitor use. Very permeable soils derived from granitc parent materials.

Weed Management Strategy

Because of the ground disturbance in the area, droughty and porous granitic soils, and the amount of vehicle traffic coming from many locations, this area is susceptible to new noxious weed invasions. However, the current weed control efforts of the County seem to be working well. Reduction, if not eradication is possibe on this site. Continue to coordinate with the County.

Weed Management Work Plan

Prevention: Monitor the spread of the knapweed and thistle.

Education: Post a small interpretive sign encouraging visitors to pull spotted knapweed.

Mechanical: Hand pull knapweed and dig thisite beginning in early June through July.

Biological: No bio-control agents are recommended.

Chemical: Coordinate with the Jefferson County Weed District to spray in the fall if hand pulling efforts have not reduced weeds.

Custer Avenue Properties

This property covers about 5 acres northeast of the Custer Ave. and McHugh Lane junction. The property houses several warehouses, the Montana Outdoors office, DFWP animal shelter, and DFWP print shop. The property warehouses are under supervision of the Administration Division while the other buildings are part of the Conservation and Education Division. The south part of the property houses most of the buildings. The remainder of the property has been partially disturbed by historical dredge-mining. Native vegetation cover is scarce. A small portion of the area is landscaped.

Weed Infestaions

Spotted knapweed is prevalent throughout the complex. In places, it is the dominant, if not the only species present. Dalmatian toadflax occurs In scattered patches. Nuisance weed species include wooly mullein.

Past Weed Control

Control efforts have been Inconsistent over the years. Prior to 1988, Capitol Grounds, Parks Division administered the property. Weeds were sprayed under an agreement with the Lewis & Clark Weed District (M. LaFond personal communcation). In 1992, the property supervisor (Adminstration and Finance Division) obtained funds to spray herbicide to control the knapweed, toadflax, and mullein. A mix of Tordon and 2,4-D was sprayed in early July. The entire property was treated. Clopyralid was used around trees and shrubs and in an old pond area where a potentially shallow groundwater table was of concern (B. Bannon 1992; D. Campbell 1992).

SiteConstraints

This area is in the High Human Use MZ. Permeable soils and disturbed gravelly soils are present. A small portion of the property is in the Sensitive Ground and Surface Water MZ (Risk Class 3).

Weed Management Strategy

The knapweed problem on this property is severe because the infestation is so dense. The site is a source of seed spread by wind and by vehicles which come and go from the property. Dense spotted knapweed infestations are present on adjacent properties. In the large unused parcel on old dredge materials control efforts should be toward containment with eventual reduction. around the buildlings, reduction should be the focus. Coordinate work with the Lewis & Clark County Weed District and immediate landowners. The Parks Division will take the lead and coordinate with the Administration Division who has responsibility for the warehouse buildlings.

Weed Management Work Plan

Prevention: Clean DFWP vehicles that must come in contact with knapweed.

Education: Inform DFWP employees about the problem and what the control strategies are for the property.

Mechanical: Hand pull knapweed around the landscaped portions of the property. In the shop area, pave areas where vehicles and equipment must be stored. In the unused area, try a progressive clearing of old knapweed and reseeding (landscaping) approach, combined with herbicide treatments.

Biological: If coordination with adjacent landowners is not possible, consider introducing knapweed bio-control agents in lieu of more a expensive chemical/seeding approach.

Chemical: In the unused area, use 2,4-D or picloram/2,4-D mix after clearing and disposing of dead material. Focus on property perimeter and work inward in successive years. Use clopyraid near desirable vegetation.

Capitol Grounds

The Capitol Grounds properties, which cover about 55 acres, include the Capitol Complex, the New Liquor Warehouse on Airport Road, the Office of Public Instruction on 11th Ave., The Old Governor's Mansion on 6th, Publications and Graphics on Front St., and Records Management on Railroad Ave. These properties have been managed by the Parks Division under a Cultural Park designation since 1983. The Capitol complex and the Old Governor's Mansion are intensively landscaped. The other properties have little landscaping and are paved or gravelled. Native plants are scarce and weedy species dominate.

Weed Infestations and Past Weed Control

Spotted knapweed is the only noxious weed found to date (M. LaFond personal communication). Many other weedy species are targeted, however. Control measures used on all sites have been primarily chemical (picloram, 2,4-D, glyphosate, and clopyralid). Cultural control and intensive landscaping work as indirect control methods. Yearly treatments are contracted-out but DFWP personnel conducting local spot spraying as the need arises. Control on adjacent properties especially the railroad corridor has been minimal. The liquor warehouse may also be susceptible to diffuse knapweed invasion.

SiteConstraints

The Capitol Grounds Complex is in the High Human Use MZ. Tourist, employee, and general public use of all the parcels and the intensive landscaping on many of the parcels makes use of herbicides a concern.

Weed Management Strategy

Current weed control efforts have been relatively successful on most of the Complex properties so past methods should be continued. However, spotted knapweed infestations at the Records Management, Liquor Warehouse and Publications Buildings are low to moderate, so containment and reduction should be the control objective. Cooperative work with the City of Helena, Lewis & Clark County Weed District and adjacent landowners in addition to herbicide applications appear to be the best approaches. Development of a reseeding/landscaping plan for the New Liquor Warehouse and the Records Management buildings may be appropriate. It may also make sense to evaluate the administrative break-down of these properties and consider consolidation of the control effort.

Weed Management Work Plan

Prevention: Monitor weed infesations, especially Dalmatian toadflax.

Education: Inform state employees and the public about the problem and what the control strategies are for the property. Encourage volunteer hand-pulling around the workplace.

Mechanical: Use hand pulling and grubbing for knapweed around the landscaped portions of the properties. Use landscaping and reseeding when possible to provide desirable, competetive vegetation.

Biological: Bio-control is not recommended at this time.

Chemical: On the majority of the parcels, if handpulling and other lanscaping techniques are not working effectively, spot spray with clopyralid (Stinger) at label recommendations. For spotted knapweed infestations at the Records Management, Liquor Warehouse and Publications Buildings use clopyralid or clopyralid/2,4-D (Curtail) at label recommendations.

Canyon Ferry State Park

The following site specific weed management plans are provided by Reclamation's Draft Canyon Ferry Weed Managemnt Plan (1993). Currently, Wildlife and Parks Divisions of Region 8 have responsibility for much of the weed control efforts around Canyon Ferry, so Region 8 helped to develop these recommendations to provide continuity and consistency in weed management goals and approaches. Management responsibilities may change in the future, depending on the outcome of peding federal legislation which establishes a three-way partnership among Reclamation, BLM, and DFWP (DFWP and Reclamation 1993).

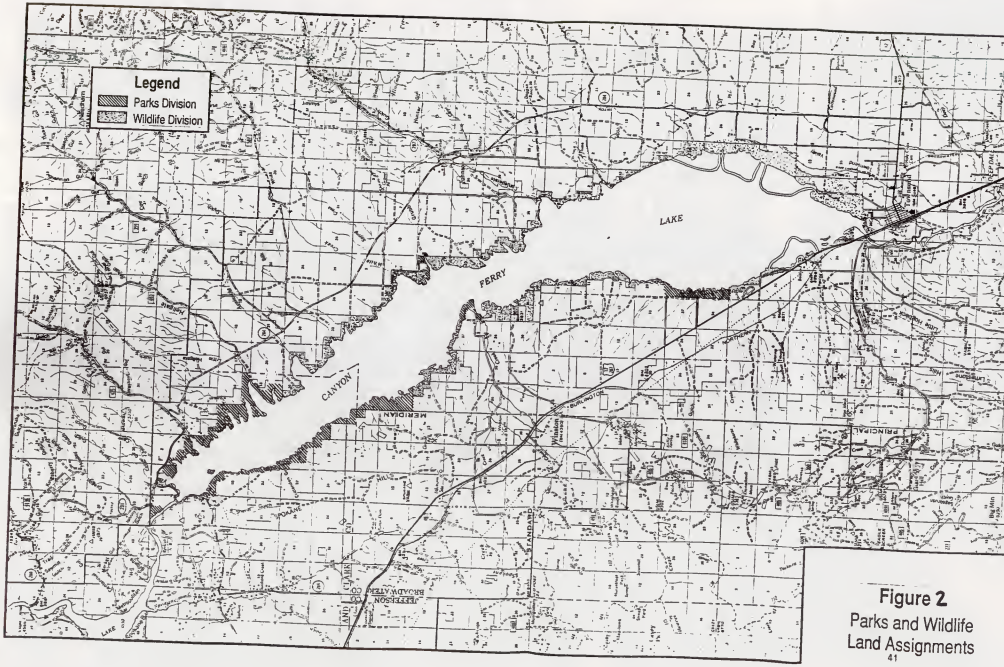


Figure 2
Parks and Wildlife
Land Assignments

SPECIFIC SITES

UNIT 1: YACHT BASIN - CAVE BAY

EXISTING ENVIRONMENT:

Location: Unit 1 includes the Bureau of Reclamation lands extending from the Yacht Basin turnoff north to the Canyon Ferry Dam and south to Cave Bay Day Use Area. Figure 2 shows the boundaries of the unit.

Land use: The area is used extensively by the public for campgrounds and day use fishing and swimming. Cave Bay Marina, and Shannon, Riverside, Court Sheriff, Ponderosa, Chinaman and Cave Bay Recreation Areas are included in the unit. Canyon Ferry Dam as well as 15 Bureau of Reclamation government houses, two warehouses, and a visitor center are part of the unit. The State Office of Public Instruction has temporary use seven of the government houses for educational purposes. Besides the public facilities present in the unit several private structures are located adjacent to the public lands.

Fish and Wildlife: The primary wildlife in the area include small mammals, Mule deer, various songbirds, waterfowl, raptors and Miriam wild turkeys in the Goon Hill vicinity. Kokanee salmon, trout, whitefish, and ling are found in the tailwaters of Canyon Ferry Dam, while trout, perch and ling are the primary species in Canyon Ferry Reservoir.

Vegetation: The area is composed primarily of coniferous forest and sagebrush grassland. Ponderosa pine/bluebunch wheatgrass forms a mosaic with sagebrush and Douglas-fir communities. Minor amounts of wetlands are found at Riverside Campground and Cave Bay.

Water Resources: Surface waters in the unit include Hauser Lake immediately below Canyon Ferry Dam, Canyon Ferry Reservoir and intermittent flows from Cave Gulch Creek.

Soils: On the west side of the reservoir soil characteristics of the unit vary from a sandy loam around Yacht Basin to a clay loam around the dam and on the west side of the Missouri River. Bedrock depths are shallow varying from 40 to 60 inches in the sandy loam to less than 20 inches in the clay loam. Rate of water transmission varies from a moderate rate in the sandy loam to a very slow rate in the clam loam.

On the east side of the reservoir the soil characteristics vary from clay loam on the east side of the Missouri River including Goon Hill to a gravely loam in the village and Court Sheriff-Chinaman-Cave Bay recreation site areas. Depth to bedrock varies

from 20-40 inches in the Riverside-Goon Hill Area to greater than 60 inches in the village-Cave Bay areas. Rate of water transmission is moderate throughout the area.

Endangered Species: Migrating Bald Eagles utilize the area from October through December.

Weed Infestation: Weed infestations are shown on Figure 2. Spotted knapweed is the primary noxious weed, located downstream on both sides of the river, along the road between the dam and Cave Bay, as well as in the Riverside, Ponderosa, Court Sheriff, and Cave Bay, Chinaman's recreation areas.

Diffuse knapweed is located below the dam on the east side and in Riverside as well as in Chinaman recreation area.

Dalmatian Toadflax is infested along the road from the dam to the village and downstream of Riverside Campground.

Leafy Spurge is located along the county road between Yacht Basin and the Dam (not shown on map).

WEED MANAGEMENT STRATEGY

The primary strategy will be to keep the weeds from spreading to uninfected areas, to enhance the recreational opportunities and to educate the public that concentrate in this area of the reservoir. Where feasible infestations will be sprayed to reduce the size and density of weeds to allow competition by desirable vegetation.

WEED MANAGEMENT WORK PLAN

Prevention: Curtail all off road vehicle travel. Require re-seeding and weed management on all new developments for construction.

Education: Develop an educational program to educate campers using the area. Disseminate information at the campgrounds and develop displays for the Visitor Center.

Mechanical: Use mowing of weeds to help control weeds in the recreation areas where ever possible. Pull weeds immediately adjacent to the surface water where possible.

Biological: If feasible, appropriate spotted knapweed biological control agents listed in Appendix D will be released along the Hauser Lake and Canyon Ferry Reservoir shoreline. Treat **Toadflax** growing near water or under sensitive trees or shrubs with Calophasia lunula.

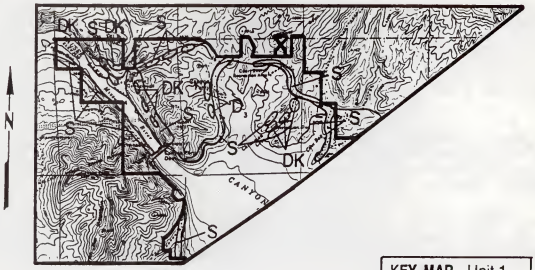
Chemical: In the forested areas along road right of ways and within campgrounds, treat **spotted and diffuse knapweed** areas with

1 pint/acre Clopyralid (Transline) according to label instructions. In the sagebrush grasslands treat high density spotted and diffuse knapweeds with 1 pint picloram (Tordon 22K). Treat **Toadflax** growing on clay soils away from the water with 2 quarts of picloram per acre. Treat **Leafy Spurge** growing between the dam and Yacht basin with 4 pints/acre 2,4-D and 2 pints/acre Dicamba.

PRIORITY

This area should have a high priority for weed control since it is a heavily used recreation area. Weed control would not only enhance the aesthetics of the area but would reduce the spread of noxious weeds from vehicle tires and water conveyance of seeds blown into the lake or river.

Unit 1



LEGEND
DK - Diffuse Knapweed
R - Russian Knapweed
S - Spotted Knapweed
W - Whitetop
L - Leafy Spurge
D - Dalmation Toadflax
C - Canadian Thistle

NOTE: Widespread weeds such as Canada Thistle and Spotted Knapweed are mapped as to general location. These weeds occur as scattered but widespread populations within the designated areas.

Figure 2
Unit 1
Yatch Basin - Cave Bay

UNIT 2: CAVE BAY - HELLGATE

EXISTING ENVIRONMENT

Location: Unit 2 includes the cabin lease sites on the east side of the reservoir immediately south of the Cave Bay Day Use Area and extending south to the Hellgate Recreation area. The unit includes Jo Bonner and Hellgate Recreation Areas and the roadless Federal lands extending from MFWP cabin lease site No. 1 on Badger Bay to the Hellgate Recreation Area. Figure 3 shows the boundaries of the unit.

Land use: The area is used extensively by the public for cabin sites along the shoreline. Jo Bonner and Hellgate Recreation Areas are used for public recreation including camping, fishing, swimming, hiking, picnics etc.

Fish and Wildlife: The primary wildlife in the area include small mammals, Mule deer, songbirds, Canada geese and osprey. Rainbow and Brown trout, perch and ling are the primary species in Canyon Ferry Reservoir.

Vegetation: The area north of Magpie Bay is composed primarily of upland shrub (big sagebrush/bluebunch wheatgrass h.t.) with patches of ponderosa pine/bluebunch wheatgrass. South of Magpie Bay the area is primarily sagebrush grassland. Wetlands dominance type groups are found in the Magpie Bay, Badger Bay and Hellgate Bay and Little Hellgate Bay (i.e. the bay north of Hellgate) areas.

Water Resources: Surface water in the unit includes Canyon Ferry Reservoir, Magpie Creek and intermittent flows in Hellgate creek.

Soils: The east shoreline from Cave Bay to Hellgate Bay consists of gravelly loams on 15 to 35 per cent slopes. In a typical profile the surface layer is gravelly loam 36 inches thick. Below this to a depth of 60 inches is gravely sandy loam. Depth to bedrock is greater than 60 inches. These soils have a moderately low run off potential due to moderate infiltration rates.

Endangered Species: Migrating Bald Eagles use the shore line area in the spring and fall.

Weed Infestation: Weed infestations are shown on Figure 3. **Spotted knapweed** is the primary noxious weed, located along the shoreline and roads adjacent to the cabin lease sites and in Hellgate Recreation Area. Patches of **Russian Knapweed** are located on the north side of Hellgate and at the head end of Tournament Bay (i.e. the bay immediately south of Hellgate). A sizable patch of **leafy spurge** is found at the head of Little Hellgate Bay. **Whitetop** is found at the head of Hellgate and along the shoreline to the south

of Hellgate. **Canada thistle** is found primarily in Magpie and Hellgate Bays.

WEED MANAGEMENT STRATEGY

The primary objective in this unit is to reduce weed populations along roadways and in campgrounds to improve recreation opportunities and prevent the spread of weeds by water conveyance and vehicles. An important part of the strategy will involve education and assistance from the public and the cabin and marina lessees.

METHODS OF WEED MANAGEMENT

Prevention: All off-road vehicle travel through the unit will not be allowed. Because of the number of weeds along the shorelines and the potential for propagation, it is important to restrict all motor vehicle travel on the beaches. The boundary fence must be maintained to keep all cattle off public lands to allow maximum vigor of desirable plants.

Education: Develop awareness pamphlets on **spotted knapweed** and mail to all cabin site lessees and adjacent landowners. Develop informational displays at the Hellgate and Magpie Recreation areas

Mechanical: Mow **spotted knapweed** located in flat recreation areas around Hellgate Bay. Pull **Spotted knapweed** growing on shorelines and in cabin lease sites whenever personnel is available.

Biological: If feasible, appropriate **spotted knapweed** biological control agents listed in Appendix D will be released along the Canyon Ferry Reservoir shoreline. Possibly treat **Canada thistle** growing along the shoreline and in riparian areas at Magpie Bay and Hellgate Bay with stem mining weevil (Ceutorhynchus litura) and stem and shoot gall fly (U. cardui).

Treat **Leafy Spurge** growing in wet lands and riparian areas at the head of Little Hellgate Bay with Gall midge (Spurgia esulae) and root boring flea beatles.

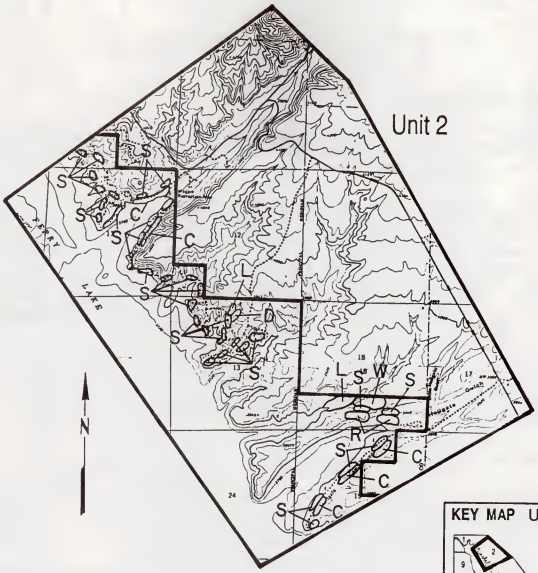
Chemical: In the forested areas along road right of ways and within campgrounds, treat **spotted and diffuse knapweed** areas with 1 pint/acre Clopyralid (Transline) according to label instructions. In the sagebrush grasslands treat high density **spotted and diffuse knapweeds** with 1 pint picloram (Tordon 22K). Treat D. toadflax with 2 qts/ acre picloram (Tordon 22K). Pull or treat **Spotted knapweed** growing below the high water with 4 qts /acre glyphosate (Rodeo). Treat **Spotted knapweed** growing on the cabin lease sites above the high water mark with 1-2 qts/ acre of 2-4 D or with 1 pint/acre of Clopyralid(Transline).

Treat high density **Russian knapweed** more than 10 feet from surface

water in Hellgate and Tournament Bay with 2 qts/ acre of picloram Tordon 22K). Treat **Russian knapweed** infestations within 10 feet of surface water with 4 qts/ac 2-4D.

PRIORITY

The West Shore Road, Cabin site areas and Hellgate Recreation Area should have a high priority for weed management since it is highly accessible and is a heavily used recreation area. Weed control would not only enhance the aesthetics of the area but would reduce the spread of noxious weeds from vehicle tires and water conveyance of seeds blown into the lake or river.



LEGEND
DK - Diffuse Knapweed
R - Russian Knapweed
S - Spotted Knapweed
W - Whitetop
L - Leafy Spurge
D - Dalmation Toadflax
C - Canadian Thistle

Figure 3
Unit 2
Hellgate - Goose Bay

UNIT 3: HELLGATE-GOOSEBAY

EXISTING ENVIRONMENT

Location: Unit 3 includes the Federal lands extending from Hellgate Recreation Area south to the inlet of Goose Bay. Figure 4 shows the boundaries of the unit.

Land use: The area is primarily undeveloped prairie lands except for the Hellgate Recreation area at the north extreme and the Goose Bay Marina at the southern end. The recreation and marina areas are heavily used by the public. The area in between is used primarily for primitive camping, fishing and hunting. The northern half of the area has been fenced to prevent vehicle use of the area. The primitive camping area north of the Goose Bay access road of Highway 284 has been proposed as a walk in only Wildlife Management Area in the Canyon Ferry Resource Management Plan.

Fish and Wildlife: The upland areas are used by antelope, mule deer. Mule deer, white tail deer, numerous songbirds and small mammals utilize the riparian shrub and tree habitats found in Avalanche Bay and the shorelines. Waterfowl use Avalanche Bay for a staging area during the fall months.

Rainbow and brown trout, yellow perch and ling are found in Canyon Ferry Reservoir. No trout spawning habitat exists in the unit.

Vegetation: The area is composed primarily of upland grassland with wetland/riparian shrub and trees in Avalanche Bay and along the shoreline between Bilk Creek and Goose Bay.

Water Resources: The surface water in the unit consists of Canyon Ferry Reservoir. Intermittent stream flows occur in Avalanche Creek and Spring Creek.

Soils: The east shoreline from Hellgate Bay to Goose Bay varies from gravelly loams on 15 to 35 per cent slopes in the northern half of the unit to a silty clay loam or a cobble loam on 0 to 5 per cent slopes in the southern half of the unit. Depth to bedrock is greater than 60 inches. The rate of infiltration in these soils varies from moderate in the north to moderately rapid in the southern half of the unit.

Endangered Species: Migrating Bald Eagles utilize the area in the spring and fall.

Weed Infestation: Weed infestations are shown on Figure 4. The shoreline riparian/wetland area contains a mixture of Spotted and Russian knapweed, whitetop and Canada thistle. Large patches of

Russian thistle and pepperweed are located in the Avalanche Bay area. Spotted knapweed, whitetop, C. thistle, and field bindweed are found in the Goose Bay Marina concession site.

WEED MANAGEMENT STRATEGY

Weeds in the undeveloped sites should be contained to the riparian areas by either eradication or reduction of the weeds spreading unto the grassland prairie. Weeds in the riparian areas will be tolerated because of the groundwater and vegetation concerns. Biological controls will be introduced in the riparian areas in an attempt to reduce the tolerated weeds. Limiting off road vehicle use both on the shoreline and in the reservoir area will be implemented to reduce the spread of weeds.

Attempts should be made to reduce if not eradicate the Russian knapweed and pepperweed in the Avalanche Bay because of wildlife values and concerns for adjoining agricultural lands. An attempt should be made to involve the adjoining landowner in a weed management program because of an adjoining weed problem.

METHODS OF WEED MANAGEMENT

Prevention: All off-road vehicle use should be strictly enforced in this area. The drive in areas in the Spring Creek Bay area should be eliminated.

Education: Signs should be erected at the Goose Bay Marina and the walk in areas to explain the noxious weed control program.

Mechanical: Mowing of weeds in the Avalanche Bay area should be explored as a possible weed reduction measure. Weeds immediately adjacent to lake shore would be pulled in the recreation areas. Mowing of weeds in the Hellgate Recreation Area should continue to reduce seed generation.

Biological: If feasible, appropriate **spotted knapweed** biological control agents listed in Appendix D will be released along the Canyon Ferry Reservoir shoreline and riparian areas. Possibly treat **Canada thistle** growing along the shoreline and in riparian areas at Avalanche Bay and Goose Bay with stem mining weevil (Ceutorhynchus litura) and stem and shoot gall fly (U. cardui).

Chemical: In the upland grasslands treat **spotted and diffuse knapweed** with 1 pint of picloram (Tordon 22K) per acre. Treat knapweeds growing below the high water level of Canyon Ferry Reservoir with 4 quarts of gylphosate (Rodeo) per acre to within 10 feet of the existing surface water. Treat **Russian knapweed** growing in Avalanche Bay area with 2 qts/acre of picloram (Tordon 22K) Treat **pepperweed** growing in Avalanche Bay with 8 pts/ac of 2,4-D. Treat **field bindweed** growing at Goose Bay with 1 qt/ac of picloram (Tordon 22K).

PRIORITY

The Goose Bay Marina area and the trailhead to the designated walk-in area should receive high priority. The field bindweed infestation on the Goose Bay Marina site should receive high priority since it is the only infestation on the project. Prevention and education should also receive high priority. Non-motorized areas should receive moderate priority with emphasis on getting biological controls established and containing existing infestations.

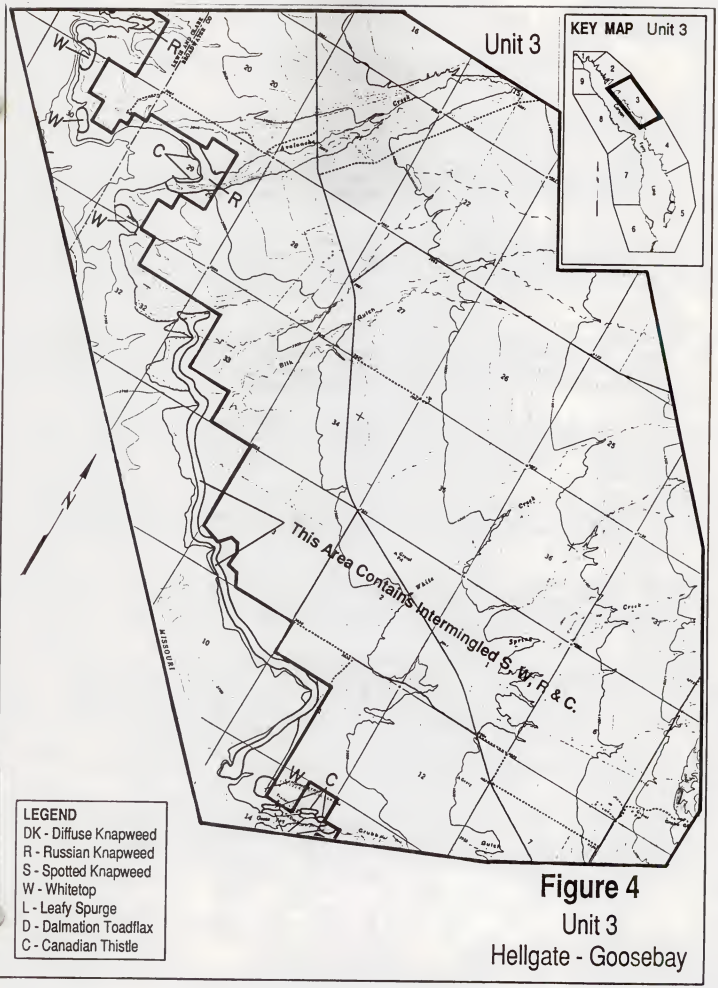


Figure 4
Unit 3
Hellgate - Goosebay

UNIT 4: GOOSE BAY - DUCK CREEK

EXISTING ENVIRONMENT

Location: Unit 4 includes Federal lands adjacent to the reservoir south of the inlet to Goose Bay extending south to the Cemetery on the south side of Duck Creek. Figure 5 shows the boundaries of the unit.

Land use: Undeveloped primitive camping, fishing and hunting are the primary uses north of Confederate Creek. The Confederate Creek - Duck Creek section has been designated as a primitive camping area with minimum facilities. Cattle grazing is the primary use on adjacent lands.

Fish and Wildlife: The upland areas are used by antelope mule deer. Mule deer, white tail deer, numerous songbirds and small mammals utilize the riparian shrub and tree habitats found in Confederate Bay, Duck Creek and the shorelines.

Rainbow and brown trout, yellow perch and ling are found in Canyon Ferry Reservoir. Confederate Creek has been developed for trout spawning. Duck Creek has potential for development for trout spawning.

Vegetation: The area is composed primarily of upland grassland with wetland/riparian shrub and trees in Confederate Bay and Duck Creek and along the reservoir in bays and areas of gentle shoreline slopes.

Water Resources: Besides Canyon Ferry Reservoir, surface waters include Confederate Creek, Duck Creek, and intermittent flows in Marks Creek to the north of Confederate creek. Ground water in Duck Creek can be as shallow as 3-5 ft.

Soils: The east shoreline from Goose Bay to Duck Creek varies from gravelly loams on 15 to 35 per cent slopes in the uplands to a loam or silty clay loam on 0 to 2 per cent slopes in the bottom lands of Confederate and Duck Creek. Depth to bedrock is greater than 60 inches. The rate of infiltration in these soils is moderate.

Endangered Species: Migrating Bald Eagles utilize the area during the spring and fall migration.

Weed Infestation: Most of the weed infestations are centered in the Confederate bay and Duck Creek riparian areas. Spotted and Russian knapweed are the prevalent noxious weeds in these areas. See Figure 5 for a distribution of the weeds.

WEED MANAGEMENT STRATEGY

Weeds in the undeveloped sites should be contained to the riparian areas by either eradication or reduction of the weeds spreading unto the grassland prairie. Weeds in the riparian areas will be tolerated because of the groundwater and vegetation concerns. Biological controls will be introduced in the riparian areas at Confederate Bay in an attempt to reduce the tolerated weeds. Limiting off road vehicle use both on the shoreline and in the reservoir area will be implemented to reduce the spread of weeds.

Attempts should be made to reduce if not eradicate the Russian knapweed and Whitetop in Confederate Bay and Duck Creek because of concerns for adjoining agricultural lands. The area to the north of Confederate Creek should be inventoried for noxious weeds.

METHODS OF WEED MANAGEMENT

Prevention: Explore the possibility of limiting motorized vehicle use in the area north of Confederate Creek. Make sure boundary fences are maintained to prevent cattle trespass. Duck Creek area is particularly vulnerable.

Education: Post education signs at Confederate and Duck Creek recreational use areas.

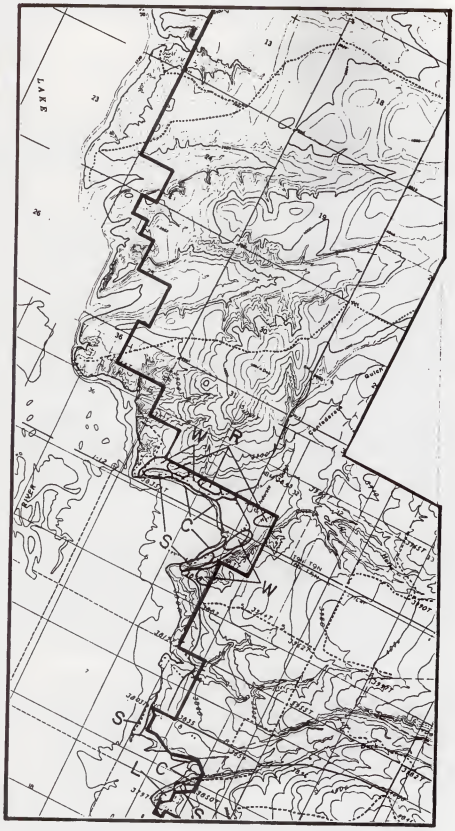
Mechanical: Mowing of weeds could be used to help control weeds in the Confederate and Duck Creek areas where ever possible. If possible, pull weeds immediately adjacent to the lake shore.

Biological: If available and if feasible, appropriate **spotted knapweed** biological control agents listed in Appendix D will be released in the Duck Creek and Confederate Creek riparian areas.

Chemical: In the sagebrush grasslands treat dense populations of **spotted and diffuse knapweed** with 1 pint picloram (Tordon 22K). Treat sparsely populated areas of **spotted and diffuse knapweed** with 2 pints/ acre of dicamba (Banvel) plus 4 pints/acre 2,4-D. Treat knapweeds growing below the high water level of Canyon Ferry Reservoir at Confederate and Duck Creek with 4 quarts of glyphosate (Rodeo) per acre to within 10 feet of the existing surface water. Treat **Russian knapweed** growing in Confederate Bay area with 2 qts/acre picloram (Tordon 22K) as indicated on label. Treat **Whitetop** growing in Confederate Bay with 2 qts/ac dicamba (Banvel) plus 2 qts/ac 2,4-D.

PRIORITY

The Confederate Duck Creek areas should receive high priority because of their extensive use and the localization of the noxious weeds in the area. Currently a road passes through a large infestation of Russian knapweed on the north side of Confederate Bay. This area needs high priority and road closures.



Unit 4

N

KEY MAP Unit 4

LEGEND
DK - Diffuse Knapweed
R - Russian Knapweed
S - Spotted Knapweed
W - Whitetop
L - Leafy Spurge
D - Dalmation Toadflax
C - Canadian Thistle

Figure 5
Unit 4
Goosebay - Duck Creek

UNIT 5: EAST SIDE WMA

EXISTING ENVIRONMENT

Location: Unit 5 includes the Federal lands adjacent to the east side of Canyon Ferry Reservoir from the Cemetery on the south side of Duck Creek extending south the to Missouri River inlet into the reservoir. Figure 6 shows the boundaries of the unit.

Land use: The entire unit has been developed into a wildlife management area by the state and is used extensively by the public for hunting, hiking, fishing, birdwatching, and viewing wildlife. The area also contains numerous agricultural lease sites where small grains and livestock forage are raised.

Fish and wildlife: The entire unit has been designated as a Wildlife Management Area with primary emphasis on waterfowl. In addition the area provides sanctuary to a large population of whitetail deer. With large amounts of riparian shrubs and trees, small mammals, songbirds, raptors, pheasants are also common in the area.

Rainbow and brown trout, yellow perch and ling are found in Canyon Ferry Reservoir. Trout move into the reservoir ponds and into the feeder canal system. Gurnett Creek has a fish barrier so that its upper reaches are not available for spawning. The channels of the Missouri River provide important trout habitat.

Vegetation: The vegetation from Duck Creek south to Gurnett Creek consists of upland grassland. South of Gurnett Creek to the south end of Pond 3, the inland area consists of irrigated hay and small grains with a wetland/riparian shrub and tree habitat found along the reservoir/pond shorelines. The southern portion of the unit consists of upland grasslands in the interior and mixture of willow and riparian shrub and tree wetland present in the Missouri River delta areas.

Water Resources: Besides Canyon Ferry Reservoir, surface water is located in three wildlife ponds adjacent to the reservoir, numerous inland developed pond systems, Ray Creek, Gurnett Creek, the east side feeder canal, developed drains, and the braided channels of the Missouri River. Depth to groundwater is highly dependent on reservoir elevations and varies from greater than 60 inches north of Gurnett Creek to as shallow as 3 to 5 feet on the east side of the reservoir ponds.

Soils: The east shoreline from Duck Creek to Gurnett Creek consists of gravelly loams on 15 to 35 per cent slopes, with moderate permeability. From Gurnett Creek south along the reservoir

ponds the soil is silty loam on 0 to 2 per cent slopes with moderate permeability. South of the reservoir ponds to the Missouri River the soil type changes to a very gravely sand with rapid permeability. In all soil types, depth to bedrock is greater than 60 inches.

Endangered Species: Migrating Bald Eagles utilize the area in the spring and fall.

Weed Infestation: Weed infestations are shown on Figure 6. Spotted knapweed and C. thistle are the predominant weeds found in the wildlife management Area. Leafy spurge is found along the east side feeder canal as well as on some of the Missouri River islands.

WEED MANAGEMENT STRATEGY

A noxious weed distribution map was developed in 1992. Weed occurrences are prioritized for treatment based on accessibility and potential for spreading. The canal systems have the potential to spread weed seed, especially if the weeds grow along sides of the canal. Russian knapweed occurs in a treeplanting on the east side. Weed spraying will be accomplished in late spring while plants are vigorously growing, or during the fall green-up period.

METHODS OF WEED MANAGEMENT

Prevention: Off-road motorized travel is prohibited on the WMA. The dikes and certain roads are closed to motorized travel, in part, to inhibit spreading weed seeds. Dredged flats along the dike system will continue to be rehabilitated with cover crops (a mix of tall and intermediate wheatgrasses, sweet clover, and alfalfa). The cover crop plantings will compete with weeds and prevent future infestations. New treeplantings which occur along the east side will continue to be cultivated on a regular basis during the growing season to inhibit noxious weed growth.

Education: Signs with rules and regulations, including restrictions on off-road motorized travel and disturbances of topsoils, will be posted on information boards at major access points on the WMA. Agricultural lessees should receive information on proper weed management on lease sites.

Mechanical: Mowing of weeds would be used to help control weeds in the wildlife areas where ever possible. Thistle infestations along roadways, canals, and parking lots will be controlled with mowing where possible. Whitetop will be controlled by mowing where accessible. Tillage will be used in the shelter belt areas to limit weed growth.

Biological: Spurge and knapweed occurrences which are inaccessible or present a danger for water contamination (other than canals)

will be treated with biological controls. This would include islands and the delta area along the Missouri River. Gall flies (U. affinis and U. quadrifasciata) would be used for biological control of knapweed along the river and lake shoreline. **Leafy Spurge** growing near water or under sensitive trees or shrubs would be infected with appropriate biological agents listed in Appendix E. Large infestations of C. Thistle growing in sensitive wetland areas will be treated, where feasible with appropriate agents listed in Appendix E.

Chemical: Leafy spurge and species of knapweed which occur along roadways, parking areas, and other accessible sites will be treated with picloram (Tordon 22K) at a rate of 1-2 pints per acre. Leafy spurge and knapweed along the canals will be treated by hand with a 2,4-D product labeled for use adjacent to water at a rate of 2 quarts per acre. In the shelter belts where tillage is not practical, clopyralid (Transline) will be used at a rate of 1 1/3 pints per acre to control Russian knapweed which occurs in a tree planting. Canada thistle along the canal banks will be treated with a 2,4-D at a rate of 2 quarts per acre . Curtail (Clopyralid and 2,4-D) at a rate of 2-4 qts per acre will be used to treat C. thistle growing in the willows and cottonwoods.

PRIORITY

All access points should have high priority to prevent spreading of weeds. Canals and dikes should have high priority because of spreading of weeds. Riparian areas should have high priority because of wildlife values and weed spreading potentials. Education should have a high priority because of the large number of people who frequent the area.

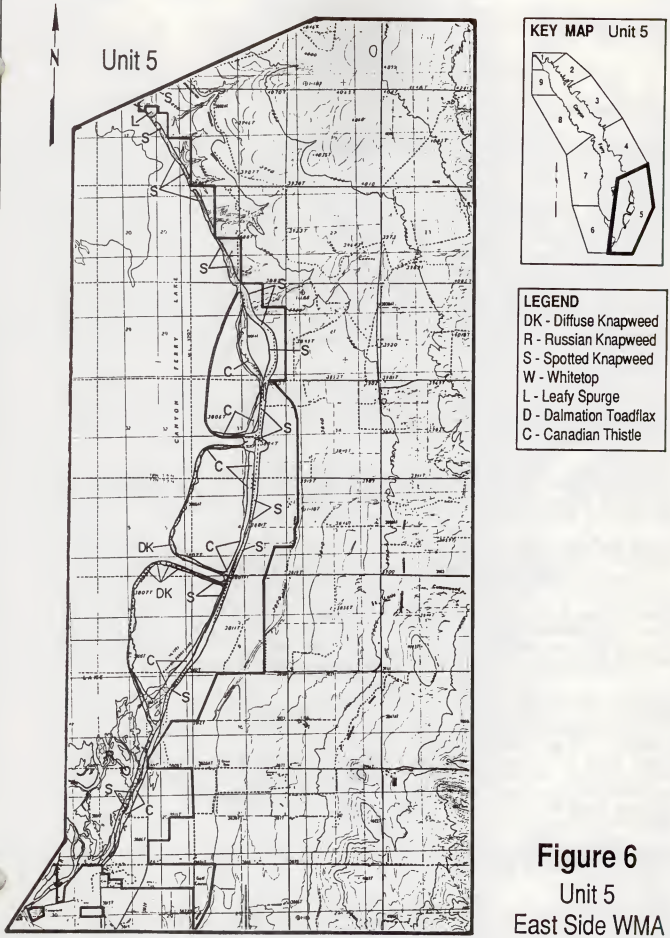


Figure 6
Unit 5
East Side WMA

UNIT 6: WEST SIDE WMA

EXISTING ENVIRONMENT

Location: Unit 6 includes federal lands extending from the Missouri River Townsend bridge north to the south end of the Silos Recreation Area. Figure 6 shows the boundaries of the unit.

Land use: The unit has been developed into a wildlife management area by the state and is used extensively by the public for hunting, hiking, fishing, birdwatching, and viewing wildlife.

Fish and Wildlife: The entire unit has been designated as a Wildlife Management Area with primary emphasis on waterfowl. In addition the area provides sanctuary to a large population of whitetail deer. With large amounts of riparian shrubs and trees, small mammals, songbirds, raptors, pheasants are also common in the area.

Rainbow and brown trout, yellow perch and ling are found in Canyon Ferry Reservoir. Trout move into the reservoir pond and into the feeder canal system. The channels of the Missouri River provide important trout habitat.

Vegetation: The southern portion of the unit is composed primarily of a mixture of wetland willow and riparian shrub and trees in the Missouri River delta. The northern section is composed of upland grasslands with willows along the shorelines.

Water Resources: Besides the Canyon Ferry Reservoir surface waters in the unit consist of the west side feeder canal, the west side pond on the reservoir, numerous inland ponds, low lying areas flooded during high water, and the braided channels and sloughs of the Missouri River. Depth to groundwater is highly dependent on reservoir elevations and varies from greater than 60 inches north of the access road to Pond 4 to as shallow as 3 to 5 feet on the west side of pond 4 and in the Missouri River delta area.

Soils: The west shoreline from the Silos Rec Area south to the access road at the north end of Pond 4 consists of cobble loams on 2 to 5 per cent slopes, with moderate permeability. From the north access road to Pond 4 south along the reservoir pond the soil is silty loam on 0 to 2 per cent slopes with moderate permeability. South of the reservoir pond to the Missouri River the soil type changes to a silty loam with moderate permeability to a very gravely sand with rapid permeability. In all soil types, depth to bedrock is greater than 60 inches.

Endangered Species: Migrating Bald Eagles utilize the area in the

spring and summer.

Weed Infestation: Weed infestations are shown on Figure 7. Spotted knapweed and C thistle are the primary noxious weeds located throughout the unit. Whitetop is located in the southern portion along the west side feeder canal.

WEED MANAGEMENT STRATEGY

A noxious weed distribution map for the WMA was developed in 1992. Weed occurrences are prioritized for treatment based on accessibility and potential for spreading. Because canals have the potential for spreading weed seed, all knapweed and spurge growing along sides of the canal will be treated with a 2,4-D product labeled for use adjacent to water. Noxious weed locations which are inaccessible or present a danger for water contamination (other than canals) will be treated with biological controls. This includes riparian areas along the Missouri River and low, moist sites on the west side of Pond 4. Thistle infestations along roadways and parking areas will be controlled with chemicals and mowing where possible. Whitetop will be controlled by mowing where accessible by tractor. Weed spraying will be accomplished in late spring while plants are vigorously growing, or during the fall green-up period.

METHODS OF WEED MANAGEMENT

Prevention: Off-road motorized travel is prohibited on the WMA. The west side dike and certain roads are closed to motorized travel, in part, to inhibit spreading weed seeds. Dredged flats along the westside dike will continue to be rehabilitated with cover crops (a mix of tall and intermediate wheatgrasses, sweet clover, and alfalfa). The cover crop plantings will compete with weeds and prevent future infestations.

Education: Signs with rules and regulations, including restrictions on off-road motorized travel and disturbance of topsoils, will be posted on information boards at major access points on the WMA.

Biological: Where feasible, where large infestations of knapweed exists in riparian areas, biological agents listed in Appendix D will be introduced, if available.

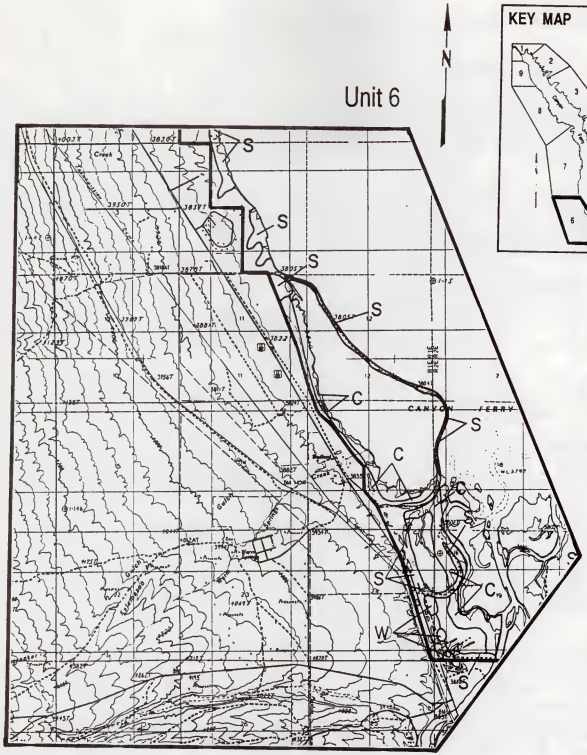
Mechanical: Mowing of weeds would be used to help control weeds in the parking lots and roadsides areas where ever possible.

Chemical: Leafy spurge and knapweed species which occur along roadways, parking areas, and other accessible sites will be treated with picloram (Tordon 22K) at a rate of 1-2 pints per acre. Where these species occur in drainages or adjacent to water, they will be

controlled by hand spraying with a 2,4-D product labeled for use next to water at a rate of 2 quarts per acre. Canada thistle will be treated with 2,4-D at a rate of 2 quarts per acre and/or Curtail (Clopyralid and 2,4-D) at a rate of 2-4 qts per acre.

PRIORITY

All access points, canals, and dikes should have high priority to prevent spreading of weeds. Riparian areas should have high priority because of wildlife values and weed spreading potentials. Education should have a high priority because of the large number of people who frequent the area.



LEGEND
DK - Diffuse Knapweed
R - Russian Knapweed
S - Spotted Knapweed
W - Whitetop
L - Leafy Spurge
D - Dalmation Toadflax
C - Canadian Thistle

Figure 7
Unit 6
West Side WMA

UNIT 7: SILOS - WHITE EARTH

EXISTING ENVIRONMENT

Location: Unit 7 includes the Federal lands along the west shore of Canyon Ferry Reservoir extending from the south end of the Silos Recreation Area north to the north side of the White Earth Recreation Area. Figure 8 shows the boundaries of the unit.

Land use: The area is used primarily for developed camping, fishing and water sports at the designated Silos and White Earth Recreation Areas. Much of the northern part of the unit is roadless and accessible only by boat or walk in. Some roaded areas have been designated for primitive camping.

Fish and Wildlife: The upland areas are used by antelope and mule deer. Mule deer, white tail deer, numerous songbirds and small mammals utilize the riparian shrub and tree habitats found in Beaver Creek and the shorelines. Waterfowl use Beaver Creek as a brooding area during the spring months.

Rainbow and brown trout, yellow perch and ling are found in Canyon Ferry Reservoir. Beaver Creek offers the only potential trout spawning habitat in the unit.

Vegetation: The southern half of the unit is composed primarily of upland grasslands while the northern portion consists of sagebrush grassland. Minor amounts of wetlands with willows are found at in some of the bays with gentle slopes.

Riparian shrub and trees are also found in the Beaver Creek delta area.

Water Resources: Surface water consists of the Canyon Ferry Reservoir and flooded low-lying areas to the north and south of the Silos Recreation Area. No streams are located in the unit.

Soils: Soil characteristics of the unit vary from a cobble loam/gravel loam in the southern two thirds of the unit to a clay loam in the northern one third of the unit. Slopes vary from 2-5 percent in the southern one third to a steeper 15- 35 percent in the northern two thirds. The rate of infiltration is moderate in the southern two thirds and slow in the northern one third. Depth to bedrock is greater than 60 inches in the southern two thirds and less than 20 inches in the northern one third.

Endangered Species: No known endangered species inhabit the area.

Weed Infestation: Weed infestations are shown on Figure 8. Spotted knapweed and leafy spurge are the two primary noxious weeds. Spotted knapweed is located along the shoreline area and in some of

the coulees draining into Canyon Ferry Reservoir. Leafy spurge is located in the coulees primarily to the north of the access road.

WEED MANAGEMENT STRATEGY

In the area north of Silos Recreation Area, attempts would be made to reduce or eradicate leafy spurge growing on the side hills of the infested coulees. Once the spurge was contained in the bottoms of the coulees, attempts would be made to reduce seed production and vitality by the introduction of biological control agents.

Areas of knapweed infestation on the prairies and roadways would be eradicated or reduced.

Infestations of knapweed on the shoreline would be reduced if personnel are available to manually remove the weeds. In shoreline areas where manual extraction is not feasible, spotted knapweed will be tolerated.

Complete the weed inventory in the northern portion of the unit.

METHODS OF WEED MANAGEMENT

Prevention: Off road vehicle use should be severely limited to prevent the spread of weeds. This is particularly true on the beaches during the winter months and periods of reservoir drawdown.

Education: Informational displays would be posted at the Silos Recreation Area.

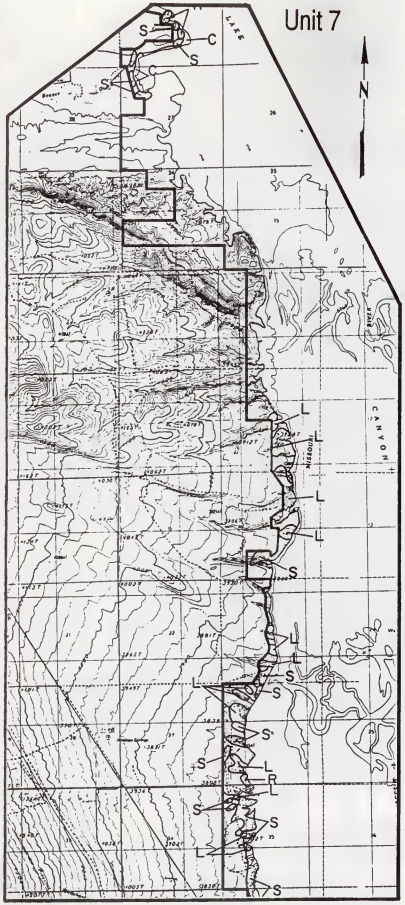
Mechanical: Mowing of weeds would be used to help control weeds in the recreation areas where ever possible. Weeds immediately adjacent to the lake shore would be pulled if personnel were available.

Biological: Where spotted knapweed infested areas are large enough biological control agents would be introduced to limit viability and seed production. **Toadflax** growing near water or under sensitive trees or shrubs would be infected with Calophasia lunula.

Chemical: In the sagebrush grasslands treat dense populations of **spotted and diffuse knapweed** with 1 pint of picloram (Tordon 22K) per acre and **leafy spurge** with 1 quart picloram plus 1 quart 2-4D amine per acre. Sparsely populated stands of knapweed and leafy spurge should be treated at a rate of 4 pints/acre 2,4-D plus 2 pints/acre dicamba (Banvel). Treat knapweeds and spurge growing below the high water level of Canyon Ferry Reservoir with 4 quarts of gylphosate (Rodeo) per acre to within 10 feet of the existing surface water.

PRIORITY

High use areas at the Silos and White Earth Recreation Areas should have high priority to prevent spreading of noxious weeds. Biological control of the leafy spurge should have high priority because of the large infestations and the long term efforts required for bio-control.



LEGEND
DK - Diffuse Knapweed
R - Russian Knapweed
S - Spotted Knapweed
W - Whitetop
L - Leafy Spurge
D - Dalmation Toadflax
C - Canadian Thistle

Figure 8
Unit 7
Silos - White Earth

UNIT 8: WEST SHORE ROADLESS

EXISTING ENVIRONMENT

Location: Unit 8 includes the federal lands on the west shore of Canyon Ferry Reservoir extending from the north side of the White Earth Recreation Area to the south end of the cabins on the west shore road. Figure 9 shows the boundaries of the unit.

Land use: The area is used primarily for undeveloped camping, hunting, fishing and water sports. All of the unit is roadless and accessible only by boat or walk in. The Mahogany Cove Recreation Area is also in the unit.

Fish and Wildlife: The upland areas are used by antelope and mule deer. Forested areas are used by elk and mule deer.

Rainbow and brown trout, yellow perch and ling are found in Canyon Ferry Reservoir. No potential trout spawning habitat exists in the unit.

The entire area has been proposed as a designated Wildlife Management Area in the Canyon Ferry Resource Management Plan. It has also been designated as critical mule deer habitat in the Plan.

Vegetation: The area contains the transition from a sagebrush grassland/ upland grassland habitat in the south to a Mountain Mahogany grassland in the middle of the unit. This in turn becomes the coniferous forest habitat type found in the northern portion of the unit.

Water Resources: Canyon Ferry Reservoir represents the only surface water in the area.

Soils: Soil characteristics of the unit consist of clay loam on 15-60 percent slopes with a slow rate of infiltration and bedrock less than 20 inches from the surface.

Endangered Species: A nesting pair Bald Eagles utilize the area during the spring, summer and fall.

Weed Infestation: Weed infestations are shown on Figure 9. Sporadic infestations of C thistle and D toadflax are found in the unit.

WEED MANAGEMENT STRATEGY

Much of the unit remains uninfected with noxious weeds. The main strategy in this unit will be to keep weeds out of the area. All off road vehicle use in the area should be restricted. Present

weed infestations should be closely evaluated to see if they can be reduced or eliminated. Attempts should be made to limit cattle grazing in the area.

METHODS OF WEED MANAGEMENT

Prevention: Restrict all off road vehicle use.

Biological: If possible, the heavier infestations of D. Toadflax should be treated with Calophasia lunula. Careful monitoring of the insect should be done to allow transfer of the agent to additional infestations in succeeding years.

Physical: Begin efforts to eliminate cattle grazing on Reclamation lands to allow grasslands to re-establish themselves.

Chemical: No significant chemical treatments are proposed for this unit. If feasible D. Toadflax could be spot treated with 2 qts/acre picloram (Tordon 22K).

PRIORITY

Area should be inspected annually to monitor weed infestations and possibly initiate management efforts before weeds become well established. D. Toadflax should receive top priority because of its ability to spread.

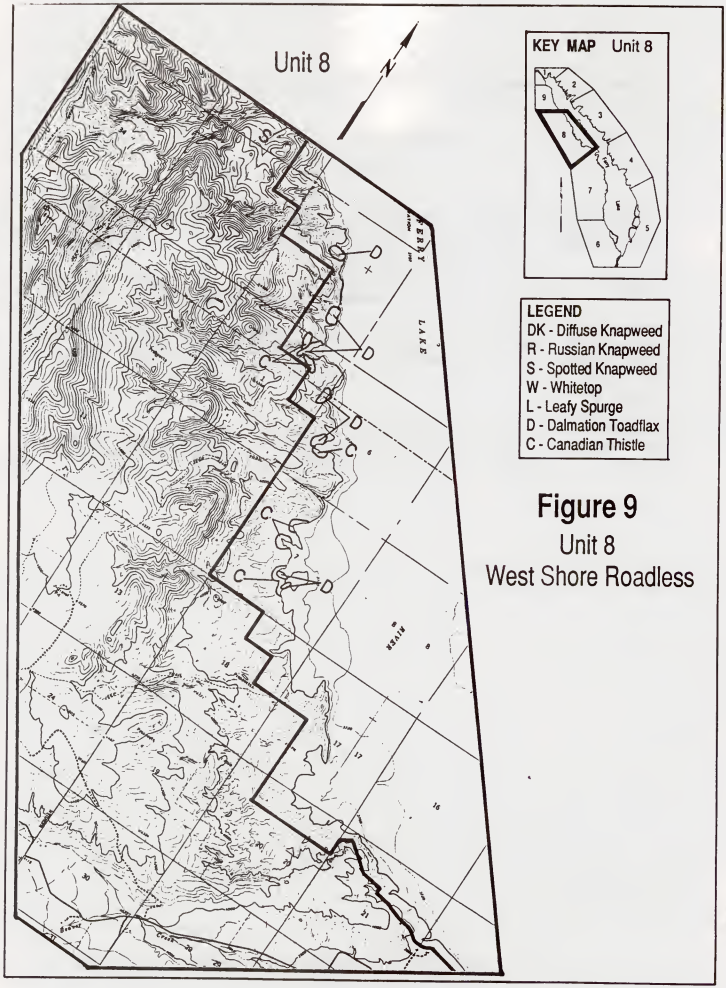


Figure 9
Unit 8
West Shore Roadless

UNIT 9: WEST SHORE CABIN SITES

EXISTING ENVIRONMENT

Location: Unit 9 includes the Federal lands along the reservoir beginning at the south end of the West Shore road and progressing north to Yacht Basin Marina. Cemetery Island is included in this unit. Figure 10 shows the boundaries of the unit.

Land use: The area is used extensively by the public for cabin sites and water based recreation along the shoreline. Recreation facilities in the unit include the Yacht Basin Marina, the Chalet Group Use Area, and Fishhawk, Overlook, Lewis and Clark, Orchard, Cemetery Island, and Crittenden Recreation Areas.

Fish and Wildlife: The primary wildlife in the area includes elk and Mule deer in the forested areas. Various small mammals, songbirds and raptors are scattered through out the area.

Rainbow and Brown trout, perch and ling are the primary species in Canyon Ferry Reservoir. No streams are located in the unit.

Vegetation: The entire unit is composed primarily of coniferous forest habitat types including both ponderosa pine/bluebunch wheatgrass and the Douglas-fir/rough fescue habitat. Minor amounts of upland grasslands is found at Overlook and Crittenden. Riparian shrub areas are found at Lewis and Clark and Orchard day use areas. A small area of wetlands are located at Lewis and Clark Recreation area.

Water Resources: Surface water in the area includes Canyon Ferry Reservoir and intermittent flows from Crittenden Creek and Lorelei Creek.

Soils: There are two main soil types in the unit. From Yacht Basin south to Overlook Campground and south from Lewis and Clark day use area south to the end of the West Shore Road consists of sandy loam, very rocky with 4 to 35 percent slopes. Bed rock is 40-60 inches below the surface. These soils have a moderately low run off potential due to moderate infiltration rates.

In between from Overlook Campground south to Lewis and Clark Day Use area the soil consists of channery /clay loam to loamy sand on 8 to 35 percent slopes. Fractured bedrock exists 20-40 inches below the surface. These soils have low run off potential due to high (rapid) infiltration rates.

Endangered Species: Migrating Bald Eagles utilize the area from October through December.

Weed Infestation: Weed infestations are shown on Figure 10. **Spotted knapweed** is the primary noxious weed, growing primarily along the West Shore roadway. **Dalmatian toadflax** has been located in two areas on the west shore road. **Diffuse knapweed** infestations occur on the south need of the west shore road from Orchard to Crittenden recreation areas. **Leafy spurge is** located across the road from Lewis and Clark Day Use area and on the Yacht Basin concession site.

WEED MANAGEMENT STRATEGY

Weed management objectives in this unit include containment of noxious weed species along the west shore road way to prevent spreading upgradient west of the roadway. Patches of Dalmatian toadflax will receive high priority of containment. Weeds growing along the shoreline will be pulled through **a** volunteer effort coordinated by the Canyon Ferry Recreation Association. Large infestations adjacent to the shoreline will be inoculated with biological agents when weed pulling is not practical.

METHODS OF WEED MANAGEMENT

Prevention: Continue to enforce off-road vehicle use restrictions.

Education: Work with the Cabin site and marina lessees, and the Canyon Ferry Recreation Association to explain proper weed management practices. Develop displays in the day use and camping areas.

Mechanical: Mowing of weeds would be used to help control weeds in the recreation areas where ever possible. Weeds immediately adjacent to the lake shore would be pulled when personnel are available. Seeding and landscape options would be required for all construction work done in the area.

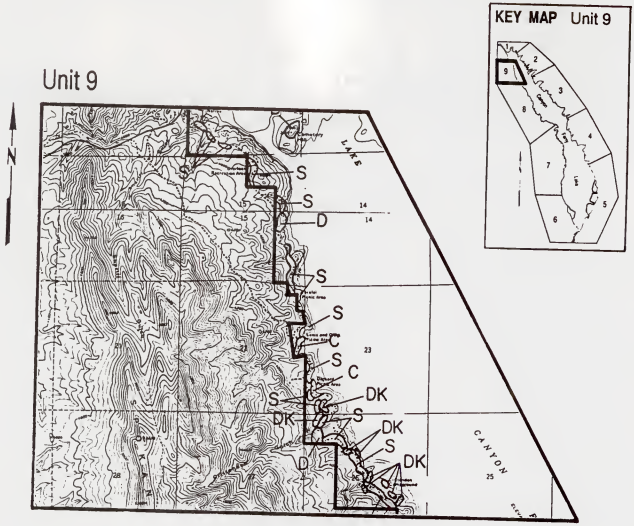
Biological: **Toadflax** growing on Cemetery Island would be considered for treatment with Calophasia lunula.

Chemical: In the forested areas along road right of ways and within campgrounds, treat **spotted and diffuse knapweed** areas with 1 pint/acre Clopyralid (Transline) according to label instructions. In the sagebrush grasslands treat high density knapweeds with 1 pint picloram (Tordon 22K). Pull or Treat **Spotted knapweed** growing below the high water with spot spray of glyphosate (Rodeo). Treat **Spotted knapweed** growing on the cabin lease sites above the high water mark with 1-2 qts/ acre of 2-4 D or with 1 pint/acre of Clopyralid(Transline).

Treat **Toadflax** growing on West shore road with 2-3 qts of picloram (Tordon 22K) per acre.

PRIORITY

The roadway, cabin and marina lease sites, and recreation areas should have a high priority for weed control because of heavy use and potential for weed spreading with vehicular travel.



LEGEND
DK - Diffuse Knapweed
R - Russian Knapweed
S - Spotted Knapweed
W - Whitetop
L - Leafy Spurge
D - Dalmation Toadflax
C - Canadian Thistle

Figure 10
Unit 9
West Shore Cabin Sites

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APPENDICES

INTEGRATED NOXIOUS WEED MANAGEMENT PLAN

Region 8
Montana Department of Fish, Wildlife and Parks

COUNTY NOXIOUS WEED CONTROL ACT AND ADMINISTRATIVE RULES

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
HELENA, MONTANA

JULY, 1991

COUNTY NOXIOUS WEED CONTROL ACT

Title 7, Chapter 22

Sections

7-22-2101 through 7-22-2153

M C A

Amended 1991

AND RULES

Rules 4.5.201 through 4.5.203

State of Montana
Department of Agriculture
Agricultural and Biological Sciences Division
Capitol Station
Helena, MT 59620-0205
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TABLE OF CONTENTS

COUNTY NOXIOUS WEED CONTROL RULES

7-22-2101. Definitions. As used in this part, unless the context indicates otherwise, the following definitions apply:

(1) "Board" means a district weed board created under 7-22-2103.

(2) "Commissioners" means the board of county commissioners.

(3) "Department" means the department of agriculture provided for in 2-15-3001.

(4) "District" means a weed management district organized under 7-22-2102.

(5) "Native plant" means a plant endemic to the state of Montana.

(6) "Native plant community" means an assemblage of native plants occurring in a natural habitat.

(7) (a) "Noxious weeds" or "weeds" means any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities and that is designated:

(i) as a statewide noxious weed by rule of the department; or
(ii) as a district noxious weed by a board, following public notice of intent and a public hearing.

(b) A weed designated by rule of the department as a statewide noxious weed must be considered noxious in every district of the state.

(8) "Person" means an individual, partnership, corporation, association, or state or local government agency or subdivision owning, occupying, or controlling any land, easement, or right-of-way, including any county, state, or federally owned and controlled highway, drainage or irrigation ditch, spoil bank, borrow pit, or right-of-way for a canal or lateral.

(9) "Supervisor" means the person employed by the board to conduct the district noxious weed management program and supervise other district employees.

(10) "Weed management" or "control" means the planning and implementation of a coordinated program for the containment, suppression, and, where possible, eradication of noxious weeds.

7-22-2102. Weed Management Districts Established. A weed management district shall be formed in every county of this state and shall include all the land within the boundaries of the county, except that a weed management district may include more than one county through agreement of the commissioners of the affected counties.

7-22-2103. District Weed Board -- Appointment and Term. (1) The commissioners shall appoint a district weed board.

(2) The commissioners shall, at a public meeting, pass a resolution establishing the number of members of the district weed board and the terms of the appointments. The board must consist of at least three members and no more than nine members, and the members of the board must be residents of the district. A majority of the board members must be rural agricultural land owners.

(3) The county extension agent in each county and other interested individuals may be appointed to serve as nonvoting members of that district's weed board.

(4) The board members are public officers.

(5) The board may call upon the county attorney for legal advice and services as it may require.

7-22-2104. Term of Office. (1) Except as provided in subsection (2), a member of a district weed board serves a term of 3 years and until the qualification of his successor. The term of office begins January 1.

(2) When a three-member weed board is established, the initial board members serve terms of 1, 2, and 3 years, respectively, as designated by the commissioners. When a five-member weed board is established, two of the initial members serve terms of 1 year, two serve terms of 2 years, and one serves a term of 3 years. After expiration of an initial term of office, the successor serves a 3-year term as provided in subsection (1).

7-22-2105. Organization of District Weed Board and Compensation. (1) The board shall organize by choosing a chairman and a secretary. The secretary may or may not be a member of the board.

(2) Salary, per diem, and mileage of such board members shall be set by resolution of the commissioners.

(3) A majority of the board constitutes a quorum for the conduct of business.

7-22-2106. Renumbered 7-22-2115 by Code Commissioner, 1985.

7-22-2107. Renumbered 7-22-2116 by Code Commissioner, 1985.

7-22-2108. Renumbered 7-22-2117 by Code Commissioner, 1985.

7-22-2109. Powers and Duties of Board. (1) The board may:

(a) employ a supervisor and other employees as necessary and provide for their compensation;

(b) purchase such chemicals, materials, and equipment and pay other operational costs as it determines necessary for implementing an effective weed management program. Such costs must be paid from the noxious weed fund.

(c) determine what chemicals, materials, or equipment may be made available to persons controlling weeds on their own land. The cost for such chemicals, materials, or equipment must be paid by such person and collected as provided in this part.

(d) enter into agreements with the department for the control and eradication of any new exotic plant species not previously established in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial use if such plant species spreads or threatens to spread into the state; and

(e) perform other activities relating to weed management.

(2) The board shall:

(a) administer the district's noxious weed program;

(b) establish management criteria for noxious weeds on all land within the district;

(c) make all reasonable efforts to develop and implement a noxious weed program covering all land within the district owned or administered by a federal agency.

7-22-2110. Administrative Hearing -- Appeals. (1) A person adversely affected by any notice, action, or order of the board may request an administrative hearing before the board. The board shall hold a hearing within 30 days of the request. Participants may be represented by legal counsel. The board shall make a record of the proceeding and enter its order and findings within 7 days after the hearing.

(2) An order of the board may be appealed to the commissioners within 30 days from the time the order is entered.

The commissioners shall hear such appeal within 30 days after the notice of appeal and shall render their order and findings within 7 days after such hearing. Participants may be represented by legal counsel.

(3) Within 30 days after the commissioners render their order and findings, the person adversely affected may file a petition in district court requesting that the order and findings of the commissioners be set aside or modified. The court may affirm, modify, or set aside the order complained of, in whole or in part.

7-22-2111. (Temporary) Liability Restrictions. A district, as defined in 7-22-2101, is liable for damages caused by its use of herbicides only for an act or omission that constitutes gross negligence. The provisions of 2-9-305 apply to board members, supervisors, and employees of a district. (Terminates July 1, 1995 -- sec. 7, Ch. 530, L. 1991.)

7-22-2112. (Temporary) Information on Herbicide Use. The district must provide information on protective clothing, health hazards, and proper application techniques to mixers, loaders, and applicators of herbicides and make information available for review by the public at the district office. (Terminates July 1, 1995 -- sec. 7, Ch. 530, L. 1991.)

7-22-2113 and 7-22-2114 reserved.

7-22-2115. Noxious Weeds and Seeds Declared Nuisance. Noxious weeds and the seed of any noxious weed are hereby declared a common nuisance.

7-22-2116. Unlawful to Permit Noxious Weeds to Propagate. It is unlawful for any person to permit any noxious weed to propagate or go to seed on his land, except that any person who adheres to the noxious weed management program of his district or who has entered into and is in compliance with a noxious weed management agreement is considered to be in compliance with this section.

7-22-2117. Violations. (1) Any person who in any manner interferes with the board or its authorized agent in carrying out the provisions of this part or who refuses to obey an order or notice of the board is guilty of a misdemeanor, and upon conviction thereof, he shall be fined not to exceed $100 for the first offense and not less than $100 or more than $200 for each subsequent offense.

(2) All fines, bonds, and penalties collected under the provisions of this part, except those collected by a justice's court, shall be paid to the county treasurer of each county and placed by him to the credit of a fund to be known as the noxious weed fund.

7-22-2118 through 7-22-2120 reserved.

7-22-2121. Weed Management Program. (1) The noxious weed management program must be based on a plan approved by the board.

(2) The noxious weed management plan must:

(a) specify the goals and priorities of the program;

(b) review the distribution and abundance of each noxious weed species known to occur within the district and specify the locations of new infestations and areas particularly susceptible to new infestations;

(c) specify pesticide management goals and procedures, including but not limited to water quality protection, public and worker safety, equipment selection and maintenance, and pesticide selection, application, mixing, loading, storage, and disposal; and

(d) estimate the personnel, operations, and equipment costs of the proposed program.

(3) The board shall provide for the management of noxious weeds on all land or rights-of-way owned or controlled by a county or municipality within the confines of the district. It shall take particular precautions while managing the noxious weeds to preserve beneficial vegetation and wildlife habitat. Where at all possible, methods for such control shall include cultural, chemical, and biological methods.

(4) The board may establish special management zones within the district. The management criteria in such zones may be more or less stringent than the general management criteria for the district.

7-22-2122. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2123. Procedure in a Case of Noncompliance. (1) Where complaint has been made or the board has reason to believe that noxious weeds described in this part are present upon a person's land within the district in violation of the law, that person must be notified by mail or telephone of the complaint and the board may request inspection of such land. The board or its authorized agent and the landowner or his representative shall inspect the land at an agreeable time, within 10 days of notification of the landowner. If after reasonable effort the board is unable to gain cooperation of the person, the board or its authorized agent may enter and inspect the land to determine if the complaint is valid.

(2) If noxious weeds are found, the board or supervisor shall notify the person or his representative and seek voluntary compliance with the district weed control program. If voluntary compliance is not possible, notice of noncompliance must be sent to the person by certified mail.

(3) The notice must specify:

(a) the basis for the determination of noncompliance;

(b) the geographic location of the area of noncompliance, by legal description or other reasonably identifiable description;

(c) measures to be undertaken in order to comply with the district's management criteria;

(d) a reasonable period of time, not less than 10 days, in which compliance measures must be initiated; and

(e) the right of the person to request, within the time specified in subsection (3) (d), an administrative hearing as provided by 7-22-2110.

(4) A person is considered in compliance if he submits and the board accepts a proposal to undertake specified control measures and is in compliance for so long as he performs according to the terms of the proposal. If the measures proposed to be taken extend beyond the current growing season, the proposal and acceptance must be in writing.

(5) In accepting or rejecting a proposal, the board shall consider the economic impact on the person and his neighbors, practical biological and environmental limitations, and alternative control methods to be used.

7-22-2124. Destruction of Weeds by Board. (1) If corrective action is not taken and no proposal is made and accepted or no request for an administrative hearing is made within the time specified in the notice, the board may forthwith enter upon the person's land and institute appropriate control measures.

In such case the board shall submit a bill to the person, itemizing man-hours of labor, material, and equipment time, together with a penalty not exceeding 10% of the total cost incurred. Labor and equipment must be valued at the current rate paid for commercial management operations in the district. The bill must specify and order a payment due date of 30 days from the date the bill is sent.

(2) A copy of the bill must also be submitted by the board to the county clerk and recorder.

(3) If a person receiving an order to take corrective action requests an administrative hearing, the board may not institute control measures until the matter is finally resolved, except in case of an emergency. In such a case, the person is liable for costs as provided in subsection (1) only to the extent determined appropriate by the board, commissioners, or court that finally resolves the matter.

7-22-2125. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2126. Embargo. The board may establish voluntary embargo programs to reduce the spread of noxious weeds within the district or the introduction of noxious weeds into the district.

7-22-2127. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2128 and 7-22-2129 reserved.

7-22-2130. Weed District Supervisor Training. Within the limitations of available funds, the board shall ensure that the weed district supervisor obtains training to properly implement the noxious weed management program described in 7-22-2121. The department shall specify through rulemaking the level and type of training necessary to fulfill this requirement.

7-22-2131 through 7-22-2140 reserved.

7-22-2141. Noxious Weed Fund Authorized. (1) The commissioners of each county in this state shall create a noxious weed management fund, to be designated the "noxious weed fund".

(2) This fund shall be kept separate and distinct by the county treasurer.

7-22-2142. Sources of Money For Noxious Weed Fund. (1) The commissioners may create the noxious weed fund and provide sufficient money in the fund for the board to fulfill its duties, as specified in 7-22-2109, by:

(a) appropriating money from the general fund of the county;

(b) at any time fixed by law for levy and assessment of taxes, levying a tax not exceeding 2 mills on the dollar of total taxable valuation in the county. The tax levied under this subsection must be identified on the assessment as the tax that will be used for noxious weed control; and

(c) levying a tax in excess of 2 mills if authorized by a majority of the qualified electors voting in an election held for this purpose pursuant to 7-6-2531 through 7-6-2536.

(2) The proceeds of the noxious weed control tax must be used solely for the purpose of managing noxious weeds in the county and must be designated to the noxious weed fund.

(3) Any proceeds from work or chemical sales must revert to the noxious weed fund and must be available for reuse within that fiscal year or any subsequent year.

(4) The commissioners may accept any private, state, or federal gifts, grants, contracts, or other funds to aid in the management of noxious weeds within the district. These funds must be placed in the noxious weed fund.

7-22-2143. Determination of Cost of Weed Control Program. Based on the board's recommendations, the commissioners shall determine and fix the cost of the control of noxious weeds in the district, whether the same be performed by the individual landowners or by the board.

7-22-2144. Payment of Cost of Weed Control Program. The total cost of such control shall be paid from the noxious weed fund. The cost of controlling such weeds growing along the right-of-way of a state or federal highway shall, upon the presentation by the board of a verified account of the expenses incurred, be paid from the state highway fund in compliance with 7-14-2132 and any agreement between the board and the department of highways. Costs attributed to other lands within the district shall be assessed to and collected from the responsible person as set forth in 7-22-2116.

7-22-2145. Expenditures From Noxious Weed Fund. (1) The noxious weed fund must be expended by the commissioners at the time and in the manner as is recommended by the board to secure the control of noxious weeds.

(2) Warrants upon the fund must be drawn by the board. Warrants may not be drawn except upon claims duly itemized by the claimant, except payroll claims that must be itemized and certified by the board, and each claim must be presented to the commissioners for approval before the warrant is countersigned by the commissioners.

7-22-2146. Financial Assistance to Persons Responsible For Weed Control. (1) The commissioners, upon recommendation of the board, may establish cost-share programs with any person, specifying costs that may be paid from the noxious weed fund and costs that must be paid by the person. Cost-share programs may be established for special projects and for established management zones.

(2) (a) When under the terms of any voluntary agreement, whether entered into pursuant to 7-22-2123 or otherwise, or under

any cost-share program entered pursuant to this section a person incurs any obligation for materials or services provided by the board, the board shall submit a bill to the person, itemizing man-hours of labor, material, and equipment time. The bill must specify and order a payment due date not less than 30 days from the date the bill is sent.

(b) A copy of the bill must be submitted by the board to the county clerk and recorder. If the sum to be repaid by the person billed is not repaid on or before the date due, the county clerk and recorder shall certify the amount thereof, with the description of the land to be charged, and shall enter the sum on the assessment list as a special tax on the land, to be collected in the manner provided in 7-22-2148.

7-22-2147. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2148. Tax Liability For Payment of Weed Control Expenses. (1) The expenses referred to in 7-22-2124 shall be paid by the county out of the noxious weed fund, and unless the sum to be repaid by the person billed under 7-22-2124 is repaid on or before the date due, the county clerk shall certify the amount thereof, with the description of the land to be charged, and shall enter the same on the assessment list of the county as a special tax on the land. If the land for any reason is exempt from general taxation, the amount of such charge may be recovered by direct claim against the lessee and collected in the same manner as personal taxes. When such charges are collected, they shall be credited to the noxious weed fund.

(2) In determining what lands are included as land covered by the special tax and are described in the certificate of the county clerk, it is presumed that all work done upon any of the land of any one landowner is for the benefit of all of the land within the district belonging to the owner, together with the parcel upon which the work was done, and the amount certified becomes a tax upon the whole thereof.

7-22-2149. Responsibility For Assessments And Taxes For Weed Control Levied on Leased State Lands. The lessee of agricultural state land is responsible for assessments and taxes levied by the board of county commissioners for the district as provided in 77-6-114.

7-22-2150. Cooperation With State And Federal-Aid Programs. The board is empowered to cooperate with any state or federal-aid program that becomes available. Under such a plan of cooperation, the direction of the program shall be under the direct supervision of the board of the district in which the program operates.

7-22-2151. Cooperative Agreements. (1) Any state agency controlling land within a district, including the department of highways; the department of state lands; the department of fish, wildlife, and parks; the department of institutions; the department of natural resources and conservation; and the university system, shall enter into a written agreement with the board. The agreement must specify mutual responsibilities for noxious weed management on state-owned or state-controlled land within the district.

(2) The board and the governing body of each incorporated municipality within the district shall enter into a written agreement and shall cooperatively plan for the management of noxious weeds within the boundaries of the municipality. The board may implement management procedures described in the plan within the boundaries of the municipality for noxious weeds only. Control of nuisance weeds within the municipality remains the responsibility of the governing body of the municipality, as specified in 7-22-4101.

(3) A board may develop and carry out its noxious weed management program in cooperation with boards of other districts, with state and federal governments and their agencies, or with any person within the district. The board may enter into cooperative agreements with any of these parties.

7-22-2152. Revegetation of Rights-Of-Way And Disturbed Areas. (1) Any state agency or local government unit approving a mine, major facility, transmission line, solid waste facility, highway, subdivision, or any other development resulting in significant disturbance of land within a district shall notify the board.

(2) Whenever any person or agency disturbs vegetation on an easement or right-of-way within a district by construction of a road, irrigation or drainage ditch, pipeline, transmission line, or other development, the board shall require that the disturbed areas be seeded, planted, or otherwise managed to reestablish a cover of beneficial plants.

(3) (a) The person or agency disturbing the land shall submit to the board a written plan specifying the methods to be used to accomplish revegetation. The plan must describe the time and method of seeding, fertilization practices, recommended plant species, use of weed-free seed, and the weed management procedures to be used.

(b) The plan is subject to approval by the board, which may require revisions to bring the revegetation plan into compliance with the district weed management plan. Upon approval by the board, the revegetation plan must be signed by the chairman of the board and the person or agency responsible for the disturbance and constitutes a binding agreement between the

board and such person or agency.

7-22-2153. Voluntary Agreements For Control of Noxious Weeds Along Roads. (1) Any person may voluntarily seek to enter into an agreement for the management of noxious weeds along a state or county highway or road bordering or running through his land. The supervisor may draft such an agreement upon the request of and in cooperation with the person; however, the agreement must, in the board's judgment, provide for effective weed management. The weed management agreement must be signed by the person and, upon approval of the board, by the chairman. An agreement involving a state highway right-of-way must also be signed by a representative of the department of highways.

(2) The agreement must contain a statement disclaiming any liability of the board and, if applicable, the department of highways for any injuries or losses suffered by the person in managing noxious weeds on the state or county highway right-of-way. The signed agreement transfers responsibility for managing noxious weeds on the specified section of right-of-way from the board to the person signing the agreement. If the board later finds that the person has failed to adhere to the agreement, the board shall issue an order informing the person that the agreement will be void and that responsibility for the management of noxious weeds on the right-of-way will revert to the board unless the person complies with the provisions of the agreement within a specified time period.

Part Cross References:

Weed Control - Department of Agriculture, Title 80, Chapter 7, Part 7.
Municipal Weed Control, 7-22-4101.
Noxious Weed Management Funding, Title 80, Chapter 7, Part 8.
Embargo against introduction of noxious weed seed from other state, 80-7-701.
General authority of county commissioners, 7-5-2101.
County officers - term of office, 7-4-2205.
Nuisance, Title 27, Chapter 30.
Classification of offenses, 45-1-201.
Department of State Lands, general powers and duties, Title 77, Chapter 1, Part 3.
Mining on State Lands, Title 77, Chapter 3.
Department of Fish, Wildlife and Parks, general powers and duties, Title 87, Chapter 1, Part 2.
Department of Highways, general powers and duties, Title 60, Chapter 2, Part 7.
Highways, acquisition and disposition of property, Title 60, Chapter 4.
Highway maintenance agreements with local government, 60-2-204.
Montana Environmental Protection Act, Title 75, Chapter 1.
Montana Solid Waste Management Act, Title 75, Chapter 10, Part 2.
County Taxation, Title 7, Chapter 6, Part 25.
Department of Institutions, general powers and duties, Title 53, Chapter 1, Part 2.
University system, Title 20, Chapter 5.
Department of Natural Resources and Conservation established 2-15-3301.
Major Facility Siting Act, Title 75, Chapter 20.
Subdivisions, Title 76, Chapter 2 and 3.
Coal mining, Title 82, Chapter 3.
Oil and gas conservation, Title 82, Chapter 11.
Hard rock mining impact, Title 90, Chapter 6, Part 3.
Role and duties of county clerk, 7-4-2611.
Employment of personnel by county commissioners. 7-5-2107.

RULES
COUNTY NOXIOUS WEED LIST
Sub-Chapter 2
Designation of Noxious Weeds

4.5.201. Designation of Noxious Weeds. (1) The department designates certain exotic plants listed in these rules as statewide noxious weeds under the County Weed Control Act 7-22-2101 (5), MCA. All counties must implement management standards for these noxious weeds consistent with weed management criteria developed under 7-22-2109 (2)(b) of the Act. The department established three categories of the noxious weeds. (History: Sec. 7-22-2101 MCA; IMP, Sec. 7-22-2101 MCA; NEW 1986, p. 337, Eff. 3/14/86; AND, 1991 MAR p. 511, Eff. 4/26/91.)

4.5.202. Category 1. (1) Category 1 noxious weeds are weeds that are currently established and generally widespread in many counties of the state. Management criteria includes awareness and education, containment and suppression of existing infestations and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses.

(2) The following are designated as category 1 noxious weeds:

(a) Canada Thistle (Cirsium arvense)

(b) Field Bindweed (Convolvulus arvensis)

(c) Whitetop or Hoary Cress (Cardaria draba)
(d) Leafy Spurge (Euphorbia esula)

(e) Russian Knapweed (Centaurea repens)

(f) Spotted Knapweed (Centaurea maculosa)

(g) Diffuse Knapweed (Centaurea diffusa)

(h) Dalmatian Toadflax (Linaria dalmatica)

(i) St. Johnswort (Hypericum perforatum).

(History: Sec. 7-22-2101 MCA; IMP, Sec. 7-22-2101 MCA; NEW 1986 MAR p. 337, Eff. 3/14/86; AND, 1991 MAR p. 511, Eff. 4/26/91.)

4.5.203. Category 2. (1) Category 2 noxious weeds have recently been introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and invasion of lands, rendering lands unfit for beneficial uses. Management criteria includes awareness and education, monitoring and containment of known infestations and eradication where possible.

(2) The following are designated as category 2 noxious weeds:

(a) Dyers Woad (Isatis tinctoria)

(b) Purple Loosestrife or Lythrum (Lythrum salicaria, L. virgatum, and any hybrid crosses thereof).

(c) Sulfur (Erect) Cinquefoil (Potentilla recta)

(History: Sec. 7-22-2101 and 80-7-802 MCA; MP Sec. 7-22-2101 MCA: EW 1986 MAR p. 337, Eff. 3/14/86; AND, 1989 MAR p. 899, Eff. 7/14/89; AND 1991 MAR p. 511, Eff. 4/26/91.)

4.5.204 Category 3. (1) Category 3 noxious weeds have not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria includes awareness and education, early detection and immediate action to eradicate infestations. These weeds are know pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

(2) The following are designated as category 3 noxious weeds:

(a) Yellow Starthistle (Centaurea solstitialis)

(b) Common Crupina (Crupina vulgaris)

(c) Rush Skeletonweed (Chondrilla juncea)

(History: Sec. 80-7-802 MCA; IMP, Sec. 7-22-2102 MCA; NEW 1991 MAR p.511, Eff. 4/26/91.)

APPENDIX 2

LEGAL FRAMEWORK

State and federal laws, policies, and programs that will affect Region 8's activities include:

- Creating a VISION for the Future of Montana's Department of Fish, Wildlife & Parks (1992)
- Weed Control Program for Lands Managed by the Montana Department of Fish, Wildlife and Parks (1983)
- Canyon Ferry Weed Management Plan and Environmental Assessment (USDI Bureau of Reclamation 1993)
- Canyon Ferry Resource Management Plan and Environmental Assessment (DFWP and USDI Bureau of Reclamation 1993)
- Montana Pesticides Act (80-8-801 *et seq.*, MCA)
- Montana Weed Control Act (80-7-701 *et seq.*, MCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) P.L. 92-516; CFR 40-171
- Montana Noxious Weed Trust Fund Act of1985 (80-7-801 *et seq.*, MCA) as amended 1991 and Rules
- Montana Water Quality Act (75-5-101 *et seq.*, MCA)
- Montana Agricultural Chemical Ground Water Protestion Act of 1989 (80-15-100 *et seq.*, MCA)
- Montana Environmental Policy Act (MEPA, 75-1-101 *et seq.*, MCA)
- Lewis & Clark County Ground Water Protection District Ordinance
- County Weed Boards for Lewis & Clark, Jefferson and Broadwater Counties; 5-Year Plans
- USDA Frest Service - Helena and Deerlodge National Forests
- USDI Bureau of Land Management - Butte Division

APPENDIX 3

SYNOPSIS OF NOXIOUS WEEDS

CATEGORY 1

Canada thistle (*Cirsium arvense*)

Canada thistle is a perennial forb that reproduces by horizontal roots and seed. The stems are hollow and branch near the top. The wavy leaves are deeply cut with spiny to smooth (with no spines) margins. The flower heads are numerous, small, compact and vary from light lavender to rose-purple. Canada thistle grows in cultivated fields, meadows, pastures and waste areas.

Dalmatian toadflax (*Linaria dalmatica*)

Dalmatian toadflax is a perennial that spreads by creeping rootstalk and seed. The plants are pale green and have very showy, yellow flowers. The "spurred" flowers are tinged with orange and are about 1 inch long. The leaves are broad, heart-shaped and clasp the stem. Dalmation toadflax is an escaped ornamental that invades rangeland, and is difficult to control.

Diffuse knapweed (*Centaurea diffusa*)

Diffuse knapweed is a biennnial or short-lived perennial forb. The tip of each branch has a single flower head. The flowers are usually white or sometimes pinkish. The bracts surrounding the flowers are yellowish-green with a light brown margin. The upper part of each bract narrows into a stiff spine. It is an excellent competitor on dry sites and can be found along highways in western Montana.

Field bindweed (*Convolvulus arvensis*)

Field bindweed is a perennial with an extensive and very deep root system. Stems are prostrate, 1-4 feet long with numerous arrowhead-shaped stem leaves which form dense tangeld mats. The white to pinkish flowers are trumpet-shaped. The plant propogates by seed and rhizome and flowers from late June to frost. Seeds remain viable for up to 50 years making this persistent weed very difficult to control. It is largely a problem in cultivated fields and waste areas.

Leafy spurge (*Euphorbia esula*)

Leafy spurge is a perennial, which reproduces by vigorous rootstalk and seeds. The small flowers are enclosed by a pair of yellowish-green, heart shaped bracts which have the appearance of flowers. Stems, leaves and flowers contain a milky sap called latex, which may cause severe rashes in humans. The weed forms dense patches and may be the most persistant noxious weed in Montana. It has wide habitat suitability, prolific reproductive capabilities, strong competitive ability and is difficult to control, especially along water bodies. Although it is unpalatable to cattle, sheep and goats when confined to an infested area will graze leafy spurge and do well on it.

Russian knapweed (*Centaurea repens*)

Russian knapweed is a perennial forb that spreads by creeping rootstalk and seed. The plant has numerous branches that are tipped with a single, lavender thistle-like flower. The leaves are small and narrow with broken edges. The roots are dark brown and have a scaly appearance. Once, established, it will completely crowd out other vegetation. Livestock tend to avoid the weed because of its bitter, quinine like taste. Horses, if forced to graze Russian knapweed, will develop nervous disorders.

Spotted knapweed (*Centaurea maculosa*)

Spotted knapweed is a short-lived perennial forb that reproduces by seed. The seeds germinate in the spring and fall, whenever growing conditions are favorable. The showy, purple flowers are held in spotted bracts. The alternate leaves have deep, narrow divisions and a rough, hairy appearance. It is very nutrient competitive which adds to the decline of native vegetation.

St. Johnswort (*Hypericum perforatum*)

St. Johnswort is most commonly known as "goatweed". It is a perennial forb reproducing by seed and rootstock. The stems are smooth, branched and woody at the base. The opposite leaves have small glandular dots. The flowers are orange-yellow with 5 petals. Goatweed is established throughout the Reservation and is found in meadows, dry pastures, rangelands, neglected fields and along roadsides. Livestock do not eat the plant unless forced to. Goatweed causes photosensitation in livestock and should be regarded as a poisonous plant.

Whitetop (*Cardaria draba*)

Whitetop is often referred to as "hoary cress". It is a perennial forb that reproduces by seeds and creeping roots. The stems often lodge with age and contain a small white flower. The dense flowers give the plant a white, flat-topped appearance. The leaves are grayish-green. The upper leaves clasp the stem.

CATEGORY 2

Dyers woad (*Isatis tinctoria*)

Dyers woad is a perennial, biennial or annual forb reproducing by seeds and from roots. The plants have a smooth, bluish-green color. The lower leaves clasp the stem with ear-like projections. The yellow flowers are very small and form a flat-topped inflorescence. The seed pods are winged like a maple seed and turn black when mature. The purplish-black seed pods have been used for there dye extract, thus the name dyers woad.

Purple loosestrife (*Lythrum salicaria*)

Purple loosestrife is an aggressive perennial plant that has capabilities of invading our wetlands and replacing valuable wetland plants. It will choke waterways and eliminate food and shelter for wildlife. It is a prolific seed producer, grows from underground roots and also sprouts from broken off plant parts. The flowers have a purple-magenta color. The leaves are linear shaped with smooth edges and are attached directly to a four-sided stem. The roots form dense mats that choke out native vegetation. Purple loosestrife is often confused with Blazing Star, Fireweed, or Blue Vervain.

Sulfur cinquefoil (*Potentilla recta*)

Sulfur cinquefoil is also referred to as "upright" or "rough fruited" cinquefoil. It is a perennial and reproduces by seed. The stems are hairy and rigid. The leaves are alternate and palmately divided with 5 to 7 coarsely toothed leaflets. The clustered flowers are a sulfur yellow. Sulfur cinquefoil is difficult to distinguish from several other native cinquefoils.

CATEGORY 3

Common crupina (*Crupina vulgaris*)

Common crupina is a annual that reproduces by seed. It is closely related to the knapweed species. The leaves are large, thick, dark green, and have stiff hairs that feel sticky. The plant produces 5 to 100 flower heads with a lavendar to purple color, and from a distance could be confused with spotted knapweed. It is generally found on well-drained, rocky to silt loam soils in pastures or rangeland. Cattle will not feed on common crupina plants. The species is competitive and forms solid stands reducing forage production and range carrying capacity. Infestations start in disturbed sites with sparse vegetation. Common crupina is not believed to be in Montana at this time.

Rush skeletonweed (*Chondrilla juncea*)

Rush skeletonweed, a member of the sunflower family, is a perennial 1-4 feet tall with an extensive and deep root system. It appears very branchy off of several main stems which have downwardly bent, coarse hairs on the lower 4-6 inches. Leaves occur at the base and resemble those of dandelions. Yellow flowering heads are small and scattered on branches. Flowering and seed production occurs from late summer through frost. It generally inhabits well-drained, light-textures soils along roadsides, inrangelands, grain fields and pastures. Soil disturbance aids establishment. Rush skeletonweed occupies large acreages in Oregon, Washington, Idaho and California. This species should not be confused with the rangeland native, skeletonweed, (Lygodesmia juncea) which has pink flowers.

Yellow star-thistle (*Centaurea solstitialis*)

Yellow star-thistle is an annual or, occasionally, biennial that reproduces by seed. The leaves are alternate and have slender, pointed lobes. The upper leaves are smaller and narrow with sharp, spiny tips. Leaf bases extend down the plant stem giving a winged affect. The flowers heads have sharp stiff spines on either side with one flower per branch. The flowers are yellow, long and tubular. It is toxic to horses and when eaten in quanitity, results in a neurological disorder which over time causes death. The chewing disease associated with it comes from the spikes on the flower.

OTHER WATCH SPECIES

Eurasian watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil is an agressive aquatic weed which is flourishing in Washington and Idaho. It resembles native milfoils with its lacy leaves and reproduces by seed and vegetative propogation. Watermilfoil roots in shallow streams and lakes in up to 15 feet of water forming extremely dense mats. It chokes waterways and irrigation ditches and depletes oxygen and therefore is a serious probelm for recreationists, fisheries and landowners. Eurasian watermilfoil has not been reported on the Reservation at this time, but occurs in Lake Pend Oreille. The species appears to have a wide tolerance to severe environmental conditions and can resprout from seemingly dried out stems and roots. Thus it is easily spread by boats and trailers that carry fragments from infested waters to clean waters.

TABLE LIST OF MONTANA NOXIOUS WEEDS

Category 1	Family	Origin	Date of Introduction	Life Form	Reproduction	Habitat	Other	Acreage Affected
Leafy spurge (Euphorbia esula)	Spurge	Eurasia	Brought to U.S. in 1827[4]; Intro.to Montana in 1917 as hay seed from N. Dakota [5]	Perennial forb	Root stalks; seed	Dry upland sites; moist areas; shallow rocky soils	Explosive seed capsules; milky sap; seeds viable for 8 years[1]	500,616[3]
Canada thistle (Cirsium arvense)	Sunflower	Eurasia	Intro. to Canada late 19th Century [1]; noted in Montana in 1901[10]	Perennial forb	Root stalks; seed	Disturbed sites; pastures; meadows	Extensive horizontal roots; male & female flowers	1,879,106[3]
Whitetop (Cardaria draba)	Mustard	Europe	Reported in Montana in 1931[10]	Perennial forb	Root stalks; seed		Deep rooted	86,301[3]
Field bindweed (Convolvulus arvensis)	Morning glory	Europe	Noted in Montana in 1901 publication [10]	Perennial forb	Root stalks; seed	Disturbed sites; cultivated fields	Taproot up to 50 feet long; seeds viable for 50 years[1]	668,772[3]
Russian knapweed (Centaurea repens)	Sunflower	Eurasia	Intro. to North America 1898[10]; Reported in Montana in 1931[10]	Perennial forb	Root stalks; seed	Irrigated and dryland pasture; range; hayland; cropland	Horses develop nervous disorders when plant is grazed	47,852[3]
Spotted knapweed (Centaurea maculosa)	Sunflower	Eurasia	1920's[10] - alfalfa & clover seed contaminant	Biennial/perennial forb	Seed	Disturbed sites; pastures; rangelands; hayland		4,721,060[3]
Diffuse knapweed (Centaurea diffusa)	Sunflower	Eurasia	Intro. with spotted knapweed[3]	Annual/perennial/biennial forb	Seed	Disturbed areas; rangeland; pastures; hayland		10,349[3]
Dalmatian toadflax (Linaria dalmatica)	Snapdragon	Europe	Reported in Montana in 1957[10]	Perennial forb	Root stalks; seed	Disturbed areas; rangeland	Deep root system; waxy leaves	96,789[3]
St. Johnswort (Hypericum perforatum)	St. Johnswort	Europe	Reported in Montana by 1919[10]	Perennial forb	Root stalks; stolon; seed	Meadows; dry sandy or gravelly soils; disturbed sites; rangeland	Poisonous (photosensitization)	514,099[3]
Category 2	**Family**	**Origin**	**Date of Introduction**	**Life Form**	**Reproduction**	**Habitat**	**Other**	**Acreage Affected**
Dyers woad (Isatis tinctoria)	Mustard	Europe	Intro. to U.S. as source of dyes. Intro. to Utah in 1917[1]. Reported in Montana in 1958[10]	Winter annual/biennial perennial forb	Seed; tproot	Disturbed areas; rangeland	Deep taproot	128[3]
Purple loosestrife (Lythrum salicaria & L. virgatum)	Loosestrife	Eurasia	Intro. to U.S. in early 1800's; first reported in Montana in 1987[10]	Perennial forb	Root stalks; seed	Floodplains; marsh edges; river margins; seasonally flooded impoundments	Long lived	Only noted in Cascade, Missoula, and Lake Counties
Sulfur cinquefoil (Potentilla recta)	Rose	Europe	Ravalli County - 1946 [9]	Perennial forb	Seed	Dry fields, wastelands;pastures; meadows; rangeland	Troublesome in limestone regions	Unknown
Category 3	**Family**	**Origin**	**Date of Introduction**	**Life Form**	**Reproduction**	**Habitat**	**Other**	**Acreage Affected**
Yellow starthistle (Centaurea solstitialis)	Sunflower	Europe	Ravalli County - 1958[9]	Winter annual/perennial forb	Seed	Disturbed areas;rangeland	Causes chewing disease in horses (nervous disorder)[11]	Ravalli, Flathead, Gallatin and Liberty Counties
Common crupina (Crupina vulgaris)	Sunflower	Europe	Found in Idaho, Oregon and Washington only[10]	Winter annual/perennial forb	Seed	Well drained, rocky to silt loam soil		-
Rush skeletonweed (Chondrilla juncea)	Sunflower	Eurasia	Currently in ID, WA, OR, CA [11]	Perennial	Root stalks; seed	Well drained, light textured soils; disturbed areas	Milky latex sap; extensive and deep root system	Sanders County

1 Whitson, T.D. 1987
2 Lacken, L.J. 1985
3 Lacey, C.A. 1987a
4 Barrett, C.L. 1982
5 Blankenship, J.W. 1901
6 Blankenship, J.E. et al 1988
7 Fay, P. 1987
8 Lacey, C.A. 1986
9 Rice, P. et al. in press
10 Forcella & Harvey 1983

From Montana Department of Agriculture 1991.

Appendix 4 - Supplemental Watch List
From: Zamora 1991

Noxious Weeds in Montana and in States and Provinces Surrounding Montana

SCIENTIFIC NAME[1]	COMMON NAME[1]	FAMILY	LOCATION[2]	FOUND IN MT[3]	ALIEN
Abutilon theophrasti	velvetleaf	Mallow	OR	yes	yes
Aegilops cylindrica	goatgrass, jointed	Grass	ID,OR	yes	yes
Agropyron repens	quackgrass	Grass	KS,OR,SD,SK,UT,WY	yes	yes
Agrostemma githago	cockle, corn	Pink	SK	yes	yes
Alhagi pseudalhagi	camelthorn	Pea	NV,OR	yes	yes
Ambrosia artemisiifolia	ragweed, common	Sunflower	OR,SK	yes	no
Ambrosia grayi	bursage, woolyleaf	Sunflower	KS	no	
Ambrosia tomentosa	bursage, skeletonleaf	Sunflower	ID,WY	yes	
Apocynum androsaemifolium	dogbane, spreading	Dogbane	AB	yes	no
Arctium lappa	burdock, great	Sunflower	BC	yes	yes
Arctium minus	burdock, common	Sunflower	BC,WY	yes	yes
Artemisia absinthium	wormwood, absinth	Sunflower	ND	yes	yes
Asclepias syriaca	milkweed, common	Milkweed	SK	no	no
Avena fatua	oats, wild	Grass	BC,SK	yes	yes
Berberis vulgaris	barberry, European	Barberry	SK	yes	yes
Brassica kaber	mustard, wild	Mustard	SK	yes	yes
Brassica rapa	mustard, birdrape	Mustard	SK	yes	yes
Camelina sativa	falseflax, largeseed	Mustard	SK	yes	yes
Cannabis sativa	marijuana	Hemp	ND,SK	yes	no
Cardaria pubescens	whitetop, hairy	Mustard	NV	yes	yes
Cardaria spp.	hoary cress	Mustard	AB,BC,ID,KS,MT,ND, OR,SD,SK,UT,WY,NV	yes	no
Carduus acanthoides	thistle, plumeless	Sunflower	AB,BC,NE,WY	yes	yes
Carduus nutans	thistle, musk	Sunflower	ID,KS,NE,ND,NV,OR, UT,WY	yes	yes
Carduus pycnocephalus	thistle, Italian	Sunflower	OR	no	yes
Carduus tenuiflorus	thistle, slenderflower	Sunflower	OR	no	yes
Carthamus lanatus	thistle, wooly distaff	Sunflower	OR	no	yes
Carthamus leucocaulos	thistle, whitestem distaff	Sunflower	OR	no	yes
Centaurea calcitrapa	starthistle, purple	Sunflower	NV,OR	yes	yes
Centaurea diffusa	knapweed, diffuse	Sunflower	AB,BC,CO,ID,MT,OR, UT,WY,NV,SK	yes	yes
Centaurea iberica	starthistle, Iberian	Sunflower	NV,OR	yes	yes

SCIENTIFIC NAME	COMMON NAME	FAMILY	LOCATION	FOUND IN MT	ALIEN
Centaurea maculosa	knapweed, spotted	Sunflower	AB,BC,CO,ID,MT,ND, OR,SK,UT,WY	yes	yes
Centaurea pratensis	knapweed, meadow	Sunflower	ID,OR	no	yes
Centaurea repens	knapweed, Russian	Sunflower	AB,BC,CO,ID,KS,MT, ND,NV,OR,SD,SK,UT, WY	yes	yes
Centaurea solstitialis	starthistle, yellow	Sunflower	AB,ID,MT,OR,SD,UT, NV	yes	yes
Centaurea squarrosa	knapweed, squarrose	Sunflower	OR,UT	no	yes
Chondrilla juncea	skeletonweed, rush	Sunflower	ID,MT,OR	no	yes
Chrysanthemum leucanthemum	daisy, ox-eye	Sunflower	AB,WY	yes	no
Cicuda sp.	hemlock, water-	Parsley	BC,NV	yes	no
Cirsium arvense	thistle, Canada	Sunflower	AB,BC,ID,KS,MT,NE, ND,NV,OR,SD,SK,UT, WY	yes	yes
Cirsium vulgare	thistle, bull	Sunflower	SK	yes	yes
Conium maculatum	hemlock, poison	Parsley	ID,NV,OR	yes	yes
Conringia orientalis	mustard, haresear	Mustard	SK	yes	yes
Convolvulus arvensis	bindweed, field	Morningglory	AB,BC,KS,ND,MT,OR, SK,SD,UT,WY	yes	yes
Crupina vulgaris	crupina, common	Sunflower	ID,MT,OR	no	yes
Cuscuta sp.	dodder	Dodder	AB,OR	yes	no
Cynodon dactylon	bermudagrass	Grass	UT	no	yes
Cynoglossum officinale	houndstongue	Borage	AB,BC,WY	yes	yes
Cyperus esculentus	nutsedge, yellow	Sedge	OR	no	no
Cytisus monspessulanus	broom, French	Pea	OR	no	yes
Cytisus scoparius	broom, Scotch	Pea	ID,OR	no	yes
Echium vulgare	blueweed	Borage	AB,BC	yes	yes
Egeria densa	elodea, Brazilian	Frog's-bit	OR	no	yes
Equisetum arvense	horestail, field	Horsetail	OR	yes	no
Equisetum telmateia	horsetail, giant	Horsetail	OR	no	no
Erodium sp.	filaree	Geranium	AB	yes	yes
Euphorbia cyparissias	spurge, cypress	Spurge	AB	yes	yes
Euphorbia dentata	spurge, toothed	Spurge	ID	no	yes
Euphorbia esula	spurge, leafy	Spurge	AB,BC,CO,ID,KS,MT, NE,ND,NV,OR,SD,SK, UT,WY	yes	yes
Fagopyron tartaricum	buckwheat, tartary	Buckwheat	BC,SK	no	yes

SCIENTIFIC NAME	COMMON NAME	FAMILY	LOCATION	FOUND IN MT	ALIEN
Galium sp.	bedstraw	Madder	AB,BC,SK	yes	no
Glycyrrhiza lepidota	licorice	Pea	OR	yes	no
Halogeton glomeratus	halogeton	Goosefoot	OR	yes	yes
Hemizonia pungens	spikeweed	Sunflower	OR	no	no
Hieracium aurantiacum	hawkweed, orange	Sunflower	OR	yes	yes
Hieracium pratense	hawkweed, yellow	Sunflower	OR	no	yes
Hoffmanseggia densiflora	hogpotato	Pea	AB	no	no
Hydrilla verticillata	hydrilla	Frog's-bit	OR	no	yes
Hyoscyamus niger	henbane, black	Nightshade	OR	yes	yes
Hypericum perforatum	St. Johnswort	St. Johnswort	MT,NV,OR	yes	yes
Isatis tinctoria	Dyers woad	Mustard	ID,OR,NV,UT,WY	yes	yes
Iva axillaris	sumpweed, poverty	Sunflower	SK	yes	no
Knautia arvensis	bluebuttons	Teasel	AB	yes	yes
Kochia scoparia	kochia	Goosefoot	OR	yes	yes
Lappula echinata	sticktight, European	Borage	SK	yes	yes
Lepidium latifolium	pepperweed, perennial	Mustard	ID,ND,NV,OR,SD,UT, WY	yes	yes
Lepidium repens	cress, hoary	Mustard	NV	yes	yes
Linaria dalmatica	toadflax, Dalmatian	Figwort	AB,BC,ID,MT,NV,OR, SK,WY	yes	yes
Linaria vulgaris	toadflax, yellow	Figwort	AB,BC,ID,OR,SK,WY	yes	yes
Lolium persicum	darnel, Persian	Grass	AB,SK	yes	yes
Lychnis alba	campion, white	Pink	AB,SK	yes	yes
Lythrum salicaria	lythrum, purple	Loosestrife	ID,MT,OR	yes	yes
Malva rotundifolia	mallow, common	Mallow	SK	yes	yes
Matricaria perferata	chamomile, scentless	Sunflower	AB,BC,SK	yes	no
Milium vernale	milium	Grass	ID	no	yes
Myriophyllum spicatum	watermilfoil, Eurasian	Water Milfoil	AB,SK	yes	yes
Nardus stricta	matgrass, Moor	Grass	ID,OR	no	yes
Neslia paniculata	mustard, ball	Mustard	SK	no	yes
Odontites verna	bartsia, red	Figwort	AB	no	yes
Onopordum acanthium	thistle, Scotch	Sunflower	ID,OR,NV,UT,WY	yes	yes
Panicum miliaceum	millet, wild-proso	Grass	OR	yes	yes
Pentaphylloides floribunda	cinquefoil, shrubby	Rose	BC	yes	yes
Polygonum convolvulus	buckwheat, wild	Buckwheat	SK	yes	yes
Polygonum cuspidatum	knotweed, Japanese	Buckwheat	OR	no	yes

SCIENTIFIC NAME	COMMON NAME	FAMILY	LOCATION	FOUND IN MT	ALIEN
Potentilla recta	cinquefoil, sulphur	Rose	MT	yes	yes
Ranunculus acris	buttercup, tall	Buttercup	AB	yes	yes
Rorippa austriaca	fieldcress, Austrian	Mustard	NV	yes	yes
Salsola iberica	thistle, Russian	Goosefoot	SK	yes	yes
Salvia aethiopis	sage, Mediterranean	Mint	NV,OR	yes	yes
Scleranthus annuus	knawel	Pink	AB	yes	yes
Senecio jacobaea	ragwort, tansy	Sunflower	BC,ID,OR	no	yes
Setaria viridis	foxtail, green	Grass	SK	yes	yes
Silene noctiflora	catchfly, nightflowering	Pink	AB,SK	yes	yes
Silene vulgaris	campion, bladder	Pink	AB,SK	yes	yes
Silybum marianum	milkthistle, blessed	Sunflower	NV	no	yes
Sisymbrium altissimum	mustard, tumble	Mustard	SK	yes	yes
Solanum carolinense	horsenettle	Nightshade	SD,NV	no	no
Solanum elaeagnifolium	nightshade, silverleaf	Nightshade	NV,OR	no	no
Solanum rostratum	buffalobur	Nightshade	ID,OR	yes	no
Sonchus arvensis	sowthistle, perennial	Sunflower	AB,BC,ID,ND,NV,SD, SK,WY	yes	yes
Sonchus oleraceus	sowthistle, annual	Sunflower	BC,SK	yes	yes
Sorghum almum	sorghum-almum	Grass	UT,NV	no	yes
Sorghum halepense	johnsongrass	Grass	ID,KS,OR,NV,UT	yes	yes
Spartina alterniflora	cordgrass, smooth	Grass	OR	no	yes
Sphaerophysa salsula	swainsonpea	Pea	NV,OR	yes	yes
Taeniatherum caput-medusae	Medusahead	Grass	UT,NV,OR	no	yes
Tanacetum vulgare	tansy, common	Mustard	AB,BC	yes	yes
Taraxacum officinale	dandelion	Sunflower	SK	yes	yes
Thlaspi arvense	pennycress, field	Mustard	SK	yes	yes
Tribulus terrestris	puncturevine	Caltrop	NV,OR	yes	yes
Ulex europaeus	gorse	Pea	OR	no	yes
Vaccaria pyramidata	cowcockle	Pink	OR	yes	yes
Xanthium spinosum	cocklebur, spiny	Sunflower	OR	yes	no
Zygophyllum fabago	beancaper, Syrian	Caltrop	ID	yes	yes

[1] The scientific and common names, for the most part, conform to the Composite List of Weeds, Revised 1989. Available from WSSA, 309 West Clark Street, Champaign, IL 61820.

[2] The location refers to the state or province that lists the weed as noxious (some weeds have only been proposed this year). Inclusion on the noxious weed list does not necessarily indicate that the weed can be found in the state or province. The following states and provinces are included: Alberta (AB), British Columbia (BC), Colorado (CO), Idaho (ID), Kansas (KS), Montana (MT), Nebraska (NE), Nevada (NV), North Dakota (ND), Oregon (OR), Saskatchewan (SK), South Dakota (SD), Utah (UT), Washington (WA), and Wyoming (WY)

[3] According to Dorn, R.D. 1984. Vascular Plants of Montana. Mountain West Publishing, Cheyenne, Wyoming.

Appendix 5 - Biological Control Agents

From: Montana Department of Agriculture
1991

HOST PLANT SPECIES	INSECTS AND PATHOGENS						
	Scientific Name	Type	Part Attacked	Status	Date Released	Where 1st Released
Canada thistle	Ceutorhynchus litura	Weevil	Stems/roots	Established	1972	MT
	Urophore cardui	Tephritid Fly	Stems	Established	1985	OR
Diffuse knapweed	Aceria centaureae	Mite	Leaves	Quarantine	N/R	N/R
	Bangasternus fausti	Weevil	Seed head	Established	1990	OR
	Metzneria paucipunctella	Moth	Seed head	Established	1975	MT
	Pelochrista medullana	Moth	Root	N/R	1984	N/R
	Pterolonche inspersa	Moth	Root	N/R	1986	N/R
	Puccinia jaceae	Fungus	Leaves	Native	N/R	N/R
	Sclerotinia sclerotiorum	Fungus	Crown	Native	N/R	N/R
	Sphenoptera lugoslavica	Beetle	Roots	Established	1981	OR
	Urophora affinis	Tephritid Fly	Seed head	Established	1973	MT
	Urophora quadrifasciata	Tephritid Fly	Seed head	Established	1988	MT
Field bindweed	Aceria malherbe	Mite	Leaves	Established	19907	TX, NJ
Leafy spurge	Aphthona abdominalis	Flea Beetle	Roots/leaves	HST/Quarantine	1991?	(Rome)
	Aphthona cyparissiae	Flea Beetle	Roots/leaves	Established	1987	MT, ND
	Aphthona czwalinae	Flea Beetle	Roots/leaves	Established	1987	ND
	Aphthona flava	Flea Beetle	Roots/leaves	Established	1985	MT, ND
	Aphthona nigriscutis	Flea Beetle	Roots/leaves	Established	1989	MT, ND, ID
	Chamaesphecia crassicornis	Clear Winged Moth	Roots	HST/Quarantine	1992?	MT
	Chamaesphecia empiformis	Clear Winged Moth	Roots	Not Esteblished	N/R	CA
	Hyles euphorbiae	Moth	Leaves/flowers	Established	1966	MT
	Oberea erythrocephala	Beetle	Stems/roots	Established	1982	MT
	Oxicesta geographica	Moth	Leaves/flowers	HST/Quarantine	N/R	MT
	Simyra dentinosa	Moth	Leeves/flowers	HST/Quarantine	N/R	MT
	Spurgia esulae	Fly	Growing tips	Established	1985	MT, ND
Purple loosestrife	Galerucella calmariensis	Weevil	N/R	HST/Quarentine	N/R	N/R
	Galerucella pusila	Weevil	N/R	HST/Quarantine	N/R	N/R
	Hylobius transversovittatus	Beetle	N/R	HST/Quarantine	N/R	N/R
Spotted knapweed	Agapeta zoegana	Moth	Roots	Established	N/R	MT
	Bangasternus fausti	Weevil	Seed head	Established	N/R	MT
	Cyphocleonus achates	Weevil	Roots	Esteblished	1988	MT
	Metzneria paucipunctella	Moth	Seed head	Established	1975	MT
	Sclerotinia sclerotiotum	Fungus	Crown	Native	N/R	MT
	Urophora affinis	Tephritid Fly	Seed head	Established	1973	MT
	Urophora quadrifascieta	Tephritid Fly	Seed head	Established	1988	MT
St. Johnswort	Agrillis hyperici	Beetle	Roots	Esteblished	1940s	CA
	Aplocera plagiata	Moth	Leeves/flowers	Established	1989	MT
	Chrysoline hyperici	Beetle	Leaves/flowers	Established	1940s	CA
	Chrysolina quadrigemini	Beetle	Leaves/flowers	Esteblished	1940s	CA
	Zeuxidiplosis giardi	Fly	Leaves	Established	N/R	CA, HI

HST = Host Specifity Testing
N/R = Non Reported

Revised March 21, 1991

Source: USDA/ARS
Rangeland Weed Laboratory
Biological Control of Weeds Research Unit
Montana State University, Bozeman, MT 59717

APPENDIX 6

HERBICIDE FORMULATIONS AND CONTROL GUIDELINES

Taken from Montana Weed Control Guide. 1990. Montana State University. Extension Service. Ext. Bull. # 23. 114 pp.

Summary table of herbicides commonly recommended for control of Category 1 and 2 noxious weeds on range and pasture

HERBICIDES COMMONLY RECOMMENDED FOR CONTROL OF CATEGORY 1 AND 2 NOXIOUS WEEDS ON RANGE AND PASTURE

CATEGORY 1 WEEDS	HERBICIDE	APPLICATION RATE PRODUCT PER ACRE	APPLICATION TIMING
Leafy spurge	Tordon 22K Banvel 2,4-D Roundup	1-3 quarts 2-4 quarts 1-2 quarts 1-2 quarts	Full flower; fall *Fall
Canada thistle	Tordon 22K +2,4-D Stinger Curtail Banvel 2,4-D	1 +1 quart 2/3-1 pint 2-4 quarts 1-2 quarts 1-2 quarts	After emergence to bud; fall
Whitetop	Banvel 2,4-D	2 quarts 2-3 quarts	Early bud; fall rosettes
Field bindweed	Tordon 22K Tordon +2,4-D Banvel 2,4-D	1 quart 5 +1 quart 1-2 quarts 1-2 quarts	Full bloom; fall; plants actively growing
Russian knapweed	Tordon 22K Stinger Curtail Banvel 2,4-D	1-2 quarts 1-1.3 pints 3-4 quarts 2-4 quarts 2-4 quarts	Bud stage; fall
Spotted & diffuse knapweed	Tordon 22K Stinger Curtail Banvel +2,4-D 2,4-D	1 pint 2.3 pints 2 quarts .5 +1 quart 1-2 quarts	Bolt, fall
Dalmatian toadflax	Tordon 22K Banvel Roundup 2,4-D	2-3 quarts 4 quarts 3-4 quarts 2-4 quarts	Bud to mid-flower
St. Johnswort	Tordon 22 K 2,4-D	1 quart 1-2 quarts	Early bud
CATEGORY 2 WEEDS	**HERBICIDE**	**APPLICATION RATE PRODUCT PER ACRE**	**APPLICATION TIMING**
Dyers woad	Ally +2,4-D	.5 oz +1 quart +surfactant	Rosette stage
Purple loosestrife	2,4-D Rodeo	.5-1% solution 1-2 quarts	Before seed shatter when actively growing Late flower
Sulfur cinquefoil	Tordon 22K Tordon +2,4-D Banvel +2,4-D Ally	1 pint 1 pint +1 quart .5 +1 quart .5 oz +surfactant	Bolt to early bud

Sources:

Lacey et al. 1985
Lacey, C.A. et al. 1986
Lacey and Lacey 1986
McKone, M. 1991
Montana State University Agricultural Experiment Station, Weed Control Research 1985 to 1990

From: Montana Department of Agriculture

1991

Noxious and Troublesome Plants

Herbicide General guidelines (*always read label for complete instructions*)

CANADA THISTLE

*** clopyralid** (Stinger)

Rate:	2/3 to 1 1/3 pt/A (pasture and rangeland).
	1/4 to 1/2 pt/A (noncropland).
Time:	Apply after a majority of basal leaves have emerged, but before bud stage.
Caution:	Do not apply more than once per season.
Tank mix:	1/2 to 2 lb ae of 2,4-D (noncropland).

*** dicamba** (Banvel)

Rate:	1 to 2 qt/A.
Time:	Apply to fall regrowth or when thistles are in the rosette stage and before a hard-killing frost or in bud stage.
Remarks:	Mid to late fall treatments have been most effective, use 1/2% surfactant for improved control.
Caution:	Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.
Tank Mix:	1 to 2 qt/A of Banvel + 1 lb ae/A qt of 2,4-D.

*** glyphosate** (Roundup)

Rate:	2 to 3 qt/A.
	Or, 2% solution (spray to wet foliage).
Time:	Apply when majority of thistles are at or beyond bud stage or in fall before a hard-killing frost.
Remarks:	For spot-treatment. All vegetation in treated areas will be killed. Avoid drift.
Caution:	Do not graze or harvest forage for 2 weeks after application. Do not treat more than 1/10 of any one acre at one time.

*** MCPA Iso-ocytl ester** (Several trade names)

Rate:	3 lbs ae/A in sufficient water to provide thorough coverage.
Time:	When weeds are in bud to early bloom.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

*** picloram** (Tordon)

Rate:	2 to 3 qt/A 22K.
Time:	Apply in the fall or spring when thistles are actively growing.
Caution:	**A restricted-use herbicide.** Consult the Montana **Special Local Need** label. Carefully read and observe all label restrictions.
Tank Mix:	1 qt/A of Tordon 22K + 1 lb ae/A of 2,4-D.

*** 2,4-D amine or ester** (Several trade names)

Rate:	1 to 2 lb ae/A.
Time:	Apply when thistles are in bud stage and in fall.
Remarks:	Suppression only. Better control is obtained if treated twice a year, in the bud stage in spring and again in fall. Plan to treat for several consecutive years.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide — General guidelines (*always read label for complete instructions*)

DALMATION TOADFLAX

* glyphosate (Roundup)

Rate:	4 to 5 qt/A.
	Or, a 2% solution (spray to wet foliage).
Time:	Apply between bud and bloom stage or in fall while actively growing.
Remarks:	For spot-treatment. Provides suppression only.
Caution:	All vegetation in treated area will be killed. Avoid drift. Do not graze or harvest forages for 2 weeks after application. Do not treat more than 1/10 of any one acre at one time.

* picloram (Tordon)

Rate:	3 to 4 qt/A of 22K.
Time:	In rosette stage in spring or fall.
Remarks:	Suppression only. Repeat applications are necessary.
Caution:	A restricted-use herbicide. Forage grasses may be injured on low organic matter or sandy textured soils at these Tordon rates. Consult Montana Special Local Need label. Carefully read and observe all label restrictions.

Noxious and Troublesome Plants

Herbicide — General guidelines (*always read label for complete instructions*)

FIELD BINDWEED

*** dicamba (Banvel)**

Rate:	1 to 2 qt/A.
Time:	Apply during vigorous fall growth or in summer when plants are in or beyond the full bloom stage.
Remarks:	Mid to late fall treatments have been most effective. Repeat applications are necessary for complete control. Rate depends on weed density, see label. Use 1/2% surfactant for improved control.
Caution:	Banvel rates above 2 qts/A may cause temporary injury to forage grasses. Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.
Tank Mix:	1 to 2 qt/A of Banvel + 1 to 2 lb ae/A of 2,4-D.

*** glyphosate (Roundup)**

Rate:	4 to 5 qt/A. Or, 2% solution (spray to wet foliage).
Time:	Apply late summer or fall when actively growing.
Remarks:	For spot-treatment. Repeat applications are necessary for complete control.
Caution:	All vegetation in treated area will be killed. Avoid drift. Do not graze or harvest forages for 2 weeks after application. Do not treat more than 1/10 of any one acre at one time.

*** picloram (Tordon)**

Rate:	2 to 3 qt/A of 22K.
Time:	Apply in fall or spring when actively growing.
Remarks:	Suppression only.
Caution:	**A restricted-use herbicide.** Consult Montana Special Local Need label. Carefully read and observe all label restrictions.
Tank Mix:	1 qt/A of Tordon 22K + 1 lb ae/A of 2,4-D.

*** 2,4-D amine or ester (Several trade names)**

Rate:	1 to 2 lb ae/A.
Time:	Apply between bud and bloom stage and in fall.
Remarks:	Suppression only. Better control is obtained if treated twice a year, in the bud stage in late spring and again in fall. Plan to treat for several consecutive years.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide	General guidelines (*always read label for complete instructions*)

LEAFY SPURGE

* picloram (Tordon)

Rate:	1 to 3 qt/A.
Time:	Apply to actively growing spurge in spring or fall.
Remarks:	Lower rates will require annual retreatment for several years. Retreat when control drops below 80%. Addition of 2,4-D may improve control at lower rates.
Caution:	**A restricted-use herbicide.** Forage grasses may be injured on low organic matter or sandy textured soils at higher Tordon rates. Consult Montana Special Local Need label. Carefully read and observe all label restrictions.
Tank Mix:	1 to 2 pt/A of picloram + 1 lb ae/A of 2,4-D.

* 2,4-D ester (Several trade names)

Rate:	1 to 2 qt ae/A.
Time:	Apply during early bud stage and in fall.
Remarks:	Suppression only. Apply every year in both spring and fall for satisfactory control.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide General guidelines (*always read label for complete instructions*)

KNAPWEED, DIFFUSE OR SPOTTED

* clopyralid (Stinger)

Rate:	12 fl oz/A (pasture and rangeland). 12 fl oz/A (noncropland).
Time:	Apply when actively growing in spring or fall.
Remarks:	Annual treatment necessary to control new seedlings.
Caution:	Do not apply more than once per season.
Tank mix:	1/2 to 2 lb ae of 2,4-D (noncropland).

* dicamba (Banvel)

Rate:	2 to 3 pt/A.
Time:	Apply in rosette stage in fall or spring.
Remarks:	Annual treatments necessary to control new seedlings. Use 1/2% surfactant for improved control.
Caution:	Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.
Tank Mix:	1 to 2 pt/A of Banvel + 1 to 2 lb ae/A of 2,4-D.

* picloram (Tordon)

Rate:	1 to 1 1/2 pt/A of 22K.
Time:	Apply when actively growing in spring or fall. Optimum time is rosette to prebud.
Remarks:	Provides residual control for 2 to 5 years depending upon soil type.
Caution:	A restricted-use herbicide. Consult Montana Special Local Need label. Carefully read and observe all label restrictions.

* 2,4-D amine or ester (Several trade names)

Rate:	2 lb ae/A.
Time:	Apply in the rosette stage in fall or spring.
Remarks:	Annual treatment necessary to control new seedlings.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide General guidelines (*always read label for complete instructions*)

KNAPWEED, RUSSIAN

* clopyralid (Stinger)

Rate:	2/3 to 1 1/3 pt/A (pasture and rangeland).
	1/4 to 1/2 pt/A (noncropland).
Time:	Apply after a majority of basal leaves have emerged, but before bud stage.
Caution:	Do not apply more than once per season.
Tank mix:	1/2 to 2 lb ae of 2,4-D (noncropland).

* dicamba (Banvel)

Rate:	2 to 4 qt/A.
Time:	Apply during early bud stage.
Remarks:	Rate depends on weed density, see label. Use 1/2% surfactant for improved control.
Caution:	Banvel rates above 2 qts/A may cause temporary injury to forage grasses. Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.

* dicamba + 2,4-D (Weedmaster)

Rate:	2 qt/A.
Time:	Apply when actively growing.
Caution:	See remarks under dicamba above.

* glyphosate (Roundup)

Rate:	4 to 5 qt/A.
	Or, 2% solution (spray to wet foliage).
Time:	Apply late summer or fall when actively growing and most weeds have reached late bud to flower stage.
Remarks:	For spot-treatment. Repeat applications are necessary for complete control.
Caution:	All vegetation in treated area will be killed. Avoid drift. Do not graze or harvest forages for 2 weeks after application. Do not treat more than 1/10 of any one acre at one time.

* picloram (Tordon)

Rate:	1 to 3 qt/A of 22K.
Time:	Apply from rosette to prebud stage or fall regrowth.
Remarks:	Lower rates will require annual retreatment for several years. Retreat when control drops below 80%. Addition of 2,4-D may improve control at lower rates.
Caution:	A restricted-use herbicide. Consult Montana Special Local Need label. Carefully read and observe all label restrictions.
Tank Mix:	1 qt/A of 22K + 1 lb ae/A of 2,4-D.

Noxious and Troublesome Plants

Herbicide General guidelines (*always read label for complete instructions*)

SAINT JOHNSWORT (Goatweed)

*** picloram** (Tordon)

Rate:	2 to 3 pt/A of 22K.
Time:	Apply at early bud stage.
Caution:	**A restricted-use herbicide. Consult Montana Special Local Need label.** Carefully read and observe all label restrictions.

*** 2,4-D ester** (Several trade names)

Rate:	3 lb ae/A.
Time:	Apply at early bud stage.
Remarks:	Retreatment will be necessary. Use sufficient water to provide thorough coverage.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide General guidelines (*always read label for complete instructions*)

HOARYCRESS (Whitetop)

*** dicamba** (Banvel)

Rate:	2 to 3 qt/A.
Time:	Apply at the rosette stage in fall or early bud stage in spring.
Remarks:	Growth starts in early spring and flowering and seed production occur before most other plants. Treat early before plants bloom. Use 1/2% surfactant for improved control.
Caution:	Banvel rates above 2 qt/A may cause temporary injury to forage grasses. Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.

*** 2,4-D ester** (Several trade names)

Rate:	2 to 3 lb ae/A.
Time:	Apply at rosette stage in fall or early bud stage in spring.
Remarks:	Suppression only. Growth starts in early spring and flowering and seed production occur before most other plants. Treat early before plants bloom.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide — General guidelines (*always read label for complete instructions*)

DYERS WOAD

*** dicamba (Banvel)**

Rate: 1 to 2 qt/A.

Time: Apply between bud and bloom stage and in fall.

Remarks: Annual applications are necessary to control new seedlings. Growth starts in early spring and flowering and seed production occur before most other plants. Use 1/2% surfactant for improved control.

Caution: Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.

*** 2,4-D amine or ester (Several trade names)**

Rate: 1 to 1 1/2 lb ae/A.

Time: Apply at rosette stage, before 4 inches tall in spring.

Remarks: Annual applications are necessary to control new seedlings. Growth starts in early spring and flowering and seed production occur before most other plants. Addition of 1/2 pt/A of Banvel will increase the effectiveness of late applications.

Caution: Do not graze dairy animals on treated areas within 7 days of application.

Purple Loosestrife

***dicamba** (Banvel) or **2,4-D**

Rate: 2 qts/A

Time: Mid to late flowering.

***glyphosate** (Rodeo)

Rate: 1% solution with water.

Time: Most effective in late summer (mid to late flowering). Must be treated on an annual basis.

Remarks: Rodeo is the most effective herbicide tested; 90% control has been achieved with plants treated late summer.

SAINT JOHNSWORT (Goatweed)

* **picloram** (Tordon)

Rate: 2 to 3 pt/A of 22K.

Time: Apply at early bud stage.

Caution: **A restricted-use herbicide.** Consult Montana Special Local Need label. Carefully read and observe all label restrictions.

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* **2,4-D ester** (Several trade names)

Rate: 3 lb ae/A.

Time: Apply at early bud stage.

Remarks: Retreatment will be necessary. Use sufficient water to provide thorough coverage.

Caution: Do not graze dairy animals on treated areas within 7 days of application.

Sulphur Cinquefoil

***clopyralid** (Stinger)

Rate: 12 fl oz/A (pasture and rangeland)
12 fl oz/A (noncropland)

Time: Apply when actively growing in spring or fall.

Remarks: Annual treatment necessary to control new seedlings.

Caution: Do not apply more than once per season.

Tank Mix: 1/2 to 2 lb ae of 2,4-D (noncropland)

***dicamba** (Banvel)

Rate: 2 to 3 pt/A

Time: Apply in rosette stage n spring or fall.

Remarks: Annual treatments necessary to control new seedlings. Use 1/2% surfactant for improved control.

Caution: Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.

Tank Mix: 1 to 2 pt/A of Banvel + 1 to 2 lb ae/A of 2,4-D.

***picloram** (Tordon)

Rate: 1 to 1 1/2 pt/A of 22K.

Time: Apply when actively growing in spring or fall. Optimum time is rosette to prebud.

Remarks: Provides residual control for 2 to 5 years depending on soil type.

Caution: A **restricted-use herbicide.** Consult Montana Special Local Need label. Carefully read and observe all label restrictions.

***2,4-D Amine**

Rate: 2 lb ae/A.

Time: Apply in rosette stage in spring or fall.

Remarks: Annual treatment necessary to control new seedlings.

Caution: Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide — General guidelines (*always read label for complete instructions*)

CRUPINA, COMMON

* dicamba (Banvel)

Rate:	1 to 3 pt/A.
Time:	Apply between seedling and rosette stage in fall or spring.
Remarks:	Annual applications are necessary to control new seedlings, use 1/2% surfactant for improved control.
Caution:	Remove meat animals from area 30 days prior to slaughter. Consult product label for dairy animal grazing restrictions.

* picloram (Tordon)

Rate:	1 to 2 pt/A of 22K.
Time:	Apply between seedling and rosette stage.
Caution:	**A restricted-use herbicide.** Consult Montana Special Local Need label. Carefully read and observe all label restrictions.

* 2,4-D amine or ester (Several trade names)

Rate:	1 to 2 lb ae/A.
Time:	Apply between seedling and rosette stage in fall or spring.
Remarks:	Annual applications are necessary to control new seedlings. Addition of 1/2 pt of Banvel will increase the effectiveness of late applications.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

Noxious and Troublesome Plants

Herbicide	General guidelines (*always read label for complete instructions*)

RUSH SKELETONWEED

* **dicamba** (Banvel)

Rate:	1 to 2 qt/A.
Time:	Apply at early bud stage. Use 1/2% surfactant for improved control.
Caution:	Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animal grazing restrictions.

* **picloram** (Tordon)

Rate:	1 to 2 qt/A of 22K.
Time:	Apply at early bud stage.
Caution:	**A restricted-use herbicide.** Consult Montana Special Local Need label. Carefully read and observe all label restrictions.

Herbicide General guidelines (*always read label for complete instructions*)

YELLOW STARTHISTLE

* **dicamba** (Banvel)

Rate:	2 to 3 pt/A.
Time:	Apply between seedling and rosette stage in fall or spring.
Remarks:	Annual applications are necessary to control new seedlings. Use 1/2% surfactant for improved control.
Caution:	Remove meat animals from treated areas 30 days prior to slaughter. Consult label for dairy animals grazing restrictions.

* **picloram** (Tordon)

Rate:	1 to 2 pt/A of 22K.
Time:	Apply between seedling and rosette stage in fall or spring.
Caution:	**A restricted-use herbicide.** Consult Montana Special Local Need label. Carefully read and observe all restrictions.

* **2,4-D amine or ester** (Several trade names)

Rate:	1 to 2 lb ae/A.
Time:	Apply between seedling and rosette stage in fall or spring.
Remarks:	Annual applications are necessary to control new seedlings.
Caution:	Do not graze dairy animals on treated areas within 7 days of application.

APPENDIX 7

HERBICIDE LABEL INSTRUCTIONS

BROADLEAF HERBICIDE

The 2,4-D Amine Weedkiller

ACTIVE INGREDIENT:

Dimethylamine salt of 2,4-Dichlorophenoxyacetic acid*	46.8%
INERT INGREDIENTS:	53.2%

*2,4-Dichlorophenoxyacetic acid equivalent 38.9% by weight or 3.8 pounds per gallon.
**Isomer specific by AOAC method No. 6.D01-5

EPA Reg. No. 264-2AA **EPA Est. No. 264-MO-01**

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

PRECAUCION AL USUARIO: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicado ampliamente.

STATEMENT OF PRACTICAL TREATMENT

IF IN EYES: Flush with water for at least 15 minutes and get medical attention.

FOR ADDITIONAL PRECAUTIONARY STATEMENTS: See inside booklet.

For **PRODUCT USE** Information Call 1-800-334-9745.

For **MEDICAL** and **TRANSPORTATION** Emergencies Only
Call 24 Hours A Day 1-800-334-7577.

RHÔNE-POULENC AG COMPANY
P.O. Box 12014, 2 TW. Alexander Drive
Research Triangle Park, N.C. 27709

MADE IN U.S.A.
RP-4500-148-000-031

Cut along perforation to open booklet

PRECAUTIONARY STATEMENTS

DANGER

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Harmful if swallowed. May be fatal if absorbed through the skin. Causes irreversible eye damage. Avoid breathing vapors or spray mist. Do not get in eyes, on skin, or on clothing. When handling this product, wear goggles or safety glasses, protective clothing and chemical resistant gloves. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco. Remove contaminated clothing and wash before reuse.

STATEMENT OF PRACTICAL TREATMENT

IF ON SKIN: Wash skin with plenty of soap and water. Remove contaminated clothing. Get medical attention.

IF SWALLOWED: If patient is conscious and alert, give 2 to 3 glasses of water or milk to drink. If available, give one tablespoon of Syrup of Ipecac to induce vomiting. Alternatively, induce vomiting by touching back of throat with finger. Do not make an unconscious person vomit. Get medical attention.

IF IN EYES: Flush with water for at least 15 minutes. Get medical attention, PREFERABLY AN OPHTHALMOLOGIST.

IF INHALED: Move to an uncontaminated area. Get medical attention.

NOTE TO PHYSICIAN

This product contains a phenoxy herbicidal chemical. There is no specific antidote. All treatments should be based on observed signs and symptoms of distress in the patient. Overexposure to materials other than this product may have occurred.

ENVIRONMENTAL HAZARDS

This product is toxic to aquatic invertebrates. Drift or runoff may adversely affect aquatic invertebrates and non-target plants. Do not apply directly to water except as specified on this label. Do not contaminate water when disposing of equipment washwaters. Do not apply when weather conditions favor drift from treated areas. Do not use the same spray equipment for other purposes unless thoroughly cleaned.

Do not use in or near a greenhouse.

Do not contaminate water used for irrigation or domestic purposes (except as specifically recommended on this label) especially in areas where grapes, cotton, tomatoes or other susceptible plants are grown. Do not treat irrigation ditches in areas where water will be used to overhead (sprinkler) irrigate susceptible crops especially grapes,, tomatoes, tobacco and cotton.

Ground Water Contamination: Most cases of ground water contamination involving phenoxy herbicides such as 2,4-D have been associated with mixing/loading and disposal sites. Caution should be exercised when handling 2,4-D pesticides at such sites to prevent contamination of ground water supplies. Use of closed systems for mixing or transferring this pesticide will reduce the probability of spills. Placement of the mixing/loading equipment on an impervious pad to contain spills will help prevent ground water contamination.

Do not apply WEEDAR® brand 64 Broadleaf Herbicide directly to, or permit mist to drift onto cotton, okra, grapes, tomatoes, fruit trees, vegetables, flowers or other desirable crop or ornamental plants which are susceptible to 2,4-D herbicide. Do not apply near susceptible plants since very small quantities of the 2,4-D will cause severe injury during the growing or dormant periods. Crops contacted by WEEDAR® 64 Broadleaf Herbicide sprays or spray drift may be killed or suffer significant stand loss with extensive quality and yield reduction.

Do not apply when a temperature air inversion exists. Such a condition is characterized by little or no air movement and an increase in air temperature with an increase in height. In humid regions a fog or mist may form. An inversion may be detected by producing a smoke column and checking for a layering effect. If questions exist pertaining to the existence of an inversion, consult with local weather services before making an application.

Use coarse sprays to minimize drift. Do not apply with hollow cone type insecticide or other nozzles that produce fine spray droplets.

Drift from aerial or ground application may be reduced by: (1) applying as near the target as possible in order to obtain coverage; (2) by increasing the volume of spray mix per acre; (3) by decreasing the pounds of pressure at the nozzle tips; (4) by using nozzles which produce a coarse spray pattern; (5) by not applying when the wind is blowing toward susceptible crops or valuable plants.

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING.

Do not apply WEEDAR® brand 64 Broadleaf Herbicide through any type of irrigation system.

GENERAL WORKER PROTECTION STATEMENTS

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area treated must be vacated by unprotected persons.

Do not enter treated areas without protective clothing until sprays have dried.

Because certain states may require more restrictive reentry intervals for various crops treated with this product, consult your State Department of Agriculture for further information.

Written or oral warnings must be given to workers who are expected to be in a treated area or in an area about to be treated with this product. Advise workers to stay out of fields during application and until sprays have dried. Regular long-sleeved work clothing should be worn when working in treated fields. See PRECAUTIONARY STATEMENTS, STATEMENT OF PRACTICAL TREATMENT AND NOTE TO PHYSICIAN for information on accidental exposures. When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings must be given if there is reson to believe that written warnings cannot be understood by workers. Written warnings must include the following information: appropriate signal word (DANGER—PELIGRO), area treated with WEEDAR® brand 64 Broadleaf Herbicide, date of application, appropriate protective clothing, and reentry interval (i.e. until sprays have dried).

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*knotweed

*bindweed
blue lettuc
*Canada th
catnip
chicory
dandelion
*docks
*dogbanes

ENERAL INFORMATION

PREPARE A SPRAY: Mix WEEDAR® brand 64 Broadleaf Herbicide only with water unless erwise indicated on this label. Add about half the water to the mixing tank, then add EDAR® 64 Broadleaf Herbicide with agitation, and finally the rest of the water with continu- agitation. Note: Adding oil, wetting agent, or other surfactant to the spray may increase effec- ness on weeds but also may reduce selectivity to crops, resulting in crop damage.

MPATIBILITY: If WEEDAR® 64 Broadleaf Herbicide is to be tank mixed with fertilizers or with er pesticides, compatibility should be tested prior to mixing. To test for compatibility, use a small tainer and mix a small amount (0.5 to 1 qt.) of spray, combining all ingredients in the same ratio he anticipated use. If any indications of physical incompatibility develop, do not use this mix- for spraying. Indications of incompatibility usually will appear within 5-15 minutes after mix- Read and follow all directions and precautions on this label and on the labels of any products which a tank mixture is being considered.

pply by air or ground equipment in sufficient gallonage to obtain adequate coverage, except as nerwise directed on this label.

e 2 or more gallons of water per acre for aerial application and 10 or more gallons of water per a for ground application.

not apply this product through any irrigation equipment.

EDS CONTROLLED BY PROPERLY APPLIED TREATMENTS OF WEEDAR® BRAND 64 CLUDE THE FOLLOWING:

ANNUAL AND BIENNIAL WEEDS

- ggarticks
- ll thistle
- ffeeweed
- mmon burdock
- mmon cocklebur
- mmon evening primrose
- mmon lambsquarters
- airy galinsoga
- nsonweed
- notweed
- *mallow (venice or little) marshelder morningglory (common, ivy, wooly)
- *musk thistle***
- mustards (except blue mustard)
- pepperweeds (except perennial)
- **pigweeds (*Amaranthus* spp.)
- prickly lettuce
- ragweed (common or giant)
- rough fleabane
- ***Russian thistle**
- **salsify (western or common)**
- ***smartweeds (annual species)**
- **sowthistles (annual or spiny)**
- **sunflower**
- ***vervains**
- **vetches**
- **wild carrot**
- **wild lettuce**
- **wild parsnips**

PERENNIAL WEEDS

- ndweed (hedge, field, European)
- lue lettuce
- anada thistle
- atnip
- nicory
- andelion
- docks
- logbanes
- *goldenrod
- *ground ivy
- healall
- hoary cress
- *ironweed
- Jerusalem-artichoke
- *many flowered aster
- *nettles (including stinging)
- ***orange hawkweed**
- **plantains**
- **sowthistle (perennial)**
- ***vervains**
- **wild garlic**
- **wild onions**

*These species may require repeated applications and/or use of the higher rate recommended on this product label even under ideal conditions for application.

**Control of pigweeds in the High Plains area of Texas and Oklahoma may not be satisfactory with this product.

***Not registered for control of musk thistle in California.

INJURY TO CROPS FROM THIS HERBICIDE MAY OCCUR. IF YOU ARE NOT PREPARED TO ACCEPT SOME DEGREE OF CROP INJURY DO NOT USE THIS PRODUCT.

Crop varieties may vary in response to 2,4-D and some are easily injured. Apply WEEDAR® BRAND 64 only to varieties known to be tolerant to 2,4-D. If you are uncertain concerning tolerant varieties or local use situations that may affect crop tolerance to 2,4-D, consult your seed company, state Agricultural Extension Service or qualified crop consultant for advice.

RECOMMENDATION FOR APPLYING WEEDAR® BRAND 64 BROADLEAF HERBICIDE

CEREAL GRAINS (Postemergence) WHEAT, BARLEY, RYE, OATS

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Not underseeded with legumes Annual and biennial weeds Perennial broadleaf weeds	½ - 2 pints* 1 - 2 pints	Apply after grain is fully tillered (usually about 4-8 inches high) but not forming joints in the stem. **Do not spray grain in boot to dough stage.**
Grain underseeded with legumes	¼ - ½ pint	Apply after grain is 8 inches tall. **Do not spray grain in boot to dough stage.** Do not spray alfalfa or sweet clover unless the infestation is severe and injury to these legumes can be tolerated.
Emergency weed control in wheat Perennial broadleaf weeds	3 pints*	Apply when weeds are approaching bud stage, after the grain dough stage. **Do not spray during the boot to dough stage.** The 3 pint per acre application can produce injury to wheat. Balance the severity of your weed problem against the possibility of crop damage. Where perennial weeds are scattered, spot treatment is suggested to minimize the extent of crop injury.

*Use the lower rate if small annual and biennial weeds are the major problem. Use the higher rate if perennial weeds or annual and biennial weeds are present which are in the hard to kill categories as determined by local experience. The higher rates increase the risk of grain injury and should be used only where the weed control problem justifies the grain damage risk. Do not apply WEEDAR® 64 to grain in the seedling stage.

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— Do not feed treated st

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Preemergence	
Postemergence Annual broadleaf weeds Perennial broadleaf weeds	

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RESTRICTIONS AND LIMITATIONS FOR USE ON CEREAL GRAINS

—For aerial application on grain, apply WEEDAR® brand 64 in 3 to 10 gallons of water per acre. For ground application use a minimum of 10 gallons of water per acre.
—Do not permit dairy animals or meat animals being finished for slaughter to forage treated grain fields within 2 weeks after treatment.
—Do not feed treated straw to livestock if an emergency treatment as described above is applied

CORN (Field and Sweet)

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Preplant	1 - 2 pints	To control emerged broadleaf weed seedlings or existing cover crops prior to planting corn, apply 7 to 14 days before planting. Do not use on light, sandy soil, or where soil moisture is inadequate for normal weed growth. Use high rate for less susceptible weeds or cover crops such as alfalfa.
Preemergence	2 - 3 pints	Apply 3 to 5 days after planting but before corn emerges. Do not use on light, sandy soils or where soil moisture is low.
Postemergence Annual broadleaf weeds Perennial broadleaf weeds	 ½ - 1 pint 1 - 1½ pints	Apply when weeds are small and corn is less than 8 inches tall (to top of canopy). When corn is over 8 inches tall, use drop nozzles and keep spray off foliage. Treat perennial weeds when they are in the bud to bloom stage. Do not spray corn in the tassel to dough stage. Corn treated with 2,4-D may become temporarily brittle. Winds or cultivation may cause stalk breakage during the period of time when the corn is brittle.

GRAIN SORGHUM—Milo

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Postemergence	1 pint	Apply when sorghum is 6 to 15 inches tall. If sorghum is taller than 8 inches to the top of the canopy, use drop nozzles and keep spray off the foliage. Do not treat during the boot, flowering, or dough stages.

RESTRICTIONS AND LIMITATIONS FOR USE ON CORN OR SORGHUM

—Do not forage or feed fodder for seven days following application.

RICE

AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
1 - 2½ pints	Apply when rice is in the late tillering stage of development, at the time of first joint development. Do not apply after panicle initiation, after rice internodes exceed ½ inch, at early seedling, early panicle, boot, or heading stages. Consult local University and Agricultural Extension Service specialists for more specific information on rates and timings of application.

SUGARCANE

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Preemergence	4 pints	Apply before canes appear for control of emerged broadleaf weeds.
Postemergence	1½ - 2 pints	Apply after cane emerges and through layby. DO NOT USE IN CALIFORNIA.

FALLOW LAND AND CROP STUBBLE

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	1 - 2 pints	Use the lower rate when weeds are small (2-3 inches tall) and actively growing. Use the higher rate on older and drought-stressed plants.
Biennial broadleaf weeds	2 - 4 pints	Spray while musk thistles or other biennial species are in the seedling to rosette stage, and before flower stalks become apparent. The lower rate can be used in spring during rosette stage. In fall or after flower stalks have developed, use the highest rate.
Perennial broadleaf weeds	2 - 6 pints	Spray weeds in bud to bloom stage, or while in good vegetative growth. Do not disturb treated area for at least 2 weeks after treatment, or until weed tops are dead.
Wild garlic and onion in crop stubble	4 - 6 pints	Apply to new regrowth of wild onion or garlic which occurs in the fall following harvest of small grains, corn, or grain sorghum.

ıS AND LIMITATIONS FOR USE ON CORN OR SORGHUM
e or feed fodder for seven days following application.

RICE

▾T OF PER ACRE	DIRECTIONS
ints	Apply when rice is in the late tillering stage of development, at the time of first joint development. Do not apply after panicle initiation, after rice internodes exceed ½ inch, at early seedling, early panicle, boot, or heading stages. Consult local University and Agricultural Extension Service specialists for more specific information on rates and timings of application.

SUGARCANE

	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
	4 pints	Apply before canes appear for control of emerged broadleaf weeds.
₫	1½ - 2 pints	Apply after cane emerges and through layby. DO NOT USE IN CALIFORNIA.

FALLOW LAND AND CROP STUBBLE

	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
af	1 - 2 pints	Use the lower rate when weeds are small (2-3 inches tall) and actively growing. Use the higher rate on older and drought-stressed plants.
ds	2 - 4 pints	Spray while musk thistles or other biennial species are in the seedling to rosette stage, and before flower stalks become apparent. The lower rate can be used in spring during rosette stage. In fall or after flower stalks have developed, use the highest rate.
eds	2 - 6 pints	Spray weeds in bud to bloom stage, or while in good vegetative growth. Do not disturb treated area for at least 2 weeks after treatment, or until weed tops are dead.
	4 - 6 pints	Apply to new regrowth of wild onion or garlic which occurs in the fall following harvest of small grains, corn, or grain sorghum.

RESTRICTIONS AND LIMITATIONS FOR USE ON FALLOW LAND AND CROP STUBBLE
—Do not plant any crop for three months after treatment or until chemical has disappeared from the soil.

ESTABLISHED GRASS PASTURES, RANGELANDS AND CONSERVATION RESERVE PROGRAM AREAS

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	2 pints	Apply when weeds are small and actively growing and prior to bud stage. Spray while musk thistles or other biennial species are in the seedling to rosette stage and before flower stalks become apparent. The lower rate can be used in the spring during rosette stage. Use the highest rate in the fall or after flower stalks have developed. Do not apply to newly seeded areas until grass is well established. Bentgrass and legumes may be injured by this treatment. Do not apply to grass in the early boot through milk stage if grass seed production is desired.
Perennial and biennial broadleaf weeds	2 - 4 pints	

RESTRICTIONS AND LIMITATIONS FOR USE IN PASTURES AND RANGELAND
—Do not graze (dairy) cattle in treated area for 7 days after application.
—Do not cut forage for hay within 30 days of application.
—Do not permit dairy animals or meat animals being finished for slaughter to forage treated fields within 3 days of slaughter.

CONSERVATION RESERVE PROGRAM AREAS

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds in young grasses	½ - 1 pint	Apply to actively growing annual broadleaf weeds. Use ½ to 1 pint when weeds are small; use higher rates on older weeds. Do not apply to young grasses with fewer than 6 leaves or prior to tillering, as excessive injury may result. Do not apply more than 1 pint until grasses are well established as excessive injury may result.
in established grasses	½ - 2 pints	
Biennial and perennial broadleaf weeds in established grasses	2 - 4 pints	Treat when biennial weeds are in the seedling to rosette stage and before flower stalks become apparent. Treat perennial weeds in the bud to bloom stage. Apply to actively growing weeds.

RESTRICTIONS AND LIMITATIONS FOR USE ON CONSERVATION RESERVE PROGRAM AREAS

- Use at least 2 gallons of water per acre by air and 5 gallons of water per acre by ground.
- Do not harvest or graze treated Conservation Reserve Program areas.
- Do not apply to grasses in the boot to dough stage if grass seed production is desired.

GRASSES FOR SEED PRODUCTION

AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
2 - 4 pints	Apply to established stands in spring from tiller to early boot stage. **Do not spray in boot stage.** New spring seedlings may be treated with the lower rate after grass seedlings have at least 5 leaves. Perennial weed regrowth may be treated in the fall. DO NOT USE IN CALIFORNIA.

RESTRICTIONS AND LIMITATIONS FOR USE ON GRASSES FOR SEED PRODUCTION
Do not graze dairy animals or cut forage for hay within 7 days of application.

NON-CROPLAND

Fencerows, roadsides, drainage ditches, golf courses, cemeteries, parks, turfgrass and other grass areas)

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	2 - 4 pints	Treat when weeds are young and actively growing. Perennial weeds should be near the bud stage but not flowering at application. Do not use on susceptible Southern grasses such as St. Augustine. Do not apply to newly seeded areas until grass is well established. Bentgrass, clover, legumes, and dichondria may be injured by this treatment.
Biennial and Perennial broadleaf weeds	4 - 8 pints	

SPOT TREATMENT IN NON-CROP AREAS
Mix 2 to 3 fluid ounces of WEEDAR® 64 Broadleaf Herbicide in 3 gallons of water. Wet all weeds and stems thoroughly. For best results, treat when weeds are actively growing.

RESTRICTIONS AND LIMITATIONS FOR USE ON NON-CROPLAND
Do not graze dairy animals for seven days following application. Use sufficient gallonage for thorough and uniform coverage.

FORESTRY—TREE INJECTION (For controlling species such as alder, aspen, birch, blackgum, cherry, oak, sweetgum, and tulip poplar): Make injections as near to the root collar as possible, using one injection per inch of trunk dbh (4½ feet). For resistant species such as hickory, injections should overlap. For best results, injections should be made during the growing season, May 15th through October 15th.

For Dilute Injection: Mix 1 gallon of WEEDAR® brand 64 Broadleaf Herbicide in 19 gallons of water for dilute injections. For Concentrate Injections: Use 1 to 2 ml of concentrate WEEDAR® 64 Broadleaf Herbicide per injection. The injection bit must penetrate the inner bark.

STONE FRUIT AND NUT ORCHARDS

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	3 pints	For control of weeds on the orchard floor, apply using coarse sprays and low pressure in sufficient volume of water to obtain thorough wetting of weeds. Treat when weeds are small and actively growing. Do not use on light, sandy soil. DO NOT USE IN CALIFORNIA.

RESTRICTIONS AND LIMITATIONS FOR USE IN STONE FRUIT AND NUT ORCHARDS

- Do not apply to bare ground as injury may result.
- Do not apply immediately before irrigation and withold irrigation for 2 days before and for 3 days after treatment.
- Do not allow spray to drift onto or contact foliage, fruit, stems, trunks of trees or exposed roots as injury may result.
- Do not apply to newly established or young orchards. Trees must be at least 1 year old and in vigorous condition.
- Do not apply during bloom.
- Do not graze or feed cover crops from treated orchards.
- Do not make more than 2 applications per year.
- Do not harvest stone fruit within 40 days of application.
- Do not harvest nuts within 60 days of application.

WEEDS AND BRUSH IRRIGATION CANAL DITCHBANKS
(Seventeen Western States: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, Nevada, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming)

For control of annual and perennial broadleaf weeds, apply 1 to 2 quarts of WEEDAR® 64 Broadleaf Herbicide per acre in approximately 20 to 100 gallons per acre. Treat when weeds are young and actively growing before the bud or early bloom stage. For harder-to-control weeds, a repeat spray after 3 to 4 weeks using the same rates may be needed for maximum results. Apply no more than two treatments per season.

For woody brush and patches of perennial broadleaf weeds, mix 1 gallon of WEEDAR® 64 in 150 gallons of water. Wet foliage thoroughly using about 1 gallon of solution per square rod.

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SPRAYING INSTRUCTIONS

Apply with low pressure (10 to 40 psi) power spray equipment mounted on a truck, tractor, or boat. Apply while traveling upstream to avoid accidental concentration of chemical into water. Spray when the air is fairly calm, 5 mph or less. Do not use on small canals (less than 10 cfs) where water will be used for drinking purposes.

Boom spraying onto water surface must be held to a minimum and no cross-stream spraying to opposite banks should be permitted. When spraying shoreline weeds, allow no more than 2-foot overspray onto water with an average of less than 1-foot overspray to prevent introduction of greater than negligible amounts of chemical into the water.

Do not allow dairy animals to graze on treated areas for at least 7 days after spraying. Water within treated banks should not be fished.

WATER HYACINTH CONTROL

For use in ponds, lakes, reservoirs, marshes, bayous, drainage ditches, canals, rivers and streams that are quiescent or slow moving.

NOTICE TO APPLICATORS

State and Local Coordination: Before application, coordination and approval of local and state authorities may be required, either by letter of agreement or issuance of special permits for such use.

Fish Toxicity—Oxygen Ratio: Fish breathe oxygen in the water and a water-oxygen ratio must be maintained. Decaying weeds use up oxygen. To avoid fish kill from decaying plant material do not treat more than one half the lake or pond at one time. For large bodies of weed infested waters leave buffer strips of at least 100 feet wide and delay treatment of these strips for 4 to 5 weeks or until the dead vegetation has decomposed.

Wind Velocity—Ground or Surface Application: Do not apply when wind speeds are at or above 10 mph. **Air Application:** Do not apply when wind speeds are at or above 5 mph.

Irrigation: Delay the use of treated waters for irrigation for three weeks after treatment unless an approved assay shows that the water does not contain more than 0.1 ppm 2,4-D acid. Do not treat irrigation ditches in areas where water will be used to overhead sprinkler irrigate susceptible crops, especially grapes, tomatoes and cotton.

Potable Water: Delay the use of treated water for domestic purposes for a period of three weeks or until such time as an approved assay shows that the water contains no more than 0.1 ppm 2,4-D acid.

WATER HYACINTH *(Eichornia crassipe)*—DIRECTIONS FOR USE

WEEDAR® 64 will control water hyacinth with surface and air applications.

Amounts to Use: 2 to 4 quarts (4 lb. acid equivalent per gallon) per acre. *Spray the weed mass only.* Use 4 quarts when plants are matured or when the weed mass is dense.

When To Apply: Spray when water hyacinth plants are actively growing. Repeat as necessary to kill regrowth and hyacinth plants missed in the previous operation.

How To Use—Surface Application: Use power sprayers operated with a boom or spray gun mounted on a boat, tractor or truck. Thorough wetting of foliage is essential for maximum control. Use 100 to 400 gal./A of spray mixture. Special Precautions such as the use of low pressure, large nozzles and thickening agents should be taken to avoid spray drift in areas of sensitive crops. For Directa-Spra operation use WEEDAR® 64 with 1 pint of LO-DRIFT™ in 50 to 100 gallons of water. For other applications, follow the LO-DRIFT™ label for mixing directions. **Air Application:** Use drift control spray equipment or thickening agents such as LO-DRIFT™ mixed into the spray solution. Apply 1.0 gallon per acre of WEEDAR® 64 through standard boom systems with a minimum of 5 gallons of spray mix per acre. For MICROFOIL® drift control spray systems, apply WEEDAR® 64 in 12 to 15 gallons spray mix per acre.

2,4-D Acid Equivalent	½ lb.	1 lb.	2 lbs.	3 lbs.	4 lbs.
WEEDAR® 64	1 pt.	2 pts.	2 qts.	3 qts.	4 qts.

EURASIAN WATER MILFOIL CONTROL

For Eurasian Water Milfoil in programs conducted by the Tennessee Valley Authority in dams and reservoirs of the TVA system.

NOTICE TO APPLICATORS

Fish Toxicity—Oxygen Ratio: Fish breathe oxygen in the water and a water-oxygen ratio must be maintained. Decaying weeds use up oxygen. To avoid fish kill from decaying plant material do not treat more than one half the lake or pond at one time. For large bodies of weed infested waters leave buffer strips of at least 100 feet wide and delay treatment of these strips for 4 to 5 weeks or until the dead vegetation has decomposed.

Wind Velocity—Ground or Surface Application: Do not apply when wind speeds are at or above 10 mph. **Air Application:** Do not apply when wind speeds are at or above 5 mph. The restrictions do not apply to subsurface applications used in weed control programs.

WATER MILFOIL *(Myriophyllum spicatum)*—DIRECTIONS FOR USE

WEEDAR® 64 will control water milfoil with surface, subsurface and air applications.

How To Use: To control water milfoil when less than 5 gallons of concentrate per acre is recommended, dilute the concentrate with water to apply a minimum of 5 gallons of spray mix per acre. Do not treat within 1/2 mile of potable water intakes. Shoreline areas should be treated by sub-surface injection applied by boat to avoid aerial drift. Do not apply when weather conditions favor drift from target area. Do not contaminate water by cleaning of equip ment washwaters.

Open Water Areas: To reduce contamination and prevent undo exposure to fish and other aquatic organisms, do not treat water areas that are not infested with aquatic weeds.

Amounts To Use: Apply 2.5 to 10 gallons of WEEDAR® 64 per acre. The higher rate is used in areas of greater water exchange. These areas may require a repeat application.

When to Apply: For best results, apply in spring or early summer when milfoil starts to grow. This timing can be checked by sampling the lake bottom in areas heavily infested with weeds the year before.

Subsurface Application: Apply 2.5 to 10 gallons of WEEDAR® 64 per acre as a concentrate directly into the water through boat mounted distribution systems.

Surface Application: Apply 2.5 to 10 gallons of WEEDAR® 64 per acre in a minimum spray volume of 5 gallons mix per acre.

Air Application: Use drift control spray equipment or thickening agents such as LO-DRIFT™ mixed into the spray solution. Apply 2.5 to 10 gallons per acre of WEEDAR® 64 through standard boom systems with a minimum of 5 gallons of spray mix per acre. For MICROFOIL® drift control spray systems apply WEEDAR® 64 in 12 to 15 gallons spray mix per acre.

STORAGE AND DISPOSAL

STORAGE

Do not contaminate water, food or feed by storage or disposal. Store in original container in a dry, secured storage area. Keep container tightly closed when not in use.

PESTICIDE DISPOSAL

Open dumping is prohibited. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law and may contaminate ground water. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL

PLASTIC

Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

DRUM

Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Local conditions may affect the use of herbicides. Consult your State Agricultural Experiment Station, Farm Advisors, or Extension Weed Specialist for advice in selecting treatment from this label to best fit local conditions.

Be sure that use of this product conforms to all applicable laws, rules and regulations. Certain states have restrictions pertaining to application distances from susceptible crops. The applicator should become familiar with these laws, rules or regulations and follow them exactly. Apply this product only as specified on this label.

LIMITED WARRANTY AND DISCLAIMER

The manufacturer warrants (a) that this product conforms to the chemical description on the label; (b) that this product is reasonably fit for the purposes set forth in the directions for use when it is used in accordance with such directions; and (c) that the directions, warnings and other statements on this label are based upon responsible experts' evaluation of reasonable tests of effectiveness, of toxicity to laboratory animals and to plants, and upon reports of field experience. Tests have not been made on all varieties or in all states or under all conditions. THE MANUFACTURER NEITHER MAKES NOR INTENDS, NOR DOES IT AUTHORIZE ANY AGENT OR REPRESENTATIVE TO MAKE ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, AND IT EXPRESSLY EXCLUDES AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

THIS WARRANTY DOES NOT EXTEND TO, AND THE BUYER SHALL BE SOLELY RESPONSIBLE FOR, ANY AND ALL LOSS OR DAMAGE WHICH RESULTS FROM THE USE OF THIS PRODUCT IN ANY MANNER WHICH IS INCONSISTENT WITH THE LABEL DIRECTIONS, WARNINGS OR CAUTIONS.

BUYER'S EXCLUSIVE REMEDY AND MANUFACTURER'S OR SELLER'S EXCLUSIVE LIABILITY FOR ANY AND ALL CLAIMS, LOSSES, DAMAGES, OR INJURIES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, WHETHER OR NOT BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE, SHALL BE LIMITED, AT THE MANUFACTURER'S OPTION, TO REPLACEMENT OF, OR THE REPAYMENT OF THE PURCHASE PRICE FOR, THE QUANTITY OF PRODUCT WITH RESPECT TO WHICH DAMAGES ARE CLAIMED. IN NO EVENT SHALL MANUFACTURER OR SELLER BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT.

NOTICE TO BUYER

Purchase of this material does not confer any rights under patents governing this product or the use thereof in countries outside of the United States.

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WEEDAR® brand 64 Broadleaf Herbicide

The 2,4-D Amine Weed Killer

ACTIVE INGREDIENT:

Dimethylamine salt of 2,4-Dichlorophenoxyacetic acid*	46.8%
INERT INGREDIENTS	53.2%
*2,4-Dichlorophenoxyacetic acid equivalent 38.9% by weight or 3.8 pounds per gallon.	

*Isomer specific by AOAC method No. 6.D01-5

EPA Reg. No. 264-2AA

EPA Est. No. 264-MO-01

KEEP OUT OF REACH OF CHILDREN
DANGER
PELIGRO

STATEMENT OF PRACTICAL TREATMENT

IF IN EYES: Flush with water for at least 15 minutes and get medical attention.
PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto
hasie que la etiqueta le haya sido explicado amplemente.

For **PRODUCT USE** Information Call 1-800-334-8745.
For **MEDICAL** and **TRANSPORTATION** Emergencies Only Call 24 Hours A Day 1-800-334-7577.

PRECAUTIONARY STATEMENTS

DANGER

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Harmful if swallowed. May be fatal if absorbed through the skin. Causes irreversible eye damage. Avoid breathing vapors or spray mist. Do not get in eyes, on skin, or on clothing. When handling this product, wear goggles or safety glasses, protective clothing and chemical resistant gloves. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco. Remove contaminated clothing and wash before reuse.

STATEMENT OF PRACTICAL TREATMENT: IF ON SKIN: Wash skin with plenty of soap and water. Remove contaminated clothing. Get medical attention. **IF SWALLOWED:** If patient is conscious and alert, give 2-3 glasses of water or milk to drink. If available, give one tablespoon of Syrup of Ipecac to induce vomiting. Alternatively, induce vomiting by touching back of throat with finger. Do not make an unconscious person vomit. Get medical attention. **IF IN EYES:** Flush with water for at least 15 minutes. Get medical attention. PREFERABLY AN OPHTHALMOLOGIST. **IF INHALED:** Move to an uncontaminated area. Get medical attention

NOTE TO PHYSICIAN: This product contains a phenoxy herbicidal chemical. All treatments should be based on observed signs and symptoms of distress in the patient. There is no specific antidote. Overexposure to materials other than this product may have occurred.

ENVIRONMENTAL HAZARDS: This product is toxic to aquatic invertebrates. Drift or runoff may adversely affect aquatic invertebrates and non-target plants. Do not apply directly to water except as specified on this label. Do not contaminate water when disposing of equipment washwaters. Do not apply when weather conditions favor drift from treated areas. Do not use the same spray equipment for other purposes unless thoroughly cleaned. Do not use in or near a greenhouse

Do not contaminate water used for irrigation or domestic purposes (except as specifically recommended on this label) especially in areas where grapes, cotton, tomatoes or other susceptible plants are grown. Do not treat irrigation ditches in areas where water will be used to overhead (sprinkler) irrigate susceptible crops especially grapes, tomatoes, tobacco and cotton

Ground Water Contamination: Most cases of ground water contamination involving phenoxy herbicides such as 2,4-D have been associated with mixing/loading and disposal sites. Caution should be exercised when handling 2,4-D pesticides at such sites to prevent contamination of ground water supplies. Use of closed systems for mixing or transferring this pesticide will reduce the probability of spills. Placement of the mixing/loading equipment on an impervious pad to contain spills will help prevent ground water contamination.

DIRECTIONS FOR USE: IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING. Do not apply WEEDAR® brand 64 Broadleaf Herbicide through any type of irrigation system.

STORAGE AND DISPOSAL

STORAGE: Do not consaminate or store near food, feedstuff, fertilizers, seeds, insecticides, fungicides or other pesticides.

PESTICIDE DISPOSAL: Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law and may contaminate ground water. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidence

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Be sure that use of this product conforms to all applicable laws, rules and regulations. Certain states have restrictions pertaining to application distances from susceptible crops

RHÔNE-POULENC AG COMPANY
P.O. Box 12014, 2 T.W. Alexander Drive
Research Triangle Park, N.C. 27709

MADE IN U.S.A
RP-4500-148-000-031

Cut along perforation to open booklet

Specimen Label

Restricted Use Pesticide

May Injure (Phytotoxic) Susceptible, Non-Target Plants. For retail sale to and use only by Certified Applicators or person under their direct supervision and only for those uses covered by the Certified Applicator's certification. Commercial certified applicators must also ensure that all persons involved in these activities are informed of the precautionary statements.

DowElanco

Tordon®

22K

Herbicide

For use in areas west of the Mississippi River for the control of susceptible broadleaf weeds and woody plants on rangeland and permanent grass pastures, fallow cropland, wheat, barley and oats not underseeded with a legume on grainland (which is not flood or sub-irrigated and not rotated to broadleaf crops), non-cropland, and on Conservation Reserve Program (CRP) acres and wildlife openings in forest and non-crop areas

Active Ingredient:
picloram: 4-amino-3,5,6-trichloropicolinic acid, potassium salt 24.4%
Inert Ingredients 75.6%
Acid Equivalent
picloram: 4-amino-3,5,6-trichloropicolinic acid - 21.1% - 2 lb per gal

EPA Reg. No. 62719-6

EPA Est. 464-MI-1

Net Contents 2.5 gal

Precautionary Statements

Hazards to Humans and Domestic Animals

Keep Out Of Reach Of Children

WARNING AVISO:

Precaucion al usuario: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

Causes Substantial But Temporary Eye Injury • Harmful If Inhaled Or Absorbed Through Skin

Do not get in eyes or on clothing. Wear goggles, face shield or safety glasses when handling. Avoid contact with skin. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse. Avoid breathing spray mist.

First Aid

If in eyes: Flush with plenty of water for at least 15 minutes. Get medical attention.

Environmental Hazards

Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water when disposing of equipment washwaters. Do not contaminate water used for irrigation or domestic purposes by cleaning of equipment or disposal of wastes. Do not allow run-off or spray to contaminate wells, irrigation ditches or any body of water used for irrigation or domestic purposes. Do not make application when circumstances favor movement from treatment site.

Picloram is a chemical which can travel (seep or leach) through soil and under certain conditions has the potential to contaminate groundwater which may be used for irrigation and drinking purposes. Users are advised not to apply picloram where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into an aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

An aquifer is defined as "an underground, saturated, permeable, geologic formation capable of producing significant quantities of water to a well or spring. It is the ability of the saturated zone, or portion of that zone, to yield water which makes it an aquifer" (American Chemical Society, 1983).

Note: Use in Hawaii limited exclusively to Supplemental Labeling. See "General Use Precautions" for details.

Notice: Read the entire label. Use only according to label directions. **Before buying or using this product, read "Warranty Disclaimer" and "Limitation of Remedies" sections elsewhere on this label.**

In case of emergency endangering health or the environment involving this product, call collect 517-636-4400.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Table of Contents

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

STORAGE AND DISPOSAL

Do not contaminate water, food, feed or fertilizer by storage or disposal. Open dumping is prohibited.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Metal Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Plastic Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Sprayer Clean-Out: To avoid injury to desirable plants, equipment used to apply Tordon 22K should be thoroughly cleaned before reusing to apply any other chemicals.

1. Rinse and flush application equipment thoroughly after use. Dispose of rinse water in non-cropland area away from water supplies.
2. Rinse a second time, adding 1 quart of household ammonia for every 25 gallons of water. Circulate the solution through the entire system so that all internal surfaces are contacted (15 to 20 minutes). Let the solution stand for several hours, preferably overnight.
3. Flush the solution out the spray tank through the boom.
4. Rinse the system twice with clean water, recirculating and draining each time.
5. Nozzles and screens should be removed and cleaned separately.

General: Consult federal, state or local disposal authorities for approved alternative procedures.

GENERAL INFORMATION

In areas west of the Mississippi River use Tordon 22K herbicide to control susceptible broadleaf weeds and woody plants on rangeland and permanent grass pastures, fallow cropland, wheat, barley and oats not underseeded with a legume on grainland (which is not flood or sub-irrigated and not rotated to broadleaf crops), non-cropland, and on Conservation Reserve Program (CRP) acres, and wildlife openings in forest and non-crop areas. **This product is NOT for sale or use in the San Luis Valley of Colorado.**

General Use Precautions

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

To prevent damage to crops and other desirable plants, read and follow all directions and precautions on this label and container before using.

Do not use for manufacturing or formulating.

Do Not Mix With Dry Fertilizer.

Chemigation: Do not apply this product through any type of irrigation system.

In Hawaii, approved uses of Tordon 22K are limited to those described in Supplemental Labeling. This Supplemental Labeling may be obtained from your DowElanco representative or chemical dealer. Refer to this Supplemental Labeling for specific use directions and precautions.

Do not make application when circumstances favor movement from treatment site.

Do not apply or otherwise permit Tordon 22K or sprays containing Tordon 22K to contact crops or other desirable broadleaf plants, including but not limited to alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes, and other vegetable crops, flowers, fruit plants, ornamentals or shade trees or the soil containing roots of nearby valuable plants.

Precautions for Avoiding Injurious Spray Drift

Applications should be made to avoid spray drift since very small quantities of spray, which may not be visible, may seriously injure susceptible crops during both growing and dormant periods. To minimize spray drift, use low nozzle pressure; apply as a coarse spray; and use nozzles designed for herbicide application that do not produce a fine droplet spray. To aid in further reducing spray drift, a drift control and deposition aid such as Nalco-Trol may be used with this product. If such a drift control aid is used, follow all use recommendations and precautions on the product label.

Ground Equipment: With ground equipment spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the manufacturers recommended minimum pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); by spraying when the wind velocity is low (follow state regulations). Avoid calm conditions which may be conducive to air inversions. In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist).

Aerial Application: With aerial applications, drift may be lessened by using a coarse spray, by using a drift control system; or by using Nalco-Trol drift control additive or equivalent. Adjust spray pressure to provide coarse spray droplets and by using nozzles which do not create fine droplets. Spray boom should be no longer than 3/4 of the wingspan or rotor length. Do not use a thickening agent with the Microfoil or the Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid calm conditions which may be conducive to air inversions.

Determine Air Movement and Direction Before Foliar Application. Do not spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movements, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Do not contaminate water intended for irrigation or domestic purposes. To avoid injury to crops or other desirable plants, do not treat or allow spray drift or run-off to fall onto banks or bottoms of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation or domestic purposes.

Do not use on flood or sub-irrigated land.

Do not spray if the loss of forage legumes cannot be tolerated. Tordon 22K may injure or kill legumes. New legume seedlings may not grow for several years following application of this herbicide.

Do not use manure from animals grazing treated areas on land used for growing broadleaf crops, ornamentals, orchards or other susceptible, desirable plants. Manure may contain enough picloram to cause injury to susceptible plants.

Do not use grass or hay from treated areas for composting or mulching of susceptible broadleaf crops.

Do not transfer livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not apply to snow or frozen ground. Application during very cold (near freezing) weather is not advisable.

Tordon 22K should not be applied on residential or commercial lawns or near ornamental trees and shrubs. Untreated trees can occasionally be affected by root uptake of herbicide through movement into the top soil or by excretion of the product from the roots of nearby treated trees. Do not apply Tordon 22K within the root zone of desirable trees unless such injury can be tolerated.

Do not rotate food or feed crops on treated land if they are not registered for use with picloram until an adequately sensitive bioassay or chemical test shows that no detectable picloram is present in the soil.

Do not move treated soil to areas other than those treatment sites for which Tordon 22K is registered for use. Also, do not use treated soil to grow plants for which use of Tordon 22K is not registered until an adequately sensitive bioassay or chemical test shows that no detectable residue of picloram is present in the soil.

Woody Plants and Broadleaf Weeds Controlled by Tordon 22K

Woody Plants:

absinth wormwood
aspen
blackberries
catclaw acacia
chaparral sp.
fringed sagebrush
gorse
junipers:cedars
locust
multiflora rose
pinyon pine
rabbitbrush
Scotch broom

Annual and Perennial Broadleaf Weeds:

brackenfern
buckwheat, wild
buffalobur
bursage
burroweed
camelthorn
clover
crupina, common
dock
field bindweed
goldenrod
henbane, black
horsenettle
  Carolina
  white
horseweed
ironweed
knapweed
  diffuse
  Russian
  spotted
  squarrose
larkspurs
  geyer
  plains
  tall
lambsquarters
leafy spurge
liconice, wild
locoweeds
lupines
milkweed
ox-eye daisy
pigweed
prickly pear cactus
ragweeds
  common
  bur
  lanceleaf
  western
rush skeletonweed
Russian thistle
snakeweeds
sowthistle
starthistles
  Iberian
  purple
  yellow
St. Johnswort
sulfur cinquefoil
sunflower
tansy ragwort
tasajillo
toadflaxes
thistles
  artichoke
  beaumont
  bull
  Canada
  distaff
  golden
  Italian
  musk
  plumeless
  Scotch
  wavy leaf

Mixing and Application Methods

Mix the required amount of Tordon 22K in water and apply as a coarse low pressure spray using ground equipment or aircraft. Use enough spray volume to provide uniform coverage of the weeds. For best results treat when the weeds are growing actively in the spring before full bloom or late summer into fall. Treatments during full bloom or seed stage of some weeds may not give good control.

To prepare the spray, add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of Tordon 22K and other registered tank mix herbicides. Finally, with continued agitation, add the rest of the water and additives such as surfactants or drift control and deposition aids.

Use with surfactants

Addition of wetting or penetration agents is not usually necessary when using Tordon 22K. Under extreme conditions, such as drought, addi-

tion of a surfactant may improve efficacy. However, if foliar burn occurs too rapidly, translocation of Tordon 22K will not occur and control of perennial weeds, such as field bindweed, may be reduced.

Use With Sprayable Liquid Fertilizer Solutions

Tordon 22K is compatible with most non-pressurized liquid fertilizer solutions; however, if these solutions are to be sprayed with Tordon 22K, a compatibility test (jar test) should be made prior to mixing. Jar tests are particularly important when a new batch of fertilizer or pesticide is used, when water sources change, or when tank mixture ingredients or concentrations are changed. Compatibility may be determined by mixing the spray components in the desired order and proportions in a clear glass jar before large scale mixing of spray components in the spray tank. Use of a compatibility aid such as Unite or Compex may help obtain and maintain a uniform spray solution during mixing and application. Agitation in the spray tank must be vigorous to be comparable with jar test agitation. For best results, liquid fertilizer rates should not exceed 50% of the total spray volume. Premix Tordon 22K with water and add to the liquid fertilizer/water mixture while agitating contents of the spray tank. Apply the spray the same day it is prepared while maintaining continuous agitation. Rinse spray tank thoroughly after use.

Note: Foliar applied liquid fertilizers can cause yellowing or leaf burn of crop foliage.

Local conditions may affect the use of herbicides. State agricultural experiment stations or extension service weed specialists in many states issue recommendations to fit local conditions. Be sure that use of this product conforms to all applicable regulations.

Spot Treatment

Use application rates as suggested in the "Approved Uses" section of this label or recommended by your area weed control specialist. Apply in a total spray volume of 20 to 100 gallons per acre. Make sure equipment is properly calibrated and that the amount of Tordon 22K added to the spray mixture corresponds to the desired rate and spray volume.

To Calibrate:

1. Measure an area 18.5 ft by 18.5 ft in the target application area.
2. Spray the measured area uniformly with **water only** and record the number of seconds required to cover the area.
3. Measure the amount of water delivered to the test area by spraying into a container for this amount of time.
4. The amount of water collected in fl oz equals spray volume in gallons per acre.
5. Refer to the chart below for the amount of Tordon 22K to mix at the spray volume indicated by the calibration procedure. This chart contains the amount of Tordon 22K to mix when the application rate is 1 quart per acre. For a rate of 1/2 quart per acre (1 pint), divide the amount in the table by 2. For an application rate of 2 quarts per acre, multiply the table value by 2

	To Apply the Equivalent of 1 Quart of Tordon 22K per Acre at the Spray Volume Indicated, Mix the Following:	
Spray Volume (gallons per acre)	Amount of Tordon 22K per 1 gallon of water	Amount of Tordon 22K per 100 gallons of water
20	10 tsp	5 quarts
40	4 3/4 tsp	2 quarts
60	3 1/4 tsp	1 2/3 quarts
80	2 1/3 tsp	1 1/4 quarts
100	2 tsp	1 quart

Note: tsp = teaspoon
6 tsp = 1 fluid ounce
Do not exceed 4 quarts per acre in any one year as a spot treatment.

Tank Mixture for Spot or Broadcast Treatment of Susceptible Weeds

Tordon 22K may also be tank mixed with 2,4-D products or other registered herbicides for use on areas having mixed species including those which respond well to 2,4-D. Read and follow all directions and use precautions on other product labels.

Wick Application

Mix 1 part of Tordon 22K with 2 parts of water to prepare a 33% solution. Apply when weeds are actively growing and are above most desirable plants. For ironweed and goldenrod, best results are obtained with applications made prior to early bud stage. Wick applicator should be drained and cleaned after each use. Ropes should be changed when flow is reduced from wear, extended use, poor cleaning or intermittent use.

APPROVED USES

NON-CROPLAND AREAS

Use Tordon 22K to control susceptible broadleaf weeds and woody plants on non-cropland areas such as on roadsides or other rights-of-way, along fence rows, and around farm buildings. Use up to 2 quarts of Tordon 22K per acre as a broadcast treatment and up to 4 quarts per acre as a spot treatment. Wick Application may be used on non-cropland. See "Wick Application" in "Mixing and Application Methods" section for directions.

RANGELAND AND PERMANENT GRASS PASTURES

Use Tordon 22K on rangeland and permanent grass pastures to control susceptible broadleaf weeds and woody plants such as (but not limited to) those shown in the table.

Grazing Restrictions: When applying more than 1 quart of Tordon 22K per acre, do not cut grass for feed within two weeks after treatment. Meat animals grazing for up to two weeks after treatment should be removed from treated areas three days prior to slaughter. Do not graze lactating dairy animals on treated areas within two weeks after treatment.

Broadcast Treatment (Ground and Aerial Applications)

Tordon 22K can be applied as a broadcast treatment by ground or aerially to control several broadleaf weeds and woody plants. Apply Tordon 22K at the suggested rates in 2 or more gallons of water per acre by air or in 10 or more gallons of water per acre by ground. Re-treat as necessary but do not exceed 1 quart of Tordon 22K per acre per season. For control of actively growing susceptible annual broadleaf weeds, including Russian thistle, apply 1/4 to 1/2 pint per acre of Tordon 22K. Tordon 22K can also be tank mixed with 1/2 to 1 pound per acre 2,4-D where species present are sensitive to 2,4-D.

Tordon 22K at rates over 1 quart may suppress certain established grasses, such as bromegrass, bluegramma, and buffalograss. However, subsequent grass growth should be improved by release from weed competition.

Weed Control Guidelines for Tordon 22K in Non-cropland, Rangeland and Pasture

Weed Species**	Rate per Acre	Comments
biennial thistles bull musk plumeless Scotch	Fall: 1/2 pint Spring: 6 - 8 fl oz with 1.0 lb ae 2,4-D	Apply when thistles are in the rosette stage before bolting in the spnng or in the fall prior to soil freeze up.
bolted musk thistle	1/2 - 1 pint + 1 lb ae 2,4-D per acre	Apply before flowenng.
broom snakeweed geyer larkspur locoweeds multiflora rose plains larkspur prickly pear cactus sulfur cinquefoil	1 pint	For pricklypear cactus, use of a diesel oil-water emulsion spray mixture may improve control.
black henbane crupina diffuse knapweed spotted knapweed yellow starthistle	1 - 2 pints	
absinth wormwood bursage Douglas rabbitbrush goldenrod ox-eye daisy	1 - 2 pints	Tank mix the lower rate with 1.0 lb ae per acre 2,4-D. Lower rates may require annual spot treatments.
wild licorice	1 quart	
Canada thistle field bindweed gorse lupines rush skeletonweed St. Johnswort tansy ragwort	1 - 2 quarts	Tank mix the lower rate with 1.0 lb ae per acre 2,4-D. Lower rates may require annual spot treatments.
dalmation toadflax juniper perennial sowthistle Russian knapweed	2 - 3 quarts	For Russian knapweed, apply at bud stage or in the fall
tall larkspur yellow toadflax	3 - 4 quarts	
leafy spurge	1 - 4 quarts	Lower rates will require annual retreatment for several years. Retreat when control drops below 80%

*For additional species or more specific rates consult your area's current Weed Control Guide and/or your local DowElanco representative.

**Many seedling annual weeds can be controlled using 1 pt per acre.

For rates exceeding 1 quart per acre, apply only as a spot treatment and the total area treated in a single season should not exceed 25% of a landowner's acreage found in any particular watershed.

Spot Treatment

See "Spot Treatment" in "Mixing and Application Methods" section for directions for calibration, spray volume determination and mixing.

Spot Concentrate Application

Eastern red cedar can be controlled with spot concentrate applications of Tordon 22K in either the spring (April-May) or fall (September-October). For best results, use 3 ml to 4 ml of Tordon 22K **(undiluted)** per 3 feet of plant height. Application should precede periods of expected rainfall. Apply directly to soil within the dripline and on the upslope side of the tree. Application to trees taller than 15 feet is not recommended. **Do not** use more than 2 pints of Tordon 22K per acre in any one year.

Wick Application

See "Wick Application" in "Mixing and Application Methods" section for directions. Apply when weeds are actively growing and are above most desirable plants. For ironweed and goldenrod, best results are obtained with applications made prior to early bud stage.

Barley, Oats, and Wheat Not Underseeded With a Legume (Which is Not Flood or Sub-Irrigated and Not Rotated to Broadleaf Crops)

Use Tordon 22K for the control of susceptible annual broadleaf weeds such as (but not limited to) volunteer sunflower, wild buckwheat, lambsquarters, pigweed, Russian thistle, and sowthistle.

Use Precautions

Do not apply Tordon 22K within 50 days before harvest.

Spray mixtures may cause shorter straw on some varieties of cereals but grain yields are usually not affected.

Do not graze or feed forage from treated areas for 2 weeks after treatment. Do not harvest hay from treated grain fields.

Use only on land that will be planted the following year to grass, barley, oats, wheat or fallowed. Do not apply more than 1 1/2 fluid ounces of Tordon 22K per acre during the small grain growing season.

Broadcast Treatment (Ground and Aerial Applications)

Tordon 22K can be applied as a single broadcast treatment by ground or aerially to control several broadleaf weeds by itself or as a tank mix with 2,4-D, MCPA, or sulfonylurea herbicides such as Ally. Apply Tordon 22K at the rates suggested in the following table in 2 to 5 gallons of water per acre by air or in 5 to 20 gallons of water per acre by ground. The addition of surfactants may aid control under dry conditions, but may cause injury to grain if used over the top. Read and follow directions and precautions on other product labels when tank mixing.

Spring Wheat, Barley and Oats

Apply from the 3 to 5 leaf stage to the early jointing stage of growth as indicated in the table below. Applications at the 3 to 5 leaf stage occasionally cause slight head malformations and straw shortening but normally do not affect yield.

Durum Wheat

Do not treat durum wheat since some varieties of durum wheat may be injured.

Winter Wheat and Barley

Apply after resumption of active growth in the spring until the early jointing stage.

Use Rates for Wheat, Barley and Oats†

Weeds	Weed Growth Stage††	Grain Growth Stage	Amounts of Each Product Per Acre†††		
			Tordon 22K	4 lb ae/gal 2,4-D or MCPA	6 lb ae/ga 2,4-D or MCPA
More susceptible species, such as: lambsquarters pennycress wild mustard mayweed	3 inches	3 to 5 leaf to early tillering	1 fl oz	1/2 pint	1/3 pint
	3 to 6 inches	Tillering to early jointing	1 1/2 fl oz	3/4 pint	1/2 pint
Less susceptible species such as: volunteer sunflower wild buckwheat Russian thistle pigweed Canada thistle, top growth suppression	1 to 6 inches	Tillering to early jointing	1 1/2 fl oz	3/4 to 1 pint	1/2 to 2/3 pint

†For oats, do not tank mix with 2,4-D herbicides.

††For best results, treat when weeds have 2 to 4 leaves and are actively growing.

†††When measuring small amounts of Tordon 22K, special care should be taken not to exceed suggested rates.

FALLOW CROPLAND (NOT ROTATED TO BROADLEAF CROPS)

Apply Tordon 22K as a post harvest or fallow treatment in continuous grain or during the fallow period. Tordon 22K may be applied alone or in tank mix combination with 2,4-D or other herbicides registered for this use. Apply in 2 or more gallons of water per acre by air or 5 or more gallons per acre by ground. Spray only under conditions that will prevent injury to nearby susceptible crops or ornamentals. Refer to "General Use Precautions" section for information on preventing drift to off-target areas.

Application Rates

Note: Do not apply more than 1 pint per acre as a broadcast treatment in any calendar year.

Annual Weeds: To control annual weeds such as Russian thistle and wild buckwheat, apply 1/4 to 1/2 pint per acre of Tordon 22K in tank mix combination with 1/2 to 1 lb ae of 2,4-D or other herbicides registered for use on fallow land. Apply when weeds are actively growing.

Field Bindweed: Apply 1/2 to 1 pint per acre of Tordon 22K plus 1/2 to 1 lb ae per acre of 2,4-D when bindweed is actively growing. Optimum time for treatment is when plant runners reach 8 to 12 inches. Use 1/2 pint per acre to control light to moderate infestations under good growing conditions or to reduce the potential for crop injury. Use higher rates for heavy infestations and longer term control. Some regrowth will occur the following season and a re-treatment program for successive years is recommended.

Canada thistle: Apply 1 pint per acre of Tordon 22K plus 1 lb ae per acre of 2,4-D when the majority of thistle plants are emerged but prior to bud stage.

Crop Rotation
Use only on land to be planted the following year to grass, barley, oats, wheat or fallowed. Many broadleaf crops are extremely sensitive to soil residues of Tordon 22K. Do not plant sensitive broadleaf crops for 36 months after treatment or until soil residues have declined to a safe level as indicated by an adequately sensitive bioassay using the intended broadleaf crop. A bioassay is recommended following treatment prior to planting any sensitive broadleaf crop.

Preplant Interval
A preplant interval following Tordon 22K application prior to planting small grains is recommended to reduce or eliminate potential crop injury and/or yield reduction. The possibility for crop injury or yield reduction to occur depends on application rate, soil organic matter, rainfall, temperature and incidence of cereal diseases. Adequate soil moisture and soil temperature during the preplant interval is important in reducing, but may not eliminate, the risk of crop injury. When considering use of Tordon 22K on fallow land, growers should consider the benefit of weed control against the risk of crop damage and treat only if the risk of injury to small grains can be tolerated. The following preplant intervals are recommended:

For applications up to 1/2 pint per acre, allow a minimum of **45 days** of soil temperatures above 40°F between application and planting.

For applications of greater than 1/2 pint and up to 1 pint per acre, allow a minimum of **60 days** of soil temperatures above 40°F between application and planting, except in the states of Idaho, North Dakota, Nebraska, Montana, Oregon, South Dakota, Washington and Wyoming, where the minimum preplant interval is **90 days**.

Spot Treatment
See "Spot Treatment" in "Mixing and Application Methods" section for directions for calibration, spray volume determination and mixing.

Spot treatments of Tordon 22K at rates over 1 pint per acre can be made on fallow, non-irrigated cropland if the treated areas comprise less than 10% of the immediate field in any one year. Tordon 22K should not be applied to cropland at rates exceeding 2 quarts per acre. When Tordon 22K at rates above 1 pint per acre are applied, injury to small grains may result for periods up to two years after treatment.

CONSERVATION RESERVE PROGRAM (CRP) FOR SEEDING TO PERMANENT GRASSES ONLY

Do not use Tordon 22K if legumes are a desired cover during CRP.

Conditions that stress grasses, such as drought, will increase potential for injury to the grass at all stages of growth.

To reduce potential damage to subsequent small grain crops, use the lower rate or discontinue the use of Tordon 22K at least 2 years prior to the seeding of small grain crops. After CRP, do not plant broadleaf crops in treated acres until an adequately sensitive bioassay shows that no detectable picloram is present in the soil.

Broadcast Treatment (Ground and Aerial Applications)

Applications of Tordon 22K should be made after perennial grasses are well established (have developed a good secondary root system and show good vigor). Most perennial grasses show improved tolerance to the herbicide at this stage of development.

For control of actively growing perennial weeds, use up to 1 quart per acre of Tordon 22K after the grass is established. For best results, use in 2 or more gallons of water per acre by air or in 5 or more gallons of water per acre by ground. Increasing the rate of application can increase the risk of injury.

For control of actively growing susceptible annual broadleaf weeds, (including Russian thistle) apply 1/4 to 1/2 pint per acre of Tordon 22K. Tordon 22K can also be tank mixed with 1/2 to 1 pound per acre of 2,4-D where 2,4-D sensitive species present. Read and follow all directions for use and use precautions on other product labels.

Spot Treatment

See "Spot Treatment" in "Mixing and Application Methods" section for directions for calibration, spray volume determination and mixing.

For spot applications when perennial grasses are established, use 1 to 8 pints per acre of Tordon 22K. Rates of 2 quarts per acre or more should only be used for control of deep-rooted perennial broadleaf weeds.

Tordon 22K at rates over 2 pints per acre may suppress certain established grasses such as bromegrass, bluegramma and buffalograss. However, subsequent grass growth should be improved by release from weed competition.

Wick Application

See "Wick Application" in "Mixing and Application Methods" section for directions. Apply when weeds are actively growing and are above most desirable plants. For ironweed and goldenrod, best results are obtained with applications made prior to early bud stage.

Warranty Limitations and Disclaimer

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. DOWELANCO MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of DowElanco or the seller. All such risks shall be assumed by Buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at DowElanco's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

DowElanco shall not be liable for losses or damages resulting from handling or use of this product unless DowElanco is promptly notified of such loss or damage in writing. In no case shall DowElanco be liable for consequential or incidental damages or losses.

The terms of the "Warranty Disclaimer" above and this "Limitation of Remedies" cannot be varied by any written or verbal statements or agreements. No employee or sales agent of DowElanco or the seller is authorized to vary or exceed the terms of the "Warranty Disclaimer" or this "Limitation of Remedies" in any manner.

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LABEL CODE 112-42-002 DATE CODE 292
EPA APPROVAL 12/20/91 REPLACES 112-42-001

Revisions Include:
1) Label reformatted and edited for clarity.
2) Updated woody plants and broadleaf weeds controlled listed.

071S100-40-AG

USE PESTICIDES PROPERLY

PROSPER WITH PESTICIDES BY USING THEM PROPERLY! READ AND FOLLOW LABEL DIRECTIONS

SANDOZ

SANDOZ AGRO, INC.
1300 EAST TOUHY AVENUE DES PLAINES ILLINOIS 60018

THIS LABELING MUST BE IN THE POSSESSION OF THE USER AT THE TIME OF THE PESTICIDE APPLICATION

NOTICE: READ "LIMIT OF WARRANTY AND LIABILITY" BEFORE BUYING OR USING. IF TERMS ARE NOT ACCEPTABLE, RETURN AT ONCE UNOPENED.

HERBICIDE

Banvel®

Banvel®

HERBICIDE

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING.

THIS LABELING MUST BE IN THE POSSESSION OF THE USER AT THE TIME OF THE PESTICIDE APPLICATION.

E.P.A. Reg. No. 55947-1

BANVEL® is a registered trademark of Sandoz Ltd.

SANDOZ

FEB 2 1993

For Weed Control in Corn, Sorghum, Small Grains, Pasture, Rangeland, Non-Cropland, Fallow, Sugarcane, Asparagus, Turf and Grass Seed Crops.

ACTIVE INGREDIENT:

Dimethylamine salt of dicamba (3,6-dichloro-o-anisic acid)*	48.2%
INERT INGREDIENTS:	51.8%
TOTAL	100.0%

*This product contains 40.0% 3,6-dichloro-o-anisic acid (dicamba) or 4 pounds per gallon (480 g/L).

KEEP OUT OF REACH OF CHILDREN

WARNING

See additional precautionary statements at end of label booklet.

TABLE OF CONTENTS

FEB 2 1993

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling

Before applying BANVEL® Herbicide, read all directions and precautions appearing on the container label and in this booklet Failure to follow all directions and precautions may result in unsatisfactory weed control, crop injury, or illegal residues

GENERAL INFORMATION

The following directions apply to all uses of BANVEL Herbicide. Additional precautions and restrictions will be found in each specific use section

Do not treat irrigation ditches or water used for crop irrigation or domestic uses.

Do not apply this product through any type of irrigation system

MIXING AND APPLICATION

UNLESS OTHERWISE SPECIFIED UNDER THE INDIVIDUAL USE HEADINGS OF THIS BOOKLET, THE FOLLOWING DIRECTIONS APPLY TO ALL CROP AND NON-CROP USES OF BANVEL HERBICIDE. REFER TO INDIVIDUAL USE SECTIONS FOR ADDITIONAL PRECAUTIONS, RESTRICTIONS, APPLICATION RATES AND TIMINGS.

BANVEL Herbicide is a water-soluble formulation that can be applied using water or sprayable fluid fertilizer as the carrier If a fluid fertilizer is to be used, a compatibility test (see COMPATIBILITY TEST on page 8) should be made prior to tank mixing

Ground or aerial application equipment which will give good spray coverage of weed foliage should be used. HOWEVER, DO NOT USE AERIAL APPLICATION EQUIPMENT IF SENSITIVE CROPS ARE GROWING IN THE VICINITY OF THE AREA TO BE TREATED.

Apply 3 to 50 gallons of diluted spray per treated acre when using ground application equipment, or 1 to 10 gallons of diluted spray per treated acre when using aerial application equipment. Use the higher level of the listed spray volumes when treating dense or tall vegetation. Use coarse sprays.

Select nozzles designed to produce minimal amounts of fine spray particles. Spray with nozzles as close to the weeds as is practical for good weed coverage.

BANVEL Herbicide should not be applied during periods of gusty wind or when wind is in excess of 15 mph as uneven spray coverage may occur.

Avoid disturbing (e g. cultivating or mowing) treated areas for at least 7 days following application.

SENSITIVE CROP PRECAUTIONS

BANVEL Herbicide may cause injury to desirable trees and plants, particularly beans, cotton, flowers, fruit trees, grapes, ornamentals, peas, potatoes, soybeans, sunflowers, tobacco, tomatoes and other broadleaf plants when contacting their roots, stems or foliage These plants are most sensitive to BANVEL Herbicide during their development or growing stage FOLLOW THE PRECAUTIONS LISTED BELOW WHEN USING BANVEL HERBICIDE.

- Do not treat areas where either possible downward movement into the soil or surface washing may cause contact of BANVEL Herbicide with the roots of desirable plants such as trees and shrubs.

- Avoid making applications when spray particles may be carried by air currents to areas where sensitive crops and plants are growing Do not spray near sensitive plants if wind is gusty or in excess of 5 mph and moving in the direction of nearby sensitive crops However, always make applications when there is some air movement to determine the direction and distance of possible spray drift Leave an adequate buffer zone between area to be treated and sensitive plants. Coarse sprays are less likely to drift out of the target area than fine sprays
- Use coarse sprays to avoid potential herbicide drift Select nozzles which are designed to produce minimal amounts of fine spray particles such as Delavan Raindrops, Spraying Systems XR flat fans or large capacity flood nozzles such as D10, TK10, or greater capacity tips Keep the spray pressure at or below 20 psi and the spray volume at or above 20 gpa, unless otherwise required by the manufacturer of drift-reducing nozzles
- Agriculturally approved drift-reducing additives may be used
- Do not apply BANVEL Herbicide in the vicinity of sensitive crops when the temperature on the day of application is expected to exceed 85° F as drift is more likely to occur
- Do not use aerial equipment to apply BANVEL Herbicide when sensitive crops and plants are growing in the vicinity of area to be treated.
- To avoid injury to desirable plants, equipment used to apply BANVEL Herbicide should be thoroughly cleaned (see PROCEDURE FOR CLEANING SPRAY EQUIPMENT on pages 8-9) before reusing to apply any other chemicals

All crop uses of BANVEL Herbicide are intended for a normal growing interval between planting and harvest. No crop rotation restrictions exist if normal harvest of treated crop has occurred. If this interval is shortened, such as in cover crops that will be plowed under, do not follow up with the planting of a sensitive crop.

Crops growing under stress conditions such as drought, poor fertility, or foliar damage due to hail, wind or insects, can exhibit various injury symptoms that may be more pronounced if herbicides are applied

Consult your local or state authorities for possible application restrictions and advice concerning these and other special local use situations Tank mix recommendations are for use only in states where the tank mix product and application site are registered

BAND TREATMENTS

BANVEL Herbicide may be applied as a band treatment. Use the formulas below to determine the appropriate rate and volume per treated acre

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \begin{matrix}\text{Broadcast}\\ \text{RATE}\\ \text{per treated acre}\end{matrix} = \begin{matrix}\text{Band RATE}\\ \text{per treated acre}\end{matrix}$$

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \begin{matrix}\text{Broadcast}\\ \text{VOLUME}\\ \text{per treated acre}\end{matrix} = \begin{matrix}\text{Band VOLUME}\\ \text{per treated acre}\end{matrix}$$

COMPATIBILITY TEST

Before mixing in the spray tank, it is advisable to test compatibility by mixing all components in a small container in proportionate quantities (see following table).

Amount of Herbicide to Add to One Pint of Spray Carrier
(Assuming Volume is 25 Gallons per Acre)

HERBICIDE FORMULATIONS	RATE PER ACRE	LEVEL TEASPOONS
Dry	1 lb	1½
Liquid	1 pt	½

If herbicide(s) do not boil-up or form flakes, sludge, gels, oily films or layers, or other precipitates, then the tested spray mix is compatible. Usually, incompatibility in any of the above described forms will occur within 5 minutes after mixing.

If components are incompatible, the use of a compatibility agent is recommended. Rerun the above COMPATIBILITY TEST with a suitable compatibility agent 1¼ teaspoon is equivalent to 2 pints per 100 gallons of fluid fertilizer).

PROCEDURE FOR CLEANING SPRAY EQUIPMENT

The steps listed below are suggested for thorough cleaning of spray equipment following applications of BANVEL Herbicide or BANVEL Herbicide tank mixes.

1) Hose down thoroughly the inside as well as outside surfaces of equipment while filling the spray tank half full of water. Flush by operating sprayer until all rinse water is removed from the system.

2) Fill tank with water while adding 1 quart of household ammonia for every 25 gallons of water. Operate the pump to circulate the ammonia solution through the sprayer system for 15 to 20 minutes and discharge a small amount of the ammonia solution through the boom and nozzles. Let the solution stand for several hours, preferably overnight.

3) Flush the solution out of the spray tank through the boom.

4) Remove the nozzles and screens and flush the system with two full tanks of water.

The steps listed below are suggested for thorough cleaning of spray equipment used to apply BANVEL Herbicide as a tank mix with wettable powders (WP), emulsifiable concentrates (EC), or other types of water dispersible formulations. BANVEL Herbicide tank mixes with water-dispersible formulations require the use of a water/detergent rinse.

5) Complete step 1.

6) Fill tank with water while adding 2 lbs. of detergent for every 40 gallons of water. Operate the pump to circulate the detergent solution through the sprayer system for 5 to 10 minutes and discharge a small amount of the solution through the boom and nozzles. Let the solution stand for several hours, preferably overnight.

7) Flush the detergent solution out of the spray tank through the boom.

8) Repeat step 1, and follow with steps 2, 3, and 4.

GENERAL WEED LIST

This is a general list of weeds which may be treated with BANVEL II herbicide in accordance with this label as recommended under the rates and timings sections of the Individual Use Headings. Proper usage of this product will give control or growth suppression of many ANNUAL, BIENNIAL, and PERENNIAL broadleaf weeds, and many WOODY brush and vine species including:

ANNUALS

Amaranth, Spiny (Spiny Pigweed)
Aster, Slender
Bedstraw
Beggarweed, Florida
Broomweed, Common
Buckwheat, Wild
Bullalobur
Burclover, California
Burcucumber
Buttercup, Roughseed
Carpetweed
Catchfly, Nightflowering
Chamomile, Corn
Chickweed, Common
Clovers (Annual)
Cockle, Corn
Cockle, Cow
Cocklebur, Common
Croton, Tropic
Croton, Woolly
Daisy, English
Eveningprimrose, Cutleaf
Fleabane, Annual
Gooseloot, Nettleleaf
Henbit
Jimsonweed
Knotweed
Kochia
Ladysthumb
Lambsquarters, Common
Lambsquarters, (triazine resistant)
Lettuce, Prickly
Mallow, Common
Mallow, Venice
Mayweed
Morningglory, Ivyleaf
Morningglory, Tall
Mustard, Tansy
Mustard, Wild
Mustard (Yellowtops)
Nightshade, Black
Pennycress, Field (Fanweed, Frenchweed, Stinkweed)
Pepperweed, Virginia (Peppergrass)
Pigweed, Prostrate
Pigweed, Redroot (Corelessweed)
Pigweed, Rough
Pigweed, Smooth
Pigweed (triazine resistant)
Pigweed, Trumble
Poorjoe
Puncturevine
Purslane, Common
Pusley, Florida
Radish, Wild
Ragweed, Common

ANNUALS *(Con't'd.)*

Ragweed, Giant (Bullyloweed)
Ragweed, Lance-Leaf
Rubberweed, Bitter (Bitterweed)
Sesbania, Hemp
Shepherdspurse
Sicklepod
Sida, Prickly (Teaweed)
Smartweed, Green
Smartweed, Pennsylvania
Sneezeweed, Bitter
Sowthistle, Annual
Sowthistle, Spiny
Spikeweed, Common
Spurge, Prostrate
Spurry, Corn
Starbur, Bristly
Sumpweed, Rough
Sunflower, Common (Wild)
Sunflower, Volunteer
Thistle, Russian
Velvetleaf
Waterhemp
Waterprimrose, Winged
Witchweed
Wormwood, Annual

BIENNIALS

Burdock, Common
Carrot, Wild (Queen Anne's Lace)
Cockle, White
Eveningprimrose, Common
Geranium, Carolina
Gramwell
Knapweed, Diffuse
Knapweed, Spotted
Mallow, Dwarf
Plantain, Bracted
Ragwort, Tansy
Starthistle, Yellow
Sweetclover
Teasel
Thistle, Bull
Thistle, Milk
Thistle, Musk
Thistle, Plumeless

PERENNIALS

* Alfalfa
Artichoke, Jerusalem
Aster, Sony
* Aster, Whiteheath
Beadstraw, Smooth
Bindweed, Field
Bindweed, Hedge
Bluewead, Texas
*Burdock, (Bur Ragweed) (Lokeweed)
Burdock, Woollyleaf (Lokeweed)
Buttercup, Tall
Campion, Bladder
Chickweed, Field
Chickweed, Mouseear Canada
Chicory
* Clover, Hop
* Dandelion, Common
* Dock Broadleaf (Bitterdock)
* Dock, Curly
Dogbane, Hemp
* Dogfennel (Cypressweed)
Fern Bracken
Garlic, Wild
Goldenrod, Canada
Goldenrod, Missouri
Goldenweed, Common Hawkweed
Horsenettle, Carolina
Ironweed
Knapweed, Black
Knapweed, Russian
Mare's Tail (Horseweed)
Milkweed, Climbing
Milkweed, Common
Milkweed, Honeyvine
Milkweed, Western Whorled
Nettle, Stinging
Nightshade, Silverleaf (White Horsenettle)
Onion, Wild
*Plantain, Broadleaf
Plantain, Buckhorn
Pokeweed
Ragweed, Western
Redvine
Smartweed, Swamp
Snakeweed, Broom
* Sorrel, Red (Sheep Sorrel)
Sowthistle
Sowthistle, Perennial
Spurge, Leafy
Sundrop, Hollishrub (Eveningprimrose)
Thistle, Canada
Toadflax, Dalmation
Trumpetcreeper (Buckvine)
Vetch
Waterhemlock
Waterprimrose, Creeping
*Woodsorrel, Creeping Common Yellow
Wormwood, Common
Wormwood, Louisiana
*Yankeeweed
Yarrow, Common

*Noted perennials may be controlled using BANVEL Herbicide at rates lower than those recommended for other listed perennial weeds. (See application rates and timings on pages 18-23, 26, 27, 32, 33, 37, 38, 43, 45, 47, 49, 50, 52, 57, 58).

WOODY

Alder
Ash
Aspen
Basswood
Beech
Birch
Blackberry
Blackgum
Cedar
Cherry
Chinquapin
Cottonwood
Creasotebush
Cucumbertree
Dewberry
Dogwood
Elm
Grape
Hawthorn (Thornapple)
Hemlock
Hickory
Honeylocust
Honeysuckle
Hornbeam
Huckleberry
Huisache
Ivy, Poison
Kudzu
Locust, Black
Maple
Mesquite
Oak
Oak, Poison
Olive, Russian
Persimmon, Eastern
Pine
Plum, Sand (Wild Plum)
Poplar
Rabbitbrush
Redcedar, Eastern
Rose, McCartney
Rose, Multiflora
Sagebrush, Fringe
Sassafras
Serviceberry
Spicebush
Spruce
Sumac
Sweetgum
Sycamore
Tarbush
Willow
Witchhazel
Youpon
Yucca

FIELD, SEED*, POPCORN* AND SILAGE CORN

Observe all precautions, mixing and application instructions on pages 4-8 as well as the following

* Do not apply BANVEL Herbicide to seed corn or popcorn without first verifying with your local seed corn company (supplier) the BANVEL selectivity on your inbred line or variety of popcorn. This precaution will help avoid potential injury of sensitive varieties

BANVEL Herbicide is not registered for use on sweet corn

Direct contact of BANVEL Herbicide with corn seed must be avoided. If corn seeds are less than 1½ inches below the surface, delay application until corn has emerged.

Up to 2 applications of BANVEL Herbicide may be made during a growing season. Do not exceed a total of 1½ pints of BANVEL Herbicide per treated acre per crop year. Allow two weeks or more between applications of BANVEL Herbicide. See appropriate section for rate information. For combinations, options or sequential treatments, refer to appropriate section.

Applications of BANVEL Herbicide to corn during periods of rapid growth may result in temporary leaning. Corn will usually become erect within 3 to 7 days. Cultivation should be delayed until after corn is growing normally to avoid breakage.

Agriculturally approved surfactants or sprayable fluid fertilizers (½ to 1 gallon per acre of 28%, 30% or 32% urea ammonium nitrate) may be added to the spray mixture to improve postemergence weed control, particularly in dry growing conditions.

Do not use adjuvants containing penetrants such as petroleum based oils after crop emergence or crop injury may result.

Corn may be harvested or grazed for feed once the crop has reached the ensilage (milk) stage or later in maturity.

Several synthetic pyrethroid insecticides are labeled for tank mix applications of BANVEL. Refer to their label for specific recommendations.

WEEDS CONTROLLED

BANVEL Herbicide will control many ANNUAL broadleaf weeds or give growth suppression of many PERENNIAL broadleaf weeds commonly found in corn (Refer to the GENERAL WEED LIST on pages 10-13)

For best performance, make application when weeds have emerged and are actively growing.

Preemergence control of cocklebur, velvetleaf, and jimsonweed may be reduced if conditions such as low temperature or lack of soil moisture cause delayed or deep germination of weeds.

PREPLANT/PREEMERGENCE IN NO TILLAGE CORN

Applications of BANVEL Herbicide may be made before, during, or after planting to emerged and actively growing broadleaf weeds. Apply BANVEL Herbicide at 1 pint per treated acre on medium or fine textured soils containing 2% or greater organic matter. Use ½ pint per treated acre on coarse textured soils (sand, sandy loam, and loamy sand) or medium and fine textured soils with less than 2% organic matter.

When planting into a legume sod (e.g., alfalfa or clover), apply BANVEL Herbicide after 4-6 inches of regrowth has occurred.

PREEMERGENCE IN CONVENTIONAL OR REDUCED TILLAGE CORN

BANVEL Herbicide may be applied after planting and prior to corn emergence. Application at 1 pint per treated acre may be made to medium or fine textured soils which contain 2% or greater organic matter. DO NOT apply to coarse textured soils (sand, sandy loam, and loamy sand) until after crop emergence (see Early Postemergence uses below).

Preemergence application of BANVEL Herbicide does not require mechanical incorporation to become active. A shallow mechanical incorporation is recommended if application is not followed by adequate rainfall or sprinkler irrigation. Avoid tillage equipment (e.g., drags, harrows) which concentrate treated soil over seed furrow.

EARLY POSTEMERGENCE (ALL TILLAGE SYSTEMS) (Spike through 8 inch tall corn)

BANVEL Herbicide at 1 pint per treated acre may be applied during the period from corn emergence through the five leaf stage or 8 inches tall, whichever comes first. Reduce the rate to ½ pint per treated acre if corn is growing on coarse textured soils (sand, sandy loam, and loamy sand). See Late Postemergence applications given below if the 6th true leaf is emerging from whorl or corn is greater than 8 inches tall.

LATE POSTEMERGENCE (ALL TILLAGE SYSTEMS) (8 to 36 inch tall corn)

Application of BANVEL Herbicide at ½ pint per treated acre may be made from 8 to 36 inch tall corn or 15 days before tassel emergence, whichever comes first. For best performance, make applications when weeds are less than 3 inches tall.

Make directed spray application when: (1) corn leaves prevent proper spray coverage, (2) sensitive crops are growing nearby; (3) tank mixing with 2,4-D.

DO NOT apply BANVEL Herbicide when soybeans are growing nearby if any of these conditions exist:

- corn is more than 24 inches tall
- soybeans are more than 10 inches tall
- soybeans have begun to bloom

OVERLAY (SEQUENTIAL) TREATMENTS

BANVEL Herbicide may be applied to ground previously treated with one or more of the following herbicides.

Atrazine
propachlor (Ramrod®)
Bicep®
cyanazine (Blades®)
Bronco®
Bullet®
metolachlor (Dual®)
EPTC (Eradicane®)
Extrazine®
paraquat (Gramoxone®)
Lasso®
alachlor (Lasso®)
Marksman®
simazine (Princep®)
pendemethalin (Prowl®)
glyphosate (Roundup®)
butylate (Sutan + ®/Genate®)

READ AND FOLLOW LABEL DIRECTIONS FOR EACH OF THE ABOVE PRODUCTS

TANK MIX TREATMENTS FOR CORN

BANVEL Herbicide may be tank mixed with one or more of the following herbicides for control of grasses or additional broadleaf weeds. Read and follow the label of each tank mix product used for precautionary statements, directions for use, rates and timings, and other restrictions.

RATES AND TIMINGS

BANVEL PLUS	PREPLANT/ PREEMERGENT (NO TILLAGE CORN)	PREEMERGENT (CONVENTIONAL OR REDUCED TILLAGE CORN)	EARLY POSTEMERGENT (ALL TILLAGE SYSTEMS)	LATE POSTEMERGENT (ALL TILLAGE SYSTEMS)	ADDITIONAL DIRECTIONS
ACCENT® (nicosulfuron)	--	--	½-1 oz a.i./A	½-1 oz a.i./A (To improve spray coverage of weeds and reduce risk of corn injury, use drop pipes to direct spray beneath corn leaves when corn is greater than 8 inches tall.)	Application may be made to emerged weeds before corn is greater than 24 inches tall. Use non ionic surfactant at 25% (V/V) with this tank mixture.
Atrazine	1¼-3 lbs. a.i./A	1¼-3 lbs. a.i./A	1¼-3 lbs. a.i./A	1¼-3 lbs. a.i./A Do not apply if corn is greater than 12 inches tall.	Application may be made before grasses are 1½ inches tall.

BANVEL PLUS	PREPLANT/ PREEMERGENT (NO TILLAGE CORN)	PREEMERGENT (CONVENTIONAL OR REDUCED TILLAGE CORN)	EARLY POSTEMERGENT (ALL TILLAGE SYSTEMS)	LATE POSTEMERGENT (ALL TILLAGE SYSTEMS)	ADDITIONAL DIRECTIONS
BEACON® (primisulfuron)	--	--	0.31-0.62 oz. a.i./A	0.31-0.62 oz. a.i./A (To improve spray coverage of weeds and reduce risk of corn injury, use drop pipes to direct spray beneath corn leaves when corn is greater than 8 inches tall.)	Application may be made to emerged weeds when corn is 4 to 24 inches tall. Use non-ionic surfactant at 25% (V/V) with this tank mixture.
BLAZER® (cyanazine)	1¼-4 lbs. a.i./A	1¼-4 lbs. a.i./A	1¼-2 lbs. a.i./A (use the 90 DF formulation only, after corn emergence.)	--	Application may be made before grasses are 1½ inches tall, and before corn is beyond the 4 leaf stage.

RATES AND TIMINGS

	PREPLANT/ PREEMERGENT (NO TILLAGE CORN)	PREEMERGENT (CONVENTIONAL OR REDUCED TILLAGE CORN)	EARLY POSTEMERGENT (ALL TILLAGE SYSTEMS)	LATE POSTEMERGENT (ALL TILLAGE SYSTEMS)	ADDITIONAL DIRECTIONS
BANVEL PLUS					
DUAL® (metolachlor)	1½-3 lbs. a.i./A	1½-3 lbs. a.i./A (use only on fine or medium textured soils with 2½% or greater organic matter)	1½-3 lbs. a.i./A	--	Application may be made before grasses reach the 2 leaf stage and before corn is greater than 3 inches tall
GRAMOXONE® (paraquat)	¼-1 lb. a.i./A	¼-1 lb. a.i./A	--	--	Application may be made to emerged weeds but prior to corn emergence.
LASSO® (alachlor)	1½-4 lbs. a.i./A	1½-4 lbs. a.i./A (use only on fine textured soils with greater than 2½% organic matter)	1½-4 lbs. a.i./A	--	Application may be made before grasses reach the 2 leaf stage and before corn is greater than 3 inches tall

PRIMEP® (simazine)	2 - 3 lbs. a.i./A	2 -3 lbs. a.i./A	--	--	Application may be made prior to corn or weed emergence
PRIMY® (pendi-methalin)	--	¾-1½ lbs. a.i./A (use only on fine or medium textured soils with 2½% or greater organic matter)	¾-1½ lbs. a.i./A	--	Application may be made immediately after planting but prior to weed emergence Corn should not be beyond the 2 leaf stage of growth.
ROUNDUP® (glyphosate)	1 - 3 lbs. a.i./A	1 - 3 lbs. a.i./A	--	--	Application may be made to emerged weeds but prior to corn emergence.
2,4-D	¼-½ lbs. a.i./A	¼-½ lbs. a.i./A	Not recommended ¼ lbs. a.i./A		Drop pipes are to be used when corn height is 8 inches or greater. Keeping the spray off the corn leaves and out of the whorl will reduce the likelihood of crop injury and improve spray coverage of weed foliage.

SORGHUM (Milo)

Observe all precautions on pages 5-7, including the reference to crops growing under stress.

Read and fallow mixing and application instructions on pages 4-5.

Applications of BANVEL Herbicide to sorghum during periods of rapid growth may result in temporary leaning of plants or rolling of leaves. These effects are usually outgrown within 10 to 14 days.

Do not graze or feed treated sorghum forage or silage prior to mature grain stage. If sorghum is grown for pasture or hay, refer to the pasture use section of this booklet. Do not apply BANVEL Herbicide to sorghum grown for seed production.

Make no more than one application per growing season.

WEEDS CONTROLLED

BANVEL Herbicide, when applied at the recommended rate for grain sorghum, will control many actively growing ANNUAL broadleaf weeds and will reduce competition from established PERENNIAL broadleaf weeds as well as control their seedlings (Refer to GENERAL WEED LIST on pages 10-13)

RATES AND TIMINGS

BANVEL Herbicide may be applied to emerged and actively growing weeds of least 15 days prior to planting. Postemergence application of BANVEL Herbicide must be made after sorghum is in the 2 leaf stage but before sorghum is 15 inches tall. For best performance, make applications when sorghum is in the 3 to 5 leaf stage and weeds are small (less than 3 inches tall). Use drop pipes (drop nozzles) if sorghum is taller than 8 inches. Keeping the spray off the sorghum leaves and out of the whorl will reduce the likelihood of crop injury and improve spray coverage of weed foliage.

BROADCAST RATE PER TREATED ACRE: ½ pint (¼ lb. a.i.)

TANK MIX TREATMENT

BANVEL plus Atrazine:

For improved control of emerged, actively growing broadleaf weeds including triazine resistant species and added suppression of perennial broadleaf weeds, tank mix ½ pint BANVEL Herbicide with 0.5 to 1.25 lbs. a.i. atrazine per treated acre. For control of grasses (less than 15 inches tall), tank mix ½ pint BANVEL Herbicide with 2 to 3 lbs. a.i. atrazine per treated acre. For best performance and minimal crop injury, make application when sorghum is 3 to 8 inches tall and when broadleaf weeds are small (less than 6 inches tall). Application of atrazine must be made before sorghum is beyond 12 inches tall. The atrazine rate will depend upon soil texture and length of residual weed control desired.

BANVEL plus Buctril®:

For improved control of broadleaf weeds, tank mix ½ pint BANVEL Herbicide with 1 to 1½ pint Buctril Herbicide per treated acre. Make application at 4 leaf to 15 inch tall sorghum. Use drop nozzles to direct spray beneath sorghum leaves when sorghum is greater than 8 inches tall.

READ AND FOLLOW THE LABEL OF EACH TANK MIX PRODUCT USED FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES AND TIMINGS AND OTHER RESTRICTIONS.

OVERLAY (SEQUENTIAL) TREATMENTS

BANVEL Herbicide may be applied to ground previously treated with one or more of the following herbicides

Herbicide	Maximum rate per treated acre (lbs. a.i.)
alachlor (Lasso®) (Screen®-treated seed)	4
atrazine	3
metolachlor (Dual®) (Concep®-treated seed)	2.5
propachlor (Ramrod®)	5

PREHARVEST USES For Use Only in the States of Texas and Oklahoma

BANVEL Herbicide may be applied for weed suppression any time after the sorghum has reached the salt dough stage. An agriculturally approved surfactant may be used to improve performance.

Delay harvest until 30 days after treatment.

BROADCAST RATE PER TREATED ACRE: ½ pint (¼ lb. a.i.)

SMALL GRAINS (WHEAT, BARLEY AND OATS) Not Underseeded To Legumes

Observe all precautions on pages 5-7. Read and follow cleaning, mixing and application instructions on pages 4-5.

Surfactants are not recommended when applying BANVEL Herbicide alone or in tank mixtures on small grains except when tank mixing with sulfonylurea herbicides (such as: Ally®, Express®, Finesse®, Glean®, or Harmony® Extra). Refer to the label of the sulfonylurea herbicide used for specific surfactant use directions.

Do not use penetrants such as petroleum based oils with BANVEL Herbicide or BANVEL Herbicide tank mixtures after small grain emergence.

Sulfonylurea resistant weeds may not be controlled completely by tank mixes of BANVEL with sulfonylurea herbicides. Refer to the tank mix sections from each specific crop for alternative BANVEL tank mixtures.

Do not graze or harvest for livestock feed prior to crop maturity. If small grains are grown for pasture only, refer to the PASTURE, RANGELAND and NON-CROPLAND section pages 34-41.

WEEDS CONTROLLED

BANVEL Herbicide will provide suppression or control of annual broadleaf weeds listed below. For improved control of listed weeds plus additional weeds, it is recommended that BANVEL Herbicide be applied in a tank mix with other herbicides. Refer to specific crop for tank mix options.

Buckwheat Tartary
Buckwheat, Wild *
Chamomile, Corn
Cocklebur, Common
Cocklebur, Common
Henbit
Knotweed
Kochia
Kochia
(sulfonylurea resistant)
Knowel (German Mass)
Ladysthumb
Lambsquarters, Common
Lettuce, Prickly
Mallow, Common
Mustard, Tansy
Nightshade, Black
Pennycress, Field
Pigweed, Redroot
(Carelessweed)
Pigweed, Rough
Pigweed, Tumble
Purslane, Common
Ragweed, Common
Ragweed, Giant
(Bullatowed)
Smartweed, Green
Smartweed, Pennsylvania
Sowthistle, Annual
Sunflower, Common
(Wild)
Sunflower, Volunteer
Thistle, Russion
Velvetleaf

BANVEL Herbicide and BANVEL Herbicide tank mixes will reduce competition from established PERENNIAL broadleaf weeds and control their seedlings. (Refer to GENERAL WEED LIST on pages 10-13).

THE SPECIAL USE TANK MIX FOR FALL SEEDED WHEAT ONLY allows a higher rate of 2,4-D to be used in combination with BANVEL Herbicide. This tank mix treatment may be used for improved performance of difficult-to-control weeds including:

*Fiddleneck (Tarweed)
Garlic, Wild
Gromwell
*Onion, Wild

* Spring applications may not control weeds that develop in the fall. For fall applications, refer to the BETWEEN CROPPING APPLICATIONS section, pages 51-56.

RATES AND TIMINGS

Application of BANVEL Herbicide may be made before, during or after planting to emerged and actively growing weeds. Use BANVEL Herbicide at ¼ pint (¼ lb. a.i.) per treated acre in wheat, fall seeded barley, and oats, and at ⅓ pint (⅓2 lb. a.i.) per treated acre in spring seeded barley. BANVEL Herbicide is most effective when used in a tank mix with other herbicides. Refer to specific crop for BANVEL Herbicide rate and application timing. For best performance, make application when weeds are in the 2 to 3 leaf stage and rosettes are less than 2 inches across. Use the higher level of listed rate ranges when treating more mature weeds or dense vegetative growth.

FALL AND SPRING SEEDED WHEAT

BANVEL HERBICIDE MUST BE APPLIED TO FALL SEEDED WHEAT PRIOR TO THE JOINTING STAGE. APPLICATIONS TO SPRING SEEDED WHEAT MUST BE MADE BEFORE WHEAT EXCEEDS THE 5 LEAF STAGE.

TANK MIX TREATMENTS

For control of grasses or additional broadleaf weeds, BANVEL Herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions.

BROADCAST RATE PER TREATED ACRE:

Apply ¼-½ pint (¼-⅛ lb. a.i.) BANVEL Herbicide with

Herbicide	amount product*	lb. a.i.
2,4-D Amine or Ester	½- ¼ pint	¼- ⅛
MCPA Amine or Ester	½- ¼ pint	¼- ⅛
bromoxynil Buctril® bromoxynil + MCPA Bronate® clopyralid Stinger® clopyralid + 2,4-D Curtail® clopyralid + MCPA Curtail®-M diuron** Karmex® metribuzin** Sencor® sulfonylureas (such as: Ally®, Express®, Finesse® Glean®, Harmony® Extra)	CONSULT PRODUCT LABELS FOR RATE RECOMMENDATIONS	

* Based on 4 pounds per gallon formulations of MCPA and 2,4-D.

** Tank mixtures for fall seeded wheat only.

SPECIAL USE TANK MIX FOR FALL SEEDED WHEAT ONLY

BANVEL	¼ pint	⅛ lb. a.i.
plus	plus	plus
2,4-D amine	1 to 2 pints	½ to 1 lb. a.i.
or	or	or
2,4-D ester	1 to 1½ pints	½ to ¾ lb. a.i.

NOTE: Do not use unless possible crop injury will be acceptable.

FALL SEEDED BARLEY

BANVEL HERBICIDE MUST BE APPLIED TO FALL SEEDED BARLEY PRIOR TO THE JOINTING STAGE.

NOTE: For fall barley varieties that are seeded during the winter months or later, follow the rates and timings given for Spring Seeded Barley.

TANK MIX TREATMENTS

For control of additional broadleaf weeds, BANVEL Herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions

BROADCAST RATE PER TREATED ACRE:

Apply ⅛-½ pint (¼-⅛ lb. a.i.) BANVEL Herbicide with

Herbicide	amount product*	lb. a.i.
2,4-D Amine or Ester	½ pint	¼
MCPA Amine or Ester	½- ¼ pint	¼- ⅛
sulfonylureas (such as: Ally®, Express®, Finesse®, Glean®, Harmony® Extra) metribuzin Sencor®	CONSULT PRODUCT LABELS FOR RATE RECOMMENDATIONS	

*Based on 4 pounds per gallon formulations of MCPA and 2,4-D.

SPRING SEEDED BARLEY

BANVEL HERBICIDE MUST BE APPLIED BEFORE SPRING SEEDED BARLEY EXCEEDS THE 4 LEAF STAGE.

TANK MIX TREATMENTS

For control of additional broadleaf weeds, BANVEL Herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions

BROADCAST RATE PER TREATED ACRE:

Apply ⅛-¾ pint (¼-⅜ lb. a.i.) BANVEL Herbicide with

Herbicide	amount product*	lb. a.i.
MCPA clopyralid + MCPA Curtail®-M metribuzin Sencor® sulfonylureas (such as: Ally®, Express®, Finesse® Glean®, Harmony® Extra	½ pint CONSULT PRODUCT LABELS FOR RATE RECOMMENDATIONS	¼

* Based on 4 pounds per gallon formulations of MCPA

FALL AND SPRING SEEDED OATS

BANVEL HERBICIDE MUST BE APPLIED BEFORE SPRING SEEDED OATS EXCEED THE 5 LEAF STAGE. APPLICATIONS TO FALL SEEDED OATS MUST BE MADE PRIOR TO THE JOINTING STAGE.

TANK MIX TREATMENTS

For control of additional broadleaf weeds, BANVEL Herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions

BROADCAST RATE PER TREATED ACRE:

Apply ⅛ to ½ pint (¼ to ¼ lb. a.i.) BANVEL Herbicide with

Herbicide	amount product*	lb. a.i.
MCPA*	½ to ½ pint	¼ to ⅛

* Based on 4 pounds per gallon formulations of MCPA

SUGARCANE

Observe all precautions on pages 5-8. Read and follow mixing and application instructions on pages 4-5.

Consult your local or state authorities for possible application restrictions, especially concerning aerial applications and advice concerning special local use situations.

WEEDS CONTROLLED

BANVEL Herbicide, when applied at the recommended rates, will control many ANNUAL, BIENNIAL and PERENNIAL broadleaf weeds commonly found in sugarcane. (Refer to GENERAL WEED LIST on pages 10-13)

RATES AND TIMINGS

Application of BANVEL Herbicide may be made any time after weeds have emerged and are actively growing but before the close-in stage of sugarcane. Application rates and timings of BANVEL Herbicide are given below. Use the higher level of listed rate ranges when treating dense vegetative growth.

WEED STAGE & TYPE	Broadcast rate per treated acre: amount product	lbs. a.i.
Annual		
Small, actively growing	½ to 1 pt.	⅛ to ½
Established weed growth	1 to 1½ pts.	½ to ¾
Biennial	1 to 2 pts.	½ to 1
Perennial		
Noted* pg 12) Perennials	2 to 4 pts	1 to 2
Other Perennials	4 to 6 pts.	2 to 3*

* Application made over the top of actively growing sugarcane may result in crop injury

When possible, direct the spray beneath the sugarcane canopy in order to minimize the likelihood of crop injury. The use of directed sprays will also aid in maximizing spray coverage of weed foliage.

Retreatments may be made as needed, however, do not exceed a total of 6 pints (3 lbs. a.i.) of BANVEL Herbicide per treated acre during a growing season.

TANK MIX TREATMENTS

BANVEL Herbicide may be tank mixed with one or more of the following herbicides for control of grasses or additional broadleaf weeds. Read and follow the label of each tank mix product used for precautionary statements, directions for use, rates and timings, weeds controlled and geographic and other restrictions.

Herbicide	Rate per treated acre (lbs. a.i.)
ametryn (Evik)	¾ to 8
asulam (Asulox)	2 to 3½
atrazine	½ to 4
dalapon	3½ to 8½
2,4-D	½ to 3*

* Application of BANVEL Herbicide plus 2,4-D tank mix at the higher listed rate ranges may result in crop injury

PASTURE, RANGELAND AND NON-CROPLAND AREAS

BANVEL Herbicide is recommended for use for pasture, rangeland, general farmstead weed and brush control and for use on non-cropland areas such as fence rows, roadways, rights-of-way (utility, railroad, highway, pipeline), non-selective forest brush control (including site preparation), non-irrigation ditchbanks, wasteland and other non-cropland areas.

Observe all precautions on pages 5-8. Read and follow mixing and application instructions on pages 4-5.

BANVEL Herbicide uses described in this section also pertain to small grains (such as barley, forage sorghum, oats, rye, sudangrass or wheat) grown for pasture use only.

NEWLY SEEDED AREAS, including small grains grown for pasture may be severely injured if rates of BANVEL Herbicide greater than 1 pint/A are applied.

ESTABLISHED GRASS CROPS growing under stress can exhibit various injury symptoms that may be more pronounced if herbicides are applied. Furthermore, rates of BANVEL Herbicide in excess of 2 quarts (2 lbs. a.i.) per treated acre may cause temporary injury to many grass species.

Bentgrass, carpetgrass, bullolagrass and St. Augustine grass may be injured at rates exceeding 1 pint BANVEL Herbicide (½ lb. a.i.) per treated acre. Usually colonial bentgrasses are more tolerant than creeping types. Velvetgrasses are most easily injured. Treatments will kill or injure alfalfa, clovers, lespedeza, wild winter peas, vetch and other legumes.

REMOVE MEAT ANIMALS FROM TREATED AREAS 30 DAYS PRIOR TO SLAUGHTER. THERE IS NO WAITING PERIOD BETWEEN TREATMENT AND GRAZING FOR NON-LACTATING ANIMALS.

TIMING RESTRICTIONS FOR LACTATING DAIRY ANIMALS FOLLOWING TREATMENT

BANVEL Herbicide Rate per Treated Acre	Days Before Grazing	Days Before Hay Harvest
Up to 1 pint (½ lb. a.i.)	7 days	37 days
Up to 1 quart (1 lb. a.i.)	21 days	51 days
Up to 2 quarts (2 lbs. a.i.)	40 days	70 days
Up to 8 quarts (8 lbs. a.i.)	60 days	90 days

NOTE: Observe all precautions and restrictions on labels of products used in tank mixtures

MIXING AND APPLICATION

BANVEL Herbicide can be applied using water, oil in water emulsions including invert systems, or sprayable fluid fertilizer as a carrier. A COMPATIBILITY TEST (page 8 of this booklet) should be made prior to tank mixing.

To prepare oil in water emulsions, half fill the spray tank with water then add the appropriate amount of emulsifier. With continuous agitation, slowly add the herbicide and then the oil (such as diesel oil or fuel oil) or a premix of oil plus additional emulsifier to spray tank. Complete filling of spray tank with water. Maintain vigorous agitation during spray operation to prevent oil and water from forming separate layers.

BANVEL Herbicide may be applied broadcast using either ground or aerial application equipment. When using ground equipment, apply 3 to 600 gallons of diluted spray per treated acre. Volume of spray applied will depend on the height, density, and type of weeds or brush being treated and on the type of equipment being used. When using aerial equipment apply 1 to 40 gallons of diluted spray per treated acre.

BANVEL Herbicide may be applied to individual clumps or small areas (SPOT TREATMENT) of undesirable vegetation using handgun or similar types of application equipment. Apply diluted sprays to allow complete wetting (up to runoff) of foliage and stems.

Herbicide adjuvants or other spray additives (emulsifiers, surfactants, wetting agents, drift control agents, or penetrants) may be used for wetting, penetration, or drift control. Spray additives must be agriculturally approved when used in pasture applications. If spray additives are used, read and follow all use recommendations and precautions on product label.

WEEDS CONTROLLED

BANVEL Herbicide, when applied at recommended rates, will control many ANNUAL, BIENNIAL and PERENNIAL broadleaf weeds, and many WOODY brush and vine species commonly found in pasture, rangeland and non-cropland areas. (Refer to GENERAL WEED LIST on pages 10-13.) Noted (*) PERENNIAL weeds may be controlled with lower rates of either BANVEL Herbicide or BANVEL Herbicide plus 2,4-D. See RATES AND TIMINGS below.

RATES AND TIMINGS

Application rates and timings of BANVEL Herbicide are given below. Use the higher level of listed rate ranges when treating dense or tall vegetative growth.

WEED STAGE & TYPE	Broadcast rate per treated acre amount product	lbs. a.i.
Annual		
Small, actively growing	½ to 1 pt	¼ to ½
Established weed growth	1 to 1½ pts	½ to ¾
*Biennial		
Rosette diameter		
Less than 3 inches	½ to 1 pt.	¼ to ½
3 inches or more	1 to 2 pts	½ to 1
Bolting	2 to 3 pts	1 to 1½
Perennial		
Suppression or top growth control	½ to 1 qt	½ to 1
Noted (*) Perennials	1 to 2 qts	1 to 2
Other Perennials	2 to 4 qts	2 to 4
Dense stands	4 to 6 qts	4 to 6
Woody Brush & Vines		
Foliage Suppression	½ to 1 qt	½ to 1
Stems	1 to 2 qts	1 to 2
Stems and Stem Sprouts	½ to 1 gal	2 to 4
Stems and Root Sprouts	1 to 2 gals.	4 to 8

* For best performance, make application when BIENNIAL WEEDS are in the rosette stage

Retreatments may be made as needed, however, do not exceed a total of 2 gallons (8 lbs. a.i.) of BANVEL Herbicide per treated acre during a growing season.

TANK MIX TREATMENTS

READ AND FOLLOW THE LABEL OF EACH TANK MIX PRODUCT USED FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES AND TIMINGS AND OTHER RESTRICTIONS. BANVEL Herbicide may be tank mixed with one or more of the following herbicides for control of grasses, additional broadleaf weeds, and woody brush and vines.

Herbicide	Rate per treated acre (lbs. a.i.)
Pasture, rangeland, and non-cropland use:	
glyphosate (Roundup®)	⅜ to 3¾
metsulfuron methyl (Ally®)	0.0038 to 0.011
paraquat (Gramoxone®)	½ to 1
picloram (Tordon®)	¼ to 3
triclopyr (Garlon®)	¾ to 9
2,4-D	¼ to 6
Non-cropland use only:	
amitrole	2 to 8
atratol (Atratol®)	4¼ to 10
atrazine	4¼ to 10
bromacil (Hyvar®)	1¼ to 24
dalapon (Dalapon®)	4½ to 12½
diquat	½
diuron (Karmex®)	4 to 12
fosamine ammonium (Krenite®)	6 to 12
hexazinone (Velpar®)	2 to 12
MSMA	2
norflurazon (Solicam®)	2 to 4

prometon (Pramitol*)	10 to 60
simazine (Princep*)	4½ to 10
sulfometuron methyl (Oust*)	0 14 to 0 56
tebuthiuron (Spike*)	1 to 16
2,4 DP (Weedone*)	½ to 11

Due to the variations that may occur in formulated products and specific use ingredients (e g water supplies), a COMPATIBILITY TEST as described on page 8 is recommended prior to actual tank mixing

CUT SURFACE TREE TREATMENTS

BANVEL Herbicide may be applied as a cut surface treatment for control of unwanted trees and prevention of sprouts of cut trees A mix of 1 part BANVEL Herbicide with 1 to 3 parts water should be used in application. Use the lower dilution when treating difficult-to-control species.

- FRILL OR GIRDLE TREATMENTS: Make a continuous cut or a series of overlapping cuts using an axe to girdle tree trunk. Spray or paint cut surface with the BANVEL Herbicide/water mix.
- STUMP TREATMENTS: Spray or paint freshly cut surface with the water mix. The area adjacent to the bark should be thoroughly wet.

NOTE: For more rapid foliar effects, 2,4-D may be added to the BANVEL Herbicide/water mix

DORMANT APPLICATIONS FOR CONTROL OF MULTIFLORA ROSE

BANVEL Herbicide can be applied when plants are dormant as an undiluted SPOT-CONCENTRATE directly to the soil or as a LO-OIL BASAL BARK treatment using an oil-water emulsion solution.

SPOT-CONCENTRATE applications of BANVEL Herbicide should be applied directly to the soil as close as possible to the root crown but within 6 to 8 inches of the crown. On sloping terrain, application should be made to the uphill side of the crown. Do not make application when snow or water prevents applying BANVEL Herbicide directly to the soil. The use rate of BANVEL Herbicide is dependent on the canopy diameter of the multiflora rose Examples Use BANVEL Herbicide at ¼, 1, or 2¾ fluid ounces of product respectively, for 5, 10, or 15 feet canopy diameters. Do not exceed a total of 2 gallons BANVEL Herbicide per acre per year.

LO-OIL BASAL BARK applications of BANVEL Herbicide should be applied to the basal stem region from the ground line up to a height of 12 to 18 inches. Spray until runoff, with special emphasis on covering the root crown. For best results, make application when plants are dormant. Do not make application after bud break or when plants are showing signs of active growth Do not make application when snow or water prevents applying BANVEL Herbicide to the ground line Refer to Mixing and Applications above in this section for method of preparing oil-in-water emulsion. Example for making approximately 2 gallons of a LO-OIL spray solution mixture: combine 1½ gallons water plus 1 ounce emulsifier plus 1 pint BANVEL Herbicide plus 2½ pints of No 2 diesel fuel Adjust amounts of materials used proportionately to the amount of final spray solution desired Do not exceed 30 gallons of spray solution mix applied per acre per year

CONSERVATION RESERVE PROGRAM (CRP) ACRES

BANVEL Herbicide is recommended for use on both newly seeded and established grasses grown in Conservation Reserve or Federal Set-Aside Programs

Observe all precautions, mixing and application directions on pages 4-8

BANVEL Herbicide treatment will injure or may kill alfalfa, clovers, lespedeza, wild winter peas, vetch, and other legumes

Agriculturally approved surfactants may be added to the spray mixture to improve postemergence weed control, particularly in dry growing conditions.

Do not use adjuvants containing penetrants such as petroleum based oils after grass emergence on newly seeded grasses

NEWLY SEEDED AREAS

BANVEL Herbicide, may be applied either preplant or postemergence to newly seeded grasses or small grains such as barley, oats, rye, sudangrass, wheat, or other grain species grown as a cover crop Postemergence applications may be made after seedling grasses exceed the 3 leaf stage Rates of BANVEL Herbicide greater than 1 pint per treated acre may severely injure newly seeded grasses Preplant applications - injury to new seedings may occur if intervals between application and grass planting is less than 45 days per pint of BANVEL Herbicide per treated acre West of the Mississippi River or 20 days per pint East of the Mississippi River

ESTABLISHED GRASS STANDS

Established grass stands are perennial grasses planted one or more seasons prior to treatment. Certain species: bentgrass, carpetgrass, smooth brome, bullalograss or St. Augustine grass may be injured when treated with BANVEL Herbicide at rates exceeding 1 pint per treated acre.

WEEDS CONTROLLED

BANVEL Herbicide, when applied at recommended rates, will control many annual and biennial weeds and provide control or suppression of many perennial weeds (Refer to GENERAL WEED LIST on pages 10-13).

RATES AND TIMINGS

Application rates and timings of BANVEL Herbicide treatment are given below Use the higher rate of the rate range when vegetation is either dense or tall, or when weeds are growing under stressed conditions such as drought or cool temperature

WEED STAGE & TYPE*	Broadcast rate per treated acre: Amount of Formulated BANVEL Herbicide	Equivalent lbs. a.i.
	·····pints·····	
Annuals		
Small actively growing	¼ to 1	⅛ to ½
Established weed growth	1	½
Biennials**		
Rosette diameter		
less than 3 inches	½ to 1	¼ to ½
3 inches or greater	1 to 2	½ to 1
bolting biennial	2 to 3	1 to 1½
Perennials**		
- Suppression/Control	2 to 4	1 to 2

* For best results, treat Biennial weeds with BANVEL Herbicide when they are in the rosette stage of growth. Retreatments may be made as needed; however, DO NOT EXCEED A TOTAL OF 2 QUARTS (2 lbs. a.i.) of BANVEL Herbicide per treated acre during a growing season.

** Biennial and Perennial weeds will require follow up (sequential) treatments for seedling control and escapes.

TANK MIX TREATMENTS

To control grasses and additional broadleaf weeds, BANVEL Herbicide may be tank mixed with other herbicides registered for use in Conservation Reserve Programs such as 2,4-D, glyphosate (Roundup®), paraquat (Gramoxone®), metsulfuron (Ally®) and others.

READ AND FOLLOW THE LABEL OF EACH TANK MIX PRODUCT USED FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES, AND OTHER RESTRICTIONS.

ASPARAGUS

For Use Only In the States of California, Oregon and Washington

IMPORTANT

Observe all precautions on pages 5-B. Read and follow mixing and application instructions on pages 4-5.

If spray contacts emerged spears, crooking (twisting) of some spears may result. If such crooking occurs, discard affected spears.

Do not harvest prior to 24 hours after treatment.

Multiple applications may be made per growing season. Do not exceed a total of 1 pint of BANVEL Herbicide per treated acre per crop year.

RATES AND TIMINGS

Apply BANVEL Herbicide to emerged and actively growing weeds in 40 to 60 gallons of diluted spray per treated acre immediately after cutting the field, but at least 24 hours before the next cutting.

Weeds	Rate Per Treated Acre
Mustard, Black Pigweed, Redroot (Carelessweed) Sowthistle, Annual * Thistle, Canada Thistle, Russian	½ to 1 pt. (¼ - ½ lb. a.i.)
* Bindweed, Field Chickweed, Common Goosefoot, Nettleleaf Radish, Wild Thistle, Milk	1 pt. (½ lb. a.i.)

BANVEL Herbicide may be applied in a tank mixture with either 2,4-D or Roundup Herbicide for improved control of noted (*) weeds. READ AND FOLLOW 2,4-D OR Roundup Herbicide PRODUCT LABELING FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES AND TIMINGS, AND OTHER RESTRICTIONS.

TURF AND LAWNS

Including Golf Course Fairways, Aprons, Tees and Rough.

IMPORTANT

Observe all precautions on pages 5-B. Read and follow mixing and application instructions on pages 4-5.

To avoid injury to newly seeded grasses, application of BANVEL Herbicide should be delayed until after the second mowing. Furthermore, application rates in excess of 1 pint (½ lb. a.i.) per treated acre may cause noticeable stunting or discoloration of sensitive grass species such as bentgrass, carpetgrass, buffalograss, and St. Augustine grass.

In areas where roots of sensitive plants extend, do not apply in excess of ¼ pint (⅛ lb. a.i.) of BANVEL Herbicide per treated acre on coarse textured (sandy-type) soils, or in excess of ½ pint (¼ lb. a.i.) per treated acre on fine textured (clayey-type) soils. Do not make repeat applications in these areas for 30 days and until previous applications of BANVEL Herbicide have been activated in the soil by rain or irrigation.

WEEDS CONTROLLED

BANVEL Herbicide, when applied at recommended rates, will control many ANNUAL, BIENNIAL, and noted (*) PERENNIAL broadleaf weeds commonly found in turf. BANVEL Herbicide will also give growth suppression of many other listed PERENNIAL broadleaf weeds and WOODY brush and vine species. (Refer to GENERAL WEED LIST on pages 10-13.)

MIXING AND APPLICATION

Apply 30 to 200 gallons of diluted spray per treated acre (3 qts. to 4¼ gals. per 1,000 sq. ft.), depending on density or height of weeds treated and on the type of equipment used.

RATES AND TIMINGS

Use the higher level of listed rate ranges when treating dense vegetative growth.

	BANVEL Herbicide		
WEED STAGE & TYPE	pints per treated acre	lbs. a.i. per treated acre	teaspoons per 1000 sq. ft.
Annual			
Small, actively growing	½ to 1	¼ to ½	1 to 2¼
Established weed growth	1 to 1½	½ to ¾	2¼ to 3¼
Biennial			
Rosette diameter			
Less than 3 inches	½ to 1	¼ to ½	1 to 2¼
3 inches or more	1 to 2	½ to 1	2¼ to 4½
Perennials and Woody			
Brush and Vines	1 to 2	½ to 1	2¼ to 4½

For best performance, apply when weeds are emerged and actively growing.

Retreatments may be made as needed; however, do not exceed a total of 2 pints (1 lb. a.i.) BANVEL Herbicide per treated acre during a growing season.

TANK MIX TREATMENTS

READ AND FOLLOW THE LABEL OF EACH TANK MIX PRODUCT USED FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES AND TIMINGS AND OTHER RESTRICTIONS.

Tank mix treatments of BANVEL Herbicide may be made with 2,4 D, MCPA, MCPP, or bromoxynil for control of additional weeds listed on the tank mix product label.

Apply ½ to ½ pint (⅛ to ¼ lb a.i.) of BANVEL Herbicide per treated acre with ½ to 1½ lbs. acid equivalent of 2,4 D, MCPA, or MCPP, or with ⅜ to ½ lb. a.i. of bromoxynil. Use the higher level of the listed rate ranges when treating established weeds. Repeat treatments may be made as needed, however, do not exceed 2 pints (1 lb. a.i.) of BANVEL Herbicide per treated acre during the growing season.

GRASS SEED CROPS

Perennial Grasses such as Bermuda grass, Bluegrass, Lawntype Fescue and Ryegrass

IMPORTANT

Observe all precautions on pages 5-8. Read and follow mixing and application instructions on pages 4-5.

Refer to the PASTURE, RANGELAND, AND NON-CROPLAND IMPORTANT section (pages 34-41) for possible grazing and feeding restrictions.

Do not use on bentgrass unless possible crop injury can be tolerated.

RATES AND TIMINGS

Apply ½ to 2 pints (¼ to 1 lb. a.i.) of BANVEL Herbicide in 5 to 40 gallons of diluted spray per treated acre after weeds have emerged and are actively growing for control of broadleaf weeds such as:

Alfalfa	Chickweed, Mouseear	Knotweed
*Bindweed, Field	Clover	Sorrel, Red
Catchfly, Nightflowering	Cockle, White	(Sheep Sorrel)
Chamomile, Corn	Dock, Curly	Starwort, Little
Chickweed, Common	* Knapweed, Russian	* Thistle, Canada

*Top growth only.

Use ½ to 1 pint (⅛ to ½ lb. a.i.) of BANVEL Herbicide per treated acre on SEEDLING GRASS after the crop reaches the 3 to 5 leaf stage. Up to 2 pints (1 lb. a.i.) of BANVEL Herbicide per treated acre may be used on well established PERENNIAL grass. DO NOT APPLY AFTER THE GRASS SEED CROP BEGINS TO JOINT.

For control of ANNUAL GRASS WEEDS such as:

Brome, Downy (Cheatgrass)
Brome, Ripgut
Fescue, Rattail

Apply 2 to 4 quarts (2 to 4 lbs. a.i.) of BANVEL Herbicide per treated acre in the fall or late summer after harvest and burning of established grass seed crops. Applications should be made immediately following the first irrigation when the soil is moist and before weeds have more than 2 leaves.

BETWEEN CROPPING APPLICATIONS (BCA) FOR BROADLEAF WEED CONTROL

IMPORTANT

Observe all precautions on pages 5-8. Read and follow mixing and application instructions on pages 4-5.

WEEDS CONTROLLED

BANVEL Herbicide, when applied at the recommended rates, will control many ANNUAL and BIENNIAL broadleaf weeds. (Refer to GENERAL WEED LIST on pages 10-13). In addition, BANVEL Herbicide will control the following PERENNIAL broadleaf weeds.

* Alfalfa	* Dandelion, Common	Redvine
Artichoke, Jerusalem	* Dock, Curly	Smartweed, Swamp
Bindweed, Field	Dogbane, Hemp	* Sowthistle, Perennial
Bindweed, Hedge	** Garlic, Wild	** Thistle, Canada
Blueweed, Texas	Horsenettle, Carolina	Trumpetcreeper
* Bursage	Nightshade, Silverleaf	(Buckvine)
(Bur Ragweed)		
(Povertyweed)		
(Lakeweed)		

Noted (*) perennials may be controlled using BANVEL Herbicide at rates lower than those recommended for other listed perennial weeds (See RATES AND TIMINGS, pages 18-21).

**SEE SPECIAL TANK MIX TREATMENTS, pages 54-55, for specific control program.

RATES AND TIMINGS

Apply BANVEL Herbicide as a broadcast or spot treatment to emerged and actively growing weeds after crop harvest and before a killing frost. Agricultural approved spray additives, such as surfactants or oils, may be used to enhance spray coverage and the herbicide's penetration of weed foliage. See ROTATIONAL CROPS (pages 55-56) for recommended interval between application and planting to prevent crop injury.

For best performance, make application when ANNUAL weeds are less than 6 inches tall, when BIENNIAL weeds are in the rosette stage, and to PERENNIAL weed regrowth in late summer or fall following a mowing or tillage treatment. Most effective control of upright perennial broadleaf weeds, such as Canada thistle and Jerusalem artichoke, occurs if application is made when the majority of weeds are 8 inches or taller. Viney perennial broadleaf weeds, such as field bindweed and hedge bindweed, are best controlled when weeds are in or beyond the full bloom stage.

Avoid disturbing treated areas for at least 7 days following application. Treatments may not kill weeds which develop from seed or underground plant parts, such as rhizomes or bulblets, after the effective period for BANVEL Herbicide. For seedling control, a follow-up program or other cultural practices could be instituted (refer to pages 25-32, for small grain in-crop uses of BANVEL Herbicide).

BANVEL Herbicide per treated acre

WEED STAGE & TYPE	amount product	lbs. a.i.
Annual	½ to 1 pt.	¼ to ½
Biennial	1 to 2 pts	½ to 1
Perennial		
Perennial suppression	1 to 2 pts.	½ to 1
Noted (*) Perennials	2 to 4 pts	1 to 2
Other Perennials	4 pts	2

Retreatments may be made as needed; however, do not exceed a total of 4 pints (2 lbs. a.i.) of BANVEL Herbicide per treated acre during any given follow period.

TANK MIX TREATMENTS

BANVEL Herbicide may be tank mixed with one or more of the following herbicides for control of grasses or additional broadleaf weeds. Read and follow the label of each tank mix product used for precautionary statements, directions for use, rates and timings, weeds controlled and geographic and other restrictions.

Herbicide	Rate per treated acre (lbs. a.i.)
ANNUAL WEED CONTROL	
atrazine	½ to 3
chlorsulfuron* (Glean®)	0.016 to 0.024
cyanazine (Blade®)	1½- ½ wt or product)
glyphosate (Roundup®, Roundup® Rt, Ranger® and others)	1¼ to 3¼
metribuzin (Sencor®, Lexone®)	¼ to ½
paraquat	½ to 1
2,4-D	¼ to ½
BIENNIAL OR PERENNIAL WEED CONTROL	
glyphosate	½ to 2
2,4-D	1 to 2
picloram (Tordon®)	⅛ to ¼

* When making tank mix applications with Glean, add a surfactant of at least 80% active ingredient at the rate of 1 to 2 quarts/100 gallons of spray or not more than ¼ to ½% by volume. Use the highest rate of surfactant when using the lower rate ranges of the tank mix and/or when treating more mature weeds or dense vegetative growth.

SPECIAL TANK MIX TREATMENTS

For suppression of perennial weeds, apply 0.25 to 0.50 lb. a.i. BANVEL Herbicide with 0.25 to 0.50 lb. a.i. glyphosate (Herbicide per treated acre.

For wild garlic control, apply 1 pint (½ lb. a.i.) BANVEL Herbicide with 1½ lbs. acid equivalent 2,4-D low volatile ester per treated acre. Apply when wild garlic is 4 to 8 inches tall.

For Canada thistle control, use BANVEL Herbicide or BANVEL Herbicide plus glyphosate Herbicide tank mix treatments.

Application may be made during fallow periods for control of volunteer barley, bulbous bluegrass, downy brome, jointed goatgrass, common rye and volunteer wheat when they are actively growing. Use 1 pint BANVEL Herbicide with ½ to ¾ lb. Kerb® 50W (0.25-0.38 lb. a.i.) Fall seeded wheat may be planted 9 months or more after application. For best performance, make application between mid-October and mid-December, prior to soil freeze up.

During fallow periods, apply BANVEL Herbicide plus Londmaster Herbicide to give improved control of kochia, wild buckwheat, prickly lettuce, field bindweed and Canada thistle. Use 4 to 8 fluid ounces of BANVEL Herbicide plus 40 to 54 fluid ounces of Londmaster Herbicide for annual weed control or Londmaster Herbicide for perennial weed suppression.

ROTATIONAL CROPS

The following recommendations are based on BANVEL Herbicide use rates up to 4 pints (2 lbs. a.i.) per treated acre.

CORN and SORGHUM may be planted in the spring following applications made during the previous year.

SOYBEANS may be planted in the spring following applications made during the previous year if less than 1 inch of rainfall occurs between application and first killing frost, treated areas should be cultivated to allow herbicide to come in contact with moist soil. Cultivation may take place before or immediately after ground thaw.

Soybean injury may occur if the interval between application and planting is less than specified. In areas with greater than 30 inches of rainfall, delay planting for 30 days per pint of BANVEL I Herbicide per treated acre. In areas with less than 30 inches of rainfall, delay planting for 45 days per pint of BANVEL I Herbicide per treated acre. Exclude days when ground is frozen.

WHEAT may be planted in the fall or spring following applications. Also, spot applications may be made any time prior to crop emergence if crop injury can be tolerated in treated areas. Wheat injury may occur if the interval between application and planting is less than the following specifications:

East of the Mississippi River, the interval is 20 days per pint of BANVEL Herbicide per treated acre. Exclude days when ground is frozen.

West of the Mississippi River, the interval is 45 days per pint of BANVEL Herbicide per treated acre. Exclude days when ground is frozen.

Following a normal harvest of corn, sorghum, soybeans, or wheat, any rotational crop may be planted. If the interval before harvest is shortened, such as when cover crops will be plowed under, do not follow up with the planting of a sensitive crop.

CONTROL OF PERENNIAL BROADLEAF WEEDS IN CROPLAND (SPOT APPLICATION ONLY)

For Use Only in the States of Idaho, Montana, Nevada, Oregon, Utah, and Washington

IMPORTANT

Observe all precautions on pages 5-8. Read and follow mixing and application instructions on pages 4-5.

Do not treat subirrigated cropland or areas where the soil remains saturated with water throughout the year.

Make only one application of BANVEL Herbicide per year.

WEEDS CONTROLLED

BANVEL Herbicide when applied at recommended rates, will control many broadleaf weeds including:

Bindweed, Field	Dock, Curly	Ragwart, Tansy
Dock, Broadleaf (Bitterdock)	Knapweed, Black	Spurge, Leafy
	Knapweed, Russian	Thistle, Canada

RATES AND TIMINGS

BANVEL Herbicide may be applied at any time following a crop harvest to stubble fallow or other cropland. Application should be made when weeds are actively growing prior to a killing frost.

Apply 4 to 6 quarts (4 to 6 lbs. a.i.) of BANVEL Herbicide per treated acre. Application may be made up to one month prior to the planting of wheat.

NOTE: Do not use unless injury to wheat or rotated barley will be acceptable.

Barley, oats, corn, sorghum (milo), annual or perennial grass crops may be planted into treated areas one year after application. Crops grown for seed (other than perennial grass seed) should not be planted into treated areas until three years after application. Do not plant broadleaf crops such as alfalfa, beans, peas, potatoes, or sugarbeets into treated areas until two years after application.

In most cases, treatments will not kill perennial weed seedlings which germinate from seed one or two years after treatment. Once the effect of the chemical has been lost, a follow-up program for seedling control or other cultural practices should be instituted.

WIPER APPLICATION USES

IMPORTANT

Observe all precautions on pages 5-8.

BANVEL Herbicide may be applied through wiper application equipment to control or suppress actively growing broadleaf weeds, brush and vines. Use a solution containing 1 part BANVEL Herbicide to 1 part water. Do not contact desirable vegetation with herbicide solution. Wiper application should only be made to crops (including pastures) and non-cropland areas described in this booklet with the exception of Grain Sorghum (Milo).

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

WARNING

Causes eye irritation. Do not get in eyes, on skin, or on clothing. Harmful if swallowed. Avoid breathing spray mist. Wash thoroughly after handling. In case of contact, wash skin with soap and water, for eyes, flush with water for 15 minutes and get medical attention.

ENVIRONMENTAL HAZARDS

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Apply this product only as directed.

STORAGE AND DISPOSAL

PROHIBITIONS
Do not contaminate water, food or feed by storage or disposal

STORAGE
Store in original container in a well-ventilated area separately from fertilizer, feed and foodstuffs. Avoid cross-contamination with other pesticides. Spillage or leakage should be contained and absorbed with clay granules, sawdust, or equivalent material for disposal

PESTICIDE DISPOSAL
Triple rinse pesticide from containers and use rinsates in the pesticide application. Wastes which cannot be used according to label instructions may be disposed of on site or at an approved waste disposal facility

CONTAINER DISPOSAL
Plastic or Metal: After triple rinsing (or equivalent), offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities, such as burning of plastic containers. If burned, stay out of smoke

LIMITATION OF WARRANTY AND LIMITATION OF LIABILITY

Notice: Read this Limitation of Warranty and Limitation of Liability before buying or using this product. If the terms are not acceptable, return the product at once, unopened, and the purchase price will be refunded.

It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness, or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of Sandoz or seller. All such risks shall be assumed by buyer or user.

Sandoz warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated in the Directions for Use, under normal use conditions, subject to the risks described above. **Sandoz makes no other express or implied warranty of fitness or of merchantability or any other express or implied warranty.**

In no event shall Sandoz or seller be liable for any incidental, consequential or special damages resulting from the use or handling of this product. **The exclusive remedy of the user or buyer, and the exclusive liability of Sandoz or seller for any and all claims, losses, injuries or damages (including claims based on breach of warranty, contract, negligence, tort, strict liability or otherwise) resulting from the use or handling of this product, shall be the return of the purchase price of the product or, at the election of Sandoz or seller, the replacement of the product.**

Sandoz and seller offer this product, and buyer and user accept it, subject to the foregoing limitations of warranty and limitation of liability, which may not be modified by any oral or written agreement.

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24 (c) SPECIAL LOCAL NEED LABELING

FEB 2 1993

TABLE OF CONTENTS

24(c) SPECIAL LOCAL NEED LABELING
WILD BUCKWHEAT CONTROL IN FALL SEEDED WHEAT

For Use Only Within the State of Oklahoma

EPA SLN No. OK-810004

IMPORTANT

OBSERVE ALL RESTRICTIONS, PRECAUTIONS AND APPLICATION DIRECTIONS IN THIS BOOKLET

TIMING OF APPLICATION: Application of BANVEL Herbicide tank mixtures given below can be made on wheat up to the development of a second node. Apply this mixture after the wild buckwheat has emerged and is actively growing. For good control apply before wild buckwheat plants are larger than two true leaves. Spray before a crop canopy is formed which would protect the weeds from the spray.

TANK MIX TREATMENTS: Tank mix 1/16 pound active (1/8) pint BANVEL Herbicide with 1/8 pound active Bromoxynil plus 1/8 pound active MCPA or with 3/16 pound active Bromoxynil per treated acre. Bromoxynil plus MCPA is sold as Bronate® (trademark of Rhone-Poulenc, Inc.) or Brominal® Plus (trademark of Union Carbide Corp.). Bromoxynil is available as Brominal® (trademark of Union Carbide Corp.) or Buctril® (trademark of Rhone-Poulenc, Inc.). Read and follow all applicable directions, restrictions, and precautions on the Bromoxynil and MCPA labels.

Dilute with water a minimum of 1 gallon total spray per acre for aerial application and a minimum of 10 gallons total spray for ground application.

24(c) SPECIAL LOCAL NEED LABELING
ANNUAL WEED CONTROL IN MILLET

For Use Only Within the State of Nebraska

EPA SLN No. NE-900001

IMPORTANT

OBSERVE ALL PRECAUTIONS IN THIS BOOKLET

WEEDS CONTROLLED

ANNUALS

Buckwheat, Tartary	Mallow, Common	Radish, Wild
Buckwheat, Wild	Mayweed	Ragweed, Common
Carpetweed	Mustard, Annual	Ragweed, Giant (Buffaloweed)
Chamomile, Corn	Mustard, Tansy	Salsify (Goatsbeard)
Chickweed, Common	Nightshade, Black	Shepherdspurse
Cockle, Corn	Pennycress, Field (Fanweed, Frenchweed, Stinkweed)	Smartweed, Green
Cockle, Cow	Pigweed, Redroot (Carelessweed)	Smartweed, Pennsylvania
Cocklebur, Common	Pigweed, Rough	Sowthistle, Annual
Dragonhead, American	Pigweed, Tumble	Starthistle, Yellow
Hempnettle,	Pineappleweed	Sunflower, Common, Wild
Knawel (German Moss)	Puncturevine	Sunflower, Volunteer
Knotweed	Purslane, Common	Thistle, Russian
Kochia		Velvetleaf
Ladysthumb		Vetch
Lambsquarters, Common		
Lettuce, Prickly		

APPLICATION DIRECTIONS

Apply BANVEL Herbicide as a broadcast or spot treatment to emerged and actively growing weeds and when millet is in the 2 to 5 leaf stage.

For control of listed Annual broadleaf weeds, apply 1/4 pint BANVEL Herbicide (1/8 lb. a.i.) with 3/8 a.i. 2,4-D.

3 to 50 gallons of diluted spray per treated acre may be applied when using ground application equipment, or 1 to 10 gallons of diluted spray per treated acre when using aerial application equipment.

24(c) SPECIAL LOCAL NEED LABELING
FOR CONTROL OF ANNUAL AND PERENNIAL BROADLEAF WEEDS SUCH AS FIELD BINDWEED IN BETWEEN CROPPING APPLICATIONS TO WHEAT

For Use Only In the State of Oklahoma

EPA SLN No. OK-850008

IMPORTANT

OBSERVE ALL PRECAUTIONS IN THIS BOOKLET
Also read and follow the Tordon 22K federal label and 24-C label for precautionary statements, directions for use, geographic and other restrictions.

Observe the following requirements:

- Do not make application more than once each calendar year

- Do not apply an or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, soilflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals, shade trees, or the soil containing roots of nearby valuable plants
- Do not apply by air For ground equipment do not apply with hollow cone-type insecticide or other nozzles that produce line-droplet spray
- Do not contaminate water intended for irrigation or domestic purposes Do not treat or allow spray drift to fall onto innerbanks or bottom of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation purposes
- Do not move treated soil to other areas where susceptible desirable plants may be exposed and damaged while phytotoxic residues are present
- Avoid spray drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods

RATES AND TIMINGS

Use BANVEL Herbicide plus Tordon 22K by ground application to control or reduce infestations of broadleaf annual and perennial weeds such as field bindweed on grainland during the period following crop harvest and prior to planting winter wheat. For reduction of perennial weeds such as field bindweed, broadcast treat infested areas using 0.5 to 1.0 pint of BANVEL Herbicide tank mixed with 0.5 to 1.0 pint of Tordon 22K in 10 or more gallons of water per acre. If either 2,4-D susceptible broadleaf weed species are present, an additional 1.0 to 2.0 pints of 2,4-D amine (3.8 lb/gal) may be added to the spray mix. For best results, treat in June or July during a fallow period or following small grain harvest by applying the 1.0 pint plus 1.0 pint rate of BANVEL Herbicide and Tordon 22K. Initial treatment alternatively may be made during a fallow period after harvesting a fall maturing crop such as grain sorghum or corn. During the next calendar year, retreat the same area with BANVEL plus Tordon 22K, preferably in May or June in the fallow period prior to fall planting of the next wheat crop. An alternative application of BANVEL Herbicide without Tordon 22K may be made in the late summer or fall during the fallow period prior to fall wheat planting. For specific rates for the use of BANVEL Herbicide, see the BETWEEN CROPPING APPLICATIONS section of this booklet. Avoid disturbing treated areas for at least 7 days following application. For seedling control a follow-up program or other cultural practices should be instituted.

Wheat may be injured when planted at varying periods following applications of Tordon 22K and BANVEL Herbicide. Do not use the BANVEL plus Tordon 22K tank mix if risk of injury to wheat cannot be tolerated.

24(c) SPECIAL LOCAL NEED LABELING FOR CONTROL OF ANNUAL AND PERENNIAL BROADLEAF WEEDS SUCH AS FIELD BINDWEED IN BETWEEN CROPPING APPLICATIONS TO WHEAT

For Use Only In the State of Texas

EPA SLN No. TX 860006

IMPORTANT

OBSERVE ALL PRECAUTIONS IN THIS BOOKLET Also read and follow the Tordon 22K federal label and 24-C label for precautionary statements, directions for use, geographic and other restrictions.

Observe the following requirements.

- Do not make application more than once each calendar year
- Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, soilflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals, shade trees, or the soil containing roots of nearby valuable plants
- Do not apply by air For ground equipment do not apply with hollow cone-type insecticide or other nozzles that produce line-droplet spray
- Do not contaminate water intended for irrigation or domestic purposes Do not treat or allow spray drift to fall onto innerbanks or bottom of irrigation ditches, either dry or containing water or other channels that carry water that may be used for irrigation purposes
- Do not move treated soil to other areas where susceptible desirable plants may be exposed and damaged while phytotoxic residues are present

- Avoid spray drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods.
- Do not apply in the vicinity of sensitive crops when the temperature on the day of application is expected to exceed 85 degrees.

RATES AND TIMINGS

Use BANVEL Herbicide plus Tordon 22K by ground application to control or reduce infestations of broadleaf annual and perennial weeds such as field bindweed on grainland during the period following crop harvest and prior to planting winter wheat. For reduction of perennial weeds such as field bindweed, broadcast treat infested areas using 0.5 to 1.0 pint of BANVEL Herbicide tank mixed with 0.5 to 1.0 pint of Tordon 22K in 10 or more gallons of water per acre. For best results, treat in June or July during a fallow period or following small grain harvest, applying the 1.0 pint plus 1.0 pint rate of BANVEL Herbicide and Tordon 22K. Initial treatment alternatively may be made during a fallow period after harvesting a fall maturing crop such as grain sorghum or corn. During the next calendar year, retreat the same area with BANVEL plus Tordon 22K, preferably in May or June in the fallow period prior to fall planting of the next wheat crop. An alternative application of BANVEL Herbicide without Tordon 22K may be made in the late summer or fall during the fallow period prior to fall wheat planting. For specific rates for the use of BANVEL Herbicide, see the BETWEEN CROPPING APPLICATIONS section of this booklet. Avoid disturbing treated areas for at least 7 days following application. For seedling control a follow-up program or other cultural practices should be instituted.

Wheat may be injured when planted at varying periods following applications of Tordon 22K and BANVEL Herbicide. Do not use the BANVEL plus Tordon 22K tank mix if risk of injury to wheat cannot be tolerated.

24(c) SPECIAL LOCAL NEED LABELING FOR CONTROL OF ANNUAL BROADLEAF WEEDS IN FALL SEEDED WHEAT

For Use Only In a Designated Area of Eastern Colorado

EPA SLN No. CO-900002

Please call the Denver regional office at 303-779-9722 for a map showing designated use area.

IMPORTANT

OBSERVE ALL PRECAUTIONS AND RESTRICTIONS IN THIS BOOKLET

Do not apply BANVEL Herbicide in the vicinity of sensitive crops when the temperature on the day of application is expected to exceed 85° F as drift is more likely to occur

WEEDS CONTROLLED

BANVEL Herbicide, when applied at recommended rates, will control or suppress the following ANNUAL weeds that may interfere with harvest of wheat.

Buckwheat, Wild	Pigweed Spp
Kochia	Sunflower
Lambsquarters, Common	Thistle, Russian

RATES AND TIMINGS

Apply BANVEL Herbicide as a broadcast or spot treatment to annual broadleaf weeds when wheat is in the hard dough stage and green color is gone from the nodes (joints) of the stem. Best results will be obtained if application can be made when weeds are actively growing but before weeds canopy over the wheat. A WAITING INTERVAL OF AT LEAST 14 DAYS IS REQUIRED BEFORE HARVEST.

For control or suppression of listed broadleaf weeds, apply ½ pint BANVEL Herbicide (¼ lb. a.i.) with ½ to 1 lb. a.i. 2,4-D amine or ester per treated acre. Check with local agricultural extension agent or 2,4-D label for specific use rates

For aerial applications, apply a minimum of 1 gallon of diluted spray per treated acre. Agriculturally approved spray additives, such as surfactants, or oils, may be used to enhance spray coverage and the herbicide's penetration of weed foliage.

NOTE: Do not graze or feed fodder from treated area. Do not use treated wheat for seed unless a germination test is performed on the seed with an acceptable result of 95% germination or better.

24(c) SPECIAL LOCAL NEED LABELING FOR CONTROL OF ANNUAL BROADLEAF WEEDS IN FALL OR SPRING SEEDED WHEAT

For Use Only In the State of Washington

EPA SLN No. WA-910032

OBSERVE ALL PRECAUTIONS AND RESTRICTIONS IN THIS BOOKLET

WEEDS CONTROLLED

BANVEL Herbicide, when applied at recommended rates, will control or suppress the following annual weeds that may interfere with harvest of wheat.

Buckwheat, Wild	Pigweed Spp
Kochia	Sunflower
Lambsquarters, Common	Thistle, Russian

RATES AND TIMINGS

Apply BANVEL Herbicide as a broadcast or spot treatment to annual broadleaf weeds when wheat is in the hard dough stage and green color is gone from the nodes (joints) of the stem. Best results will be obtained if application can be made when weeds are actively growing but before weeds canopy over the wheat. A WAITING INTERVAL OF AT LEAST 10 TO 14 DAYS IS REQUIRED BEFORE HARVEST.

For control or suppression of listed broadleaf weeds, apply ½ pint BANVEL Herbicide (¼ lb. a.i.) with ½ to 1 lb. a.i. 2,4-D amine per treated acre. Check with local agricultural extension agent or 2,4-D label for specific use rates.

For aerial applications, apply a minimum of 3 gallons of diluted spray per treated acre. Agriculturally approved spray additives, such as surfactants, may be used to enhance spray coverage and the herbicide's penetration of weed foliage.

NOTE: Do not graze or feed fodder from treated area. Do not use treated wheat for seed. Do not use straw as bedding

24(c) SPECIAL LOCAL NEED LABELING FOR CONTROL OF ANNUAL BROADLEAF WEEDS IN PREHARVEST WHEAT

For Use Only In the States of Idaho, Kansas, North Dakota, Oklahoma, Oregon, South Dakota and Utah

EPA SLN Nos.

OR-900013	KS-900002
SD-910003	ND-890001
UT-900002	OK-840010
ID-900013	

OBSERVE ALL PRECAUTIONS IN THIS BOOKLET

WEEDS CONTROLLED

ANNUALS

Buckwheat, Wild	Pigweed Spp.
Kochia	Sunflower
Lambsquarters, Common	Thistle, Russian

RATES AND TIMINGS

Apply BANVEL Herbicide as a broadcast or spot treatment to annual broadleaf weeds when wheat is in the hard dough stage and green color is gone from the nodes (joints) of the stem. Best results will be obtained if application can be made when weeds are actively growing but before weeds canopy over the wheat. A WAITING INTERVAL OF AT LEAST 14 DAYS IS REQUIRED BEFORE HARVEST.

For control or suppression of listed broadleaf weeds, apply ½ pint BANVEL Herbicide (¼ lb. a.i.) with ½ to 1 lb. a.i. 2,4-D amine or ester per treated acre. Check with local agricultural extension agent or 2,4-D label for specific use rates.

For aerial applications, apply a minimum of 1 gallon of diluted spray per treated acre. Agriculturally approved spray additives, such as surfactants, or oils, may be used to enhance spray coverage and like herbicide's penetration of weed foliage.

NOTE: Do not graze or feed fodder from treated area. Do not use treated wheat for seed unless a germination test is performed on the seed with an acceptable result of 95% germination or better.

In Idaho, due to specific restrictions on the use of phenoxy and phenoxy like herbicides, please consult the Idaho Department of Agriculture for further information.

In Kansas, please follow the following restrictions:

Do not apply within 500 feet of native prairie hay meadows in Eastern Kansas East of Federal Highway 77.

Do not apply when wind speed exceeds 10 miles per hour

24(c) SPECIAL LOCAL NEED LABELING FOR CONTROL OF ANNUAL BROADLEAF WEEDS IN PREHARVEST WHEAT

For Use Only In the State of Montana

EPA SLN No. MT-910005

OBSERVE ALL PRECAUTIONS AND RESTRICTIONS IN THIS BOOKLET

IMPORTANT

Notify any bee keepers in area of proposed use

WEEDS CONTROLLED

BANVEL Herbicide, when applied at recommended rates, will control or suppress the following annual weeds that may interfere with harvest of wheat

Buckwheat, Wild	Pigweed Spp.
Kochia	Sunflower
Lambsquarters, Common	Thistle, Russian

RATES AND TIMINGS

Apply BANVEL Herbicide as a broadcast or spot treatment to annual broadleaf weeds when wheat is in the hard dough stage and green color is gone from the nodes (joints) of the stem. Best results will be obtained if application can be made when weeds are actively growing but before weeds canopy over the wheat. A WAITING INTERVAL OF AT LEAST 14 DAYS IS REQUIRED BEFORE HARVEST.

For control or suppression of listed broadleaf weeds, apply ½ pint BANVEL Herbicide (¼ lb. a.i.) with ½ to 1 lb. a.i. 2,4-D amine per treated acre. Check with local agricultural extension agent or 2,4-D label for specific use rates.

For aerial applications, apply a minimum of 3 gallons of diluted spray per treated acre. Agriculturally approved spray additives, such as surfactants, may be used to enhance spray coverage and the herbicide's penetration of weed foliage.

NOTE: Do not graze or feed fodder from treated area. Do not use treated wheat for seed unless a germination test is performed on the seed with an acceptable result of 95% germination or better.

Do not apply when wind speed exceeds 10 miles per hour. A 250 foot set back must be observed from any fish bearing waters. A 50 foot buffer zone must be observed for any ground application.

This sample label is current as of March 1, 1990. The product descriptions and recommendations provided in this sample label are for background information only. Always refer to the label on the product container before using Monsanto or any other agrichemical product.

RODEO

AQUATIC HERBICIDE
by Monsanto

Complete Directions for Use in Aquatic and Other Noncrop Sites.

EPA Reg. No. 524-343

AVOID CONTACT WITH FOLIAGE, GREEN STEMS, OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, SINCE SEVERE INJURY OR DESTRUCTION MAY RESULT. ®RODEO is a registered trademark of Monsanto Company.

This product has been approved for use in California except as stated otherwise on page 42.

1990-1 892.38-000.88/CG

Read the entire label before using this product.

Use only according to label instructions.

Read "LIMIT OF WARRANTY AND LIABILITY" before buying or using. If terms are not acceptable, return at once unopened.

REFORMULATION IS PROHIBITED. SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS.

LIMIT OF WARRANTY AND LIABILITY

This Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

Buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this Company, including but not limited to, incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather, weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied, as well as weather conditions which are outside the application ranges set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil or treated vegetation.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY, OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES.

Buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

Keep out of reach of children.

CAUTION!

MAY CAUSE EYE IRRITATION.

MAY BE HARMFUL IF INHALED.

Avoid contact with eyes, skin or clothing.

Avoid breathing vapors or spray mist.

Wash thoroughly with soap and water after handling.

FIRST AID: IF IN EYES, flush with plenty of water for at least 15 minutes. Get medical attention.

IF ON SKIN, flush with water. Wash clothing before reuse.

IF INHALED, remove individual to fresh air. Seek medical attention if breathing difficulty develops.

In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

Environmental Hazards

Do not contaminate water when disposing of equipment washwaters. Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss can cause fish suffocation.

In case of:

SPILL or LEAK, soak up and remove to a landfill.

Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied only in stainless steel, aluminum, fiberglass, plastic and plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl) glycine, in the form of its isopropylamine salt	53.8%
INERT INGREDIENTS	46.2%
	100.0%

*Contains 648 grams per litre or 5.4 pounds per U.S. gallon of the active ingredient, glyphosate, in the form of its isopropylamine salt. Equivalent to 480 grams per litre or 4 pounds per U.S. gallon of the acid, glyphosate.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Storage and Disposal

Do not contaminate water, foodstuffs, seed or feed by storage or disposal.

STORAGE:

STORE ABOVE 10°F (−12°C.) TO KEEP PRODUCT FROM CRYSTALIZING.

Crystals will settle to the bottom. If allowed to crystalize, place in a warm room 68°F. (20°C.) for several days to redissolve and shake well before using.

DISPOSAL

Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state or local procedures.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is destroyed. Do not reuse container, destroy when empty.

Triple rinse container, then puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

GENERAL INFORMATION

This product, a water soluble liquid, mixes readily with water and nonionic surfactant to be applied as a foliar spray for the control or destruction of many herbaceous and woody plants.

This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days but on most perennial brush species may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow the activity of this product and delay visual effects of control. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of above-ground growth and deterioration of underground plant parts.

Unless otherwise directed on this label, delay application until vegetation has emerged and reached the stages described for control of such vegetation under the "Weeds Controlled" section of this label.

Unemerged plants arising from unattached underground rhizomes or root stocks of perennials or brush will not be affected by the spray and will continue to grow. For this reason best control of most perennial weeds or brush is obtained when treatment is made at late growth stages approaching maturity.

Always use the higher rate of this product per acre within the recommended range when vegetation is heavy or dense.

Do not treat weeds or brush under poor growing conditions such as drought stress, disease or insect damage, as reduced control may result. Reduced results may also occur when treating weeds or brush heavily covered with dust.

Reduced control may result when applications are made to any weed or brush species that have been mowed, grazed, or cut, and have not been allowed to regrow to the recommended stage for treatment.

Rainfall or irrigation occurring within 6 hours after application may reduce effectiveness. Heavy rainfall or irrigation within 2 hours after application may wash the product off the foliage and a repeat treatment may be required.

This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product or other materials that are not expressly recommended in this label. Mixing this product with herbicides or other materials not recommended on this label may result in reduced performance.

ATTENTION

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift, or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants, or other areas on which treatment was not intended. The likelihood of plant or crop injury occurring from the use of this product is greatest when winds are gusty or in excess of 5 miles per hour or when other conditions, including lesser wind velocities, will allow spray drift to occur. When spraying avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. When not in use, keep container closed to prevent spills and contamination.

MIXING AND APPLICATION INSTRUCTIONS

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES. HAND GUN APPLICATIONS SHOULD BE PROPERLY DIRECTED TO AVOID SPRAYING DESIRABLE PLANTS. NOTE: REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, such as WATER FROM PONDS AND UNLINED DITCHES.

MIXING

This product mixes readily with water. Mix spray solutions of this product as follows: fill the mixing or spray tank with the required amount of water while adding the required amount of this product (see "Directions for Use" and "Weeds Controlled" sections of this label). Near the end of the filling process, add the required surfactant and mix well. Remove hose from tank immediately after filling to avoid siphoning back into the water source. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, place the filling hose below the surface of the spray solution, terminate by-pass and return lines at the bottom of the tank and if needed use an approved anti-foam or defoaming agent.

Keep by-pass line on or near bottom of tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50 mesh. Carefully select correct nozzle to avoid spraying a fine mist. For best results with conventional ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

When using this product, mix 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution. Use a nonionic surfactant labeled for use with herbicides. The surfactant must contain 50 percent or more active ingredient.

Always read and follow the manufacturer's surfactant label recommendations for best results.

These surfactants should not be used in excess of 1 quart per acre when making **broadcast** applications.

Clean sprayer and parts immediately after using this product by thoroughly flushing with water and dispose of rinsate according to labeled use or disposal instructions.

Carefully observe all cautionary statements and other information appearing on the surfactant label.

APPLICATION EQUIPMENT AND TECHNIQUES

■ AERIAL EQUIPMENT ■

See the supplemental label for use of this product by air in California.

Use the recommended rates of this product and surfactant in 3 to 20 gallons of water per acre as a broadcast spray, unless otherwise specified. See the "Weeds Controlled" section of this label for specific rates. Aerial applications of this product may only be made as specifically recommended on this label.

AVOID DRIFT — DO NOT APPLY DURING INVERSION CONDITIONS, WHEN WINDS ARE GUSTY, OR UNDER ANY OTHER CONDITION WHICH WILL ALLOW DRIFT. DRIFT MAY CAUSE DAMAGE TO ANY VEGETATION CONTACTED TO WHICH TREATMENT IS NOT INTENDED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES MUST BE MAINTAINED.

Coarse sprays are less likely to drift; therefore, do not use nozzles or nozzle configurations which dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure.

Drift control additives may be used. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

Ensure uniform application — To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Thoroughly wash aircraft, especially landing gear, after each day of spraying to remove residues of this product accumulated during spraying or from spills. PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. LANDING GEAR ARE MOST SUSCEPTIBLE. The maintenance of an organic coating (paint) which meets aerospace specification MIL-C-38413 may prevent corrosion.

■ BOOM EQUIPMENT ■

For control of weed or brush species listed on this label using conventional boom equipment — Use the recommended rates of this product and surfactant in 3 to 30 gallons of water per acre as a broadcast spray, unless otherwise specified. See the "Weeds Controlled" section of this label for specific rates. As density of vegetation increases, spray volume should be increased within the recommended range to insure complete coverage. Carefully select correct nozzle to avoid spraying a fine mist.

For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

■ HAND-HELD and HIGH-VOLUME EQUIPMENT ■

Use Coarse Sprays Only

For control of weeds listed on this label using knapsack sprayers or high-volume spraying equipment utilizing handguns or other suitable nozzle arrangements — Prepare a ¾ to 1½ percent solution of this product in water, add a nonionic surfactant and apply to foliage of vegetation to be controlled. For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

Applications should be made on a spray-to-wet basis. Spray coverage should be uniform and complete. Do not spray to point of runoff.

Where less than complete coverage occurs with spot treatments, use a 5 percent spray solution.

Prepare the desired volume of spray solution by mixing the amount of this product in water, shown in the following table:

Spray Solution

OESIRED VOLUME	AMOUNT DF RDDEO®				
	¾%	1%	1¼%	1½%	5%
1 gallon	1 oz.	1½ oz.	1⅔ oz.	2 oz.	6⅔ oz.
25 gallons	1⅔ pt.	1 qt.	1¼ qt.	1½ qt.	5 qt.
100 gallons	3 qt.	1 gal.	1¼ gal.	1½ gal.	5 gal.

2 tablespoons = 1 ounce

For use in knapsack sprayers, it is suggested that the recommended amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution and add the correct amount of surfactant.

WEEDS CONTROLLED

ANNUAL WEEDS

Apply to actively growing annual grasses and broadleaf weeds.

Allow at least 3 days after application before disturbing treated vegetation. After this period the weeds may be mowed, tilled or burned. See "Directions for Use," "General Information," and "Mixing and Application Instructions" for labeled uses and specific application instructions.

Broadcast Application — Use 1⅓ pints of this product per acre plus 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution if weeds are less than 6 inches tall. If weeds are greater than 6 inches tall, use 2⅔ pints of this product per acre plus 2 or more quarts

of an approved nonionic surfactant per 100 gallons of spray solution.

Hand-Held High-Volume Application — Use a ¾ percent solution of this product in water plus 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution and apply to foliage of vegetation to be controlled.

When applied as directed under the conditions described in this label, this product plus nonionic surfactant WILL CONTROL the following ANNUAL WEEDS:

Balsamapple** *Momordica charantia*

Barley *Hordeum vulgare*

Barnyardgrass *Echinochloa crus-galli*

Bassia, fivehook *Bassia hyssopifolia*

Bluegrass, annual *Poa annua*

Bluegrass, bulbous *Poa bulbosa*

Brome *Bromus spp.*

Buttercup *Ranunculus spp.*

Cheat *Bromus secalinus*

Chickweed, mouseear *Cerastium vulgatum*

Cocklebur *Xanthium strumarium*

Corn, volunteer *Zea mays*

Crabgrass *Digitaria spp.*

Dwarfdandelion *Krigia cespitosa*

Falseflax, smallseed *Camelina microcarpa*

Fiddleneck *Amsinckia spp*

Flaxleaf fleabane *Conyza bonariensis*

Fleabane *Erigeron spp.*

Foxtail *Setaria spp*

Foxtail, Carolina *Alopecurus carolinianus*

Groundsel, common *Senecio vulgaris*

Horseweed/Marestail *Conyza canadensis*

Kochia *Kochia scoparia*

Lambsquarters, common *Chenopodium album*

Lettuce, prickly *Lactuca serriola*

Morningglory *Ipomoea spp.*

Mustard, tansy *Descurainia pinnata*

Mustard, tumble *Sisymbrium altissimum*

Mustard, wild *Sinapis arvensis*

Oats, wild *Avena fatua*

Panicum *Panicum spp.*

Pennycress, field *Thlaspi arvense*

Pigweed, redroot *Amaranthus retroflexus*

Pigweed, smooth *Amaranthus hybridus*

Ragweed, common *Ambrosia artemisiifolia*

Ragweed, giant *Ambrosia trifida*

Rocket, London *Sisymbrium irio*

Rye *Secale cereale*

Ryegrass, Italian* *Lolium multiflorum*

Sandbur, field *Cenchrus spp.*

Shattercane *Sorghum bicolor*

Shepherdspurse *Capsella bursa-pastoris*

Signalgrass, broadleaf *Brachiaria platyphylla*

Smartweed, Pennsylvania *Polygonum pensylvanicum*

Sowthistle, annual *Sonchus oleraceus*

Spanishneedles* *Bidens bipinnata*

Stinkgrass *Eragrostis cilanensis*

Sunflower *Helianthus annuus*

Thistle, Russian *Salsola kali*

Spurry, umbrella *Holosteum umbellatum*

Velvetleaf *Abutilon theophrasti*

Wheat *Triticum aestivum*

Mustard, blue *Chorispora tenella*

Witchgrass *Panicum capillare*

*Apply 3 pints of this product per acre.

**Apply with hand-held equipment only.

Annual weeds will generally continue to germinate from seed throughout the growing season. Repeat treatments will be necessary to control later germinating weeds.

PERENNIAL WEEDS

Apply this product as follows to control or destroy most vigorously growing perennial weeds. Unless otherwise directed, allow at least 7 days after application before disturbing vegetation.

Add 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution to the rates of this product given in this list. See the "General Information," "Directions for Use," and "Mixing and Application" sections of this label for specific uses and application instructions.

NOTE: If weeds have been mowed or tilled, do not treat until regrowth has reached the recommended stages. Fall treatments must be applied before a killing frost.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed.

When applied as recommended under the conditions described, this product plus surfactant WILL CONTROL the following PERENNIAL WEEDS:

Alfalfa *Medicago sativa*

Alligatorweed* *Alternanthera philoxeroides*

Artichoke, Jerusalem *Helianthus tuberosus*

Bahiagrass *Paspalum notatum*

Bermudagrass *Cynodon dactylon*

Bindweed, field *Convolvulus arvensis*

Bluegrass, Kentucky *Poa pratensis*

Blueweed, Texas *Helianthus ciliaris*

Brackenfern *Pteridium spp.*

Bromegrass, smooth *Bromus inermis*

Canarygrass, reed *Phalaris arundinacea*

Cattail *Typha spp.*

Clover, red *Trifolium pratense*

Clover, white *Trifolium repens*

Cogongrass *Imperata clylindrica*

Cutgrass, giant* *Zizaniopsis miliacea*

Dallisgrass *Paspalum dilatatum*

Dandelion *Taraxacum officinale*

Lantana *Lantana camara*

Loosestrife, purple *Lythrum salicaria*

Lotus, American *Nelumbo lutea*

Maidencane *Panicum hematomon*

Milkweed *Asclepias spp.*

Muhly, wirestem *Muhlenbergia frondosa*

Mullein, common *Verbascum thapsus*

Napiergrass *Pennisetum purpureum*

Nightshade, silverleaf *Solanum elaeagnifolium*

Nutsedge: purple, yellow *Cyperus rotundus* *Cyperus esculentus*

Orchardgrass *Dactylis glomerata*

Pampasgrass *Cortaderia jubata*

Paragrass *Brachiaria mutica*

Phragmites** *Phragmites spp.*

Quackgrass *Agropyron repens*

Reed, giant *Arundo donax*

Ryegrass, perennial *Lolium perenne*

Smartweed, swamp *Polygonum coccineum*

Dock, curly *Rumex crispus*

Dogbane, hemp *Apocynum cannabinum*

Fescue *Festuca spp.*

Fescue, tall *Festuca arundinacea*

Guineagrass *Panicum maximum*

Horsenettle *Solanum carolinense*

Horseradish *Armoracia rusticana*

Johnsongrass *Sorghum halepense*

Kikuyugrass *Pennisetum clandestinum*

Knapweed *Centaurea repens*

*Partial control.

**Partial control in southeastern states. See specific recommendations below.

Spatterdock *Nuphar luteum*

Sweet potato, wild* *Ipomoea pandurata*

Thistle *Cirsium arvense*

Timothy *Phleum pratense*

Torpedograss* *Panicum repens*

Tules, common *Scirpus acutus*

Vaseygrass *Paspalum urvillei*

Waterhyacinth *Eichornia crassipes*

Waterlettuce *Pistia stratiotes*

Waterprimrose *Ludwigia spp.*

Wheatgrass, western *Agropyron smithii*

Alligatorweed — Apply 6 pints of this product per acre as a broadcast spray or as a 1¼ percent solution with hand-held equipment to provide partial control of alligatorweed. Apply when most of the target plants are in bloom. Repeat applications will be required to maintain such control.

Bermudagrass — Apply 7½ pints of this product per acre as a broadcast spray or as a 1½ percent solution with hand-held equipment. Apply when target plants are actively growing and when seed heads appear.

Bindweed, field / Silverleaf Nightshade / Texas Blueweed — Apply 6 to 7½ pints of this product per acre as a broadcast spray west of the Mississippi River and 4½ to 6 pints of this product per acre east of the Mississippi River. With hand-held equipment, use a 1½ percent solution. Apply when target plants are actively growing and are at or beyond full bloom. For silverleaf nightshade, best results can be obtained when application is made after berries are formed. Do not treat when weeds are under drought stress. New leaf development indicates active growth. For best results apply in late summer or fall.

Brackenfern — Apply 4½ to 6 pints of this product per acre as a broadcast spray or as a ¾ to 1 percent solution with hand-held equipment. Apply to fully expanded fronds which are at least 18 inches long.

Cattail — Apply 4½ to 6 pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Apply when target plants are actively growing and are at or beyond the early-to-full bloom stage of growth. Best results are achieved when application is made during the summer or fall months.

Cogongrass — Apply 4.5 to 7.5 pints of this product per acre as a broadcast spray. Apply when cogongrass is at least 18 inches tall and actively growing in late summer or fall. Allow 7 or more days after application before tillage or mowing. Due to uneven stages of growth and the dense nature of vegetation preventing good spray coverage, repeat treatments may be necessary to maintain control.

Cutgrass, giant — Apply 6 pints of this product per acre as a broadcast spray or as a 1 percent solution with hand-held equipment to provide partial control of giant cutgrass. Repeat applications will be required to maintain such control, especially where vegetation is partially submerged in water. Allow for substantial regrowth to the seven-to-ten-leaf stage prior to retreatment.

Dogbane, hemp / Knapweed / Horseradish — Apply 6 pints of this product per acre as a broadcast spray or as a 1⅓ percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the late bud-to-flower stage of growth. For best results, apply in late summer or fall.

Fescue, tall — Apply 4½ pints of this product per acre as a broadcast spray or as a 1 percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the boot-to-head stage of growth. When applied prior to the boot stage less desirable control may be obtained.

Guineagrass — Apply 4½ pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Apply when target plants are actively growing and when most have reached at least the 7-leaf stage of growth.

Johnsongrass / Bluegrass, Kentucky / Bromegrass, smooth / Canarygrass, reed / Orchardgrass / Ryegrass, perennial / Timothy / Wheatgrass, western — Apply 3 to 4½ pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the boot-to-head stage of growth. When applied prior to the boot stage, less desirable control may be obtained. In the fall, apply before plants have turned brown.

Lantana — Apply this product as a ¾ to 1 percent solution with hand-held equipment. Apply to actively growing lantana at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody stage of growth.

Loosestrife, purple — Apply 4 pints of this product per acre as a broadcast spray or as a 1 percent solution using hand-held equipment. Treat when plants are actively growing at or beyond the bloom stage of growth. Best results are achieved when application is made during summer or fall months. Fall treatments must be applied before a killing frost.

Lotus, American — Apply 4 pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Treat when plants are actively growing at or beyond the bloom stage of growth. Best results are achieved when application is made during summer or fall months. Fall treatments must be applied before a killing frost. Repeat treatment may be necessary to control regrowth from underground parts and seeds.

Maidencane / Paragrass — Apply 6 pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Repeat treatments will be required, especially to vegetation partially submerged in water. Under these conditions, allow for regrowth to the seven-to-ten leaf stage prior to retreatment.

Milkweed, common — Apply 4½ pints of this product per acre as a broadcast spray or as a 1½ percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached the late bud-to-flower stage of growth.

Nutsedge, purple, yellow — Apply 4½ pints of this product per acre as a broadcast spray, or as a ¾ percent solution with hand-held equipment to control existing nutsedge plants and immature nutlets attached to treated plants. Apply when target plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control.

Pampasgrass — Apply a 1.5 percent solution of this product with hand-held equipment when plants are actively growing.

Phragmites — For partial control of phragmites in Florida and the counties of other states bordering the Gulf of Mexico, apply 7.5 pints per acre as a broadcast spray or apply a 1½ percent solution with hand-held equipment. In other areas of the U.S., apply 4 to 6 pints per acre as a broadcast spray or apply a ¾ percent solution with hand-held equipment for partial control. For best results, treat during late summer of fall months when plants are actively growing and in full bloom. Due to the dense nature of the vegetation, which may prevent good spray coverage and uneven stages of growth, repeat treatments may be necessary to maintain control. Visual control symptoms will be slow to develop.

Quackgrass / Kikuyugrass / Muhly, wirestem — Apply 3 to 4½ pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment when most quackgrass or wirestem muhly is at least 8 inches in height (3- or 4-leaf stage of growth) and actively growing. Allow 3 or more days after application before tillage.

Reed, giant — For control of giant reed, apply a 1.5 percent solution of this product with hand-held equipment when plants are actively growing. Best results are obtained when applications are made in late summer to fall.

Spatterdock — Apply 6 pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Apply when most plants are in full bloom. For best results, apply during the summer or fall months.

Sweet potato, wild — Apply this product as a 1½ percent solution using hand-held equipment. Apply to actively growing weeds that are at or beyond the bloom stage of growth. Repeat applications will be required. Allow the plant to reach the recommended stage of growth before retreatment.

Thistle — Apply 3 to 4½ pints of this product per acre as a broadcast spray or as a 1½ percent solution with hand-held equipment. Apply when target plants are actively growing and are at or beyond the bud stage of growth.

Torpedograss — Apply 6 to 7½ pints of this product per acre as a broadcast spray or as a ¾ to 1½ percent solution with hand-held equipment to provide partial control of torpedograss. Use the lower rates under terrestrial conditions, and the higher rates under partially submerged or a floating mat condition. Repeat treatments will be required to maintain such control.

Tules, common — Apply this product as a 1½ percent solution with hand-held equipment. Apply to actively growing plants at or beyond the seedhead stage of growth. After application visual symptoms will be slow to appear and may not occur for 3 or more weeks.

Waterhyacinth — Apply 5 to 6 pints of this product per acre as a broadcast spray or apply a ¾ to 1 percent solution with hand-held equipment. Apply when target plants are actively growing and at or beyond the early bloom stage of growth. After application, visual symptoms may require 3 or more weeks to appear with complete necrosis and decomposition usually occurring within 60 to 90 days. Use the higher rates when more rapid visual effects are desired.

Waterlettuce — For control, apply a ¾ to 1 percent solution of this product with hand-held equipment to actively growing plants. Use higher rates where infestations are heavy. Best results are obtained from mid-summer through winter applications. Spring applications may require retreatment.

Waterprimrose — Apply this product as a ¾ percent solution using hand-held equipment. Apply to plants that are actively growing at or beyond the bloom stage of growth, but before fall color changes occur. Thorough coverage is necessary for best control.

Other perennials listed on this label — Apply 4½ to 7½ pints of this product per acre as a broadcast spray or as a ¾ to 1½ percent solution with hand-held equipment. Apply when target plants are actively growing and most have reached early head or early bud stage of growth.

WOODY BRUSH AND TREES

When applied as recommended under the conditions described, this product plus surfactant CONTROLS or PARTIALLY CONTROLS the following woody brush plants and trees:

Alder
Alnus spp.

Ash*
Fraxinus spp.

Aspen, quaking
Populus tremuloides

Bearmat, Bearclover
Chamaebatia foliolosa

Birch
Betula spp.

Blackberry
Rubus spp.

Broom:
French
Cytisus monspessulanus

Scotch
Cytisus scoparius

Buckwheat, California*
Eriogonum fasciculatum

Cascara*
Rhamnus purshiana

Catsclaw*
Acacia greggi

Ceanothus
Ceanothus spp.

Chamise
Adenostoma fasciculatum

Cherry:
Bitter
Prunus emarginata

Black
Prunus serotina

Pin
Prunus pensylvanica

Maple:
Red**
Acer rubrum

Sugar
Acer saccharum

Vine*
Acer circinatum

Monkey Flower*
Mimulus guttatus

Oak:
Black*
Quercus velutina

Northern pine
Quercus palustris

Post
Quercus stellata

Red
Quercus rubra

Southern red
Quercus falcata

White*
Quercus alba

Persimmon*
Diospyros spp.

Poison Ivy
Rhus radicans

Poison Oak
Rhus toxicodendron

Poplar, yellow*
Liriodendron tulipifera

Raspberry
Rubus spp.

Rose, multiflora
Rosa multiflora

Coyote brush
Baccharis consanguinea

Creeper, Virginia*
Parthenocissus quinquefolia

Dewberry
Rubus trivialis

Elderberry
Sambucus spp.

Elm*
Ulmus spp.

Eucalyptus, bluegum
Eucalyptus globulus

Hasardia*
Haplopappus squamosus

Hawthorn
Crataegus spp.

Hazel
Corylus spp.

Holly, Florida; Brazilian Peppertree
Schinus terebinthifolius

Honeysuckle
Lonicera spp.

Kudzu
Pueraria lobata

Locust, black*
Robinia pseudoacacia

Manzanita
Arctostaphylos spp.

Russian-olive
Elaeagnus angustifolia

Sage, black
Salvia mellifera

Sagebrush, California
Artemisia californica

Salmonberry
Rubus spectabilis

Saltbush, Sea myrtle
Baccharis halimifolia

Sassafras
Sassafrass albidum

Sourwood*
Oxydendrum arboreum

Sumac:
Poison*
Rhus vernix

Smooth*
Rhus glabra

Winged*
Rhus copallina

Sweet gum
Liquidambar styraciflua

Swordfern*
Polystichum munitum

Tallowtree, Chinese
Sapium sebiferum

Thimbleberry
Rubus parviflorus

Tobacco, tree*
Nicotiana glauca

Trumpetcreeper
Campsis radicans

Waxmyrtle, southern*
Myrica cerifera

Willow
Salix spp.

*Partial control

**See below for control or partial control instructions.

NOTE: If brush has been mowed or tilled or trees have been cut, do not treat until regrowth has reached the recommended stage of growth.

Apply the recommended rate of this product plus 2 or more quarts of a nonionic surfactant per 100 gallons of spray solution when plants are actively growing and unless otherwise directed, after full-leaf expansion. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when application is made in the spring to early summer when brush species are at high moisture content and are flowering. Ensure thorough coverage when using hand-held equipment. Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

See "Directions for Use" and "Mixing and Application Instructions" section of this label for labeled use and specific application instructions.

Apply the product as follows to control or partially control the following woody brush and trees.

Alder / Blackberry / Dewberry / Honeysuckle / Oak, Post / Raspberry — For control, apply 4½ to 6 pints per acre as a broadcast spray or as a ¾ to 1¼ percent solution with hand-held equipment.

Aspen, Quaking / Hawthorn / Trumpetcreeper — For control, apply 3 to 4½ pints of this product per acre as a broadcast spray or as a ¾ to 1¼ percent solution with hand-held equipment.

Birch / Elderberry / Hazel / Salmonberry / Thimbleberry — For control, apply 3 pints per acre of this product as a broadcast spray or as a ¾ percent solution with hand-held equipment.

Broom: French, Scotch — For control, apply a 1¼ to 1½ percent solution with hand-held equipment.

Buckwheat, California / Hasardia / Monkey Flower / Tobacco, Tree — For partial control of these species, apply a ¾ to 1½ percent solution of this product as a foliar spray with hand-held equipment. Thorough coverage of foliage is necessary for best results.

Catsclaw — For partial control, apply a 1¼ to 1½ percent solution with hand-held equipment and at least 50 percent of the new leaves are fully developed.

Cherry: Bitter, Black, Pin / Oak, Southern Red / Sweet Gum — For control, apply 3 to 7½ pints of this product per acre as a broadcast spray or as a 1 to 1½ percent solution with hand-held equipment.

Coyote Brush — For control, apply a 1¼ to 1½ percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

Eucalyptus, bluegum — For control of eucalyptus resprouts, apply a 1½ percent solution of this product with hand-held equipment when resprouts are 6 to 12 feet tall. Ensure complete coverage. Apply when plants are actively growing. Avoid application to drought-stressed plants. For control of eucalyptus trees 2 to 24 inches in diameter, cut trees as close to the soil surface as desired. Apply a 50 to 100 percent solution of this product to freshly cut surface immediately after cutting. Delay in applying this product may result in poor performance.

Holly, Florida / Waxmyrtle — For partial control, apply this product as a 1½ percent solution with hand-held equipment.

Kudzu — For control, apply 6 pints of this material per acre as a broadcast spray or as a 1½ percent solution with hand-held equipment. Repeat applications will be required to maintain control.

Maple, Red** — For control, apply as a ¾ to 1¼ percent solution with hand-held equipment when leaves are fully developed. For partial control, apply 2 to 7½ pints of this product per acre as a broadcast spray.

Maple, Sugar / Oak: Northern Pin, Red — For control, apply as a ¾ to 1¼ percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

Poison Ivy / Poison Oak — For control, apply 6 to 7½ pints of this product per acre as a broadcast spray or as a 1½ percent solution with hand-held equipment. Repeat applications may be required to maintain control. Fall treatments must be applied before leaves lose green color.

Rose, Multiflora — For control, apply 3 pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Treatment should be made prior to leaf deterioration by leaf feeding insects.

Sage, Black / Sagebrush, California / Chamise Tallowtree, Chinese — For control of these species apply a ¾ percent solution of this product as a foliar spray with hand-held equipment. Thorough coverage of foliage is necessary for best results.

Saltbush, Sea myrtle — For control, apply this product as a 1 percent solution with hand-held equipment.

Willow — For control, apply 4½ pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment.

***Other woody brush and trees listed in this label** — For partial control, apply 3 to 7½ pints of this product per acre as a broadcast spray or as a ¾ to 1½ percent solution with hand-held equipment.

AQUATIC AND OTHER NONCROP SITES

When applied as directed and under the condition described in the "Weeds Controlled" section of this label, this product will control or partially control the labeled weeds growing in the following industrial, recreational, and public areas or other similar sites:

Aquatic Sites — This product may be applied to emerged weeds in all bodies of fresh and brackish water which may be flowing, nonflowing, or transient. This includes lakes, rivers, streams, ponds, estuaries, rice levees, seeps, irrigation and drainage ditches, canals, reservoirs, and similar sites.

If aquatic sites are present in the noncrop area and are part of the intended treatment, read and observe the following directions:

There is no restriction on the use of treated water for irrigation, recreation, or domestic purposes.

Consult local state lish and game agency and water control authorities before applying this product to public water. Permits may be required to treat such water.

NOTE: Do not apply this product within ½ mile upstream of a potable water intake in flowing water (i.e., river, stream, etc.) or within ½ mile of a potable water intake in a standing body of water such as lake, pond, or reservoir.

This product does not control plants which are completely submerged or have a majority of their foliage under water.

For treatments after drawdown of water or in drainage ditches, allow 7 or more days after treatment before reintroduction of water. Apply this product within one day after drawdown to ensure application to actively growing weeds.

Floating mats of vegetation may require retreatment. Avoid wash-off of sprayed foliage by spray boat or recreational boat backwash or by rainfall within 6 hours of application. Do not retreat within 24 hours following the initial treatment.

Applications made to moving bodies of water must be made while traveling upstream to prevent concentration of this herbicide in water. When making any bankside applications, do not overlap more than 1 foot into open water. Do not spray across open moving bodies of water, or where weeds do not exist. The maxi-

mum application rate of 7½ pints per acre must not be exceeded in any single application.

When emerged infestations require treatment of the total surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill.

Other Noncrop-Type Sites:

Airports	Pipeline, Power, Telephone & Utility Rights of Way
Golf Courses	Pumping Installations
Highways & Roadsides	Railroads
Industrial Plant Sites	Schools
Lumberyards	Storage Areas
Parking Areas	Similar Sites
Parks	
Petroleum Tank Farms	

INJECTION AND FRILL APPLICATIONS

Woody vegetation may be controlled by injection or frill application of this product. Apply this product using suitable equipment which must penetrate into living tissue. Apply the equivalent of 1 ml of this product per 2 to 3 inches of trunk diameter. This is best achieved by applying 25 to 100 percent concentration of this material either to a continuous frill around the tree or as cuts evenly spaced around the tree below all branches. As tree diameter increases in size, better results are achieved by applying dilute material to a continuous frill or more closely spaced cuttings. Avoid application techniques that allow runoff to occur from frill or cut areas in species that exude sap freely after frills or cutting. In species such as these, make frill or cut at an oblique angle so as to produce a cupping effect and use undiluted material. For best results, applications should be made during periods of active growth and full leaf expansion.

This treatment WILL CONTROL the following woody species:

Oak *Quercus spp.*	**Sweet gum** *Liquidambar styraciflua*
Poplar *Populus spp.*	**Sycamore** *Platanus occidentalis*

This treatment WILL SUPPRESS the following woody species:

Black gum *Nyssa sylvatica*	**Hickory** *Carya spp.*
Dogwood *Cornus spp.*	**Maple, red** *Acer rubrum*

CUT STUMP APPLICATION

Woody vegetation may be controlled by treating freshly cut stumps of trees and resprouts with this product. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut vegetation close to the soil surface. **Apply a 50 to 100 percent solution of this product to freshly cut surface immediately after cutting.** Delay in applying this product may result in reduced performance. For best results, trees should be cut during periods of active growth and full leaf expansion.

When used according to directions for injection or cut stump application, this product will CONTROL, PARTIALLY CONTROL or SUPPRESS most woody brush and tree species, some of which are listed below.

Alder *Alnus spp.*	**Oak** *Quercus spp.*
Coyotebrush *Baccharis consanguinea*	**Poplar** *Populus spp.*
Dogwood *Cornus spp.*	**Salt cedar** *Tamarix spp.*
Eucalyptus, bluegum *Eucalyptus glotulus*	**Sweet gum** *Liquidambar styraciflua*
Hickory *Carya spp.*	**Sycamore** *Platanus occidentalis*
Madrone *Arbutus menziesii*	**Tan oak** *Lithocarpus densiflorus*
Maple *Acer spp.*	**Willow** *Salix spp.*

RELEASE OF BERMUDAGRASS OR BAHIAGRASS ON NONCROP SITES

RELEASE OF DORMANT BERMUDAGRASS AND BAHIAGRASS

When applied as directed, this product will provide control or suppression of many winter annual weeds and tall fescue for effective release of dormant bermudagrass or bahiagrass. Make applications to dormant bermudagrass or bahiagrass.

For best results on winter annuals, treat when weeds are in an early growth stage (below 6 inches in height) after most have germinated. For best results on tall fescue, treat when fescue is in or beyond the 4 to 6-leaf stage.

WEEDS CONTROLLED

Rate recommendations for control or suppression of winter annuals and tall fescue are listed below.

Apply the recommended rates of this product in 10 to 25 gallons of water per acre plus 2 quarts nonionic surfactant per 100 gallons of total spray volume.

WEEDS CONTROLLED OR SUPPRESSED*

NOTE: C = Control
S = Suppression

	RODEO®		FLUID OZ / ACRE			
WEED SPECIES	6	9	12	18	24	48
Barley, little *Hordeum pusillum*	S	C	C	C	C	C
Bedstraw, catchweed *Galium aparine*	S	C	C	C	C	C
Bluegrass, annual *Poa annua*	S	C	C	C	C	C
Chervil *Chaerophyllum tainturieri*	S	C	C	C	C	C
Chickweed, common *Stellaria media*	S	C	C	C	C	C
Clover, crimson *Trifolium incarnatum*	•	S	S	C	C	C
Clover, large hop *Trifolium campestre*	•	S	S	C	C	C
Speedwell, corn *Veronica arvensis*	S	C	C	C	C	C
Fescue, tall *Festuca arundinacea*	•	•	•	•	S	S
Geranium, Carolina *Geranium carolinianum*	•	•	S	S	C	C
Henbit *Lamium amplexicaule*	•	S	C	C	C	C
Ryegrass, Italian *Lolium multiflorum*	•	•	S	C	C	C

	RODEO®		FLUID OZ / ACRE			
WEED SPECIES	6	9	12	18	24	48
Vetch, common *Vicia sativa*	•	•	S	C	C	C

*These rates apply only to sites where an established competitive turf is present.

RELEASE OF ACTIVELY GROWING BERMUDAGRASS

NOTE: USE ONLY ON SITES WHERE BAHIAGRASS OR BERMUDAGRASS ARE DESIRED FOR GROUND COVER AND SOME TEMPORARY INJURY OR YELLOWING OF THE GRASSES CAN BE TOLERATED.

When applied as directed, this product will aid in the release of bermudagrass by providing control of annual species listed in the "Weeds Controlled" section of this label, and suppression or partial control of certain perennial weeds.

For control or suppression of those annual species listed on this label, use ¾ to 2¼ pints of this product as a broadcast spray in 10 to 25 gallons of spray solution per acre, plus 2 quarts of a nonionic surfactant per 100 gallons of total spray volume. Use the lower rate when treating annual weeds below 6 inches in height (or length of runner in annual vines). Use higher rate as size of plants increases or as they approach flower or seedhead formation.

Use the higher rate for partial control or longer term suppression of the following perennial species. Use lower rates for shorter-term suppression of growth.

Bahiagrass	Johnsongrass**
Dallisgrass	Trumpetcreeper*
Fescue (tall)	Vaseygrass

*Suppression at the higher rate only.

**Johnsongrass is controlled at the higher rate.

Use only on well-established bermudagrass. Bermudagrass injury may result from the treatment but regrowth will occur under moist conditions. Repeat applications in the same season are not recommended, since severe injury may result.

BAHIAGRASS SEEDHEAD AND VEGETATIVE SUPPRESSION

When applied as directed in the "Noncrop Sites" section of this label, this product will provide significant inhibition of seedhead emergence and will suppress vegetative growth for a period of approximately 45 days with single applications and approximately 120 days with sequential applications.

Apply this product 1 to 2 weeks after full green-up of bahiagrass or after the bahiagrass has been mowed to a uniform height of 3 to 4 inches. Applications must be made prior to seedhead emergence. Apply 5 fluid ounces per acre of this product, plus 2 quarts of an approved nonionic surfactant per 100 gallons of total spray volume in 10 to 25 gallons of water per acre.

Sequential applications of this product plus nonionic surfactant may be made at approximately 45-day intervals to extend the period of seedhead and vegetative growth suppression. For continued vegetative growth suppression, sequential applications must be made prior to seedhead emergence.

Apply no more than 2 sequential applications per year. As a first sequential application, apply 3 fluid ounces of this product per acre plus nonionic surfactant. A

second sequential application of 2 to 3 fluid ounces per acre plus nonionic surfactant may be made approximately 45 days after the last application.

CALIFORNIA

This product has been approved by the U.S. Environmental Protection Agency for the uses, crops and sites listed in this label and by California. Approval of the items listed below is pending under the state of California registration requirements. With the exceptions of these items, this booklet contains the material approved by California in label 1990-1.

These use conditions, crops, and sites may not be treated with this product in California until approval is received:

- Use of 1.0 ml of this product per 2 to 3 inches of trunk diameter for injection and frill applications.
- Rice levees.
- Use of this product for cut stump treatments on the following species:

Coyotebrush	Poplar
Dogwood	Russian Olive
Hickory	Sweetgum
Maple	Sycamore

Product is protected by U.S. Patent No. 3,799,758 and U.S. Patent No. 4,405,531.

Other patents are pending.

No license granted under any non-U.S. patent.

EPA Reg. No. 524-343

In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

1990-1 892.38-000.88/CG

MONSANTO COMPANY
AGRICULTURAL PRODUCTS
ST. LOUIS, MISSOURI, 63167 U.S.A.

This sample label is current as of October 1, 1991. The product descriptions and recommendations provided in this sample label are for background information only. Always refer to the label on the product container before using Monsanto or any other agrichemical product.

Complete Directio

EPA Reg. No. 524-308-AA

AVOID CONTACT WITH FOLIAGE, GREEN STEMS, OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, SINCE SEVERE INJURY OR DESTRUCTION MAY RESULT.

This product has been approved for use in California except as stated otherwise on page 127.

1991-2 **897.10-005.55/CC**

Read the entire label before using this product.

Use only according to label instructions.

Read "LIMIT OF WARRANTY AND LIABILITY" before buying or using. If terms are not acceptable, return at once unopened.

REFORMULATION IS PROHIBITED. SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS.

LIMIT OF WARRANTY AND LIABILITY

(Not applicable to consumer applications applied by the homeowner for noncommercial purposes as permitted by the supplemental labeling for one-quart containers.)

This Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

Buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this Company, including, but not limited to, incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather, weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied, as well as weather conditions which are outside the application ranges set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY, OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES.

Buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

Keep out of reach of children.

WARNING!

CAUSES EYE IRRITATION.
HARMFUL IF SWALLOWED OR INHALED.
MAY CAUSE SKIN IRRITATION.

Do not get in eyes, on skin or on clothing.

Avoid breathing vapor or spray mist.

Wash thoroughly with soap and water after handling.

FIRST AID: IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Get medical attention.

IF ON SKIN, immediately flush with plenty of water. Remove contaminated clothing. Wash clothing before reuse.

IF SWALLOWED, this product will cause gastrointestinal tract irritation. Immediately dilute by swallowing water or milk. Get medical attention.

IF INHALED, remove individual to fresh air. Get medical attention if breathing difficulty develops.

In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

Environmental Hazards

Do not apply directly to water or wetland (swamps, bogs, marshes or potholes). Do not contaminate water when disposing of equipment washwaters.

Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

ACTIVE INGREDIENT:	
*Glyphosate, N-(phosphonomethyl) glycine, in the form of its isopropylamine salt	41.0%
INERT INGREDIENTS:	59.0%
	100.0%

*Contains 480 grams per litre or 4 pounds per U.S. gallon of the active ingredient, glyphosate, in the form of its isopropylamine salt. Equivalent to 356 grams per litre or 3 pounds per U.S. gallon of the acid, glyphosate.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling.

Storage and Disposal

Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

See container label for STORAGE AND DISPOSAL instructions.

GENERAL INFORMATION

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER CONDITIONS AS SPECIFIED WITHIN THIS LABEL.

This product, a water soluble liquid, mixes readily with water to be applied as a foliar spray for the control or destruction of most herbaceous plants. It may be applied through most standard industrial or field-type sprayers after dilution and thorough mixing with water in accordance with label instructions.

This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days, but on most perennial weeds may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow activity of this product and delay visual effects of control. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of aboveground growth and deterioration of underground plant parts.

Unless otherwise specified on this label, delay application until vegetation has emerged and reached the stages described for control of such vegetation under the "Weeds Controlled" section of this label. Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected by the herbicide and will continue to grow. For this reason, best control of most perennial weeds is obtained when treatment is made at late growth stages approaching maturity.

Always use the higher rate of this product per acre within the recommended range when (1) weed growth is heavy or dense, or (2) weeds are growing in an undisturbed (noncultivated) area.

Do not treal weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Reduced results may also occur when treating weeds heavily covered with dust.

Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed, or cut, and have not been allowed to regrow to the recommended stage for treatment.

Rainfall or irrigation occurring within 6 hours after application may reduce effectiveness. Heavy rainfall or irrigation within 2 hours after application may wash the chemical off the foliage and a repeat treatment may be required.

This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product with herbicides or other materials that are not expressly recommended in this labeling. Mixing this product with herbicides or other materials not recommended on this label may result in reduced performance.

For best results, spray coverage should be uniform and complete. Do not spray weed foliage to the point of runoff.

Keep people and pets off treated areas until spray solution has dried.

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours.

ATTENTION

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift, or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants, or other areas on which treatment was not intended. The likelihood of injury occurring from the use of this product is greatest when winds are gusty or in excess of 5 miles per hour or when other conditions, including lesser wind velocities, will allow spray drift to occur. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. Keep container closed to prevent spills and contamination.

MIXING, ADDITIVES AND APPLICATION INSTRUCTIONS

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES. DO NOT APPLY WHEN WIND OR OTHER CONDITIONS FAVOR DRIFT. HAND GUN APPLICATIONS SHOULD BE PROPERLY DIRECTED TO AVOID SPRAYING DESIRABLE PLANTS. NOTE: REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, SUCH AS WATER FROM PONDS AND UNLINED DITCHES.

MIXING

This product mixes readily with water. Mix spray solutions of this product as follows: Fill the mixing or spray tank with the required amount of water. Add the recommended amount of this product (see the "Directions for Use" and "Weeds Controlled" sections of this label) near the end of the filling process and mix well. Remove hose from tank immediately after filling to avoid siphoning back into the carrier source. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, place the filling hose below the surface of the spray solution, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent.

TANK MIXTURES

Always predetermine the compatibility of labeled tank mixtures of this product with water carrier by mixing small proportional quantities in advance.

Mix labeled tank mixtures of this product with water as follows:

1. Place a 20 to 35 mesh screen or wetting basket over filling port.
2. Through the screen, fill the sprayer tank one-half full with water and start agitation.
3. If a wettable powder is used, make a slurry with the water carrier, and add it SLOWLY through the screen into the tank. Continue agitation.
4. If a flowable formulation is used, premix one part flowable with one part water. Add diluted mixture SLOWLY through the screen into the tank. Continue agitation.
5. If an emulsifiable concentrate formulation is used, premix one part emulsifiable concentrate with two parts water. Add diluted mixture slowly through the screen into the tank. Continue agitation.
6. Continue filling the sprayer tank with water and add the required amount of this product near the end of the filling process.
7. Where nonionic surfactant is recommended, add this to the spray tank before completing the filling process.
8. Add individual formulations to the spray tank as follows: wettable powder, flowable, emulsifiable concentrate, drift control additive, water soluble liquid followed by surfactant.

Maintain good agitation at all times until the contents of the tank are sprayed. If the spray mixture is allowed to settle, thorough agitation is required to resuspend the mixture before spraying is resumed.

Keep by-pass line on or near bottom of tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50 mesh. Carefully select proper nozzle to avoid spraying a fine mist. For best results with conventional ground applications equipment, use flat fan nozzles.

Clean sprayer and parts immediately after using this product by thoroughly flushing with water.

ADDITIVES

SURFACTANTS

Nonionic surfactants which are labeled for use with herbicides may be used. Do not reduce rates of this product when adding surfactant. When adding additional surfactant, use 0.5 percent surfactant concentration (2 quarts per 100 gallons of spray solution) when using surfactants which contain at least 70 percent active ingredient or a 1 percent surfactant concentration (4 quarts per 100 gallons of spray solution) for those surfactants containing less than 70 percent active ingredient. Read and carefully observe surfactant cautionary statements and other information appearing on the surfactant label.

AMMONIUM SULFATE

The addition of 1 to 2 percent dry ammonium sulfate by weight or 8.5 to 17 pounds per 100 gallons of water may increase the performance of this product, and this product, plus 2,4-D, Banvel or residual herbicide tank mixtures on annual and perennial weeds. The improvement in performance may be apparent where environmental stress is a concern. Low quality ammonium sulfate may contain material that will not readily dissolve which could result in nozzle tip plugging. To determine quality, perform a jar test by adding ¼ cup of ammonium sulfate to 1 gallon of water and agitate for 1 minute. If undissolved sediment is observed, predissolve the ammonium sulfate in water and filter prior to addition to the spray tank. If ammonium sulfate is added directly to the spray tank, add slowly with agitation. Adding too quickly may clog outlet line. Ensure that ammonium sulfate is completely dissolved in the spray tank before adding herbicides or surfactant. Thoroughly rinse the spray system with clean water after use to reduce corrosion.

NOTE: The use of ammonium sulfate as an additive does not preclude the need for additional surfactant. Do not use herbicide rates lower than recommended in this label.

™Banvel is a trademark of Sandoz, Inc.

COLORANTS OR DYES

Agriculturally approved colorants or marking dyes may be added to this product. Colorants or dyes used in spray solutions of this product may reduce performance, especially at lower rates or dilutions. Use colorants or dyes according to the manufacturer's recommendations.

APPLICATION EQUIPMENT AND TECHNIQUES

Do not apply this product through any type of irrigation system.

This product may be applied with the following application equipment:

Aerial—Fixed Wing and Helicopter

Broadcast Spray

Controlled Droplet Applicator (CDA)—Hand-held or boom-mounted applicators which produce a spray consisting of a narrow range of droplet sizes.

Hand-Held and High-Volume Spray Equipment—Knapsack and backpack sprayers, pump-up pressure sprayers, handguns, handwands, lances and other hand-held spray equipment used to direct the spray onto weed foliage and vehicle-mounted high-volume spray equipment for spray-to-wet applications.

Selective equipment—Recirculating sprayers, shielded sprayers and wiper applicators.

See the appropriate part of this section for specific rates of application and instructions.

AERIAL EQUIPMENT

Use the recommended rates of this herbicide in 3 to 15 gallons of water per acre unless otherwise specified on this label. See the "Weeds Controlled" section of this label for specific rates. Unless otherwise specified, do not exceed one quart per acre. **(Aerial applications of this product may be made in annual cropping conventional tillage systems, fallow and reduced tillage systems, pre-harvest, silvicultural sites, and rights-of-way. Refer to the individual use area sections of this label for recommended volumes and application rates.) FOR AERIAL APPLICATION IN CALIFORNIA, REFER TO THE FEDERAL SUPPLEMENTAL LABEL FOR AERIAL APPLICATIONS IN THAT STATE FOR SPECIFIC INSTRUCTIONS, RESTRICTIONS AND REQUIREMENTS.**

This product plus Oust tank mixtures may not be applied by air in California

Avoid direct application to any body of water.

AVOID DRIFT—DO NOT APPLY DURING INVERSION CONDITIONS. WHEN WINDS ARE GUSTY, OR UNDER ANY OTHER CONDITION WHICH FAVORS DRIFT, DRIFT MAY CAUSE DAMAGE TO ANY VEGETATION CONTACTED TO WHICH TREATMENT IS NOT INTENDED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES MUST BE MAINTAINED.

Coarse sprays are less likely to drift, therefore, do not use nozzles or nozzle configurations which dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure

Drift control additives may be used. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

Ensure uniform application—To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Thoroughly wash aircraft, especially landing gear, after each day of spraying to remove residues of this product accumulated during spraying or from spills. PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. LANDING GEAR ARE MOST SUSCEPTIBLE. The maintenance of an organic coating (paint) which meets aerospace specification MIL-C-38413 may prevent corrosion

BROADCAST EQUIPMENT

For control of annual or perennial weeds listed on this label using broadcast equipment—Use the recommended rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified on this label. See the "Weeds Controlled" section of this label for specific rates. As density of weeds increases, spray volume should be increased within the recommended range to ensure complete coverage. Carefully select proper nozzle to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

CONTROLLED DROPLET APPLICATION (CDA)

The rate of this product applied per acre by vehicle-mounted CDA equipment must not be less than the amount recommended in this label when applied by conventional broadcast equipment. For vehicle-mounted CDA equipment, apply 3 to 15 gallons of water per acre.

For the control of labeled annual weeds with hand-held CDA units, apply a 20 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 1.5 MPH (1 quart per acre). For the control of labeled perennial weeds, apply a 20 to 40 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 0.75 MPH (2 to 4 quarts per acre).

Controlled droplet application equipment produces a spray pattern which is not easily visible. Extreme care must be exercised to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation, as damage or destruction may result.

HAND-HELD and HIGH-VOLUME EQUIPMENT

Use coarse sprays only.

Mix this product in clean water and apply to foliage of vegetation to be controlled. For applications made on a spray-to-wet basis, spray coverage should be uniform and complete. Do not spray to the point of runoff.

For control of annual weeds listed on this label, apply a 0.5 percent solution of this product plus nonionic surfactant to weeds less than 6 inches in height or runner length. Apply prior to seedhead formation in grass or bud formation in broadleaf weeds. Allow three or more days before tillage or mowing.

For annual weeds over 6 inches tall, or when not using additional surfactant, or unless otherwise specified, use a 1 percent solution. For best results, use a 2 percent solution on harder-to-control perennials, such as bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

Less than complete coverage of weeds may result from the use of spray equipment designed for motorized spot treatments. Where less than complete coverage of annual weeds occurs, use a 5 percent solution. Do not reduce recommended concentrations of this product when adding surfactant.

Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table:

Spray Solution

DESIRED VOLUME	AMOUNT OF ROUNDUP®				
	½%	1%	1½%	2%	5%
1 gallon	⅔ oz	1⅓ oz	2 oz	2⅔ oz	6⅔ oz
25 gallons	1 pt	1 qt	1½ qt	2 qt	5 qt
100 gallons	2 qt	1 gal	1½ gal	2 gal	5 gal

2 tablespoons = 1 fluid ounce

For use in knapsack sprayers, it is suggested that the proper amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution.

For hand-held WIPER APPLICATORS, see the "Selective Equipment" section and for hand-held CONTROLLED DROPLET APPLICATORS, see the "Controlled Droplet Application (CDA)" section of this label.

SELECTIVE EQUIPMENT

This product may be applied through a recirculating spray system, a shielded applicator, or a wiper applicator after dilution and thorough mixing with water to listed weeds growing in any noncrop site specified on this label and only when specifically recommended in cropping systems.

A recirculating spray system directs the spray solution onto weeds growing above desirable vegetation, while spray solution not intercepted by weeds is collected and returned to the spray tank for reuse.

A shielded applicator directs the herbicide solution onto weeds while shielding desirable vegetation from the herbicide.

A wiper applicator applies the herbicide solution onto weeds by rubbing the weed with an absorbent material containing the herbicide solution.

AVOID CONTACT WITH DESIRABLE VEGETATION.

Contact of the herbicide solution with the desirable vegetation may result in damage or destruction. Applicators used above desired vegetation should be adjusted so that the lowest spray stream or wiper contact point is at least two inches above the desirable vegetation. Droplets, mist, foam, or splatter of the herbicide solution settling on desirable vegetation may result in discoloration, stunting, or destruction.

Applications made above the crops should be made when the weeds are a minimum of 6 inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations, or when the height of the weeds varies so that not all weeds are contacted. In these instances, repeat treatment may be necessary.

See the "Weeds Controlled" section of this label for recommended stage of growth for specific weeds.

NOTE

- Maintain equipment in good operating condition. Avoid leakage or dripping onto desirable vegetation.
- Adjust height of applicator to insure adequate contact with weeds.
- Keep nozzle tips and wiping surfaces clean.
- Keep spray patterns aligned into recovery chamber of the recirculating sprayer.
- Keep shields on shielded applicators adjusted to protect desirable vegetation.
- Maintain recommended roller RPM on roller applicators while in use.
- Keep wiper material at proper degree of saturation with herbicide solution.
- DO NOT use wiper equipment when weeds are wet.
- DO NOT operate equipment at ground speeds greater than 5 mph. Weed control may be affected by speed of application equipment. As weed density increases, reduce equipment ground speed to ensure good coverage of weeds.
- Be aware that, on sloping ground, the herbicide solution may migrate, causing dripping on the lower end and drying on the upper end of a wiper applicator.
- Variation in equipment design may affect weed control. With wiper applicators, the wiping material and its orientation must allow delivery of sufficient quantities of the recommended herbicide solution directly to the weed.
- Care must be taken with all types of wipers to ensure that the absorbent material does not become over-

saturated, causing the herbicide to drip on desirable vegetation.

Mix only the amount of solution to be used during a one-day period, as reduced activity may result from use of leftover solutions. With all equipment, drain and clean sprayer and wiper parts immediately after using this product by thoroughly flushing with water.

RECIRCULATING SPRAYERS

Recirculating sprayer calibration is made on the basis of ground speed and delivery volume. Two procedures can be used to calibrate: (1) determine the discharge being delivered per minute, then operate at the designated ground speed, or (2) select the desired ground speed and then adjust the sprayer to deliver the recommended volume per minute (this may require nozzle changes). Use the appropriate table below.

Do not operate at nozzle pressure above 20 PSI.

Table 1. Use this table when calibrating box or row-type recirculating sprayers. Box or row-type sprayer calibration is based on the total discharge collected per row. Use only straight stream or 15° fan-type nozzles.

VOLUME PER MINUTE PER ROW	
MPH	Fluid Ounces
2	26 to 35
3	38 to 51
4	51 to 68
5	65 to 86

NOTE: Be certain the amount collected is for all spray streams treating one row.

Table 2. Use this table when calibrating broadcast type recirculating sprayers. Broadcast recirculating sprayer calibration is based on the discharge collected per minute from one nozzle on a 20-inch spacing.

VOLUME PER MINUTE PER NOZZLE	
MPH	Fluid Ounces
2	7 to 9
3	10 to 13
4	13 to 18
5	16 to 22

When applied as recommended under the conditions described for recirculating sprayers, this product will control the following weeds growing a minimum of 6 inches above desirable vegetation.

Perennial Broadleaf Weeds—To SUPPRESS the following weeds, mix in a ratio of 4 quarts of this product in 20 gallons of water and apply as directed.

Dogbane, hemp *Apocynum cannabinum*
Milkweed *Asclepias syriaca*

Perennial Grasses and Annual Broadleaf Weeds—To control the following weeds, mix in a ratio of 3 quarts of this product in 20 gallons of water and apply as directed:

Cocklebur *Xanthium strumarium*
Pigweed, redroot *Amaranthus retroflexus*
Johnsongrass *Sorghum halepense*
Sunflower *Helianthus annuus*

Annual Grasses—To control the following weeds, mix in a ratio of 2 quarts of this product in 20 gallons of water and apply as directed:

Corn *Zea mays*
Shattercane *Sorghum bicolor*

SHIELDED APPLICATORS

When applied as directed under conditions described for shielded applicators, this product will control those weeds listed in the "Weeds Controlled" section of this label.

Shielded applicators which apply the herbicide solution as a spray band should be calibrated on a broadcast equivalent rate and volume basis. To determine these:

Band width in inches / Row width in inches	×	Herbicide Broadcast RATE per acre	=	Herbicide Band RATE per acre
Band width in inches / Row width in inches	×	Broadcast VOLUME of solution per acre	=	Band VOLUME of solution per acre

Use nozzles that provide uniform coverage within the treated area. EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT WITH DESIRABLE VEGETATION.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

WIPER APPLICATORS

Wiper applicators include either roller or wick devices which physically wipe appropriate concentrations or amounts of this product directly onto the weed. Equipment must be designed, maintained, and operated to prevent the herbicide solution from contacting desirable vegetation. Operate this equipment at ground speeds no greater than 5 mph. Performance may be improved by reducing speed in areas of heavy weed infestations to ensure adequate wiper saturation. Better results may be obtained if two applications are made in opposite directions.

Do not add surfactant to the herbicide solution.

For Roller Applicators—Mix 1 gallon of this product in enough water to prepare 10 gallons of herbicide solution (10 percent solution). Apply this solution to perennial weeds or annual broadleaf weeds listed in this "Wiper Applicators" section.

Mix 1 gallon of this product in enough water to provide 20 gallons of herbicide solution (5 percent solution). Apply this solution to annual grasses listed in this "Wiper Applicators" section.

Roller speed should be maintained at 40 to 60 RPM.

For Wick or Wiper Applicators—Mix 1 gallon of this product in 2 gallons of water to prepare a 33 percent solution. Apply this solution to weeds listed in this "Wiper Applicators" section.

In severe infestations, reduce equipment ground speed to ensure that adequate amounts of this product are wiped on the weeds. A second treatment in the opposite direction may be beneficial.

Do not permit herbicide solution to contact desirable vegetation.

When applied as recommended under the conditions described for "Wiper Applicators", this product CONTROLS the following weeds:

ANNUAL GRASSES

Corn *Zea mays*
Rye, common *Secale cereale*
Panicum, Texas *Panicum texanum*
Shattercane *Sorghum bicolor*

ANNUAL BROADLEAVES

Sicklepod *Cassia obtusifolia*
Starbur, bristly *Acanthospermum hispidum*
Spanishneedles *Bidens bipinnata*

When applied as recommended under the conditions described for "Wiper Applicators", this product SUPPRESSES the following weeds:

ANNUAL BROADLEAVES

Beggarweed, Florida *Desmodium tortuosum*
Ragweed, giant *Ambrosia trifida*
Sunflower *Helianthus annuus*
Dogfennel *Eupatorium capilliflorium*
Thistle, musk *Carduus nutans*
Pigweed, redroot *Amaranthus retroflexus*
Velvetleaf *Abutilon theophrasti*
Ragweed, common *Ambrosia artemisifolia*

PERENNIAL GRASSES

Bermudagrass *Cynodon dactylon*
Smutgrass *Sporobolus poiretii*
Guineagrass *Panicum maximum*
Vaseygrass *Paspalum urvillei*
Johnsongrass *Sorghum halepense*

PERENNIAL BROADLEAVES

Dogbane, hemp *Apocynum cannabinum*
Nightshade, silverleaf *Solanum elaeagnifolium*
Milkweed *Ascelepias syriaca*
Thistle, Canada *Cirsium arvense*

WEEDS CONTROLLED

This herbicide controls many annual and perennial grasses and broadleaf weeds.

ANNUAL WEEDS

- Apply to actively growing grass and broadleaf weeds.
- Allow at least 3 days after treatment before tillage.
- For maximum agronomic benefit, apply when weeds are 6 inches or less in height.
- To prevent seed production, applications should be made prior to seedhead formation.
- This product does not provide residual control, therefore, delay application until maximum weed emergence. Repeat treatments may be necessary to control later germinating weeds.

LOW-VOLUME BROADCAST APPLICATION (LOW-RATE TECHNOLOGY)

When applied as directed under the conditions described, this product will control the weeds listed below when:

1. Water carrier volumes of 3 to 10 gallons per acre for ground applications and 3 to 5 gallons per acre for aerial applications are recommended. (See the "Aerial Application" section of this label for approved sites.)
2. A nonionic surfactant is added at 0.5 to 1 percent by total spray volume. Use 0.5 percent surfactant concentration when using surfactants which contain at

least 70 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 70 percent active ingredient.

NOTE

- The addition of 2 percent dry ammonium sulfate by weight or 17 pounds per 100 gallons of water may increase the performance of this product on annual weeds. The improvement in performance may be apparent where environmental stress is a concern. Refer to the "Mixing, Additives and Application Instructions" section of this label.
- Do not tank-mix with soil residual herbicides when using these rates unless otherwise specified.
- For weeds that have been mowed, grazed, or cut, allow regrowth to occur prior to treatment.
- Refer to the "Tank Mixtures" portion of this section for control of additional broadleaf weeds.

WEED SPECIES	MAXIMUM HEIGHT/ LENGTH	RATE PER ACRE** (FLUID OUNCES)
Foxtail *Setaria spp*	12"	8 oz.
Barnyardgrass *Echinochloa crus-galli*	6" (0 to 4" (4 to 6"	12 oz. 16 oz.[1]) 24 oz.[1])
Bluegrass, annual *Poa annua*		
Brome, downy* *Bromus tectorum*		
Mustard, blue *Chorispora tenella*		
Mustard, tansy *Descurainia pinnata*		
Mustard, tumble *Sisymbrium altissimum*		
Mustard, wild *Sinapis arvensis*		
Spurry, umbrella *Holosteum umbellatum*		
Barley *Hordeum vulgare*	12"	
Rye *Secale cereale*		
Sandbur, field *Cenchrus spp*		
Shattercane *Sorghum bicolor*		
Stinkgrass *Eragrostis cilianensis*		
Wheat *Triticum aestivum*	18"	
Morningglory *Ipomea spp*	2"	16 oz.
Sicklepod *Cassia obtusifolia*		
Bluegrass, bulbous *Poa bulbosa*	6"	
Cheat *Bromus secalinus*		
Chickweed, common *Stellaria media*	6"	16 oz.
Chickweed, mouseear *Cerastium vulgatum*		
Corn *Zea mays*		
Goatgrass, jointed *Aegilops cylindrica*		
Groundsel, common *Senecio vulgaris*		
Horseweed/Marestail *Conyza canadensis*		
Lambsquarters, common *Chenopodium album*		
Pennycress, field Fanweed *Thlaspi arvense*		
Rocket, London *Sisymbrium irio*		
Ryegrass, Italian *Lolium multiflorum*		
Shepherdspurse *Capsella bursa-pastoris*		
Spurge, annual *Euphorbia spp.*		
Buttercup *Ranunculus spp.*	12"	
Cocklebur *Xanthium strumarium*		
Crabgrass *Digitaria spp.*		
Dwarfdandelion *Krigia cespitosa*		
Falsellax, smallseed *Camelina microcarpa*		
Foxtail, Carolina *Alopecurus carolinianus*		
Johnsongrass, seedling *Sorghum halepense*		
Oats, wild *Avena fatua*		
Panicum, fall *Panicum dichotomiflorum*		
Panicum, Texas *Panicum texanum*		
Pigweed, redroot *Amaranthus retroflexus*		
Pigweed, smooth *Amaranthus hybridus*		
Witchgrass *Panicum capillare*		
Sicklepod *Cassia obtusifolia*	3 to 4"	24 oz
Signalgrass, broadleaf *Brachiaria platyphylla*	4"	
Horseweed / Marestail *Conyza canadensis*	7 to 12"	24 oz
Lambsquarters, common *Chenopodium album*		
Spurge, annual *Euphorbia spp.*		
Rice, red *Oryza sativa*	4"	32 oz.
Teaweed *Sida spinosa*		
Sprangletop *Leptochloa spp.*	6"	
Geranium, Carolina *Geranium carolinianum*	12"	
Goosegrass *Eleusine indica*		
Primrose, cutleaf evening *Denothera laciniate*		
Pusley, Florida *Richardia scabra*		
Sicklepod *Cassia obtusifolia*	5 to 12"	
Spanishneedles *Bidens bipinnata*		
Filaree *Erodium spp.*	12"	48 oz.
Sprangletop *Leptochloa spp.*		

[1]Use these rates to control barnyardgrass in Alabama Arkansas, Mississippi, Missouri, Louisiana and Texas for preplant treatments.

*For control in no-till systems, use 16 fluid ounces per acre.

**For those rates less than 32 fluid ounces per acre, this product at rates up to 32 fluid ounces per acre may be used where heavy weed densities exist.

TANK MIXTURES

ROUNDUP® plus BANVEL plus NONIONIC SURFACTANT

ROUNDUP plus 2,4-D plus NONIONIC SURFACTANT

DO NOT APPLY BANVEL OR 2,4-D TANK MIXTURES BY AIR IN CALIFORNIA.

These tank mixtures are recommended for use in fallow and reduced tillage areas only. Follow use directions as given in the "Low-Volume Broadcast Application" section.

This product plus Banvel or 2,4-D will control the annual grasses and broadleaf weeds previously listed for this product alone at the indicated heights (except 8 fluid ounces per acre applications), plus the following broadleaf weeds. For those weeds previously listed at 8 fluid ounces of this product alone per acre, use 12 fluid ounces in these tank mixtures.

NOTE: Refer to the specific product labels for crop rotation restrictions and cautionary statements of all products used in tank mixtures. Some crop injury may occur if Banvel is applied within 45 days of planting. The addition of Banvel in a mixture with this product may provide short-term residual control of selected weed species.

Apply 12 to 16 fluid ounces of this product plus 0.25 lb. a.i. of Banvel or 0.5 pound a.i. of 2,4-D, plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre to control dense populations of the following annual broadleaf weeds when less than the height indicated:

Cocklebur (12") *Xanthium strumarium*
Morningglory (6") *Ipomea spp.*
Kochia* (6") *Kochia scoparia*
Pigweed, redroot (12") *Amaranthus retroflexus*
Lambsquarters (12") *Chenopodium album*
Pigweed, smooth (12") *Amaranthus hybridus*
Lettuce, prickly (6") *Lactuca serriola*
Thistle, Russian (12") *Salsola kali*
Marestail/Horseweed (6") *Conyza canadensis*

Controlled with Banvel tank mixture only.

Apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D, plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre to control the following annual broadleaf weeds when less than 6 inches in height

Ragweed, common *Ambrosia artemisiifolia*
Smartweed, Pennsylvania *Polygonum pensylvanicum*
Ragweed, giant *Ambrosia trifida*
Velvetleaf *Abutilon theophrasti*

HIGH-VOLUME BROADCAST APPLICATIONS

When applied as directed under the conditions described, this product will control the weeds listed below when water carrier volumes are 10 to 40 gallons per acre for ground applications.

Apply 1 to 1.5 quarts of this product per acre plus 0.5 to 1 percent nonionic surfactant by total spray volume. Use 1 quart per acre if weeds are less than 6 inches tall and 1.5 quarts per acre if weeds are over 6 inches tall. If weeds have been mowed, grazed, or cut, allow adequate time for new growth to recommended stages prior to treatment. These rates will also provide control of weeds listed in the "Low-Volume Broadcast Application" section.

WEED SPECIES

Balsamapple* *Momordica charantia*
Bassia, fivehook *Bassia hyssopifolia*
Brome *Bromus spp.*
Fiddleneck *Amsinckia spp.*
Flaxleaf Fleabane *Conyza bonariensis*
Foxtail *Setaria spp.*
Kochia *Kochia scoparia*
Lettuce, prickly *Lactuca serriola*
Panicum *Panicum spp.*
Ragweed, common *Ambrosia artemisiifolia*
Ragweed, giant *Ambrosia trifida*
Smartweed, Pennsylvania *Polygonum pensylvanicum*
Sowthistle, annual *Sonchus oleraceus*
Sunflower *Helianthus annuus*
Thistle, Russian *Salsola kali*
Velvetleaf *Abutilon theophrasti*

*Apply with hand-held equipment only.

PERENNIAL WEEDS

Apply this product as follows to control or destroy most perennial weeds:

NOTE: If weeds have been mowed or tilled, do not treat until plants have resumed active growth and have reached the recommended stages.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. Repeat treatments must be made prior to crop emergence.

The addition of 1 to 2 percent dry ammonium sulfate by weight or 8.5 to 17 pounds per 100 gallons of water may increase the performance of this product on perennial weeds. The improvement in performance may be apparent where environmental stress is a concern. Refer to the "Mixing, Additives and Application Instructions" section of this label.

When applied as recommended under the conditions described, this product WILL CONTROL the following PERENNIAL WEEDS:

Alfalfa *Medicago sativa*
Alligatorweed* *Alternanthera philoxeroides*
Artichoke, Jerusalem *Helianthus tuberosus*
Bahiagrass *Paspalum notatum*
Bentgrass *Agrostis spp.*
Bermudagrass *Cynodon dactylon*
Bermudagrass, water (knotgrass) *Paspalum distichum*
Bindweed, field *Convolvulus arvensis*
Bluegrass, Kentucky *Poa spp.*
Blueweed, Texas *Helianthus ciliaris*
Brackenfern *Pteridium aquilinum*
Bromegrass, smooth *Bromus inermis*
Bursage, woollyleaf *Franseria tomentosa*
Canarygrass, reed *Phalaris arundinacea*
Cattail *Typha spp.*
Clover, red *Trifolium pratense*
Clover, white *Trifolium repens*
Cogongrass *Imperata cylindrica*
Dallisgrass *Paspalum dilatatum*
Kikuyugrass *Pennisetum clandestinum*
Knapweed *Centaurea repens*
Lantana *Lantana camara*
Milkweed *Asclepias spp.*
Muhly, wirestem *Muhlenbergia frondonsa*
Mullein, common *Verbascum thapsus*
Napiergrass *Pennisetum purpureum*
Nightshade, silverleaf *Solanum elaeagnifolium*
Nutsedge, purple, yellow *Cyperus rotundus* *Cyperus esculentus*
Orchardgrass *Dactylis glomerata*
Pampas *Cortaderia jubata*
Paragrass *Brachiaria mutica*
Phragmites* *Phragmites spp.*
Quackgrass *Agropyron repens*
Redvine* *Brunnichia ovata*
Reed, giant *Arundo donax*
Ryegrass, perennial *Lolium perenne*
Smartweed, swamp *Polygonum coccineum*
Spurge, leafy* *Euphorbia esula*
Dandelion *Taraxacum officinale*
Dock, curly *Rumex crispus*
Dogbane, hemp *Apocynum cannabinum*
Fescues *Festuca spp.*
Fescue, tall *Festuca arundinacea*
Guineagrass *Panicum maximum*
Horsenettle *Solanum carolinense*
Horseradish *Armoracia rusticana*
Johnsongrass *Sorghum halepense*
Sweet potato, wild* *Ipomoea pandurata*
Thistle, Canada *Cirsium arvense*
Timothy *Phleum pratense*
Torpedograss* *Panicum repens*
Trumpetcreeper* *Campsis radicans*
Vaseygrass *Paspalum urvillei*
Wheatgrass, western *Agropyron smithii*

*Partial Control

This product is not registered in California for use on water bermudagrass, redvine and trumpetcreeper.

See "Directions for Use" and "Mixing, Additives and Application Instructions" sections of this label for labeled uses and specific application instructions.

Alfalfa—Apply 1 quart of this product per acre plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Make application after the last hay cutting in the fall. Allow alfalfa to regrow to a height of 6 to 8 inches or more prior to treatment. Applications should be followed with deep tillage at least 7 days after treatment, but before soil freeze-up.

Alligatorweed—Apply 4 quarts of this product per acre or apply a 1½ percent solution with hand-held equipment to provide partial control. Apply when most of the plants are in bloom. Repeat applications will be required to maintain such control.

Bentgrass—For suppression in grass seed production areas. For ground applications only, apply 1.5 quarts of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 10 to 20 gallons of water per acre. Ensure entire crown area has resumed growth prior to a fall application. Bentgrass should be actively growing and have at least 3 inches of growth. Tillage prior to treatment should be avoided. Tillage 7 to 10 days after application is recommended for best results. Failure to use tillage after treatment may result in unacceptable control.

Bermudagrass—For control, apply 5 quarts of this product per acre and, for partial control, apply 3 quarts per acre. Treat when bermudagrass is actively growing and seedheads are present. Retreatment may be necessary to maintain control. Allow 7 or more days after application before tillage.

Bermudagrass, water (knotgrass)—Apply 1.5 quarts of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 5 to 10 gallons of water per acre. Apply when water bermudagrass is actively growing and 12 to 18 inches in length. Allow 7 or more days before tilling, flushing or flooding the field.

Fall applications only—Apply 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 5 to 10 gallons of water per acre. Fallow fields should be tilled prior to application. Apply prior to frost on water bermudagrass that is actively growing and 12

to 18 inches in length. Allow 7 or more days before tillage.

Bindweed, field—For control, apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts east of the Mississippi River. Apply when the weeds are actively growing and are at or beyond full bloom. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost. Allow 7 or more days after application before tillage.

Also for control, apply 2 quarts of this product plus 0.5 pound a.i. of Banvel in 10 to 20 gallons of water per acre. At these rates, apply using ground application only.

The following tank mixtures with 2,4-D may be applied using aerial application equipment (except in California) in fallow and reduced tillage systems only.

For suppression on irrigated agricultural land apply 1 to 2 quarts of this product plus 1 pound a.i. of 2,4-D in 10 to 20 gallons of water per acre with ground equipment only. Applications should be made following harvest or on fall fallow ground when the bindweed is actively growing and the majority of runners are 12 inches or more in length. The use of at least one irrigation will promote active bindweed growth.

For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Applications should be delayed until maximum emergence has occurred and when vines are between 6 to 18 inches in length.

In California only, apply 1 to 5 quarts of this product per acre. Actual rate needed for suppression or control will vary within this range depending on local conditions. Also, for more specific use recommendations for California refer to the following paragraph.

For suppression on irrigated land where annual tillage is performed, apply 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Apply to actively growing bindweed that has reached a length of 12 inches or greater. Allow maximum weed emergence and runner growth. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth. Allow 3 or more days after application before tillage.

Bluegrass, Kentucky / Bromegrass, smooth / Orchardgrass—Apply 2 quarts of this product in 10 to 40 gallons of water per acre when the grasses are actively growing and most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1½ quarts of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Apply to actively growing plants when most have reached 4 to 12 inches in height. Allow 7 or more days after application before tillage.

Orchardgrass (sods going to no-till corn)—Apply 1 to 1.5 quarts of this product per acre plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Apply to orchardgrass that is a minimum of 12 inches tall for spring applications and 6 inches tall for fall applications. Allow at least three days following application before planting. A sequential application of 3.75 to 4.5 quarts of Lariat® herbicide, or equivalent, will be necessary for optimum results. Lariat should be applied within 3 to 10 days following spring applications to prevent annual weed growth.

Lariat is not registered for use in California.

*Lariat is a registered trademark of Monsanto Company.

Blueweed, Texas—Apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts per acre east of the Mississippi River. Apply when weed is actively growing and is at or beyond full bloom. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth. New leaf development indicates active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost. Allow 7 or more days after application before tillage.

Brackenfern—Apply 3 to 4 quarts of this product per acre as a broadcast spray or as a 1 to 1½ percent solution with hand-held equipment. Apply to fully expanded fronds which are at least 18 inches long.

Bursage, woollyleaf—For control, apply 2 quarts of this product plus 1 pint of Banvel per acre. For partial control, apply 1 quart of this product plus 1 pint of Banvel per acre. Add 0.5 to 1 percent nonionic surfactant by total spray volume and apply 3 to 20 gallons of water per acre. Apply when plants are producing new active growth which has been initiated by moisture for at least 2 weeks and when plants are at or beyond flowering.

Canarygrass, reed/Timothy / Wheatgrass, western—Apply 2 to 3 quarts of this product per acre. For best results, apply to actively growing plants when most have reached the boot-to-head stage of growth. Allow 7 or more days after application before tillage.

Cogongrass—Apply 3 to 5 quarts of this product plus 0.5 to 1 percent nonionic surfactant in 10 to 40 gallons of water per acre. Apply when Cogongrass is at least 18 inches tall and actively growing in late summer or fall. Allow 7 or more days after application before tillage or mowing. Due to uneven stages of growth and the dense nature of vegetation preventing good spray coverage, repeat treatments may be necessary to maintain control.

Dandelion/Dock, curly—Apply 3 to 5 quarts of this product per acre when plants are actively growing and most have reached the early bud stage of growth. Allow 7 or more days after application before tillage.

Also for control, apply 16 fluid ounces of this product plus 0.5 pounds a.i. 2,4-D plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre.

Dogbane, hemp—Apply 4 quarts of this product per acre. Apply when actively growing and when most weeds have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or fall. Allow 7 or more days after application before tillage.

For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Delay applications until maximum emergence of dogbane has occurred.

Fescue, tall—Apply 3 quarts of this product in 10 to 40 gallons of water per acre to actively growing plants when most have reached boot-to-early seedhead stage of development.

Fall applications only—Apply 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Apply to fescue in the fall when actively growing and plants have 6 to 12 inches of new growth. Allow 7 or more days after application before tillage. A sequential application of 1 pint per acre of this product plus nonionic surfactant will improve long-term control and control seedlings germinating after fall treatments or the following spring.

Guineagrass—Apply 3 quarts of this product per acre or use a 1 percent solution with hand-held equipment. Apply to actively growing guineagrass when most has reached at least the 7-leaf stage of growth. Ensure thorough coverage when using hand-held equipment. Allow 7 or more days after application before tillage.

Johnsongrass/Ryegrass, perennial—Apply 1 to 3 quarts of this product per acre. In annual cropping systems apply 1 to 2 quarts of this product per acre. Apply 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre. In noncrop or areas where annual tillage (no-till), is not performed, apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre. For best results, apply to actively growing plants when most have reached the boot-to-head stage of growth or in the fall prior to frost. Allow 7 or more days after application before tillage. Do not tank-mix with residual herbicides when using the 1 quart per acre rate.

For burndown of Johnsongrass, apply 1 pint per acre plus 0.5 to 1 percent nonionic surfactant in 3 to 10 gallons of water per acre before the plants reach a height of 12 inches. For this use, allow at least 3 days after treatment before tillage.

Spot Treatment (partial control or suppression)—Apply a 1 percent solution of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume when johnsongrass is 12 to 18 inches in height. Coverage should be uniform and complete.

Kikuyugrass—Apply 2 to 3 quarts of this product per acre. Spray when most kikuyugrass is at least 8 inches in height (3 or 4-leaf stage of growth) and actively growing. Allow 3 or more days after application before tillage.

Knapweed/Horseradish—Apply 4 quarts of this product per acre. Apply when actively growing and when most weeds have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or fall. Allow 7 or more days after application before tillage.

Lantana—Apply this product as a 1 to 1¼ percent solution using hand-held equipment only. Apply to actively growing lantana at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody stage of growth. Allow 7 or more days after application before tillage.

Milkweed, common—Apply 3 quarts of this product per acre. Apply when actively growing and most of the milkweed has reached the late bud to flower stage of growth. Following small grain harvest or mowing, allow milkweed to regrow to a mature stage prior to treatment. Allow 7 or more days after application before tillage.

Muhly, wirestem—Apply 1 to 2 quarts of this product per acre. Use 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Use 2 quarts of this product when

applying 10 to 40 gallons of water per acre or in pasture, sod, or noncrop areas. Spray when the wirestem muhly is 8 inches or more in height and actively growing. Do not till between harvest and fall applications or in the fall or spring prior to spring applications. Allow 3 or more days after application before tillage. This product will not provide residual control of wirestem muhly from seeds which germinate after application of this product. Do not tank mix with residual herbicides when using the 1 quart per acre rate.

Nightshade, silverleaf—For control, apply 2 quarts of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Applications should be made when at least 60 percent of the plants have berries. Fall treatments must be applied before a killing frost. Allow 7 or more days after application before tillage. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth.

Nutsedge, purple, yellow—Apply 3 quarts of this product per acre as a broadcast spray, or apply a 2 percent solution from hand-held equipment to control existing nutsedge plants and immature nutlets attached to treated plants. Treat when plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control of ungerminated tubers.

Sequential applications of 1 to 2 quarts of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre will provide control. Make applications when a majority of the plants are in the 3 to 5-leaf stage (less than 6 inches tall). Repeat this application, as necessary, when newly emerging plants reach the 3 to 5-leaf stage. Subsequent applications will be necessary for long-term control

For suppression to partial control of existing plants, apply 1 pint to 2 quarts of this product per acre, plus 0.5 to 1 percent nonionic surfactant in 3 to 40 gallons of water per acre. Treat when plants have 3 to 5 leaves and most are less than 6 inches tall. Repeat treatments will be required to control subsequent emerging plants or regrowth of existing plants. Wait 7 days after treatment before tillage or mowing.

Pampas—Apply this product as a 1½ to 2 percent solution using hand-held equipment. Apply to plants that are actively growing at or beyond the boot stage of growth. Thorough coverage is necessary for best control.

Phragmites—For partial control of phragmites in Florida and the counties of other states bordering the Gulf of Mexico, apply 5 quarts per acre as a broadcast spray or apply a 2 percent solution from hand-held equipment. In other areas of the U.S., apply 3 quarts per acre as a broadcast spray or apply a 1 percent solution from hand-held equipment for partial control. For best results, treat during late summer or fall months or when plants are actively growing and in full bloom. Treatment before or after this stage may lead to reduced control. Due to the dense nature of the vegetation, which may prevent good spray coverage or uneven stages of growth, repeat treatments may be necessary to maintain control. Visual control symptoms will be slow to develop.

Rangelands—In Annual Cropping Systems, or in Pastures and Sods Followed by Deep Tillage: Apply 1 to 2 quarts of this product per acre. For the one quart rate, apply 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. For the 2 quart rate, apply in 10 to 40 gallons of water per acre. Do not tank mix with residual herbicides when using the 1 quart rate. Spray when quackgrass is 8 to 12 inches in height and actively growing. Do not till between harvest and fall applications or in the fall or spring prior to spring application. Allow 3 or more days after application before tillage. In pastures or sods, for best results use a moldboard plow.

Quackgrass—Pasture or Sod or Other Noncrop Areas Where Deep Tillage is Not Planned Following Application: Apply 2 to 3 quarts in 10 to 40 gallons of water per acre. Spray when the quackgrass is greater than 8 inches tall and actively growing. Do not till between harvest and fall application or in fall or spring prior to spring application. Allow 3 or more days after application before tillage.

Redvine—For suppression, apply 24 fluid ounces of this product per acre at each of two applications 7 to 14 days apart or a single application of 2 quarts per acre. Apply recommended rates in 5 to 10 gallons of water per acre plus 0.5 to 1 percent nonionic surfactant by total volume. Apply to actively growing plants in late September or early October, which are at least 18 inches tall and have been growing 45 to 60 days since the last tillage operation. Make applications at least one week before a killing frost.

Reed, giant—For control of giant reed, apply a 2 percent solution of this product when plants are actively growing. Best results are obtained when applications are made in late summer to fall.

Smartweed, swamp—Apply 3 to 5 quarts of this product per acre when plants are actively growing and most have reached the early bud stage of growth. Allow 7 or more days after application before tillage.

Also for control, apply 16 fluid ounces of this product plus 0.5 pound active ingredient of 2,4-D plus 0.5 to 1 percent nonionic surfactant by total volume in 3 to 10 gallons of water per acre in the late summer or fall. Apply when plants are actively growing and most have reached the early bud stage of growth. Allow 7 or more days after application before tillage.

Spurge, leafy—For suppression, apply 16 fluid ounces of this product plus 0.5 pound active ingredient 2,4-D plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre in the late summer or fall. Apply when plants are actively growing. If mowing has occurred prior to treatment, apply when most of the plants are 12 inches tall. Allow 7 or more days after application before tillage.

Sweet Potato, wild—Apply this product as a 2 percent solution using hand-held equipment. Apply to actively growing weeds that are at or beyond the bloom stage of growth. Repeat applications will be required. Allow the plant to reach the recommended stage of growth before retreatment. Allow 7 or more days before tillage.

Thistle, Canada—Apply 2 to 3 quarts of this product per acre. Apply to actively growing thistles when most are at or beyond the bud stage of growth. After harvest, mowing or tillage in the late summer or fall, allow at least 4 weeks for initiation of active growth and rosette development prior to the application of this product. Fall treatments must be applied before a killing frost. Allow 3 or more days after application before tillage.

For suppression of Canada thistle, apply 1 quart per acre of this product, or 1 pint of this product plus 0.5 pound a.i. 2,4-D per acre, plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre in the late summer or fall after harvest, mowing or tillage. Allow rosette regrowth to a minimum of 6 inches in diameter before treating. Applications can be made as long as leaves are still green and plants are actively growing at the time of application. Allow 3 or more days after application before tillage.

Torpedograss—Apply 4 to 5 quarts of this product per acre to provide partial control of torpedograss. Apply to actively growing torpedograss when most plants are at or beyond the seedhead stage of growth. Repeat applications will be required to maintain control. Fall treatments must be applied before frost. Allow 7 or more days after application before tillage.

Trumpetcreeper—For control, apply 2 quarts of this product per acre in 5 to 10 gallons of water per acre. Apply to actively growing plants in late September or October, which are at least 18 inches tall and have been growing 45 to 60 days since the last tillage operation. Make applications at least 1 week before a killing frost.

Other perennials listed on this label—Apply 3 to 5 quarts of this product per acre. Apply when actively growing and most have reached early head or early bud stage of growth. Allow 7 or more days after application before tillage.

WOODY BRUSH AND TREES

When applied as recommended under the conditions described, this product CONTROLS or PARTIALLY CONTROLS the following woody brush, plants and trees:

Alder
Alnus spp.

Ash*
Fraxinus spp.

Aspen, quaking
Populus tremuloides

Bearmat (Bearclover)
Chamaebatia foliolosa

Birch
Betula spp.

Blackberry
Rubus spp.

Broom:
French
Cytisus monspessulanus
Scotch
Cytisus scoparius

Buckwheat, California*
Eriogonum fasciculatum

Cascara*
Rhamnus purshiana

Catsclaw*
Acacia greggi

Ceanothus*
Ceanothus spp.

Chamise
Adenostoma fasciculatum

Cherry:
Bitter
Prunus emarginata
Black
Prunus serotina
Pin
Prunus pensylvanica

Coyote brush
Baccharis consanguinea

Maple:
Red**
Acer rubrum
Sugar
Acer saccharum

Vine*
Acer circinatum

Monkey Flower*
Mimulus guttatus

Oak:
Black*
Quercus velutina
Northern Pin
Quercus palustris
Post
Quercus stellata
Red
Quercus rubra
Southern Red
Quercus falcata
White*
Quercus alba

Persimmon*
Diospyros spp.

Poison Ivy
Rhus radicans

Poison Oak
Rhus toxicodendron

Poplar*, yellow
Liriodendron tulipifera

Raspberry
Rubus spp.

Rose, multiflora
Rosa multiflora

Russian-olive***
Elaeagnus angustifolia

"Mixing, Additives and Application Instructions" section of this label for information on how to apply this product by air.

DO NOT APPLY THIS PRODUCT BY AIR TO RIGHTS-OF-WAY SITES IN THE STATE OF CALIFORNIA.

In order to reduce the aerial application drift hazard to aquatic sites*, to nontarget sites, or any site containing desirable vegetation, always maintain appropriate buffer zones. A buffer zone of the following minimum distances should be maintained:

- Helicopters using a Microfoil™ boom, a Thru-Valve™ boom (TVB-45), or equivalent drift control systems, should maintain at least a 50-foot buffer zone.
- When using other aerial equipment:

1. Maintain at least a 75-foot buffer zone for applications using 2 quarts or less per acre of this product.
2. Maintain at least a 125-foot buffer zone for applications using more than 2 quarts per acre of this product.
3. Maintain at least a 400-foot buffer zone for applications on rights-of-way when applied from 75 feet or more above ground level.

These distances should be increased if conditions favoring drift exist.

*Aquatic sites include all lakes, ponds, and streams used for significant domestic purposes or angling.

™Microfoil is a trademark of Union Carbide Agricultural Products, Inc.

™Thru-Valve is a trademark of Waldrum Specialties, Inc.

SITE PREPARATION

Following preplant applications of this product, any silvicultural species may be planted.

POSTDIRECTED SPRAY

In established silvicultural sites, use as a spray on the foliage of undesirable vegetation. Care must be exercised to avoid contact of spray, drift or mist with foliage or green bark of desirable species.

CONIFER RELEASE

For release, apply only where conifers have been established for more than one year. Vegetation should not be disturbed prior to treatment or until visual symptoms appear after treatment. Symptoms of treatment are slow to appear, especially in woody species treated in late fall. Injury may occur to conifers treated for release, especially where spray patterns overlap or the higher rates are applied or when applications are made during periods of active conifer growth. **Do not use additional surfactant with conifer release applications.**

Applications must be made after formation of final conifer resting buds in the fall or prior to initial bud swelling in spring. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Use the following rates for conifer release to control or partially control the weeds listed in the "Weeds Controlled" section of this label.

For release of the following conifer species:

Douglas fir
Pseudotsuga menziesii

Pines*
Pinus spp.

Fir
Abies spp.

Spruce
Picea spp.

Hemlock
Tsuga spp.

*Includes all species except eastern white pine, loblolly pine or slash pine.

Apply 1½ to 2 quarts of this product per acre except in Washington and Oregon, west of the crest of the Cascade Mountains. For spring treatments west of the crest of the Cascade Mountains, apply 1 quart of this product per acre before conifer bud swell for control of annual weeds. For fall treatments in Washington and Oregon, west of the crest of the Cascade Mountains, apply 1 to 1½ quarts of this product per acre before any major leaf drop of deciduous species.

For release of western hemlock, apply 1 quart of this product per acre.

For release of the following conifer species:

Loblolly pine
Pinus taeda

Slash pine
Pinus elliottii

Eastern white pine
Pinus strobus

Late Season Application—Apply 1½ to 2 quarts of this product in a minimum of 5 gallons of spray solution per acre during early autumn. Applications made prior to September 1 or when conditions are conducive to rapid growth of conifers will create the potential for increased injury in the form of top and/or needle burn. Injury may decrease with later applications. Some autumn colors are acceptable at time of application. Apply prior to frost or leaf drop of undesirable plants. Applications made according to label directions will release loblolly pine, eastern white pine and slash pine by reducing competition from the following species:

Ash
Fraxinus spp.

Cherry:
Black
Prunus serotina

Pin
Prunus pensylvanica

Elm
Ulmus spp.

Hawthorn
Crataegus spp.

Locust, black
Robina pseudoacacia

Maple, red
Acer rubra

Oak:
Black
Quercus velutina

Post
Quercus stellata

Southern Red
Quercus falcata

White
Quercus alba

Persimmon
Diospyros spp.

Poplar, yellow
Liriodendron tulipifera

Sassafras
Sassafras albidum

Sourwood
Oxydendrum arboreum

Sumac:
Poison
Rhus vernix

Smooth
Rhus glabra

Winged
Rhus copallina

Sweetgum
Liquidambar styraciflua

Apply only to those sites where woody brush and trees listed in this label constitute the majority of the undesirable species.

Roundup plus Oust Tank Mixtures for Conifer Release from Herbaceous Weeds

To release **loblolly pines** from herbaceous weeds, tank mixtures of this product with Oust will provide control of annual weeds listed in the "Weeds Controlled" section of this and the Oust label, and partial control of the perennial weeds listed below.

Apply 16 to 24 fluid ounces of this product with 2 to 4 ounces of Oust in 10 to 30 gallons of spray solution per acre. Make application to actively growing weeds as a broadcast spray over the top of the young loblolly pines.

This product plus Oust tank mixtures may not be applied by air in California.

This tank mixture may be applied using aerial equipment. When applying by air, use the recommended rate in 5 to 15 gallons of spray solution per acre.

For control of annual weeds below 12 inches in height (or runner length on annual vines), use the low rates of both products. Use the higher rates of both products when annual weeds are in more advanced stages of growth and approaching flower or seed formation.

Use the higher rates of both products for partial control of the following perennial weeds. Use the lower rates for suppression of growth.

Bahiagrass
Paspalum notatum

Broomsedge
Andropogon virginicus

Dock, curly
Rumex crispus

Dogfennel
Eupatorium capillifolium

Fescue, tall
Festuca arundinacea

Johnsongrass**
Sorghum halepense

Poorjoe**
Diodia teres

Trumpetcreeper*
Campsis radicans

Vaseygrass
Paspalum urvillei

Vervain, blue
Verbena hastata

*Suppression at the higher rates only.

**Control at the higher rates.

Pine damage may occur or can be accentuated if treatment takes place when young trees are under stress from drought, flood water, insects or disease.

Read and observe the cautionary statements and all other information appearing on the label of all herbicides used.

NOTE TO USER

This product must not be used in areas where adverse impact on Federally designated endangered/threatened plant or aquatic species is likely.

Prior to making applications, the user of this product must determine that no such species are located in or immediately adjacent to the area to be treated.

CUT STUMP TREATMENTS

Woody vegetation may be controlled by treating freshly cut stumps of trees and resprouts with this product. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut vegetation close to the soil surface. Apply a 50 to 100 percent solution of this product to the freshly cut surface immediately after cutting. Delays in application may result in reduced performance. For best results, applications should be made during periods of active growth and full leaf expansion.

When used according to directions for cut stump application, this product will CONTROL, PARTIALLY CONTROL or SUPPRESS many types of woody brush and tree species, some of which are listed below:

Alder
Alnus spp.

Eucalyptus/Bluegum
Eucalyptus glotulus

Madrone
Arbutus menziesii

Oak
Quercus spp.

Reed, giant
Arundo donax

Saltcedar
Tamarisk spp.

Sweetgum
Liquidambar styraciflua

Tan Oak
Lithocarpus densiflorus

INJECTION AND FRILL APPLICATIONS

Woody vegetation may be controlled by injection or frill application of this product. Apply this product using suitable equipment which must penetrate into the living tissue. Apply the equivalent of 1 ml of this product per each 2 to 3 inches of trunk diameter (DBH). This is best achieved by applying 50 to 100 percent concentration of this material either to a continuous frill around the tree or as cuts evenly spaced around the tree below all branches. As tree diameter increases in size, better results are achieved by applying diluted material to a continuous frill or more closely spaced cuttings. Avoid application techniques that allow runoff to occur from frill or cut areas in species that exude sap freely after frills or cutting. In species such as this, make frill or cut at an oblique angle so as to produce a cupping effect and use undiluted material. For best results, application should be made during periods of active growth and after full leaf expansion.

This treatment WILL CONTROL the following woody species:

Oak *Quercus spp.*	**Sweetgum** *Liquidambar styraciflua*
Poplar *Populus spp.*	**Sycamore** *Platanus occidentalis*

This treatment WILL SUPPRESS the following woody species:

Black gum *Nyssa sylvatica*	**Hickory** *Carya spp.*
Dogwood *Cornus spp.*	**Maple, red** *Acer rubrum*

TURFGRASSES AND GRASSES FOR SEED PRODUCTION

PREPLANT AND RENOVATION

When applied as directed for "Noncrop Uses", under conditions described, this product controls most existing vegetation prior to the planting or renovation of either turfgrasses or grass seed production areas.

For specific rates of application and instructions for control of various annual and perennial weeds, and woody brush and trees, see the "Weeds Controlled" section of this label.

For maximum control of existing vegetation, delay planting to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses, such as bermudagrass, summer or fall applications provide best control.

DO NOT DISTURB SOIL OR UNDERGROUND PLANT PARTS BEFORE TREATMENT. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow proper translocation into underground plant parts.

TURFGRASSES

Where existing vegetation is growing in a field or unmowed situation, apply this product to actively growing weeds at the stages of growth given in the "Weeds Controlled" section of this label.

Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at least one regular mowing to allow sufficient growth for good interception of the spray.

Desirable turfgrasses may be planted following the above procedures.

GRASSES FOR SEED PRODUCTION

Apply this product to actively growing weeds at the stages of growth given in the "Weeds Controlled" section of this label prior to planting or renovation of turf or forage grass areas grown for seed production.

DO NOT feed or graze treated areas within 8 weeks after application.

ANNUAL WEED CONTROL IN DORMANT BERMUDAGRASS AND BAHIAGRASS TURF

When applied as directed for "Noncrop Uses" under the conditions described, this product will provide control or suppression of many winter annual weeds and tall fescue for effective release of dormant bermudagrass and bahiagrass turf. Refer to the rate table for Roundup alone under the "Release of Bermudagrass and Bahiagrass" section of this label for recommended rates and volumes on the species to be suppressed or controlled. Treat only when turf is dormant and prior to spring greenup. Spot treatments or broadcast applications of this product in excess of 16 fluid ounces per acre may result in injury or delayed greenup in highly maintained turfgrass areas; i.e., golf courses, lawns, etc. DO NOT APPLY TANK MIXTURES of this product plus Oust in highly maintained turfgrass areas.

RELEASE OF BERMUDAGRASS OR BAHIAGRASS

NOTE: Use only in areas where bermudagrass or bahiagrass are desirable ground covers and where some temporary injury or discoloration can be tolerated. Use tank mixtures of this product plus Oust only on railroads, highways, utility plant sites, or other right-of-way areas.

When applied as directed for "Noncrop Uses" under the conditions described, this product will provide control or suppression of many winter annual weeds and tall fescue for effective release of dormant bermudagrass or bahiagrass. This product may be tank-mixed with Oust as recommended for residual control. Make applications to dormant bermudagrass or bahiagrass. Tank mixtures of this product plus Oust may delay greenup. To avoid delays in greenup and minimize injury, do not add more than 1 ounce per acre of Oust on bermudagrass or more than ½ ounce per acre on bahiagrass, or treat when these grasses are in a semi-dormant condition.

For best results on winter annuals, treat when plants are in an early growth stage (below 6 inches in height) after most have germinated. For best results on tall fescue, treat when fescue is in or beyond the 4 to 6-leaf stage.

WEEDS CONTROLLED

Rate recommendations for control or suppression of winter annuals and tall fescue are listed below:

Apply the recommended rates of this product alone or as a tank mixture in 10 to 25 gallons of water, plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre.

For the best recommendation for the mixture of weeds within your geographic areas, contact your Monsanto sales representative.

WEEDS CONTROLLED OR SUPPRESSED WITH ROUNDUP® ALONE*

NOTE: C = Control
S = Suppression

	ROUNDUP® FLUID OZ/ACRE					
WEED SPECIES	8	12	16	24	32	64
Barley, little *Hordeum pusilium*	S	C	C	C	C	C
Bedstraw, catchweed *Galium aparine*	S	C	C	C	C	C
Bluegrass, annual *Poa annua*	S	C	C	C	C	C
Chervil *Chaerophyllum tainturieri*	S	C	C	C	C	C
Chickweed, common *Stellaria media*	S	C	C	C	C	C
Clover, crimson *Trifolium incarnatum*	•	S	S	C	C	C
Clover, large hop *Trifolium campestre*	•	S	S	C	C	C
Fescue, tall *Festuca arundinaceae*	•	•	•	•	S	S
Geranium, Carolina *Geranium carolinianum*	•	•	S	S	C	C
Henbit *Lamium amplexicaule*	•	S	C	C	C	C
Ryegrass Italian *Lolium multiflorum*	•	•	S	C	C	C
Speedwell, corn *Veronica arvensis*	S	C	C	C	C	C
Vetch, common *Vicia sativa*	•	•	S	C	C	C

*These rates apply only to sites where an established competitive turf is present.

WEEDS CONTROLLED OR SUPPRESSED WITH ROUNDUP® PLUS OUST*

NOTE: C = Control
S = Suppression

	ROUNDUP® + OUST						
WEED SPECIES	ROUNDUP (FL. OZ/A) + OUST (OZ/A)	8 + ¼	12 + ¼	12 + ½	16 + ¼	16 + ½	12 16 + + 1 1
Barley, little *Hordeum pusilium*		C	C	C	C	C	C C
Bedstraw, catchweed *Galium aparine*		C	C	C	C	C	C C
Bluegrass, annual *Poa annua*		S	C	C	C	C	C C
Chervil *Chaerophyllum tainturieri*		C	C	C	C	C	C C
Chickweed, common *Stellaria media*		S	C	C	C	C	C C

Clover, crimson *Trifolium incarnatum*	S	S	S	S	C	C	C
Clover, large hop *Trifolium campestre*	•	•	S	S	S	C	C
Fescue, tall *Festuca arundinaceae*	•	•	•	•	•	S	S
Geranium, Carolina *Geranium carolinianum*	•	S	S	C	C	C	C
Henbit *Lamium amplexicaule*	•	S	C	C	C	C	C
Ryegrass, Italian *Lolium multiflorum*	•	S	S	C	C	C	C
Speedwell, corn *Veronica arvensis*	S	C	C	C	C	C	C
Vetch, common *Vicia sativa*	C	C	C	C	C	C	C

*These rates or mixtures of rates apply only to sites where an established competitive turf is present.

RELEASE OF ACTIVELY GROWING BERMUDAGRASS

When applied as directed, this product will aid in the release of bermudagrass by providing control of annual species listed in the "Weeds Controlled" section of this and the Oust label, and suppression or partial control of certain perennial weeds.

For control or suppression of those annual species listed on this label, use 1 to 3 pints of this product as a broadcast spray in 10 to 25 gallons of spray solution per acre. Use the lower rate when treating annual weeds less than 6 inches in height (or length of runner in annual vines). Use the higher rate as plant size increases or as they approach flower or seedhead formation.

Use the higher rate of this product for partial control of the following perennial species. Use the lower rates for suppression of growth. For best results, see the "Weeds Controlled" section of this label for proper stage of growth.

Bahiagrass *Paspalum notatum*
Bluestem, silver *Andropogon saccharoides*
Fescue, tall *Festuca arundinacea*
Johnsongrass** *Sorghum halepense*
Trumpetcreeper* *Campsis radicans*
Vaseygrass *Paspalum urvillei*

*Suppression at higher rates only.

**Control at the higher rates.

This product may be tank-mixed with Oust. If tank-mixed, use no more than 1 to 2 pints per acre of this product with 1 to 2 ounces of Oust per acre.

Use the lower rates of both mixtures to control annual weeds less than 6 inches in height (or runner length in annual vines) that are listed in the "Weeds Controlled" section of this booklet and the Oust label. Use the higher rates as annual weeds increase in size and approach the flower or seedhead stages.

Use the higher rates of this product to provide partial control of the following perennial weeds. Use the lower rates for suppression of growth.

Bahiagrass *Paspalum notatum*
Bluestem, silver *Andropogon saccharoides*
Broomsedge *Andropogon virginicus*
Johnsongrass* *Sorghum halepense*
Poorjoe** *Diodia teres*
Trumpetcreeper* *Campsis radicans*
Dock, curly *Rumex crispus*
Dogfennel *Eupatorium capilliforium*
Fescue, tall *Festuca arundinacea*
Vaseygrass *Paspalum urvillei*
Vervain, blue *Verbena hastata*

*Suppression at higher rates only.

**Control at the higher rates.

Use only on well-established bermudagrass. Bermudagrass injury may result from the treatment but regrowth will occur under most conditions. Repeat applications in the same season are not recommended, since severe injury may result.

Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

COOL SEASON TURF GROWTH REGULATION

When applied as directed, this product will suppress growth and seedhead development of listed turf species in industrial sites.

This product is recommended for management of coarse turfs on roadside rights-of-way or other industrial areas. Do not use on high-quality turf or other areas where some turf color changes cannot be tolerated. Slight turf discoloration may occur but turf will regreen and regrow under most conditions as effects of this product wear off.

Apply 4 to 6 fluid ounces of this product per acre alone or in a recommended tank mixture. Spray volumes of 10 to 40 gallons per acre are recommended.

When using this product, mix 2 quarts of a nonionic surfactant per 100 gallons of spray solution.

This product can be used for growth and seedhead suppression of:

Tall Fescue
Smooth Brome

For best results, apply this product in a recommended tank mixture to actively growing turfgrasses after greenup in the spring of the year. For suppression of seedheads, applications must be made before boot-to-seedhead stage of development. Applications made from seedhead emergence until maturity may result in turf discoloration or injury.

After mowing or removal of seedheads, this product in a recommended tank mixture may also be used to suppress the growth of certain turfgrasses. Allow turf to recover from stress caused by heat, drought, or mowing before making applications. Applications made to turf under stress may increase the potential for discoloration or injury.

ANNUAL GRASSES

For growth suppression of some annual grasses such as annual ryegrass, wild barley and wild oats, apply 3 to 4 fluid ounces of this product in 10 to 40 gallons of spray solution per acre. Applications should be made when annual grasses are actively growing and before the seedheads are in the boot stage of development. Treatments made after seedhead emergence may cause injury to the desired grasses.

TANK MIXTURES

For the following tank mixtures, consult each product label for weeds controlled and the correct stage of application. Do not treat turf under stress.

Tank mixtures plus 2,4-D Amine

For additional weed control benefits, up to 1 pound per acre of 2,4-D amine may be added to the follo tank mixtures. Consult the label for 2,4-D amine for weeds controlled.

TALL FESCUE

Roundup plus Telar™

For suppression of tall fescue growth and seedheads and control or partial control of some annual weeds, apply this tank mixture after greenup and prior to boot-to-seedhead stage of development. Use up to ½ ounce of Telar per acre.

This tank mixture can also be applied after mowing or removal of tall fescue seedheads for turf growth suppression. Make only one of the above applications per growing season.

Roundup plus Oust™

For suppression of tall fescue growth and seedheads, and control or partial control of some annual weeds, apply this tank mixture after greenup and prior to boot-to-seedhead stage of development. Use up to 1/4 ounce of Oust per acre.

Roundup plus Escort™

This tank mixture can be applied after mowing or removal of tall fescue seedheads for turf growth suppression and control or partial control of some annual weeds. Use up to 1/3 ounce of Escort per acre.

SMOOTH BROME

Roundup plus Oust

For suppression of smooth brome growth and seedheads and control or partial control of some annual weeds, apply this tank mixture after greenup and prior to boot-to-seedhead stage of development. Use up to 1/4 ounce of Oust per acre.

BAHIAGRASS SEEDHEAD AND VEGETATIVE SUPPRESSION

When applied as directed in the indicated noncrop areas (roadsides, airports, golf course roughs, and plant sites), this product will provide significant inhibition of seedhead emergence and will suppress vegetative growth for a period of approximately 45 days with single applications and approximately 120 days with sequential applications.

Apply this product 1 to 2 weeks after full greenup of bahiagrass or after the bahiagrass has been mowed to a uniform height of 3 to 4 inches. Applications must be made prior to seedhead emergence. Apply 6 fluid ounces per acre of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 10 to 25 gallons of water per acre.

Sequential applications of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume may be made at approximately 45 day intervals to extend the period of seedhead and vegetative growth suppression. For continued seedhead suppression, sequential applications must be made prior to seedhead emergence. Apply no more than 2 sequential applications per year. As a first sequential application, apply 4 fluid ounces of

this product per acre plus nonionic surfactant. A second sequential application of 2 to 4 fluid ounces per acre plus nonionic surfactant may be made approximately 45 days after the last application.

A tank mixture of this product plus Oust may be applied only on roadsides for seedhead inhibition and vegetative suppression. Apply 6 fluid ounces per acre of this product plus 0.25 ounce per acre of Oust, plus 0.5 to 1 percent nonionic surfactant by total spray volume 1 to 2 weeks following an initial spring mowing. When using this product plus Oust for suppression of bahiagrass, make only one application per year.

CROPPING SYSTEMS

When applied as directed for "Cropping Systems", under the conditions described, this product controls annual and perennial weeds listed on this label, prior to the emergence of direct seeded crops or prior to transplanting of crops listed on this label.

See "General Information" and "Mixing, Additives and Application Instructions" sections of this label for essential product performance information.

See the following "Cropping Systems" sections for specific recommended uses.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF SPRAY WITH FOLIAGE, GREEN STEMS OR FRUIT OF DESIRABLE CROPS, PLANTS, TREES OR OTHER DESIRABLE VEGETATION SINCE SEVERE DAMAGE OR DESTRUCTION MAY RESULT.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. Except as otherwise specified on this label, repeat treatments must be made before the crop emerges in accordance with the instructions of this label.

Except as otherwise specified in a crop section of this label, the combined total of all treatments must not exceed 8 quarts per acre of this product per year.

Do not plant subsequent crops other than those on the label for 30 days following application.

Do not harvest or feed treated vegetation for 8 weeks following application. Following spot treatment or selective equipment use, allow 14 days before grazing domestic livestock or harvesting forage grasses and legumes.

ALFALFA*	LETTUCE
ARTICHOKE, JERUSALEM	LOGANBERRY
ASPARAGUS*	LONGAN
ATEMOYA	LYCHEE
BARLEY*	MELONS***
BEANS (All)	MUSTARD GREENS
BEET GREENS	OATS*
BEETS (Red, Sugar)	OKRA
BLACKBERRY	OLALLIEBERRY
BLUEBERRY	ONION
BOYSENBERRY	PARSNIPS
BREADFRUIT	PASSION FRUIT
BROCCOLI	PEANUTS
CABBAGE	PEAS (All)
CANISTEL	PEPPER***
CARAMBOLA	PERSIMMONS
CARROT	PINEAPPLE****
CAULIFLOWER	POTATO (Irish, Sweet)
CELERY	PUMPKIN***
CHICORY	RADISH
CORN (All)*	RASPBERRY (Black, Red)
	RICE**
COTTON*	RUTABAGA
CRANBERRY	SAPODILLA
CUCUMBER***	SAPOTE (Black, Mamey, White)
CURRANT	SORGHUM (Milo)*
DATES	SOURSOP
DEWBERRY	SOYBEANS*
EGGPLANT***	SPINACH
ELDERBERRY	SQUASH*** (Summer, Winter)
FORAGE GRASSES*	SUGAR APPLE
FORAGE LEGUMES*	TAMARIND
GARLIC***	TOMATILLO***
GOOSEBERRY	TOMATOES***†
GOURDS***	TURNIPS
HORSERADISH	WATERCRESS***
HUCKLEBERRY	WATERMELON***
JABOTICABA	WHEAT*
JACKFRUIT	YAMS
KALE	
LENTILS	

*Spot treatments may be applied in these crops.

**Do not treat rice fields or levees when the fields contain flood water.

***Apply only prior to planting. Allow at least 3 days between application and planting.

****Do not feed or graze treated pineapple forage following application.

† Use is restricted to direct seeded crops only.

When applying this product prior to transplanting crops into plastic mulch, care must be taken to remove residues of this product from the plastic prior to transplanting. Residues can be removed by 1/2 inch natural rainfall or by applying water via a sprinkler irrigation system.

Spot Treatment (Only those crops with "*" can be spot treated.)—Applications in growing crops must be made prior to heading of small grains and milo, initial pod set in soybeans, silking of corn, boll opening on cotton.

For forage grasses and forage legumes see "Spot Treatment" in the "Pastures" section of "Cropping Systems" in this label.

For dilution and rates of application using boom or handheld equipment, see "Mixing, Additives and Application Instructions" and "Weeds Controlled" sections of this label.

NOTE: FOR FORAGE GRASSES AND FORAGE LEGUMES, NO MORE THAN ONE-TENTH OF ANY ACRE SHOULD BE TREATED AT ONE TIME. FOR ALL OTHER CROPS, DO NOT TREAT MORE THAN 10 PERCENT OF THE TOTAL FIELD AREA TO BE HARVESTED.

THE CROP RECEIVING SPRAY IN TREATED AREA WILL BE KILLED. TAKE CARE TO AVOID DRIFT OR SPRAY OUTSIDE TARGET AREA FOR THE SAME REASON.

Selective Equipment—This product may be applied through recirculating sprayers, shielded applicators, or wiper applicators in cotton and soybeans. Shielded and wiper applicators may also be used in tree crops and grapes. Wiper applicators may be used in rutabagas, forage grasses and forage legumes, including pasture sites and grain sorghum (milo).

See the "Selective Equipment" part of the "Application Equipment and Techniques" section of this label for information on proper use and calibration of this equipment.

Allow at least the following time intervals between application and harvest:

Cotton, Soybeans	7 days
Apples, Atemoya, Avocado, Breadfruit, Canistel, Carambola, Cherry, Citrus, Dates, Grapes, Jaboticaba, Jackfruit, Longan, Lychee, Passion Fruit, Pear, Persimmons, Rutabagas, Sapodilla, Sapote, Soursop, Sugar Apple, Tamarind	14 days
Stone Fruit	17 days
Nut Crops	21 days
Sorghum (milo)*	40 days

*Do not use roller applicators. Do not feed or graze treated milo fodder. Do not ensile treated vegetation.

ASPARAGUS

When applied as directed for "Cropping Systems" under the conditions described, this product controls weeds listed on this label in asparagus.

For specific rates of applications and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

Prior to Crop Emergence—Apply this product prior to crop emergence for the control of emerged labeled annual and perennial weeds. DO NOT APPLY WITHIN A WEEK BEFORE THE FIRST SPEARS EMERGE.

Spot Treatment—Apply this product immediately after cutting, but prior to the emergence of new spears. Do not treat more than 10 percent of the total field area to be harvested. Do not harvest within 5 days of treatment.

Postharvest—Apply this product after the last harvest and all spears have been removed. If spears are allowed to regrow, delay application until ferns have developed. Delayed treatments should be applied as directed or shielded spray in order to avoid contact of the spray with ferns, stems or spears. Direct contact of the spray with the asparagus may result in serious crop injury.

NOTE: Select and use recommended types of spray equipment for postemergence postharvest applications. A directed spray is any application where the spray pattern is aligned in such a way as to avoid direct contact of the spray with the crop. A shielded spray is any application where a physical barrier is positioned and maintained between the spray and the crop to prevent contact of spray with the crop.

BERRIES AND SMALL FRUITS

For cranberries, apply after fruit set and no later than 30 days before harvest.

For other berries, apply as a preplant broadcast application, or as a directed spray or wiper application postplanting.

Wiper applicators may be used in cranberries in accordance with instructions in this section.

See "General Information" and "Mixing, Additives and Application Instructions" sections of this label for essential product performance information.

See the "Selective Equipment" part of the "Application Equipment and Techniques" section of this label for information on recommended use and calibration of this equipment.

For Wick or other Wiper Applicators—Mix 1 gallon of this product in 4 gallons of water to prepare a 20 percent solution. Apply the solution to emerged weeds. Apply after cranberry fruit set and no later than 30 days before harvest.

In severe infestations, reduce equipment ground speed

to ensure that adequate amounts of this product are wiped on the weeds. A second treatment in the opposite direction may be beneficial.

Do not permit herbicide solution to contact desirable vegetation, including green shoots, canes, or foliage.

FALLOW AND REDUCED TILLAGE SYSTEMS

FOR AERIAL APPLICATION IN CALIFORNIA, REFER TO SUPPLEMENTAL LABEL.

Use this product in fallow and reduced tillage systems for control of annual weeds prior to emergence of crops listed in this label. Refer to the "Weeds Controlled" section of this label for specific rates and instructions. This product may be applied using ground or aerial spray equipment. See the "Application Equipment and Techniques" section of this label for instructions.

- TANK MIXTURES
- ROUNDUP® plus BANVEL plus NONIONIC SURFACTANT
- ROUNDUP plus 2,4-D plus NONIONIC SURFACTANT
- ROUNDUP plus GOAL™ plus NONIONIC SURFACTANT

DO NOT APPLY BANVEL OR 2,4-D TANK MIXTURES BY AIR IN CALIFORNIA.

Applications of 2,4-D or Banvel must be made at least 7 days prior to planting corn. Applications of 2,4-D must be made at least 30 days prior to planting soybeans.

The addition of Banvel in a mixture with this product may provide short-term residual control of selected weed species. Some crop injury may occur if Banvel is applied within 45 days of planting. Refer to the Banvel and 2,4-D labels for cropping restrictions and other use instructions.

Roundup® plus Goal Tank Mixtures

This product alone or in tank mixtures with Goal plus 0.5 to 1 percent nonionic surfactant by total spray volume will provide control of those weeds listed below.

Make applications when weeds are actively growing and at the recommended stages of growth. Avoid spraying when weeds are subject to moisture stress, when dust is on the foliage or when straw canopy covers the weeds.

ROUNDUP® 12 fluid oz/acre + GOAL®* 2 to 4 fluid oz/acre		ROUNOUP 16 fluid oz/acre + GOAL®* 2 to 4 fluid oz/acre	
Wheat	18"**	Annual grasses at	
Barley	12"	left plus	
Bluegrass, annual	6"	Ryegrass, annual	6"
Barnyardgrass	6"	Chickweed	6"
Rye	6"	Groundsel	6"
		Marestail	6"
		Rocket, London	6"
		Shepherdspurse	6"
		Crabgrass	12"
		Johnsongrass, seedling	12"
		Lambsquarters	12"
		Oats, wild	12"
		Pigweed, redroot	12"
		Mustards	12"

ROUNDUP 12 fluid oz/acre + GOAL®* 2 to 4 fluid oz/acre		ROUNDUP 16 fluid oz/acre + GOAL®* 2 to 4 fluid oz/acre	
Annual grasses above plus:		Annual weeds above plus	
Cheeseweed, common	3"	Cheeseweed, common	6"
Chickweed	3"	Groundsel	6"
Groundsel	3"	Chickweed	12"
Rocket, London	6"	Rocket, London	12"
Shepherdspurse	6"	Shepherdspurse	12"

*Maximum height or length in inches.

**Use the higher rate when weeds approach maximum recommended height or stands are dense.

These recommended tank mixtures may be applied using ground or aerial spray equipment. Refer to the "Weeds Controlled" section of this label for specific rates and instructions.

™Goal is a trademark of Rohm and Haas Company.

ECOFARMING SYSTEMS

The recommendations made in this section are not registered for use in California.

The Ecofarming System consists of the following rotation: winter wheat, corn/sorghum, ecofallow.

Use the following tank mixtures for control of emerged annual weeds before planting corn or sorghum in the Ecofarming System.

ROUNDUP® at 16 to 20 fluid ounces per acre plus 2,4-D at 0.375 to 0.5 pound a.i. per acre plus ATRAZINE at 0.75 to 1 pound a.i. per acre plus LASSO® at 2.5 to 3 quarts per acre

The above tank mixture should be applied in 28-0-0 or 32-0-0 liquid fertilizer carrier at 20 to 30 gallons per acre. The liquid fertilizer may be diluted with water to achieve the required carrier volume.

WEEDS CONTROLLED—The following weeds, up to a maximum height of 4 inches, will be controlled:

Barnyardgrass *Echinochloa crus-galli*
Bluegrass, annual *Poa annua*
Carpetweed *Mollugo verticillata*
Cheeseweed *Malva parviflora*
Chickweed *Stellaria media*
Cocklebur *Xanthium strumarium*
Corn, volunteer
Crabgrass *Digitaria sanguinalis*
Eastern black nightshade *Solanum ptycanthum*
Fiddleneck *Amsinckia intermedia*
Field bindweed *Convolvulus arvensis*
Filaree *Erodium cicutarium*
Foxtail, giant *Setaria faberii*
Foxtail, green *Setaria viridis*
Foxtail, yellow *Setaria lutescens*
Groundsel *Senecio vulgaris*
Jimsonweed *Datura stramonium*
Johnsongrass, seedling *Sorghum halepense*
Kochia* *Kochia scoparia*
Lambsquarters *Chenopodium album*
Lettuce, prickly *Lactuca serriola*
Pigweed, redroot *Amaranthus retroflexus*
Pigweed, smooth *Amaranthus hybridus*
Pigweed, spiny *Amaranthus spinosus*
Purslane, common *Portulaca oleracea*
Ragweed, common *Ambrosia artemisiifolia*
Ragweed, giant *Ambrosia trifida*
Rocket, London *Sisymbrium irio*
Russian thistle *Salsola kali*
Shepherdspurse *Capsella bursa-pastoris*
Smartweed, pale *Polygonum lapathifolium*
Smartweed, Pennsylvania *Polygonum pensylvanicum*
Sowthistle, annual *Sonchus oleraceus*
Speedwell, purslane *Veronica peregrina*
Speedwell, corn *Veronica arvensis*
Sunflower, common *Helianthus annuus*
Velvetleaf *Abutilon theophrasti*
Wheat, volunteer *Triticum aestivum*

*For improved control of kochia, add 4 fluid ounces per acre (0.125 pound a.i. per acre) of Banvel to the above tank mixture.

Risk of crop injury from 2,4-D or Banvel can be reduced by applying this treatment 7 to 14 days before planting.

Refer to the label booklet for Lasso herbicide for preemergence weed control achieved by this tank mixture.

Refer to the specific product labels for crop rotation restrictions and cautionary statements for all products used in these tank mixtures.

®Lasso is a registered trademark of Monsanto Company.

AID TO TILLAGE

This product, when used in conjunction with preplant tillage practices, will provide control of downy brome, cheat, volunteer wheat, tansy mustard and foxtail. Apply 8 fluid ounces of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre. Make applications when weeds are actively growing and before they are 6 inches in height. Application must be followed by conventional tillage practices no later than 15 days after treatment and before regrowth occurs. Allow at least 1 day after application before tillage. Tank mixtures with residual herbicides may result in reduced performance.

PASTURES

Apply this product prior to planting forage grasses and legumes.

Pasture or Hay Crop Renovation—When applied as a broadcast spray, this product controls the annual and perennial weeds listed in this label prior to planting forage grasses or legumes. Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

Spot Treatment—When applied as a spot treatment as recommended, this product controls annual and perennial weeds listed in this label which are growing in pastures, forage grasses and forage legumes composed of bahiagrass, bermudagrass, bluegrass, brome, fescue orchardgrass, ryegrass, timothy, wheatgrass, alfalfa or clover.

Wiper Application—When applied as directed, this product controls or suppresses the weeds listed under "Wiper Applicators" in the "Selective Equipment" section of this label.

For spot treatment and wiper application, apply in areas where the movement of domestic livestock can be controlled. No more than one-tenth of any acre should be treated at one time. Further applications may be made in the same area at 30 day intervals. Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.

SUGARCANE

When applied as directed for "Cropping Systems", under the conditions described, this product controls those emerged annual and perennial weeds listed on this label growing in or around sugarcane or in fields to be planted to sugarcane. This product will also control undesirable sugarcane.

NOTE: Where repeat treatments are necessary, do not exceed a total of 10.6 quarts of this product per acre per year. Do not apply to vegetation in or around ditches, canals or ponds containing water to be used for irrigation.

Broadcast Treatment—Apply this product in 10 to 40 gallons of water per acre on emerged weeds growing in fields to be planted to sugarcane.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

For removal of last stubble or ratoon cane, apply 4 to 5 quarts of this product in 10 to 40 gallons of water per acre to new growth having at least 7 or more new leaves. Allow 7 or more days after application before tillage.

Spot Treatment in or Around Sugarcane Fields—For dilution and rates of application using hand-held equip-

ment, see "Mixing, Additives and Application Instructions" and "Weeds Controlled" sections of this label.

For control of volunteer or diseased sugarcane, make a 1 percent solution of this product in water and spray to wet the foliage of vegetation to be controlled.

NOTE: When spraying volunteer or diseased sugarcane, the plants should have at least 7 new leaves.

Avoid spray contact with healthy cane plants since severe damage or destruction may result.

Do not feed or graze treated sugarcane forage following application.

CONSERVATION TILLAGE, MINIMUM TILLAGE AND NO-TILL SYSTEMS CORN AND SOYBEANS Tank Mixtures

The recommendations made in this section are not registered for use in California.

When applied as recommended under the conditions described, these tank mixtures listed in this section control many emerged weeds, and give preemergence control of many annual weeds where corn or soybeans will be planted directly into a cover crop, established sod, or in previous crop residues.

Refer to specific product labels for crop rotation restrictions and cautionary statements of all products used in these tank mixtures. For mixing instructions, see the "Mixing, Additives and Application Instructions" section of this label.

Apply these tank mixtures in 10 to 20 gallons of water or 10 to 60 gallons of nitrogen solutions per acre before, during or after planting. Do not apply these mixtures after crop emergence.

When tank mixing with residual herbicides, add an agriculturally approved nonionic surfactant at 0.5 to 1 percent by volume of spray solution. The addition of 1 to 2 percent dry ammonium sulfate by weight may increase the performance of this product.

NOTE: When using these tank mixtures, do not exceed 4 quarts of this product per acre.

CORN

For residual control, this product may be tank-mixed with the following herbicides or combination of herbicides:

LASSO®/ALACHLOR	ATRAZINE
LARIAT®	CYANAZINE
BULLET®	SIMAZINE
DUAL™	PRDWL™
BICEP™	

For improved burndown, this product may be tank-mixed with 2,4-D or dicamba. Applications of 2,4-D or dicamba must be made at least 7 days prior to planting corn. See the "Weeds Controlled" section for specific rate information.

SOYBEANS

For residual control, this product may be tank-mixed with the following herbicides or combination of herbicides:

CANDPY™	LOREX™ PLUS
COMMAND™	PREVIEW™
DUAL™	PRDWL™
GEMINI™	TURBO™
LASSO®/ALACHLOR	SCEPTER™
LEXONE™	SENCOR™
LINURON	SQUADRON™

For improved burndown, this product may be tank-mixed with the following herbicides:

2,4-DB
2,4-D*

*Applications of 2,4-D must be made at least 30 days prior to planting soybeans. See the "Weeds Controlled" section for specific rate information.

CORN AND SOYBEANS

Annual Weeds—For difficult to control weeds such as fall panicum, barnyardgrass, crabgrass, shattercane and broadleaf signalgrass up to 2 inches tall, and Pennsylvania smartweed up to 6 inches tall, apply this product at 2 pints per acre in these tank mixtures. For other labeled annual weeds, apply 1 to 1.5 pints of this product per acre when weeds are less than 6 inches tall, and 2 to 3 pints when weeds are over 6 inches tall. For a complete list of annual weeds controlled, see the "Weeds Controlled" section of this label.

Perennial Weeds—At normal application times in minimum tillage systems, perennial weeds may not be at the proper stage of growth for control. See the "Weeds Controlled" section of this label for the proper stage of growth for perennial weeds.

Use of 2 to 4 quarts of this product per acre in the tank mixtures mentioned above, under these conditions provides top kill and reduces competition from many emerged perennial grass and broadleaf weeds. For emerged perennial weeds controlled, see the "Weeds Controlled" section of this label.

To obtain the desired stage of growth, it may be necessary to apply this product alone in the late summer or fall and then follow with a label-approved, seedling weed control program at planting.

USE OF THESE TANK MIXTURES FOR BERMUDAGRASS OR JOHNSONGRASS CONTROL IN MINIMUM TILLAGE SYSTEMS IS NOT RECOMMENDED. For bermudagrass control, follow the instructions under "Control of Perennial Weeds" section of this label and then use a label-approved, seedling weed-control program in a minimum tillage or conventional tillage system. For Johnsongrass control, follow the instructions under "Control of Perennial Weeds" section of this label, and then use a label-approved seedling weed-control program with conventional tillage.

* Bullet, Lasso and Lariat are registered trademarks of Monsanto Company.

™Canopy, Blades, Gemini, Lexone, Lorox Plus and Preview are trademarks of E.I. duPont de Nemours and Company.

™Dual is a trademark of Ciba-Geigy Corporation.

™Sencor and Turbo are trademarks of Bayer AG.

™Prowl, Scepter and Squadron are trademarks of American Cyanamid Company.

™Command is a trademark of FMC Corporation.

PREHARVEST APPLICATIONS

COTTON

When applied as directed under the conditions described, this product controls annual and perennial weeds listed on this label prior to the harvest of cotton.

Broadcast Applications—This product may be applied using either aerial or ground spray equipment. For ground applications with broadcast equipment, apply this product in 10 to 20 gallons of water per acre. For aerial applications, apply this product in 3 to 10 gallons of water per acre.

FOR AERIAL APPLICATIONS, REFER TO THE "APPLICATION EQUIPMENT AND TECHNIQUES" AND "AERIAL EQUIPMENT" SECTIONS OF THIS LABEL.

FOR AERIAL APPLICATIONS IN CALIFORNIA, REFER TO THE FEDERAL SUPPLEMENTAL LABEL FOR AERIAL APPLICATIONS IN THAT STATE FOR SPECIFIC INSTRUCTIONS, RESTRICTIONS AND REQUIREMENTS.

DO NOT EXCEED A MAXIMUM RATE OF 1 QUART PER ACRE OF THIS PRODUCT WHEN MAKING APPLICATIONS BY AIR.

Weed Control—For specific rates of application and instructions for control of various annual and perennial weeds, for this product used alone or in the following tank mixtures, see the "Weeds Controlled" section of this label.

To control johnsongrass using multiple directed or broadcast over the top spray equipment, apply 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 10 to 20 gallons of water per acre. Ensure complete coverage.

For partial control of field bindweed, apply 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 20 gallons of water per acre. Apply when bindweed is actively growing and 12 inches or greater in length. Reduced performance may result if bindweed is under drought stress.

Tank Mixtures

ROUNDUP® plus DEF™ 6
ROUNDUP plus Folex™
ROUNDUP plus PREP™
ROUNDUP plus PREP plus DEF 6 or FOLEX

When applied as recommended under the conditions described, these tank mixtures control annual and perennial weeds listed on this label prior to the harvest of cotton. For application guidelines, precautions and use rates, refer to the Def, Folex and Prep labels.

This product when tank-mixed with DEF 6 or Folex defoliants may provide enhancement of cotton leaf drop and regrowth inhibition.

Timing of Application—Apply this product or these tank mixtures for preharvest weed control after 60 percent of the cotton bolls have opened.

NOTE: DO NOT APPLY TO CROPS GROWN FOR SEED. Allow a minimum of 7 days between application and harvest. Do not feed or graze treated cotton forage or hay following preharvest applications.

™Def is a trademark of Mobay Chemical Corporation.
™Folex and Prep are trademarks of Rhone-Poulenc, Inc.

TREE AND VINE CROPS

This product is recommended for weed control in established groves, vineyards, or orchards, or for site preparation prior to transplanting crops listed in this section. Applications may be made with boom equipment, CDA, shielded sprayers, hand-held and high-volume wands, fances, or orchard guns, or with wiper applicator equipment, except as directed in this section. See the "Application Equipment and Techniques" section of this label for specific information on use of equipment.

When applying this product, refer to the "Weeds Controlled" section of this label and to specific recommendations in this section for rates to be used.

NOTE

Repeat treatments may be necessary to control weeds originating from underground parts of untreated weeds

or from seeds. This product does not provide residual weed control. For subsequent weed control, use repeated applications of this product. Do not apply more than 10.6 quarts of this product per acre per year.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE SOLUTION, SPRAY, DRIFT, OR MIST WITH FOLIAGE OR GREEN BARK OF TRUNK, BRANCHES, SUCKERS, FRUIT, OR OTHER PARTS OF TREES OR VINES. CONTACT OF THIS PRODUCT WITH OTHER THAN MATURED BROWN BARK CAN RESULT IN SERIOUS CROP DAMAGE.

AVOID PAINTING CUT STUMPS WITH THIS PRODUCT AS INJURY RESULTING FROM ROOT GRAFTING MAY OCCUR IN ADJACENT TREES.

Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed or cut and have not been allowed to regrow to the recommended stage for treatment.

For specific rates of applications and instructions, see the "Weeds Controlled" section of this label, and to specific recommendations which follow.

MIDDLES MANAGEMENT

FOR ANNUAL WEEDS IN MIDDLES BETWEEN ROWS OF TREE AND VINE CROPS

For citrus crops treat uniformly between trees.

ROUNDUP® / ROUNDUP plus GOAL™

This product alone or in mixtures with Goal will control or suppress the annual weeds listed below.

Apply the recommended rates of this product, either alone or in mixtures with Goal plus 0.5 to 1 percent nonionic surfactant by spray volume in 3 to 10 gallons of water per acre. Apply when weeds are actively growing and less than 6 inches in height or diameter. If weeds are under drought stress, irrigate prior to application. Reduced control may occur if weeds have been mowed prior to application. Up to 48 fluid ounces per acre of this product may be used to control weeds which have been mowed, are stressed, or are growing in dense populations.

WEED SPECIES	MAXIMUM HEIGHT/ DIAMETER (INCHES)	RATE PER ACRE ROUNDUP® (FLUID OUNCES)	RATE PER ACRE GOAL (FLUID OUNCES)
Barley *Hordeum leporinum*	6	8	•
Bluegrass, annual *Poa annua*			
Barnyardgrass *Echinochloa crus galli*	6	12	•
Chickweed, common *Stellaria media*			
Red Maids *Calandrinia ciliata*			
Crabgrass *Digitaria spp*	6	16	•
Fleabane, flaxleaf *Conyza bonariensis*		DR	
Groundsel, common *Senecio vulgaris*		16 to 32 + 4 to 16**	
Junglerice *Echinochloa colonum*			
Lambsquarters, common *Chenopodium album*			
Pigweed, redroot *Amaranthus retroflexus*			
Rocket, London *Sisymbrium irio*			
Ryegrass, common *Lolium multiflorum*		16 to 32 + 4 to 16**	
Shepherdspurse *Capsella bursa-pastoris*			
Sowthistle, annual *Sonchus oleraceus*			
Cheeseweed, common *Malva spp.*	3	12 to 32 + 4 to 16	
Cheeseweed, common *Malva spp.*	6	16 to 32 + 4 to 16	
Filaree* *Erodium spp.*			
Horseweed / Marestail *Conyza canadensis*			
Nettle, stinging *Urtica dioica*			
Purselane, common *Portulaca oleracea*			

*Suppression only.

**The mixture of this product plus Goal is recommended when weeds are stressed or growing in dense populations.

STRIPS

FOR ANNUAL AND PERENNIAL WEEDS IN STRIPS OF TREE AND VINE CROPS

TANK MIXTURES WITH RESIDUAL HERBICIDES

When applied as a tank mixture, this product provides control of the emerged annual weeds and control or suppression of emerged perennial weeds listed in this label. The following residual herbicides will provide preemergence control of those weeds listed in the individual product labels.

- **ROUNDUP® plus GOAL™ 1.6E**
- **ROUNDUP plus KARMEX™ DF**
- **ROUNDUP plus KROVAR™ I**
- **ROUNDUP plus KROVAR™ II**
- **ROUNDUP plus SIMAZINE, PRINCEP CALIBER™ 90**
- **ROUNDUP plus SIMAZINE 4L**
- **ROUNDUP plus SIMAZINE 80W**
- **ROUNDUP plus SOLICAM™ 80DF**
- **ROUNDUP plus SURFLAN™ AS**
- **ROUNDUP plus SURFLAN 75W**
- **ROUNDUP plus SIMAZINE (80W, or 4L, or PRINCEP CALIBER 90) plus SURFLAN (AS or 75W)**
- **ROUNDUP plus GOAL (1.6E) plus SURFLAN (AS or 75W)**
- **ROUNDUP plus GOAL (1.6E) plus SIMAZINE (80W, or 4L, or PRINCEP CALIBER 90)**
- **ROUNDUP plus GOAL (1.6E) plus SURFLAN (AS or 75W) plus SIMAZINE (80W, 4L, or PRINCEP CALIBER 90)**

Do not apply these tank mixtures in Puerto Rico.

When tank-mixing with residual herbicides, add an agriculturally approved nonionic surfactant at 0.5 to 1 percent by volume of spray solution.

Refer to the individual product labels for specific crops, rates, geographical restrictions and precautionary statements.

Read and carefully observe the label claims, cautionary statements, rates and all other information on the labels of all products.

®Karmex is a trademark of E.I. duPont de Nemours and Company

RECOMMENDED RATES

Annual Weeds—Apply 1 to 5 quarts per acre of this product in these tank mixtures. Use rates at the higher end of the recommended range when weeds are stressed, growing in dense populations or are greater than 12 inches tall.

Perennial Weeds—Apply 1 pint to 5 quarts per acre of this product in these tank mixtures to control or suppress perennial weeds. Follow the recommendations in the "Weeds Controlled" section of this label for stage of growth and application rates for specific perennial weeds.

ROUNDUP® plus GOAL plus SIMAZINE/SURFLAN

This product plus low rates of Goal in three-way or four-way mixtures with simazine and/or Surflan will provide postemergence control of the weeds listed below.

Refer to the individual simazine and Surflan labels for preemergence rates, weeds controlled, precautionary statements and other important information.

Apply these tank mixtures in 3 to 40 gallons of water. Add 0.5 to 1 percent nonionic surfactant by total spray volume to the spray solution.

Apply 1 to 5 quarts per acre of this product plus 4 to 48 fluid ounces per acre of Goal plus labeled rates of simazine and/or Surflan to control the following weeds:

Barley, wild *Hordeum leporinum*
Bluegrass, annual *Poa annua*
Cheeseweed, common *Malva spp.*
Chickweed, common *Stellaria media*
Filaree* *Erodium spp.*
Fleabane, flaxleaf *Conyza bonariensis*
Groundsel, common *Senecio vulgaris*
Horseweed / Marestail *Conyza canadensis*
Nettle, stinging *Urtica dioica*
Pineappleweed *Matricaria matricarioides*
Rocket, London *Sisymbrium irio*
Shepherdspurse *Capsella bursa-pastoris*
Sowthistle, annual *Sonchus oleraceus*

*Use a minimum of 1.5 quarts of this product in these mixtures.

NOTE: This recommendation does not preclude the use of Goal in these mixtures at higher, labeled rates for preemergence weed control.

PERENNIAL GRASS SUPPRESSION ORCHARD FLOORS

When applied as directed, this product will suppress vegetative growth as indicated below.

Bahiagrass

This product will provide significant inhibition of seedhead emergence and will suppress vegetative growth for a period of approximately 45 days with a single application and approximately 120 days with sequential applications. Apply this product 1 to 2 weeks after full green-up or after mowing to a uniform height of 3 to 4

inches. Applications must be made prior to seedhead emergence. Apply 6 fluid ounces of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 10 to 25 gallons of water per acre.

Sequential applications of this product plus nonionic surfactant may be made at approximately 45-day intervals to extend the period of seedhead and vegetative growth suppression. For continued seedhead suppression, sequential applications must be made prior to seedhead emergence. Apply no more than 2 sequential applications per year. As a first sequential application, apply 4 fluid ounces of this product plus nonionic surfactant. A second sequential application of 2 to 4 fluid ounces may be made approximately 45 days after the last application.

Bermudagrass

For burndown, apply 1 to 2 quarts of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 20 gallons of water per acre. Use 1 quart of this product in 3 to 20 gallons of water per acre east of the Rocky Mountains. Use 1 to 2 quarts of this product in 3 to 10 gallons of water per acre west of the Rocky Mountains. Use this treatment only if reduction of the bermudagrass stand can be tolerated. When burndown is required prior to harvest, allow at least 21 days to ensure sufficient time for burndown to occur.

Suppression only (east of the Rocky Mountains)—Apply 6 to 16 fluid ounces of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 20 gallons of water per acre no sooner than 1 to 2 weeks after full green-up. Mowing prior to application may occur provided a minimum height of 3 inches is maintained. Rates of 6 to 10 fluid ounces of this product plus nonionic surfactant should be used in shaded conditions or where a lesser degree of suppression is desired. Sequential applications may be made when regrowth occurs and bermudagrass injury and stand reduction can be tolerated.

Suppression only (west of the Rocky Mountains)—Apply 16 fluid ounces of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre up to 6 inches in height and no sooner than 1 to 2 weeks after full green-up. Mowing prior to application may occur provided a minimum height of 3 inches is maintained. Sequential applications may be made when regrowth occurs and bermudagrass injury and stand reduction can be tolerated.

Cool Season Grass Covers

For suppression of tall fescue, line fescue, orchardgrass and quackgrass, apply 8 fluid ounces of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 10 to 20 gallons of water per acre. For best suppression, add ammonium sulfate to the spray solution at a rate of 2 percent by weight or 17 pounds per 100 gallons of spray solution.

For suppression of Kentucky bluegrass covers, apply 6 fluid ounces of this product plus 0.5 to 1 percent nonionic surfactant. Do not add ammonium sulfate.

For best results, mow cool season grass covers in the spring to even their height and apply the recommended rate of this product 3 to 4 days after mowing. Avoid treating cool season grass covers under poor growing conditions, such as drought stress (drip irrigation), disease or insect damage.

LOW VOLUME APPLICATION (FLORIDA AND TEXAS)

For burndown or control of the weeds listed, apply the recommended rates of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 30 gallons of water per acre. Where weed foliage is dense, use 10 to 30 gallons of water per acre.

Annual Weeds

Goatweed—Apply 2 to 3 quarts per acre of this product plus 17 pounds of ammonium sulfate per 100 gallons of water plus 0.5 to 1 percent nonionic surfactant by total spray volume. Apply in 20 to 30 gallons of water per acre when plants are actively growing. Use 2 quarts per acre when plants are less than 8 inches tall and 3 quarts per acre when plants are greater than 8 inches. If goatweed is greater than 8 inches, the addition of Krovar II or Karmex may improve control. Use labeled rates for these residual products.

Read and carefully observe the label claims, cautionary statements, rates and all other information on the Krovar II and Karmex labels.

Perennial Weeds

Apply when weeds are actively growing and at the growth stages listed in the "Perennial Weeds Controlled" section of this label. If perennial weeds are mowed, allow weeds to regrow to the recommended stage of growth.

S = Suppression B = Burndown
PC = Partial control C = Control

WEED SPECIES	ROUNDUP RATE PER ACRE			
	1 qt	2 qts	3 qts	5 qts
Bermudagrass	B	•	PC	C
Guineagrass				
Texas and Florida Ridge	B	C	C	C
Florida Flatwoods	•	B	C	C
Paragrass	B	C	C	C
Torpedograss	S	•	PC	C

TREE CROPS

Citrus*: citron, grapefruit, kumquat, lemon, lime, orange, pummelo, tangelo, tangerine, tangors.

Nuts:** almond, chestnuts, filbert, macadamia, pecan, pistachio, walnut.

Pome Fruit*: apple, pear.

Stone Fruit*:** apricots, cherries, nectarines, olives, peaches, plums/prunes.

For cherries, any application equipment listed in this section may be used in all states.

For citron and olives, apply as a directed spray only.

Any application equipment listed in this section may be used in apricots, nectarines, peaches, and plums/prunes growing in Arizona, California, Colorado, Idaho, Kansas, Kentucky, New Jersey, North Dakota, Oklahoma, Oregon, Texas, Utah, and Washington, except for peaches grown in the states specified in the following paragraph. In all other states use wiper equipment only.

For PEACHES grown in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee only, apply with a shielded boom sprayer or shielded wiper applicator which prevents any contact of this product with the foliage or bark of trees. Apply no later than 90 days after first bloom. Applications made after this time may result in severe damage. Remove suckers and low hanging limbs at least 10 days prior to application. Avoid applications near trees with recent pruning wounds or other mechanical injury. Apply only near trees which have been planted in the orchard for 2 or more years. EXTREME CARE MUST BE TAKEN TO ENSURE NO PART OF THE PEACH TREE IS CONTACTED.

Tropical Fruit: acerola, atemoya*, avocado*, banana (plantains), breadfruit*, canistel*, carambola*, coffee****, dates*, figs*, guava, jaboticaba*, jackfruit*, longan*, lychee*, mango*, papaya, passion fruit*, persimmons*, sapodilla, sapote, soursop, sugar apple*, tamarind, tea. Allow a minimum of 1 day between last application and harvest of guava and papaya. In coffee and banana, delay applications 3 months after transplanting to allow the new coffee or banana plant to become established.

NOTE:

*Allow a minimum of 14 days between last application and harvest.

**Allow a minimum of 21 days between last application and harvest of these crops.

***Allow a minimum of 17 days between last application and harvest.

****Allow a minimum of 28 days between last application and harvest.

VINE CROPS

Kiwi Fruit*

Grapes:* Any variety of table, wine, or raisin grape may be treated with any equipment listed in this section.

In the northeast and Great Lakes regions, applications must be made prior to the end of bloom stage of grapes to avoid injury.

*Applications should not be made when green shoots, canes, or foliage are in the spray zone.

*Allow a minimum of 14 days between last application and harvest.

CALIFORNIA

This product has been approved by the U.S. Environmental Protection Agency and by the state of California for the uses, crops and sites listed in this label. With the exception of these items, this booklet contains the material approved by California.

These use conditions, crops and sites may not be treated with this product in California until approval is received

- Cool season turf growth regulation.

This product is protected by U.S. Pat. No. 4,405,531. Other patents pending. No license granted under any non-U.S. patent(s).

This product has been approved for use in California except as stated otherwise on page 127.

EPA Reg. No. 524-308 897.10-005.55/CG

In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

MONSANTO COMPANY
AGRICULTURAL PRODUCTS
ST. LOUIS, MISSOURI, 63167 U.S.A.

SEP 1 1 1992

DowElanco

Stinger*

Herbicide

For selective postemergence control of broadleaf weeds in sugar beets, field corn, wheat, barley, and oats not underseeded with a legume, Christmas tree plantations, grasses grown for seed, fallow cropland, rangeland and permanent grass pastures, non-cropland areas, conservation reserve program (CRP) acres

Active Ingredient:
clopyralid: 3,6-dichloro-2-pyridinecarboxylic acid, monoethanolamine salt 40.9%
Inert Ingredients.....59.1%
TOTAL 100.0%
Acid Equivalent:
clopyralid: 3,6-dichloro-2-pyridinecarboxylic acid - 31% – 3 lb/gal
EPA Reg. No. 62719-73
EPA Est. 464-MI-1
Net Contents 1 qt

Precautionary Statements

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUSCION:

PRECAUSCION AL USUARIO:
Si usted no lee ingles, no use este producto hasta que la etiqueta le haya sido explicada ampliaments.

Hazards to Humans and Domestic Animals

Causes Eye Injury • Harmful If Inhaled Or Absorbed Through Skin. Avoid contact with eyes, skin or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

First Aid

If in eyes: Flush with plenty of water. Get medical attention if irritation persists.
If on skin: Wash with plenty of soap and water. Get medical attention.

Environmental Hazards

Do not contaminate water when disposing of equipment washwaters. Do not contaminate water used for irrigation or domestic purposes. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark.

Clopyralid is a chemical which can travel (seep or leach) through soil and under certain conditions contaminate ground- water which may be used for irrigation or drinking purposes. Users are advised not to apply clopyralid where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow, or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into an aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

Physical or Chemical Hazards

Combustible - Do not use or store near heat or open flame. Do not cut or weld container.

Notice: Read the entire label. Use only according to label directions.

Before buying or using this product, read Warranty Disclaimer and Limitation of Remedies sections elsewhere on this label.
In case of emergency endangering life or property involving this product, call collect 517-636-4400
Agricultural Chemical: Do Not Ship or Store with Food, Feeds, Drugs, or Clothing

Stinger*

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all "DIRECTIONS FOR USE" carefully before applying.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Storage: Store above 28° F or warm to 40° F and agitate before use.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Metal Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Plastic Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Sprayer Clean-Out: To avoid injury to desirable plants, equipment used to apply Stinger should be thoroughly cleaned before reusing to apply any other chemicals.

1. Rinse and flush application equipment thoroughly after use at least three times with water, and dispose of rinse water in non-cropland area away from water supplies.
2. During the second rinse, add 1 qt of household ammonia for every 25 gallons of water. Circulate the solution through the entire system so that all internal surfaces are contacted (15-20 min). Let the solution stand for several hours, preferably overnight.
3. Flush the solution out of the spray tank through the boom.
4. Rinse the system twice with clean water, recirculating and draining each time.
5. Nozzles and screens should be removed and cleaned separately.

GENERAL INFORMATION

Stinger herbicide is recommended for selective, postemergence control of broadleaf weeds in sugar beets, field corn, wheat, barley and oats not underseeded with a legume, fallow cropland, rangeland and permanent grass pastures, grasses grown for seed, Christmas trees, conservation reserve program (CRP) acres, and non-cropland areas including fence rows, around farm buildings, and equipment pathways.

GENERAL USE PRECAUTIONS

Apply only once per 12 month period, except for Christmas trees, sugar beets, field corn and grasses grown for seed. A fallow treatment that precedes or follows a small grain application is also allowed, except in irrigated small grains.

Rotation Crop Restrictions

Residues of Stinger in treated plant tissues which have not completely decayed may affect succeeding susceptible crops.

- Wheat, barley, oats, grasses, field corn, or sugar beets may be planted at anytime following treatment.
- Do not plant alfalfa, asparagus, canola (rapeseed), cole crops, grain sorghum, onions, popcorn, safflower, sweet corn, or strawberries for 12 months after a Stinger herbicide application.
- Do not plant dry beans, soybeans, or sunflowers for 12 months after a Stinger herbicide application, or 18 months if soils contain less than 2% organic matter and natural precipitation is less than 15 inches during the 12 months following treatment. For these areas see "Special Conditions" section.
- Do not plant other crops, including peas, lentils, potatoes and broadleaf crops grown for seed for 18 months after treatment unless the risk of injury is acceptable. For low moisture (less than 15 inches annual rainfall) and low organic matter (less than 2%) areas, a field bioassay is recommended prior to planting these sensitive crops.

Special Conditions: In areas defined previously as low in organic matter and precipitation, sensitive crops such as dry beans, soybeans, and sunflowers may be injured when planted 12 months after treatment. Unless the risk of injury is acceptable, these crops should not be planted until 18 months after treatment. The potential for injury may be reduced by burning, removal, or incorporation of treated crop residues with a minimum of 2 supplemental fall irrigations.

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. Therefore, do not apply Stinger directly to or allow spray drift to come in contact with vegetables, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Avoid spray drift: Applications should be made to avoid spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. A drift control or deposition agent such as Nalco-Trol may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

To minimize spray drift, apply Stinger in a total spray volume of 10 or more gallons per acre as large-droplet, low-pressure spray. Refer to manufacturer's recommendations for additional information on gallons per acre, spray pressure, sprayer speed, nozzle types and arrangements, nozzle heights above the target canopy, etc., for respective application equipment. Spot treatments should only be applied with a calibrated boom to prevent misapplication. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying no more than 20 gallons of spray per acre; by using no more than 30 pounds spraying pressure with large droplet-producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 6 to 7 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Do not apply by aircraft.

Do not transfer livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants.

Do not move treated soil and avoid situations where treated soil particles may blow into area where susceptible crops are grown. Violent windstorms may move soil particles. If this product is on soil particles and they are blown onto susceptible plants, visible symptoms may appear. Serious injury is unlikely. The hazard of movement of this product on dust is reduced if treated fields are irrigated or if rain occurs shortly after application.

Straw from treated areas, or manure from animals that have grazed treated areas, cannot be used for composting or mulching on ground where susceptible crops may be grown the following season. To promote herbicide decomposition, plant material should be evenly incorporated or burned. Adequate moisture is also required to promote breakdown of plant residues which contain clopyralid.

Do not use in a greenhouse. Excessive amounts of this herbicide in the soil may temporarily inhibit seed germination or plant growth.

Broadleaf Weeds Controlled

artichoke, Jerusalem	marshelder
buckwheat, wild	nightshade, Eastern black
buffalobur†	nightshade, cutleaf
burdock, common	nightshade, hairy
chamomile, false (scentless)	oxeye daisy
chamomile, mayweed (dogfennel)	pineappleweed
clover, sweet	ragweed, common
clover, red	ragweed, giant
cocklebur, common	salsify, meadow (goatsbeard)
coffeeweed	sicklepod
cornflower (bachelor button)	smartweed, green†
dandelion	sorrel, red
dock, curly	sowthistle, annual
groundsel, common	sowthistle, perennial††
hawksbeard, narrowleaf	starthistle, yellow
horseweed	sunflower
jimsonweed	thistle, Canada
knapweed, diffuse	thistle, musk
knapweed, Russian†	vetch
knapweed, spotted	volunteer alfalfa
ladysthumb†	volunteer beans
lettuce, prickly	volunteer lentils
locoweed, white	volunteer peas
locoweed, Lambert	

†These weeds may only be suppressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree of weed control and duration of effect will vary with weed size and density, spray rate and coverage, and growing conditions before, during, and after the time of treatment. For perennial weeds, Stinger will control the initial top growth and inhibit regrowth during the season of application (season-long control). At higher use rates shown on this label, Stinger may cause a reduction in shoot regrowth in the season following application; however, plant response may be inconsistent due to inherent variability in shoot regrowth from perennial root systems.

Weed Control Guidelines† Amount of Stinger Per Acre x Use Site††

Weed Species	Growth Stage,	Sugar Beet, Christmas Trees	Wheat, Barley, Oats	Grasses for Seed	Fallow Cropland	Range & Pasture, CRP, & Non-crop	Field Corn
clover cocklebur sunflower ragweeds Jerusalem artichoke jimsonweed volunteer soybean vetch marshelder	Up to 5 leaf	1/4-1/2 pt	1/4-1/3 pt	1/4-1/2 pt	1/4-1/2 pt	1/3-2/3 pt	1/4-1/2 pt
wild buckwheat nightshade sp. buffalobur smartweeds (suppression)	1-3 leaf stage, but before wising 2-4 leaf 2-3 leaf	1/2 pt					
Canada thistle sowthistle (suppression)	rosette to prebud	1/2 -2/3 pt	1/4-1/3 pt	1/3-2/3 pt	2/3 pt	2/3-1 pt	1/3-2/3 pt
knapweeds, spotted/diffuse knapweeds, Russian (suppression)	up to bud stage	2/3 pt	—	2/3 pt	—	2/3-1pt 1- 1 1/3 pt	—

† This table is intended as a reference only. For complete instructions see the body of the text.

†† Use the lower rate for light to moderate infestations and good growing conditions and the higher rate for dense infestations or under poor growing conditions such as drought.

For measuring small volumes, refer to the following table to obtain appropriate conversions of pints to fluid ounces.

Conversion Chart - Pints to Fluid Ounces

Pints	Fluid Ounces
1/3	5
1/4	4
1/2	8
2/3	11

Application

Timing

Apply to actively growing weeds. Extreme growing conditions such as drought or near freezing temperatures prior to, at, and following time of application may reduce weed control and increase the risk of crop injury at all stages of growth. Only weeds which are emerged at the time of application will be affected. Wet foliage at the time of application may decrease control. The treatment with Stinger will be rainfast within 6-8 hours after application.

Rate

Generally, lower labeled application rates will be satisfactory for young, succulent growth of sensitive weed species. For less sensitive species, perennials, and under conditions where control is more difficult (plant stress conditions such as drought or extreme temperatures, dense weed stands, and/or larger weeds), the higher rates will be needed. Weeds in fallow or other areas where crop competition is not a factor will generally require higher rates to obtain control or suppression.

Coverage

Adequate spray coverage and drift control are important. Obtaining a balance between spray coverage and drift control may sometimes be difficult but can be achieved provided the applicator understands the factors affecting coverage and drift. Factors affecting spray coverage include spray volume, crop canopy, and weed density. As crop canopy and weed density increase, spray volume should be increased to obtain equivalent weed control. Refer to manufacturer's recommendations for information on the relationship between gallons per acre, spray pressure, sprayer speed, nozzle type and arrangement, nozzle height above the target canopy, droplet size, and drift potential for respective application equipment. Use equipment and nozzle types which are designed for herbicide application. Do not apply less than 2 and not more than 40 gallons per acre total spray volume. For best results, apply 10 or more gallons per acre by ground. Reducing total spray volume may result in decreased coverage and weed control. Use enough total spray volume and a delivery system to provide thorough coverage and a uniform spray pattern. Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants.

Use of Adjuvants

Addition of surfactants, crop oils, or other adjuvants is not usually necessary when using Stinger. Adding a surfactant to the spray mixture may increase effectiveness on weeds but may reduce selectivity to the crop, particularly under conditions which promote plant stress. If an adjuvant is added to the spray solution, follow all manufacturer use guidelines.

Tank Mixes

When tank mixing, read and follow the label of each tank-mix product used for precautionary statements, directions for use, weeds controlled, and geographic and other restrictions. Use in accordance with the most restrictive of label limitations and precautions. No label dosages should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

APPROVED USES

Sugar Beets

Stinger herbicide is recommended for the control of various annual and perennial broadleaf weeds infesting sugar beets. Apply 1/4 to 2/3 pint of Stinger per acre with ground equipment as a broadcast foliar spray. Apply in 10 or more gallons total spray volume per acre when the sugar beets are in the cotyledon to 8 leaf stage of growth and the weeds are young and actively growing. Re-treat as necessary but do not exceed 2/3 pint of Stinger per acre per season. Do not apply within 105 days before harvest of beet roots and tops.

Stinger Herbicide may be applied as a band treatment. Use the formulas below to determine the appropriate rate and volume per treated acre.

Band width in inches / Row width in inches	X	Broadcast rate per treated acre	=	Band rate per treated acre
Band width in inches / Row width in inches	X	Broadcast volume per treated acre	=	Band volume per treated acre

For annual weed control spray 1/4 – 1/2 pint of Stinger per acre on weeds up to the 5 leaf growth stage. Wild buckwheat applications should be made at the 1-3 leaf stage, before vining begins.

For the most effective control of perennials such as Canada thistle and sowthistle, apply 1/2 – 2/3 pint of Stinger per acre as a broadcast treatment to the entire infested area. Apply when the majority of basal leaves have emerged, but before the bud stage. Cultivation can disrupt translocation to the roots of perennials such as Canada thistle. For best results do not cultivate thistle patches.

To promote herbicide efficacy wait a minimum of 7 days after application before flood or furrow irrigation.

Tank Mixes

To control additional broadleaf weeds and provide consistent control of difficult weeds such as wild buckwheat, tank mix 1/4 – 2/3 pint of Stinger per acre with 2-6.5 pints of Betamix or Betanex. For best results, apply 1/4 pint of Stinger tank mixed with 2-6.5 pints of Betamix or Betanex followed 1-2 weeks later by a second application of 1/4 – 1/3 pint of Stinger per acre tank mixed with Betamix or Betanex. **Note:** Do not add additional adjuvants when employing a Betamix or Betanex tank mix with Stinger due to increased potential for crop injury. (See "Tank Mixes" section under "General Use Precautions".)

Stinger may be tank mixed with grass herbicides such as Poast for grassy weed control. Be sure to include crop oil or Dash surfactant to optimize grass weed control. (See "Tank Mixes" section under "General Use Precautions".)

Field Corn

Stinger is recommended for postemergence control of Canada thistle, Jerusalem artichoke, annual sowthistle, common sunflower, common cocklebur, giant and common ragweed, jimsonweed and other broadleaf weeds infesting field corn. Apply Stinger at suggested timing and rates for field corn as indicated below.

Apply Stinger to actively growing broadleaf weeds any time after corn emergence through 24 inch tall corn. Apply with ground equipment as a postemergence broadcast or directed spray in 10 or more gallons of spray volume per acre to ensure uniform and thorough spray coverage of the weed foliage. Use only spray nozzles designed for herbicide application. The use of flat fan nozzles provides the best coverage and distribution of chemical on the plant foliage. Use spray pressures (at the boom) which nozzle manufacturers recommend to obtain desired spray volume. Use higher spray pressures and volumes when weed foliage is dense.

For effective control of Canada thistle, apply 1/3-2/3 pint of Stinger per acre as a broadcast treatment to the entire infested area. Apply when the majority of thistle plants have emerged, and thistles are at least 6-8 inches in diameter or height, but before bud stage. Cultivation can disrupt translocation to the roots of Canada thistle. For best long term control, do not cultivate before or after application. If cultivation is necessary, wait 14 to 20 days after application before cultivating to allow for thorough translocation.

Control of Canada thistle will be influenced by growing conditions, density and size of thistle plant at the time of application, tillage practices used, etc. Light infestations (less

than 10 plants per square yard) will generally be adequately controlled with a rate of 1/3 pint per acre. For medium to heavy infestations, (more than 10 plants per square yard) rates of 1/2-2/3 pint per acre are generally more effective since these Canada thistle stands involve an extensive rhizome system.

The following are general descriptions of control to be expected from each rate of application, given a medium to heavy population of Canada thistle. Control of lighter infestations may be better than that described.

A rate of 1/3 pint per acre will suppress top growth of Canada thistle for 6-8 weeks. Some regrowth may occur by the end of the season, but this will not interfere with harvesting of the crop.

A rate of 1/2 pint per acre will generally provide season long control of Canada thistle. Not all rhizomes will be killed, and some regrowth may occur by the end of the growing season.

A rate of 2/3 pint per acre will provide season long control of Canada thistle plus suppression into the following season, resulting in a reduction of the total number of Canada thistle plants in the treated area.

For control of common cocklebur, giant ragweed, common ragweed, sunflower, other annual weeds and Jerusalem artichoke, apply 1/4-1/2 pint of Stinger on weeds up to the 5 leaf stage. Use higher rate listed for heavy infestations or when greater residual control is desired.

Corn Inbred Lines or Breeding Stock

Susceptibility of corn to injury from Stinger is highly related to varietal response. Inbred lines or any breeding stock may be injured by Stinger. Contact your seed production agronomist for advice before applying Stinger to inbred lines or breeding stock.

Hand-Held Sprayers

Applications should be made on a spray-to-wet basis with spray coverage uniform and complete. Do not spray to the point of runoff. Prepare the desired volume of spray solution by mixing the amount of Stinger with water as shown in the following table.

Desired Volume Spray Solution	Amount of Stinger
1 gal	1/4 fl oz
25 gal	1/3 pt
100 gal	1 1/3 pt

Restrictions: Re-treat as necessary, but do not apply more than 2/3 pint of Stinger per acre per year. Do not apply to field corn greater than 24 inches tall. Do not allow livestock to graze treated areas or harvest treated corn silage as feed within 40 days after last treatment.

Christmas Tree Plantations

Timing

Stinger can be safely applied over the top of actively growing: balsam fir, blue spruce, Douglas fir, Fraser fir, grand fir, lodgepole pine, noble fir, ponderosa pine, and white pine. For the Pacific Northwest: do not apply in the first year of transplanting. (Some needle curling has been observed on 1st year transplants.) Apply to actively growing weeds. For control of annual weeds apply Stinger up to the 5 leaf growth stage (for wild buckwheat application at 3-5 leaf, but before vining, is recommended). For control of weeds such as Canada thistle and knepweeds, apply after the majority of the basal leaves have emerged, but before bud stage. Later application may result in less consistent control.

Rate

Apply 1/4-1/2 pint of Stinger per acre for control of annual weeds. Apply 1/2-2/3 pint of Stinger per acre for difficult to control weeds such as Canada thistle and knapweeds. Apply as a broadcast or band application in a minimum of 10 gallons per acre by ground application. For band applications, use the formula under "sugar beets" to determine the appropriate rate and volume per treated acre. Apply as often as needed, but do not exceed 2/3 pint per acre. Do not exceed 1/2 pint per acre for blue spruce. Tree injury may occur with the addition of a surfactant or crop oil with Stinger. Do not use unless previous experience shows injury is tolerable.

Grasses Grown For Seed

Timing

Apply only to established grasses before the boot stage. Applications in the boot stage and beyond can result in increased injury. Do not apply to bentgrass unless injury can be tolerated. For control of late emerging Canada thistle, a preharvest treatment may be made after grass seed is fully developed. Treatment of Canada thistle at the bud stage or later may result in less consistent control. Post harvest fall treatments may be made to actively growing Canada thistle after the majority of basal leaves have emerged.

Rate

Use 1/4 to 2/3 pint of Stinger per acre for control of annual weeds and Canada thistle. Re-treat as necessary, but do not exceed 2/3 pint of Stinger per acre per season.

Tank Mixtures for Grasses Grown for Seed

Stinger may be tank mixed with 2,4-D, MCPA, dicamba, or bromoxynil to control additional broadleaf weeds. Refer to the manufacturer's label for use rates and tank mix guidelines.

Note: Dicamba or bromoxynil tank mixes may be useful in broadening the annual weed control spectrum, but may reduce long term control of perennials such as Canada thistle. Do not tank mix Stinger with 2,4-D, MCPA, or dicamba unless the risk to crop injury is acceptable.

Fallow Cropland

Timing

Stinger can be applied either postharvest, in the spring/summer (during fallow period), or to set-aside acres to control or suppress weeds listed above (refer to rotation restrictions). Apply to young, emerged weeds under conditions that promote active growth. For best results on perennial weeds such as Canada thistle, apply after the majority of the basal leaves have emerged, but before bud stages. Later applications may result in less consistent control. Extreme growing conditions (such as drought or near freezing temperatures) prior to, at, and following the time of application may reduce weed control.

For best results, wait 14 to 20 days after application before cultivating or fertilizing with shank-type applicators to allow for thorough translocation.

Rate

Apply 1/4-2/3 pint of Stinger per acre. Use the higher rate on perennial weeds or when the condition of the weeds at the time of treatment may prevent optimum control.

Tank Mixtures for Fallow Cropland

To improve control of certain broadleaf weeds, Stinger may be applied with 0.5-2.0 lb ae per acre 2,4-D.

Wheat, Barley and Oats

Apply 1/4-1/3 pint of Stinger per acre from the 3 leaf stage up to early boot stage of growth. For control of perennial weeds such as Canada thistle, 1/3 pint of Stinger per acre should be used. Russian knapweed will only be suppressed at this rate.

Note: Do not permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within 1 week after treatment. Do not harvest hay from treated grain fields.

Tank Mixtures for Wheat, Barley and Oats

Tank mix 1/4 to 1/3 pint per acre of Stinger with the herbicides listed below for the control of additional weed.

Active Ingredient	Product	Formulation	Amount of Product per Acre
bromoxynil	Buctril	2 lb/gal	3/4-1 pt
chlorsulfuron	Glean	75% DF	1/6-1/4 wt oz
dicamba	Banvel	4 lb/gal	1/8-1/4 pt
diuron	Direx 4L Diuron 4L Diuron 80 WDG Diuron DF	4 lb/gal 80% DF 80% WP	3/4-1 1/4 pt 1/2-1 lb
MCPA or 2,4-D†		4 lb/gal	1/2-1 pt
metribuzin†	Lexone DF Sencor DF	75% DG	2 1/2-4 wt oz
metsulfuron methyl†	Ally	60% DF	1/10 wt oz
terbutryn†	Igran 80WP	80% WP	7.5-12.5 wt oz
thifensulfuron†	Harmony	75% DF	1/3-1/2 wt oz
tribenuron methyl†	Express	75% DF	1/6-1/4 wt oz
thifensulfuron + tribenuron methyl†	Harmony Extra	75% DF	1/3-2/3 wt oz

†Tank mix for application on wheat and barley only.

Non-Cropland

For use on non-cropland areas such as fencerows, around farm buildings and equipment pathways. For control of broadleaf weeds, apply 1/4-1 1/3 pints of Stinger per acre. The lower rate of 1/4 pint per acre provides acceptable control of weeds only under highly favorable growing conditions and when plants are 1-3 inches tall. Apply 1/2 pint per acre when weeds are 3-6 inches tall or under dry conditions. Where Canada thistle or knapweeds are the primary pest, best results are obtained by applying 2/3-1 1/3 pints of Stinger per acre. To improve spectrum of activity or to increase activity against taller weeds, Stinger may be tank mixed with 0.5-2.0 lb ae per acre of 2,4-D amine or low volatile ester.

Rangeland and Permanent Grass Pastures

Use Stinger on forage grasses such as smooth brome, orchardgrass, and Timothy.

Apply 1/2-1 1/3 pints of Stinger per acre when weeds are young and actively growing. Grasses are tolerant, but new grass seedlings may be injured to varying degrees until the grass has become well established.

Note: Some forbs are susceptible to Stinger Herbicide. Do not spray pastures containing desirable forbs, especially legumes, unless injury can be tolerated. However, the stand and growth of established perennial grasses is usually improved after spraying, especially when rainfall is adequate and grazing is deferred.

Do not use hay or straw from treated areas for composting or mulching on susceptible broadleaf crops.

There are no grazing restrictions for Stinger at label use rates.

Conservation Reserve Program (CRP) For Seeding To Permanent Grasses Only

Do not use Stinger if legumes or bentgrass are a desired cover during CRP.

Conditions that stress grasses, such as drought, will increase potential for injury to the grass at all stages of growth. Do not use in newly seeded areas until grass is established.

After CRP, do not plant broadleaf crops in treated areas until an adequately sensitive bioassay shows that no detectable clopyralid is present in the soil.

Broadcast Applications (Ground)

Applications of Stinger should be made when perennial grasses have become established (has tillered, developed a good secondary root system and shows good vigor) since most perennial grasses have shown better tolerance to the herbicide at that stage.

For control of actively growing weeds such as musk thistle, Canada thistle, and knapweed (spotted, diffuse and Russian), use 2/3-1 1/3 pints per acre of Stinger after the majority of basal leaves have emerged, but before bud stage. For the control of wild buckwheat, volunteer sunflower and musk thistle rosettes, apply 2/3 pint per acre of Stinger. Stinger can also be tank mixed with 1/2-1 lb per acre of 2,4-D where species present are sensitive to 2,4-D. For best results, use in 10 or more gallons of water per acre by ground. Increasing the rate of application can increase the risk of injury. Application prior to the flowering stage is recommended (still in the bud stage).

WARRANTY DISCLAIMER

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. DOWELANCO MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY

INHERENT RISKS OF USE

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application or other factors, all of which are beyond the control of DowElanco or the seller. All such risks shall be assumed by Buyer.

LIMITATION OF REMEDIES

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at DowElanco's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

DowElanco shall not be liable for losses or damages resulting from handling or use of this product unless DowElanco is promptly notified of such loss or damage in writing. In no case shall DowElanco be liable for consequential or incidental damages or losses.

The terms of the "Warranty Disclaimer" above and this "Limitation of Remedies" cannot be varied by any written or verbal statements or agreements. No employee or sales agent of DowElanco or the seller is authorized to vary or exceed the terms of the "Warranty Disclaimer" or this "Limitation of Remedies" in any manner.

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Indianapolis, IN 46268, U.S.A.
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Specimen Label 112-25-002 Date Code 292
EPA Approval 02/03/92 Replaces 112-25-001
Discard Previous Specimen Labels

REVISIONS INCLUDE:
1) Use of clopyralid in Scotch Pine deleted from Chirstmas Tree Section.
2) Added conversion of "pints to fluid ounces" table.
3) Wetlans statement under "Environmental Hazards" updated as per EPA Policy.

SEP 1 1 1992

DowElanco

Transline*

Vegetation Management

Specialty Herbicide

For selective control of broadleaf weeds in non-cropland areas, industrial manufacturing and storage sites, rights-of-way, and wildlife openings, including grazed areas on these sites

Active Ingredient:
clopyralid: 3,6-dichloro-2-pyridinecarboxylic acid, monoethanolamine salt.....40.9%
Inert Ingredients.....59.1%
Acid Equivalent:
3,6-dichloro-2-pyridinecarboxylic acid - 31% - 3 lb/gal

EPA Reg. No. 62719-73
EPA Est. 464-MI-1
Net Contents 2.5 gal

Precautionary Statements

Keep Out of Reach of Children

Hazards to Humans and Domestic Animals

CAUTION PRECAUCION:

Precaucion al usuario: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

Causes Eye Injury • Harmful If Inhaled Or Absorbed Through Skin

Avoid contact with eyes, skin or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

First Aid

If in eyes: Flush with plenty of water. Get medical attention if irritation persists.
If on skin: Wash with plenty of soap and water. Get medical attention.

Environmental Hazards

Do not contaminate water when disposing of equipment washwaters. Do not contaminate water used for irrigation or domestic purposes. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark.

Clopyralid is a chemical which can travel (seep or leach) through soil and under certain conditions contaminate groundwater which may be used for irrigation or drinking purposes. Users are advised not to apply clopyralid where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow, or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

Physical or Chemical Hazards

Combustible - Do not use or store near heat or open flame. Do not cut or weld container.

Notice: Read the entire label. Use only according to label directions. **Before buying or using this product, read "Warranty Disclaimer" and "Limitation of Remedies" elsewhere on this label.**

In case of an emergency endangering life or property involving this product, call collect 517-636-4400.
Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Transline*

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.
Storage: Store above 28°F or warm to 40° F and agitate before use.
Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
Plastic Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.
Metal Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.
Sprayer Clean-Out: To avoid injury to desirable plants, equipment used to apply Transline herbicide should be thoroughly cleaned before reusing to apply any other chemicals.

1. Rinse and flush application equipment thoroughly after use at least three times with water. Dispose of rinse water in non-cropland area away from water supplies.
2. During the second rinse, add 1 qt of household ammonia for every 25 gallons of water. Circulate the solution through the entire system so that all internal surfaces are contacted (15-20 min.). Let the solution stand for several hours, preferably overnight.
3. Flush the solution out of the spray tank through the boom.
4. Rinse the system twice with clean water, recirculating and draining each time.
5. Nozzles and screens should be removed and cleaned separately.

General Information

Transline herbicide is recommended for selective, postemergence control of broadleaf weeds in non-cropland areas including equipment pathways, industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical lines and railroads. Use on these sites may include application to grazed areas as well as establishment and maintenance of wildlife openings and forest spot application adjacent to these sites.

General Use Precautions

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. Therefore, do not apply Transline directly to or allow spray drift to come in contact with vegetables, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Chemigation: Do not apply this product through any type of irrigation system.

Avoid Spray Drift: Applications should be made to avoid spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift. A drift control or deposition agent such as Nalco-Trol may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

Ground Application: To minimize spray drift, apply Transline in a total spray volume of 10 or more gallons per acre as large-droplet, low-pressure spray. Refer to manufacturer's recommendations for additional information on gallons per acre, spray pressure, sprayer speed, nozzle types and arrangements, nozzle heights above the target canopy, etc., for respective application equipment. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by using no more than 30 pounds spraying pressure with large droplet-producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 6 to 7 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Do not apply by aircraft.

Do not transfer livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants.

Straw from treated areas, or manure from animals that have grazed treated areas, cannot be used for composting or mulching on ground where susceptible crops may be grown the following season. To promote herbicide decomposition, plant material should be evenly incorporated or burned. Adequate moisture is also required to promote breakdown of plant residues which contain clopyralid.

Do not use in a greenhouse. Excessive amounts of this herbicide in the soil may temporarily inhibit seed germination or plant growth.

Weeds Controlled

acacias
artichoke, Jerusalem
buckwheat, wild
buffalobur†
bull thistle
burdock, common
Canada thistle (rosette to bud)
chamomile, false (scentless)
chamomile, mayweed (dogfennel)
clover, sweet
clover, red
cocklebur, common
coffeeweed
cornflower (bachelor button)
dandelion
dock, curly
groundsel, common
hawkabeard, narrowleaf
horseweed
jimsonweed
knapweed, diffuse
knapweed, Russian†
knapweed, spotted
kudzu
ladysthumb†
lettuce, prickly
locoweed, white
locoweed, lambert
marshelder
mesquite
musk thistle (rosette to bud)
nightshade, Eastern black
nightshade, cutleaf
nightshade, hairy
oxeye daisy
pineappleweed
ragweed, common
ragweed, giant
salsify, meadow (goatsbeard)
sicklepod
smartweed, green†
sorrel, red
sowthistle, annual
sowthistle, perennial†
starthistle, yellow
sunflower (common and wild)
teasel, common
thistle, bull
thistle, Canada
thistle, musk
vetch

†These weeds may only be suppressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree of weed control and duration of effect will vary with weed size and density, spray rate and coverage, and growing conditions before, during, and after the time of treatment.

Application

Timing

Apply to actively growing weeds. Extreme growing conditions such as drought or near freezing temperatures prior to, at, and following time of application may reduce weed control. Only weeds which are emerged at the time of application will be affected. Wet foliage at the time of application may decrease control. The treatment with Transline will be rainfast within 2 hours after application.

Rate

Generally, lower labeled application rates will be satisfactory for young, succulent growth of sensitive weed species. For less sensitive species, perennials, and under conditions where control is more difficult (plant stress conditions such as drought or extreme temperatures, dense weed stands, and/or larger weeds), the higher rates will be needed.

Coverage

Adequate spray coverage and drift control are important. Obtaining a balance between spray coverage and drift control may sometimes be difficult but can be achieved provided the applicator understands the factors affecting coverage and drift. Factors affecting spray coverage include spray volume, and weed density. As weed density increases, spray volume should be increased to obtain equivalent weed control. Refer to manufacturer's recommendations for information on the relationship between gallons per acre, spray pressure, sprayer speed, nozzle type and arrangement, nozzle height above the target canopy, droplet size, and drift potential for respective application equipment. Use equipment and nozzle types which are designed for herbicide application. Reducing total spray volume may result in decreased coverage and weed control. Use enough total spray volume and delivery system to provide thorough coverage and a uniform spray pattern. Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants.

Effectiveness on Perennial Weeds

Transline will control the initial topgrowth and inhibit regrowth during the season of application (season-long control). At higher use rates shown on this label, Transline may cause a reduction in shoot regrowth in the season following application; however, plant response may be inconsistent due to inherent variability in shoot regrowth from perennial root systems.

Use of Adjuvants

Addition of surfactants, crop oils, or other adjuvants is not usually necessary when using Transline Herbicide. Adding a surfactant to the spray mixture may increase effectiveness on weeds. If an adjuvant is added to the spray solution, follow all manufacturer use guidelines.

Tank Mixes

When tank mixing, read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled, and geographic and other restrictions. Use in accordance with the most restrictive of label limitations and precautions. No label dosages should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

Non-Cropland Use

For use on non-cropland areas such as industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical power lines, communication lines, pipelines and railroads, including grazed areas on these sites and forest spot application adjacent to these sites.

Broadcast Application (Ground)

For control of broadleaf weeds, apply 1/4 to 1 1/3 pints of Transline per acre (equivalent to 0.09 to 0.5 lb ae per acre). Non-ionic surfactant should be used in spray mixtures at 1 to 2 quarts per 100 gallons of spray mixture. The lower rate of 1/4 pint per acre provides acceptable control of weeds only under highly favorable plant growing conditions and when plants are no larger than 3 to 6 inches tall. Where Canada thistle or knapweeds are the primary pest, best results are obtained by applying 2/3 to 1 1/3 pints of Transline per acre after basal leaves are produced. For roadside applications, spray volumes of 25 to 50 gallons per acre will ensure adequate coverage. Transline can be tank mixed with diesel oil or equivalent invert agent approved for use on agricultural crops. Established grasses are tolerant but new grass seedlings may be injured to varying degrees until the grass has become well established.

High-Volume Leaf Stem Treatment (Woody Plants)

For control of brush, use 1 to 3 quarts of Transline per 100 gallons of total spray solution. Thorough coverage is necessary for good results, therefore, apply as a complete spray-to-wet foliar application of more than 1 1/3 pints of Transline per acre. To minimize drift, use a maximum spray pressure of 50 psi and keep sprays no higher than the tree crowns. Trees taller than 8 feet in height may be hard to treat efficiently and to obtain necessary coverage.

Do not apply by air.

Unsatisfactory control may result if application is made when brush and weeds are under severe drought stress or other conditions that inhibit good growth. Environmental conditions may influence results considerably. For best results on mesquite, apply in the spring or early summer during the period 40 to 90 days after the first green growth appears and when soil moisture is adequate for good growth. Soil temperatures of 75° to 83° F at a 12 to 18 inch depth are optimal for good plant kills. Soil temperature of less than 75° F at this depth will reduce the ultimate root kill of mesquite.

Warranty Disclaimer

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. DOWELANCO MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of DowElanco or the seller. All such risks shall be assumed by Buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at DowElanco's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

DowElanco shall not be liable for losses or damages resulting from handling or use of this product unless DowElanco is promptly notified of such loss or damage in writing. In no case shall DowElanco be liable for consequential or incidental damages or losses.

The terms of the "Warranty Disclaimer" above and this "Limitation of Remedies" cannot be varied by any written or verbal statements or agreements. No employee or sales agent of DowElanco or the seller is authorized to vary or exceed the terms of the "Warranty Disclaimer" or this "Limitation of Remedies" in any manner.

DowElanco• Indianapolis, IN 46268, U.S.A.

LABEL CODE 113-20-002 DATE CODE 792
EPA APPROVAL 06/25/91

Revisions include:
1) Wildlife openings added to approved sites and grazing allowed on treated areas.
2) Added bull thistle, kudzu and common teasel to weeds controlled.
3) Rainfast time reduced to 2 hours; Telar as adjuvant deleted; and spray drift precautions edited.

Specialty Products
Supplemental Labeling

SEP 1 1 1992

DowElanco

DowElanco | Quad IV, 9002 Purdue Road | P.O. Box 681428 | Indianapolis, Indiana 46268-1189 USA

Transline* Herbicide

EPA Reg. No. 62719-73

Revisions and Additions to Product Labeling for Transline Herbicide†

ATTENTION

†This supplemental labeling contains new or revised sections of the Transline Herbicide label recently approved by EPA. Use of this labeling to supplement existing Transline Herbicide labeling is recommended until such revisions appear on new containers of Transline Herbicide.

- It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
- This labeling must be in the possession of the user at the time of application.
- Read the label affixed to the container for Transline Herbicide before applying. Carefully follow all precautionary statements and applicable use directions.
- Use of Transline Herbicide according to this supplemental labeling is subject to all use precautions and limitations imposed by the label affixed to the container for Transline Herbicide.

Directions for Use

The following sections of the Transline Herbicide label have been amended. Information added or revised is identified in **bold print.**

"DIRECTIONS FOR USE" section is amended to read:
Transline Herbicide is recommended for selective, postemergence control of the following broadleaf weeds in non-cropland areas including equipment pathways, industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical power lines, communication lines, pipelines and railroads. **Use on these sites may include application to grazed areas as well as establishment and maintenance of wildlife openings and forest spot application adjacent to these sites.**

"Non-Cropland" section is amended to read :
For use on non-cropland areas such as industrial manufacturing and storage sites and right-of-way such as along roadsides, electrical power lines, communication lines, pipelines and railroads, **including grazed areas on these sites and forest spot application adjacent to these sites.**

The list of weed species controlled by Transline Herbicide is amended to add:
bull thistle, kudzu and common teasel.

"For Perennial Weeds" section....is amended to change rainfast time:
...The treatment with Transline Herbicide will be rainfast within **2** hours after application.

*Trademark of DowElanco

123-Q2ASP002 Approved 06/25/91
Initial printing.

Specialty Products
Supplemental Labeling

SEP 1 1 1992

DowElanco

DowElanco | Quad IV, 9002 Purdue Road | P.O. Box 681428 | Indianapolis, Indiana 46268-1189 USA

Transline* Herbicide

EPA Reg. No. 62719-73

For Distribution and Use Only In the State of Montana

Broadleaf Weed Control in Rangeland and Permanent Grass Pastures

ATTENTION

- It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
- This labeling must be in the possession of the user at the time of application.
- Read the label affixed to the container for Transline before applying. Carefully follow all precautionary statements and applicable use directions.
- Use of Transline according to this supplemental labeling is subject to all use precautions and limitations imposed by the label affixed to the container for Transline.

Directions for Use

Use Transline to control susceptible broadleaf weeds on rangeland areas or on established forage grasses such as smooth brome, orchardgrass and timothy in established permanent pastures. Best results are obtained when weeds are small and actively growing (prior to flowering) and application is made in 10 or more gallons of water per acre using ground equipment . Refer to the "Directions for Use" section of the Transline product label for broadleaf weeds controlled. There are no grazing restrictions following Transline Herbicide applications when used at labeled rates.

Application Rates

Apply Transline at a rate of 1/3 to 1 1/3 pints per acre when weeds are young and actively growing. For control of actively growing weeds such as musk thistle, Canada thistle, and knapweed (spotted, diffuse and Russian), use 2/3 to 1 1/3 pints per acre of Transline after the majority of basal leaves have emerged, but before bud stage. For control of wild buckwheat, sunflower and musk thistle rosettes, apply 2/3 pint per acre of Transline. Transline can also be mixed with 1/2 to 1 lb per acre of 2,4-D where weed species present are susceptible to 2,4-D.

Precautions:

- Some desirable broadleaf plants (forbs) are susceptible to Transline Herbicide. Do not spray pastures containing desirable forbs, especially legumes, unless injury can be tolerated. However, the stand and growth of established perennial grasses is usually improved after treatment, especially if rainfall is adequate for active plant growth and grazing is deferred.
- Grasses are tolerant to Transline, but new grass seedlings may be injured to varying degrees until well established as evidenced by development of secondary roots and tillering (multiple stems).
- Do not use hay or straw from treated areas for composting or mulching on susceptible broadleaf crops.
- Rotation to Broadleaf Crops: Do not plant broadleaf crops in treated areas until an adequately sensitive bioassay show that no detectable clopyralid is present in the soil.

*Trademark of DowElanco

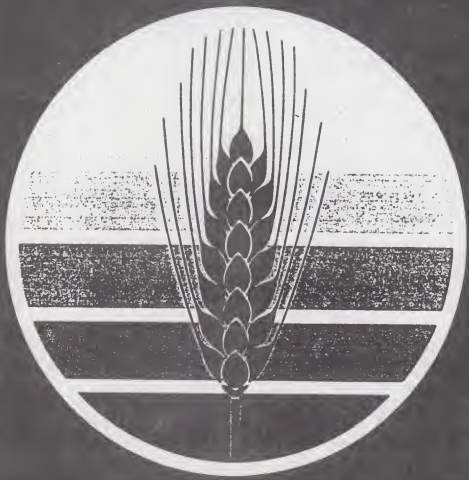
123-20-003 Approved 02/03/92
Initial printing.

Amendments:
1) Use on rangeland and permanent grass pastures in the state of Montana added to Transline label.

DUPONT

Ally®

HERBICIDE



".....A Growing Partnership With Nature"

INDEX

DUPONT ALLY® HERBICIDE

DRY FLOWABLE

ACTIVE INGREDIENT	BY WEIGHT
Metsulfuron Methyl	
Methyl 2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoate	60%
INERT INGREDIENTS	40%
TOTAL	100%

EPA Reg. No. 352-435

U.S. Pat. 4,383,113

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION! Harmful if absorbed through skin. Causes eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing dust or spray mist. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse.

STATEMENT OF PRACTICAL TREATMENT

In case of contact with eyes, immediately flush with plenty of water.

If on skin, wash with plenty of soap and water. Get medical attention if irritation persists.

For medical emergencies involving this product, call toll-free 1-800-441-3637.

ENVIRONMENTAL HAZARDS

Do not apply directly to water or wetlands (swamps, bogs, marshes and potholes). Do not contaminate water when disposing of equipment washwaters.

IMPORTANT INFORMATION—(READ BEFORE USING)

Injury to or loss of desirable trees or vegetation may result from failure to observe the following: Do not apply, drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. Do not use on lawns, walks, driveways, tennis courts or similar areas. Prevent drift of spray to desirable plants. Do not contaminate any body of water, including irrigation water that may be used on other crops.

Carefully observe all sprayer cleanup instructions both prior to and after using this product, as spray tank residue may damage crops other than wheat, barley, grasses grown on Conservation Reserve Program (CRP) acres or grasses grown in pastures and rangeland.

READ AND FOLLOW ALL APPROPRIATE SECTIONS OF LABEL INCLUDING PRECAUTIONS BEFORE USING THIS PRODUCT.

PESTICIDE HANDLING

- Calibrate sprayers only with clean water away from the well site.
- Make scheduled checks of spray equipment.
- Assure accurate measurement of pesticides by all operation employees.
- Mix only enough product for the job at hand.
- Avoid over-filling of spray tank.
- Do not discharge excess material on the soil at a single spot in the field or mixing/loading station.
- Dilute and agitate excess solution and apply at labeled rates/uses.
- Avoid storage of pesticides near well sites.
- When triple rinsing the pesticide container, be sure to add the rinsate to the spray mix.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irrigation system.

"Ally" should be used only in accordance with recommendations on this label or in separate published Du Pont recommendations available through local dealers.

Du Pont will not be responsible for losses or damages resulting from the use of this product in any manner not specifically recommended by Du Pont. User assumes all risks associated with such nonrecommended use.

CEREAL AND CRP USE INSTRUCTIONS

GENERAL INFORMATION

Du Pont "Ally" Herbicide is recommended for use on wheat and barley in CO, ID, KS, MN, MT, NE, NM, ND, OK, SD, TX, UT and WY. Do not use this product in the following counties of Colorado: Alamosa, Conejos, Costilla, Rio Grande and Saquache.

"Ally" is recommended for use on land primarily dedicated to the production of wheat (including durum) and barley. Rotation options are provided for certain other crops such as oats, proso millet, dryland grain sorghum, dryland corn, soybeans, flax, sunflower, safflower, alfalfa, hay and dry beans. In areas having a short growing season, prolonged periods of low soil temperature and low annual rainfall, "Ally" can remain in the soil for 34 months or more and cause severe injury to certain crops other than those listed in the "CerealCrop Rotation Guidelines" section of this label. Read and follow the "CerealCrop Rotation Guidelines" section for the specific rotation intervals. Before using "Ally", carefully consider your crop rotation plans and options. For maximum rotational flexibility, do not treat all your wheat or barley acres with "Ally".

"Ally" is a 60% active ingredient herbicide formulated as a dry flowable granule to be mixed in water and applied for use as a uniform broadcast spray for selective weed control in wheat (including durum), barley and in grasses on acreage enrolled in the CRP. "Ally" may be applied by air or with ground spray equipment. It is noncorrosive, nonflammable, nonvolatile and does not freeze.

For application to wheat or barley, "Ally" should be applied postemergence to actively growing broadleaf weeds. Herbicide combinations may be required for certain weeds as indicated under "Tank Mixtures for Resistant Weed Management" or "Tank Mixtures" in the "Weed Control in Wheat and Barley" section.

"Ally" rapidly inhibits growth of susceptible weeds; however, typical symptoms (discoloration) of dying weeds may not be noticeable for 1 to 3 weeks after application depending on growing conditions and weed susceptibility. Warm, moist conditions following treatment enhance the activity of "Ally", while cold, dry conditions delay activity. Weeds hardened-off by cold weather or drought stress may not be fully controlled or suppressed and regrowth may occur. Snow or rainfall received within 4 hours after application can reduce the level of weed control.

Degree of control and duration of effect depend on: weed spectrum and density; weed size and variability; growing conditions prior to, at and following time of application; amount of precipitation, and spray coverage. With adequate rainfall for soil activation, short-term residual control of the more sensitive species may be obtained for a few weeks after application.

INFORMATION ON RESISTANT WEEDS

Naturally-occurring weed biotypes* resistant to this product are known to exist. To delay the development of resistant biotypes, spray "Ally" only in tank mixtures with broadleaf herbicides having a different mode of action**, such as: 2,4-D, Banvel[1] / "Banvel" SGF, Buctril[2], Bronate[2], Curtail[3], Curtail M[3], MCPA, Du Pont Karmex® DF Herbicide or Du Pont Lexone® DF Herbicide as specified in the "Tank Mixtures for Resistant Weed Management" section of this label.

Note: Because these resistant biotypes are known to be present, accurate record keeping of pesticides applied to individual fields is advisable in order to obtain information on the spread and dispersal of the resistant biotypes.

* Biotypes are naturally-occurring individuals of the species which have a slightly different genetic makeup. Resistant biotypes may look exactly the same as susceptible biotypes. Herbicide-resistant biotypes are able to survive a use rate several times higher than needed to control susceptible biotypes. These resistant biotypes will not be controlled by "Ally" Herbicide or other herbicides that have the same mode of action such as Amber[4], Du Pont Express® Herbicide, Du Pont Glean® FC Herbicide and Du Pont Harmony® Extra Herbicide.

** Mode of action is the chemical interaction that interrupts a biological process necessary for plant growth and development.

GRAZING

"Ally" has no grazing restrictions.

MAXIMUM USE RATE AND SOIL PH LIMITATION

In CO, ID, Western KS and Western NE (west of Highway 183), MN, MT, NM, ND, OK Panhandle, TX Panhandle, SD, UT and WY, the maximum crop use rate is 1/10 ounce per acre (oz/A) in a 22-month period.

In Central KS, Central NE, Central OK and North Central TX, the maximum crop use rate is 1/10 oz/A in a 10-month period.

Do not use "Ally" on soils with a pH greater than 7.9 as the extended soil residual activity could adversely affect crop rotation options beyond normal intervals and, under certain conditions, cause injury to wheat and barley.

Note: Prior to using "Ally", take soil samples at 0-4" depth and determine the soil pH. Soil pH is to be determined by laboratory analysis using the 1:1 soil to water suspension method on representative soil samples taken at 0-4" depth. Representative soil sampling requires the collection of soil samples from each distinct topographical area in a field, for example, hilltops, hillsides and low areas. This means that several soil samples must be taken and analyzed separately

in order to obtain a correct assessment of the soil pH variation in a given field. Consult local extension publications for additional information on recommended soil sampling procedures.

WEED CONTROL IN WHEAT AND BARLEY

For best weed control or weed suppression, apply "Ally" postemergence to weeds when environmental conditions favor active growth of broadleaf weeds and when crop canopy will allow thorough coverage of target weeds. Unless otherwise directed, always include a surfactant.

For best weed control performance, use "Ally" in a tank mix with 2,4-D (ester formulations perform best). This tank mix works best where weed biotypes resistant to "Ally", "Amber", "Glean" FC, "Harmony" Extra or "Express" Herbicides are not suspected or known to occur.

Where resistant weed biotypes, such as kochia and Russian thistle, are suspected (land which has had 2 or more previous applications of "Glean" FC or is immediately adjacent to land where "Glean" FC has been used 2 or more times) or known to be present, select the most effective tank mix partner labeled for the control of kochia and/or Russian thistle and adjust the rate so that it alone will control the resistant biotype(s).

Note: If resistant biotypes are present, degree of control will depend solely on the effectiveness of the tank mix partner.

Determine crop rotation plans according to "Cereal Crop Rotation Guidelines" section of this label.

TIMING OF CROP APPLICATION

For winter wheat and winter barley, apply "Ally" (1/10 oz/A) postemergence after crop is in the 2-leaf stage but before the boot stage. Do not apply during boot stage or early heading, as crop injury may occur.

For spring barley and spring wheat (except durum or Wampum variety), apply "Ally" (1/10 oz/A) postemergence after crop is in the 2-leaf stage but before the boot stage. Do not apply during boot stage or early heading, as crop injury may occur.

For durum spring wheat and Wampum variety of spring wheat, apply "Ally" (1/10 oz/A) postemergence only after crop is tillering (refer to 2,4-D manufacturers' labels) but before the boot stage and only in combination with 2,4-D. Do not apply during boot stage or early heading, as crop injury may occur.

Irrigated Cereals (wheat/barley): On land dedicated to cereal production, which includes supplemental irrigation, delay first post treatment irrigation following treatment for at least 3 days after treatment. The first post treatment irrigation should not exceed 1". Apply "Ally" after crop tillering has begun. Do not apply "Ally" to stressed plants.

WEEDS CONTROLLED WITH TANK MIXES OF "ALLY" PLUS OTHER BROADLEAF HERBICIDES

1/10 Ounce Per Acre

(80 acres treated per 8 ounce container)

Unless otherwise directed, treat when weeds are less than 4" tall or in diameter and are actively growing. See "Specific Weed Problems", "Tank Mixtures For Resistant Weed Management" and "Tank Mixtures" sections for additional information.

- Blue/purple mustard*
- Bur buttercup (testiculate)
- Coast fiddleneck (tarweed)
- Common chickweed
- Common purslane
- Conical catchfly
- Cowcockle
- False chamomile
- Field pennycress (fanweed)
- Filaree
- Flixweed*
- Groundsel (common)
- Henbit
- Kochia**
- Lambsquarters (common, slimleaf)
- Mayweed chamomile
- Miners lettuce
- Pigweed (redroot, smooth, tumble)
- Plains coreopsis
- Prickly lettuce**
- Russian thistle**
- Shepherd's-purse
- Smallseed falseflax
- Smartweed (green, ladysthumb, pale)
- Snow speedwell
- Tansymustard*
- Trecale mustard
- Tumble/Jim Hill mustard
- Volunteer sunflower
- Waterpod
- Wild mustard

* See "Specific Weed Problems".

** Naturally-occurring resistant biotypes of these weeds are known to occur in the Central Plains and in Southern ID and UT. "Ally" will not control these resistant biotypes. See "Tank Mixtures For Resistant Weed Management" section of label for additional information.

WEEDS SUPPRESSED† WITH TANK MIXES OF "ALLY" PLUS OTHER BROADLEAF HERBICIDES*

- Annual Ryegrass
- Canada thistle
- Common sunflower
- Corn gromwell
- Knotweed (prostrate)
- Sowthistle (annual)
- Wild buckwheat

† Weed suppression is a visual reduction in weed competition (reduced population and/or vigor) as compared to an untreated area. Degree of suppression will vary with rate used, size of weeds and environmental conditions following treatment.

* See "Specific Weed Problems".

SPECIFIC WEED PROBLEMS

Annual Ryegrass (OK, TX): To obtain the best results, a sequential treatment of "Glean" FC in the fall followed by "Ally" in the spring is recommended. Apply "Glean" FC at 1/2 oz/A preemergence to ryegrass. 1/2 to 1" of rainfall is needed to move "Glean" FC into the weed root zone prior to ryegrass emergence. Remove grazing cattle during wet (muddy) field conditions to avoid disturbing the herbicide barrier. Immediately after completion of wheat grazing, apply "Ally" with a surfactant or with a liquid nitrogen fertilizer topdressing application. For fields not grazed, apply the sequential application of "Ally" as soon as ryegrass starts to grow after winter dormancy. Do not add a surfactant to liquid nitrogen fertilizer plus "Ally" combinations. In mixing "Ally" with liquid fertilizer, slurry "Ally" in water, then thoroughly mix the slurry into the fertilizer. Run a tank mix compatibility test before mixing "Ally" in fertilizer solution. DO NOT use with fertilizers having a pH of 3.0 or less, as rapid product degradation can occur. The addition of 2,4-D is not recommended for annual ryegrass suppression.

Blue Mustard, Flixweed and Tansymustard (ID, MN, MT, ND, SD, UT and WY): For best results, apply "Ally" tank mixtures with 2,4-D or MCPA postemergence to mustards, but before bloom.

Canada Thistle and Sowthistle: Apply either "Ally" plus surfactant or "Ally" plus 2,4-D or MCPA in the spring after majority of thistles have emerged and are small (rosette stage to 6" elongating stems) and actively growing. An application will inhibit the ability of emerged thistles to compete with the crop.

Sunflower (common/volunteer): Apply either "Ally" plus surfactant or "Ally" plus 2,4-D or MCPA after the majority of sunflowers have emerged, are 2" to 4" tall and are actively growing. Thorough coverage is important. Use minimum spray volumes of 3 gal by air and 5 gal by ground.

Corn Gromwell and Prostrate Knotweed: Apply "Ally" plus surfactant when weeds are actively growing, no larger than 2" tall and crop canopy will allow thorough coverage. The addition of 2,4-D or MCPA may or may not improve the results.

Wild Buckwheat: For best results, apply "Ally" plus 2,4-D or "Ally" plus MCPA when plants have no more than 3 true leaves (not counting the cotyledons). If plants are not actively growing, delay treatment until environmental conditions favoring active weed growth are present. Thorough coverage is important.

TANK MIXTURES
FOR RESISTANT WEED MANAGEMENT

Central KS, Central NE, Central OK and North Central TX:

Apply "Ally" only as a tank mix treatment with 2,4-D (amine or ester), MCPA (amine or ester) or "Banvel" / "Banvel" SGF. Use 1/10 oz/A of "Ally" plus either 1/4 to 1/2 lb active ingredient 2,4-D/MCPA (ester formulations of 2,4-D or MCPA have provided best results) or 1/16 to 1/8 lb active ingredient "Banvel" / "Banvel" SGF. Surfactant may be added at 1 to 2 pt per 100 gal of spray volume; however, the addition of surfactant may increase the chance for crop injury. Apply "Ally" plus MCPA from 3-5 leaf stage, but prior to boot stage. Apply "Ally" plus 2,4-D after tillering (refer to 2,4-D manufacturer's label), but prior to boot stage. Refer to "Banvel" / "Banvel" SGF labels for application timing of "Ally" tank mix.

If resistant weed biotypes, such as kochia and Russian thistle, are suspected (land which has had 2 or more previous applications of "Glean" FC or is immediately adjacent to land where "Glean" FC has been used 2 or more times) or known to be present, consider using another herbicide treatment or adjust the use rate of the "Ally" tank mix partner labeled for the control of kochia and/or Russian thistle so that it alone will control the resistant biotypes.

"Ally" tank mixes can be applied annually in this area.

Do not apply "Ally" during fallow unless specified otherwise.

Read and follow all use instructions, label rates, weed control claims, warnings and precautions for the companion herbicide(s).

Southern ID, MN, MT, ND, SD, UT and Northern WY:

Where resistant weeds are not suspected (land not previously treated more than once with "Glean" FC and not immediately adjacent to other land where "Glean" FC has been used 2 or more times), apply "Ally" as a tank mix treatment with 2,4-D (amine or ester), MCPA (amine or ester) or "Banvel" / "Banvel" SGF. Use 1/10 oz/A of "Ally" plus either 1/4 to 1/2 lb active ingredient 2,4-D/MCPA (ester formulations of 2,4-D/MCPA have provided best results) or 1/16 to 1/8 lb active ingredient "Banvel" / "Banvel" SGF. Surfactant may be added at 1 to 2 pt per 100 gal of spray volume; however, the addition of surfactant may increase the chance for crop injury. Apply "Ally" plus MCPA from 3-5 leaf stage, but prior to boot stage. Apply "Ally" plus 2,4-D after tillering (refer to 2,4-D manufacturer's label), but prior to boot stage. Refer to "Banvel" / "Banvel" SGF labels for application timing of "Ally" tank mix.

If resistant weed biotypes, such as kochia and Russian thistle, are suspected (land which has had 2 or more previous applications of "Glean" FC or is immediately adjacent to land where "Glean" FC has been used 2 or more times) or known to be present, consider using another herbicide treatment or adjust the use rate of the "Ally" tank mix partner labeled for the control of kochia and/or Russian thistle so that it alone will control the resistant biotypes.

Do not apply "Ally" during fallow.

Do not apply "Ally" more often than once in a 22-month period for a given field.

Do not apply "Ally" for 22 months before or after a "Glean" FC treatment.

Read and follow all use instructions, label rates, weed control claims, warnings and precautions for the companion herbicide(s).

CO, Western KS and Western NE (west of Highway 183), Eastern NM, OK Panhandle, TX Panhandle and Southeastern WY:

Where resistant weeds are not suspected (land not previously treated more than once with "Glean" FC and not immediately adjacent to other land where "Glean" FC has been used 2 or more times), apply "Ally" as a tank mix treatment with 2,4-D (amine or ester), MCPA (amine or ester) or "Banvel" / "Banvel" SGF. Use 1/10 oz/A of "Ally" plus either 1/4 to 1/2 lb active ingredient 2,4-D /MCPA (ester formulations of 2,4-D/MCPA have provided best results) or 1/16 to 1/8 lb active ingredient "Banvel" / "Banvel" SGF. Surfactant may be added at 1 to 2 pt per 100 gal of spray volume; however, the addition of surfactant may increase the chance for crop injury. Apply "Ally" plus MCPA from 3-5 leaf stage, but prior to boot stage. Apply "Ally" plus 2,4-D after tillering (refer to 2,4-D manufacturer's label), but prior to boot stage. Refer to "Banvel" / "Banvel" SGF labels for application timing of "Ally" tank mix.

If resistant weed biotypes, such as kochia and Russian thistle, are suspected (land which has had 2 or more previous applications of "Glean" FC or is immediately adjacent to land where "Glean" FC has been used 2 or more times) or known to be present, consider using another herbicide treatment or adjust the use rate of the "Ally" tank mix partner labeled for the control of kochia and/or Russian thistle so that it alone will control the resistant biotypes.

Do not apply "Ally" more often than once in a 22-month period on a given field.

Read and follow all use instructions, label rates, weed control claims, warnings and precautions for the companion herbicide(s).

TANK MIXTURES

"Ally" must be in suspension before adding companion herbicide(s) or spray adjuvant(s).

For tank mixtures with other broadleaf weed herbicides, see "Tank Mixtures For Resistant Weed Management" section of this label.

Other Tank Mixtures: "Ally" will not control wild oats or other grasses. If broadleaf weeds plus wild oats and/or grasses are present, apply "Ally" with a suitable registered product either as a tank mix or sequential treatment. When tank mixing "Ally" and Assert® herbicide, ALWAYS include another broadleaf herbicide with a different mode of action for control of resistant weeds, for example: 2,4-D ester, MCPA ester, "Bronate" or "Buctril".

Read and follow all use instructions, label rates, weed control claims, warnings and precautions for the companion herbicide(s).

DO NOT tank mix with Hoelon® 3EC as wild oat or green foxtail control may be reduced.

"Ally" may be tank mixed with insecticides registered for use on cereal grains. However, under certain conditions (drought stress, crop in 2-4 leaf stage), tank mixes of "Ally" plus organophosphate insecticides (such as methyl or ethyl parathion, Di-Syston®, etc.) may produce temporary crop yellowing or, in severe cases, crop injury. The potential for crop injury is greatest when there are fluctuations in day/night temperatures just prior to or soon after application. Limit first use to a small area before treating large acreage.

Do not apply "Ally" within 60 days of crop emergence where an organophosphate insecticide (such as "Di-Syston") has been applied as an in-furrow treatment, as crop injury may result.

DO NOT USE "ALLY" PLUS MALATHION AS CROP INJURY MAY RESULT.

See "Spray Preparation, Additives, Product Measurements, Surfactant and Liquid Fertilizer" section of label.

WEED CONTROL FOR THE CONSERVATION RESERVE PROGRAM (CRP)

"Ally" is registered for CRP use in CO, Southern ID, KS, MT, NE, NM, ND, OK, SD, TX, UT and WY. Consult "Ally" supplemental label for CRP use instructions.

WEED CONTROL IN REDUCED TILLAGE FALLOW

DO NOT USE "ALLY" IN FALLOW UNLESS SPECIFIED OTHERWISE.

EQUIPMENT–SPRAY VOLUMES

Read before using: It is important that spray equipment is cleaned and free of existing pesticide deposits before using "Ally". Follow the cleanup procedures specified on the label of the product previously sprayed. If no cleanup is provided, follow sprayer cleanup procedure in "Sprayer Cleanout" section of this label for all application equipment.

Spray Equipment: Apply using properly calibrated air or ground equipment. Select a spray volume and delivery system that will insure thorough coverage and a uniform spray pattern. Avoid overlapping, and shut off spray booms while starting, turning, slowing or stopping, or injury to the crop or following crops may result.

Do not use equipment and/or spray volumes that will cause spray to drift onto nontarget sites. Do not make applications during weather conditions which cause spray to drift onto nontarget sites. For additional information, refer to "Caution-Avoid Spray Drift" section of label.

Refer to specific manufacturer's recommendations for additional information on gallons per acre(GPA), pressure, speed, nozzle types and arrangements, nozzle heights above the target canopy, etc., for respective application equipment.

Do not apply this product through any type of irrigation system.

Agitation: Continuous agitation is required to keep "Ally" in suspension.

Ground Application: For optimum spray distribution and thorough coverage, use flat fan or low volume flood nozzles. For flat fan nozzles, do not use less than 3-GPA.

For flood nozzles on 30-inch nozzle spacings, use not less than 10 GPA and no larger than TK10 nozzles or equivalent and not less than 30 psi. On 40-inch nozzle spacings, use not

less than 13 GPA. 100% overlapping of nozzle spray pattern is recommended for 30 and 40-inch spacings.

With Raindrop® nozzles, do not use less than 30 GPA and insure for 100% overlap of nozzle spray patterns.

Use 50-mesh screens or larger.

Aerial Application: Use nozzle types and arrangements that will provide for optimum spray distribution and maximum coverage at 1 to 5 GPA. Do not apply during inversion conditions, when winds are gusty, or when other conditions will favor poor coverage and/or off-target spray movement.

CEREAL CROP ROTATION GUIDELINES

The crop rotation intervals specified in this section of the label must be followed unless a LRB[sm] bioassay indicates a shorter planting interval. See "Bioassay" section of label for details.

Crop rotation plans are determined by the crop to be planted and a minimum rotation interval. Minimum rotation interval is the time from the last application of "Ally" to the anticipated date of planting. For maximum rotational flexibility, do not use "Ally" on all your wheat or barley. Do not use on soils with a pH greater than 7.9.

Wherever "Ally" is used on land previously treated with "Glean" FC, read the rotational guidelines on both labels and follow the one with the longest interval stated for your situation.

CROP TO BE PLANTED

Prior to planting a rotational crop, determine the soil pH. Soil pH is to be determined by laboratory analysis using the 1:1 soil to water suspension method on representative soil samples taken at 0-4" depth. Representative soil sampling requires the collection of soil samples from each distinct topographical area in a field, for example, hilltops, hillsides and low areas. This means that several soil samples must be taken and analyzed separately in order to obtain a correct assessment of the soil pH variation in a given field. Consult local extension publications for additional information on recommended soil sampling procedures.

Cumulative Precipitation equals the total amount of moisture received from the date of "Ally" application to the date of planting the rotational crop. Should accumulated precipitation not be sufficient to meet the indicated amounts or the soil pH is above 7.9, do not rotate to the indicated crops until the following growing season.

These crops can be planted on nonirrigated land following the use of "Ally" at 1/10 oz/A:

Winter and spring wheat

Area: all[1]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): none
Minimum Rotation Interval (months): 1

CRP grasses[2]

Area: all[1]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): none
Minimum Rotation Interval (months): 4

Durum wheat, barley, spring/winter oats

Area: all[1]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): none
Minimum Rotation Interval (months): 10

Grain sorghum, proso millet

Area: CO, KS, NE, NM, OK, TX, Southern WY
Soil pH: 7.9 or less
Cumulative Precipitation (inches): none
Minimum Rotation Interval (months): 10

Area: SD[3]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 13
Minimum Rotation Interval (months): 12

Area: MT, Northern WY
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: ND (west of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: ND (east of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 34
Minimum Rotation Interval (months): 34

Field corn

Area: Central KS[4]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 25
Minimum Rotation Interval (months): 14

Area: CO[4], KS[3], NE[3], North Central TX[4], Southern WY[3]
Soil pH: 7.5 or less
Cumulative Precipitation (inches): 15
Minimum Rotation Interval (months): 12

Area: CO[4], KS[3], NE[3], TX Panhandle, Southern WY[3]
Soil pH: 7.6 to 7.9
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: SD[4]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 15
Minimum Rotation Interval (months): 12

Area: MT, Northern WY
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: ND (west of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: ND (east of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 34
Minimum Rotation Interval (months): 34

Soybeans

Area: Central KS[3]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 25
Minimum Rotation Interval (months): 14

Area: KS[4], NE[4]
Soil pH: 7.5 or less
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: KS[4], NE[4]
Soil pH: 7.6 to 7.9
Cumulative Precipitation (inches): 33
Minimum Rotation Interval (months): 34

Cotton (dryland only)

Area: OK (east of the Panhandle), North Central TX[4]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 25
Minimum Rotation Interval (months): 14

Area: OK Panhandle and TX Panhandle, Eastern NM
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 30
Minimum Rotation Interval (months): 22

Alfalfa (hay only)

Area: MT
Soil pH: 7.5 or less
Cumulative Precipitation (inches): none
Minimum Rotation Interval (months): 22

Area: MT
Soil pH: 7.6 to 7.9
Cumulative Precipitation (inches): none
Minimum Rotation Interval (months): 34

Dry beans

Area: ND (west of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: ND (east of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 34
Minimum Rotation Interval (months): 34

Flax, Safflower, Sunflower

Area: CO, KS, MT, NE, NM, OK, SD, TX, UT, WY, Southern ID,
Soil pH: 7.9 or less
Cumulative Precipitation (inches): None
Minimum Rotation Interval (months): 22

Area: ND (west of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 22
Minimum Rotation Interval (months): 22

Area: ND (east of State Hwy 1)
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 34
Minimum Rotation Interval (months): 34

All other crops*

Area: all[1]
Soil pH: 7.9 or less
Cumulative Precipitation (inches): 28
Minimum Rotation Interval (months): 34

* All other crops refers to any crop not listed above or to a crop listed above where a specific crop rotation interval is not given.

1 All — CO, KS, MT, NE, NM, ND, OK, SD, TX, UT, WY, Southern ID

2 CRP grasses —

Blue Grama

Bluestems - Big, Little, Plains, Sand, WW Spar

Buffalograss

Green Sprangletop

Indiangrass

Kleingrass

Lovegrasses - Atherstone, Sand, Weeping, Wilman

Orchardgrass

Sideoats Grama

Switchgrass - Blackwell

Wheatgrasses - Bluebunch, Crested, Intermediate, Pubescent, Siberian, Slender, Streambank, Tall, Thickspike, Western

Wildrye grass - Russian

The planting of grass and legume mixtures is not recommended as injury to the legume may occur.

3 SD—Generally south of state Highway 212 and east of the Missouri River, and generally south of state Highway 34 and west of the Missouri River

4 Central KS—Generally east of state Highway 183 and west of the Flinthills

5 CO—Generally north of I-70

5 KS—Generally north of I-70 and west of state Highway 183

5 NE—Generally west of state Highway 77 and east of the Panhandle

5 WY—Counties of Goshen, Laramie, Platte

6 SD—Generally east of the Missouri River and south of state Highway 14 and west of the Missouri River

7 Central KS—Generally east of state Highway 183 and west of the Flinthills

8 KS—Generally north of I-70 and west of state Highway 183

8 NE—Generally west of state Highway 77 and east of the Panhandle

9 Counties of:

Archer	Dallas	Hill	Montague	Tarrent
Baylor	Delta	Hood	Morris	Throckmorton
Bell	Denton	Hopkins	Navarro	Titus
Bosque	Eastland	Hunt	Palo Pinto	Upshur
Bowie	Ellis	Jack	Parker	Van Zandt
Callahan	Falls	Johnson	Rains	Wilbarger
Camp	Fannin	Kaufman	Red River	Wichita
Cass	Foard	Knox	Robertson	Williamson
Clay	Franklin	Lamar	Rockwall	Wise
Collin	Grayson	Limestone	Shackelford	Wood
Cooke	Hardeman	McLennan	Somervell	Young
Coryell	Haskell	Milam	Stephens	

PRECAUTIONS

In CO, ID, Western KS and Western NE (west of Highway 183), MN, NM, ND, OK Panhandle, TX Panhandle, SD, UT and WY, the maximum use rate is 1/10 oz/A in a 22 month period.

In Central KS, Central NE, Central OK and North Central TX, the maximum use rate is 1/10 oz/A in a 10 month period.

Do not use on soils with pH greater than 7.9 (for example, highly calcareous soils) as extended soil residual activity could adversely affect minimum rotation intervals for all crops.

Wherever "Ally" is used on land previously treated with "Glean" FC, read the rotational guidelines on both labels and follow the one with the longest interval stated for your situation.

Wherever land has been or will be treated with "Ally", "Amber" and "Assert", plant only wheat or barley until a bioassay (see "Bioassay" section of label) demonstrates that other crops can be successfully grown. On land that is frequently rotated to crops other than wheat or barley, do not use "Ally" wherever "Assert" has been or will be used. The additive effect of soil residues from these treatments has not been determined and crop rotation guidelines and minimum rotation intervals are not known; injury to rotational crops may occur.

Do not apply to irrigated land where tailwater will be used to irrigate crops other than wheat and barley.

Do not apply to frozen ground where surface runoff may occur.

Do not apply to snow-covered ground.

Varieties of wheat and barley differ in their tolerance to herbicides. When using "Ally" for the first time on a particular variety, limit initial use to one 8 oz container. If no symptoms of crop injury occur within 14 days after treatment, balance of acreage can be treated.

Do not apply "Ally" to wheat or barley that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease or insect damage, as crop injury may result. Severe winter stress, drought, disease or insect damage following application also may result in crop injury.

Under certain conditions such as heavy rainfall, prolonged cool weather (daily high temperatures less than 50 degrees F) or wide fluctuations in day/night temperatures just prior to or soon after treatment, temporary discoloration and/or crop injury may occur. Risk of injury is greatest when crop is in the 2-5 leaf stage.

Tank mixtures of "Ally" and organophosphate insecticides (such as methyl or ethyl parathion or "Di-Syston", etc.) may cause temporary discoloration or crop injury. The potential for crop injury is greatest when there are wide fluctuations in day/night temperatures just prior to or soon after treatment.

The combined treatment effects of "Ally" postemergence preceded by preemergence wild oat herbicides may cause crop injury to spring wheat when crop stress (soil crusting, planting too deep, prolonged cold weather or drought) causes poor seedling vigor.

To prevent cold weather related crop injury, avoid making applications during winter months when weather conditions are unpredictable and can be severe.

Do not apply to wheat or barley undersown with legumes or grasses, as injury to the forage may result.

To reduce the potential for movement of treated soil due to wind erosion, do not apply to powdery dry or light sandy soils until they have been stabilized by rainfall, trashy mulch, reduced tillage or other cultural practices. Injury to adjacent crops may occur when treated soil is blown onto land used to produce crops other than cereal grains.

For ground applications applied to weeds when dry, dusty field conditions exist, control of weeds in wheel track areas may be reduced. The addition of 2,4-D or MCPA should improve weed control under these conditions.

Tank mix applications of "Ally" plus "Assert" may cause temporary crop discoloration/stunting or injury when heavy rainfall occurs shortly after application.

Preplant or preemergence applications of 2,4-D or herbicides containing 2,4-D made within two weeks of planting spring cereals may cause crop injury when used in conjunction with early postemergence applications of "Ally". Under these conditions, delay "Ally" treatment until crop tillering has begun.

With any chemical, follow labeling instruction and warnings carefully.

WEED CONTROL IN PASTURES

GENERAL INFORMATION

Du Pont "Ally" Herbicide is formulated as a dry flowable granule to be mixed in water and applied as a spray for selective weed control in grasses grown in pastures and rangeland.

"Ally" rapidly inhibits growth of susceptible weeds; however, typical symptoms (discoloration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Warm, moist conditions following treatment enhance the activity of "Ally"; cold, dry conditions delay activity. Weeds hardened off by cold weather or drought stress may not be fully controlled or suppressed and regrowth may occur. Rainfall received within 4 hours after application can reduce the level of weed control.

Degree of control and duration of effect depend on: weed spectrum and density; weed size; growing conditions prior to, at and following time of application; amount of precipitation, and spray coverage. With adequate rainfall for soil activation, short-term residual control of the more sensitive species may be obtained for a few weeks after application.

Do not exceed a single application per year.

Do not apply "Ally" through any type of irrigation system.

IMPORTANT PRECAUTIONS

Do not use on lawns, golf courses, athletic fields, commercial sod operations, or other high maintenance, fine turfgrass areas.

Do not use on grasses grown for seed.

Injury to or loss of subsequently sprayed crops may result from failure to observe the following procedures:

"Ally" must be cleaned from application equipment according to cleanup procedures described in the SPRAYER CLEANUP section of this label, prior to spraying crops other than grasses grown in pastures, rangeland, wheat, barley, or Conservation Reserve Program acres.

GRASS SELECTIVITY

Bermudagrass, bluegrass, orchardgrass, bromegrass, timothy and native grasses such as bluestems and grama have demonstrated good tolerance to "Ally".

Note: Bermudagrass should be established for 60 days, bluegrass, bromegrass, orchardgrass, and timothy should be established for 6 months, and fescue should be established for 24 months at time of application or injury may result.

Applications of "Ally" to fescue may cause temporary stunting and yellowing of the grass as well as seedhead suppression. These symptoms may be minimized by: making application later in the spring or in the fall, using lowest recommended rate for target weed, using 1/16 to 1/8% v/v surfactant (1/2 to 1 pint/100 gallons), and/or tank-mixing "Ally" and 2,4-D.

Following "Ally" application, a reduction in production of the first cutting may result primarily due to seedhead suppression.

Applications of "Ally" to timothy should be made after green-up in the spring. The timothy should be 4 - 6 inches tall at application.

Do not apply "Ally" to ryegrass (Italian or perennial) pastures as injury to or loss of pasture may result.

Broadleaf pasture species, such as alfalfa and the clovers, are highly sensitive to "Ally" and will be severely stunted or killed by application of "Ally".

APPLICATION VOLUMES

GROUND: Use a minimum of 10 gallons per acre for weed control in improved pastures.

AERIAL: Use orifice discs, cores and nozzle types and arrangements that will provide for optimum spray distribution and maximum coverage at 2 to 5 GPA. For higher density pasture grasses and/or weeds use higher spray volume. Do not apply during inversion conditions, when winds are gusty, or when other conditions will favor poor coverage and/or drift.

Note: Aerial application of "Ally" is restricted to the states of CO, ID, KS, MN, MO, ND, NE, NM, OK, OR, SD, TX, UT, WA and WY.

Note: See "Spray Preparation, Additives, Product Measurements, Surfactant and Liquid Fertilizer" section of label for further information.

GRAZING

"Ally" has no grazing restriction.

WEED CONTROL, RATES, AND TIMING OF APPLICATION

Pensacola bahiagrass (Paspalum notatum) control in established bermudagrass:

Apply "Ally" at 3/10 ounce of product per acre plus surfactant.

Apply after green-up in the spring but before bahiagrass seedhead formation. Application should be made when adequate moisture is available to enhance grass growth.

"Ally" is very effective for removal of bahiagrass from bermudagrass pastures. In highly infested pastures, use of "Ally" can result in areas that may be bare of useful forage until the bermudagrass has the time to recolonize the area. Therefore, in areas where heavy bahiagrass infestations exist, it is strongly advised that "Ally" not be applied to an entire farm or ranch in one year, but that treatments be spread out over a period of years. Fertilization (particularly with nitrogen and potassium) and/or replanting, may accelerate the process of recolonization by bermudagrass.

Under heavy bahiagrass pressure, grazing pressure or adverse weather conditions (heat and drought), some regrowth may occur.

Note: Ally should not be used for the control of common or Argentine bahiagrass. "Ally" should not be applied in liquid fertilizer solutions for Pensacola bahiagrass control as poor control and/or regrowth may occur.

Broadleaf Weed Control:(a)*

Apply "Ally" at the rate of 1/10 to 2/10 ounces product per acre for control of:

Bitter sneezeweed	Groundsel
Buttercup	Henbit
Carolina geranium	Marestail
Common broomweed	Mayweed
Common chickweed	Pigweed
Common mullein	Plains coreopsis
Common purslane	Plantain
Conical catchfly	Shepherd's-purse
Cow cockle	Smallseed falseflax
Curly dock	Snow speedwell
Dandelion	Wild garlic*(b)
False chamomile	Wild mustard
Field pennycress	Woolly croton*(c)
Filaree	

Apply "Ally" at the rate of 2/10 to 3/10 ounce product per acre plus surfactant for the control of:

Annual marshelder	Horsemint (beebalm)
Blackeyed-susan	Musk thistle*(e)
Buckbrush*(d)	Purple scabious
Burclover	Western snowberry *(d)
Common yarrow	Wild carrot
Dogfennel	

*(a) Apply before weeds are 4 inches tall or in diameter unless otherwise indicated. Apply when weeds are actively growing.

*(b) Apply in the early spring when wild garlic is less than 12 inches tall with 2 to 4 inches of new growth. Thorough spray coverage of all wild garlic plants is essential.

*(c) Apply in the late spring or early summer, preemergence through two true leaf stage.

*(d) Western snowberry or Buckbrush may be controlled or suppressed by "Ally". Weed suppression is a visual reduction in weed competition (reduced population and/or vigor) as compared to an untreated area. Degree of suppression will vary with the rate used, size of weeds and environmental conditions following treatment.

*(e) Apply in the spring or early summer prior to flowering or in the fall after newly emerged plants have reached the rosette stage of growth. Fall applications should be made prior to freezing of soil. Cold, dry conditions delay herbicidal activity and weeds hardened off by cold or drought weather conditions may not be fully controlled, resulting in regrowth.

TANK MIXTURES FOR SPECIFIC WEEDS

"Ally" can be applied in a tank mix combination with Grazon' P+D, "Grazon" PC / "Tordon" 22K, 2,4-D, Banvel' or Weedmaster' in states where these products are labeled for postemergence control of the following weeds:

Annual marshelder	Giant ragweed
Burclover	Prickly lettuce
Carolina horsenettle	Sunflower
Common cocklebur	Western ragweed
Common milkweed	
Common ragweed	

Application Rates

"Ally" at 1/10 to 2/10 ounce per acre may be tank mixed with one of the following products:

PRODUCT		OZ/A
"Grazon" P+D	at	8 to 32
"Grazon" PC / "Tordon" 22K	at	4 to 16
2,4-D	at	16 to 32
"Banvel"	at	4 to 32
"Weedmaster"	at	8 to 32

PERENNIAL WEED CONTROL

Broadcast applications: Apply "Ally" at the rate of 3/10 ounce of product per acre plus surfactant for the suppression of:

Blackberry	Multiflora rose
Dewberry	

Application should be made in the spring, soon after fully leafed. Multiflora rose must be less than 3 feet tall for a broadcast application to give effective control.

Spot application: Apply "Ally" at the rate of 1 ounce of product per 100 gallons of water, plus surfactant, for the control of:

Blackberry	Canada thistle
Dewberry	Multiflora rose

Apply as a foliar spray to runoff. Do not exceed 75 gallons of total spray per acre. Foliar applications should be made after brush is fully leafed. Complete coverage of all foliage and stems is required for control. Effectiveness may be reduced if rainfall occurs within 4 hours after application. On tall, dense stands, it is often necessary to spray from both sides to obtain adequate coverage. For Canada thistle, apply in the spring when the Canada thistle is at least 6-10 inches tall and before flowering.

CROP ROTATION GUIDELINES (INCLUDING OVERSEEDING AND PASTURE RENOVATION)

After application of "Ally", a period of time must elapse before the treated pasture can be overseeded, renovated, or rotated to other crops. This period of time is referred to as the Minimum Rotation Interval. In more technical terms,

The Minimum Rotation Interval is the time in months from the date of the last application of "Ally" to the date of planting of any crop or forage.

Note: Failure to observe the Minimum Rotation Interval may result in injury to or loss of any planted crop or forage.

The length of the Minimum Rotation Interval depends upon the rate of "Ally" applied, the method of application (broadcast vs. spot), the pH of the soil, and the environmental conditions after application. In general, longer Minimum Rotation Intervals are associated with higher rates; higher soil pH's; cooler, drier environmental conditions, and shorter growing seasons.

For maximum rotational flexibility, do not use "Ally" on all your pasture.

Do not use "Ally" on pastures with a soil pH greater than 7.9 (for example, highly calcareous soils) as extended soil residual activity could adversely affect Minimum Rotation Intervals for all crops.

Unless a Minimum Rotation Interval is specified, a FIELD BIOASSAY must be completed before rotating to any crop other than those listed below. See "FIELD BIOASSAY" section of this label.

Section I:

AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA and WV.

After treatment with "Ally" at 3/10 ounce product per acre, or less:

The Minimum Rotation Interval for overseeding with desirable broadleaf forage plants, such as alfalfa, red clover, white clover or sweet clover, is 4 months.

The Minimum Rotation Interval for overseeding or renovating with bermudagrass, bluegrass, orchardgrass, bromegrass, ryegrass, fescue or timothy is 4 months.

The Minimum Rotation Interval for rotating to winter or spring wheat is 1 month.

The Minimum Rotation Interval for rotating to durum wheat, barley, or oats is 10 months.

The Minimum Rotation Interval for rotating to all row crops except those listed above is 34 months, unless a FIELD BIOASSAY is performed.

After treatment with "Ally" at greater than 3/10 ounce product per acre:

The Minimum Rotation Interval for rotating to any crop or forage is 34 months unless a FIELD BIOASSAY is performed.

Section II:

All states not listed in Section I

After treatment with "Ally" at rates of 2/10 ounce product per acre or less:

The Minimum Rotation Interval for overseeding with desirable broadleaf forage plants, such as red clover, white clover or sweet clover is 12 months.

The Minimum Rotation Interval for overseeding or renovating with bermudagrass, bluegrass, orchardgrass, bromegrass, ryegrass or timothy is 6 months. For overseeding or renovating with fescue, the Minimum Rotation Interval is 18 months.

The Minimum Rotation Interval for rotating to winter or spring wheat is 1 month.

The Minimum Rotation Interval for rotating to durum wheat, barley, or oats is 10 months.

After treatment with "Ally" at greater than 2/10 ounce product per acre:

The Minimum Rotation Interval for rotating to any crop or forage is 34 months unless a FIELD BIOASSAY is performed.

SPRAY PREPARATION, ADDITIVES, PRODUCT MEASUREMENTS, SURFACTANT AND LIQUID FERTILIZER

Spray Preparation: Pour the proper amount of "Ally" into the necessary volume of water in the spray tank with the agitator running. Continuous agitation is required for a uniform suspension and application. "Ally" must be added first to the spray tank followed by any other tank mix chemicals or surfactants.

Use spray preparation of "Ally" within 24 hours or product degradation may occur. If spray preparation is left standing without agitation, thoroughly agitate before reusing.

Additives: Do not use with spray additives that lower the pH of the spray solution below pH 3.0, as rapid product degradation can occur.

Product Measurement: The "Ally" volumetric measuring cylinder is to be used as a guide, since the degree of accuracy varies by plus or minus 7.5%. For more precise measurement, use scales calibrated in ounces.

Surfactant: Unless directed otherwise, use a surfactant of at least 80% active ingredient and add it as the last ingredient at the rate of 1 to 2 quarts per 100 gal of spray volume on winter wheat or 1/2 to 1 quart on spring wheat, spring or winter barley, durum spring wheat and Wampum variety of spring wheat. Antifoaming agents may be needed. DO NOT use liquid fertilizer in addition to or as a substitute for a surfactant. **Pastures only** - If applying in liquid nitrogen fertilizer, see **"Liquid N Carrier"** section of this label.

Note: If applying "Ally" to fescue pastures, use 1/2 to 1 pint surfactant/100 gallons (1/16 to 1/8% v/v).

Liquid Fertilizer: Slurry "Ally" in water; then thoroughly mix the slurry into the liquid fertilizer. DO NOT add a surfactant. Run a tank mix compatibility test before mixing "Ally" in fertilizer solution. DO NOT use with fertilizers having a pH of 3.0 or less as rapid product degradation can occur. If 2,4-D is included in "Ally" and liquid fertilizer mixture, the ester formulations are generally more compatible.

Liquid N Carrier: Slurry "Ally" in water; then thoroughly mix the slurry into the liquid fertilizer. The addition of a surfactant can cause crop injury. Run a tank mix compatibility test before mixing "Ally" in fertilizer solution. DO NOT use with fertilizers having a pH of 3.0 or less as rapid product degradation can occur.

Note: When "Ally" is applied using liquid nitrogen fertilizer solution as spray carrier; early, temporary, crop yellowing and stunting may occur.

Note: Since the presence of tank-mix partners can interfere with the dispersion of "Ally", when multiple tank loads of the same tank mix are being prepared, presburry "Ally" in a dedicated container of clean water prior to adding to the tank.

CAUTION - AVOID SPRAY DRIFT

Follow these practices to minimize drift.

Do not allow spray from either ground or aerial equipment to drift onto adjacent crops or land, as even small amounts can injure susceptible plants. When spraying near adjacent, sensitive crops or plants, do everything possible to reduce spray drift. This includes:

Stop spraying if wind speed becomes excessive. DO NOT SPRAY IF WIND SPEED IS 10 MPH OR GREATER. Spray drift can occur at wind speeds less than 10 MPH. If sensitive crops or plants are downwind, extreme caution must be used even in relatively low wind conditions! DO NOT SPRAY IF WINDS ARE GUSTY.

High temperatures, drought and low relative humidity increase the possibility of harmful spray drift. EXTREME CAUTION MUST BE USED WHEN THESE CONDITIONS ARE PRESENT AND SENSITIVE CROPS OR PLANTS ARE NEARBY, REGARDLESS OF WIND SPEED.

Do not apply when a temperature inversion exists. An inversion is characterized by low air movement and an increase in air temperature with an increase in altitude. In humid regions, a fog or mist may form. An inversion may be detected by producing a smoke column and checking for a layering effect. Smoke-producing devices on aircraft are recommended. If not sure whether inversion conditions are present, consult with local weather services before making an application.

Drift from aerial or ground equipment may be further reduced by:

Using large droplet size sprays to minimize drift. DO NOT APPLY WITH HOLLOW-CONE INSECTICIDE NOZZLES ON GROUND EQUIPMENT. Do not use nozzles that produce small droplets, such as Sprayfoil® or airblast-type nozzles. Nozzles should be oriented at an angle between straight down and straight back for ground applications.

For aerial applications, orient nozzles straight back along the windstream using straight stream orifices (such as disk with no swirl plate). If using flood-type nozzles on aircraft, orient them so spray is produced in direction of the airstream. Use the lowest number of nozzles practical with the largest orifice size per nozzle to obtain minimum of 1 GPA. Application height should not exceed 1/2 length of wing span, to minimize drift potential. Boom length must not exceed 2/3 of wing span.

Increasing volume of spray mix per acre (for example, minimum 5 GPA by air, 10 GPA by ground) by using higher flow-rate nozzles.

Reducing pressure (PSI). DO NOT EXCEED 40 PSI when applying "Ally". (Vehicle speed must also be reduced to maintain spray mix volume per acre). Consult manufacturer's catalogs for details on correct calibration.

Apply as close to target plants as possible while still maintaining a good spray pattern.

Note: Do not allow spray to drift onto adjacent crops, or onto agricultural land scheduled to be planted to crops other than wheat, barley, grasses grown on Conservation Reserve Program (CRP) acres or grasses grown in pastures and rangeland, as injury to the crop may occur. Extreme care must be taken to prevent drift onto susceptible nontarget plants or nontarget land.

BIOASSAY

DU PONT LRB™ BIOASSAY SERVICE

In the states of ID, MT, ND and SD, the Du Pont LRB™ Bioassay Service is available through certain dealers and/or consultants. This service uses soil samples taken by Du Pont certified individuals for laboratory bioassay analysis. LRB™ results will serve as a crop rotation recommendation.

Check with your local Du Pont representative or call toll free 1-800-782-3557 for information regarding the LRB™ Bioassay Service.

FIELD BIOASSAY

"Ally" is a useful tool for weed control in pastures; however, under some conditions small amounts of "Ally" can remain in the soil and injure crops other than those listed on the "Ally" label under "Crop Rotation Guidelines" for 34 months or more after application. Therefore, before you use "Ally" you should carefully consider your crop rotation plans during the three (or more) year period following treatment.

A field bioassay involves growing test strips of the crop or crops you plan to grow the following year in fields previously treated with "Ally". Crop response will indicate whether or not to rotate to the crop(s) grown in the test strips.

"Ally" breaks down most rapidly in soils that have high microbial populations. Factors that favor microbial activity include having annual rainfall of 10" or more and having long growing seasons with warm soil temperatures. Factors that reduce microbial activity, hence slow the disappearance of "Ally" in soils, are low rainfall and prolonged periods of soil temperatures less than 40 Deg. F.

Microbial activity, soil temperature, and to a large degree soil moisture, can vary greatly from year-to-year, and from area-to-area. Consequently, it is not always possible to accurately predict when areas treated with "Ally" can be rotated to crops other than those listed on the label.

A biological assay of your "Ally" treated field is the only sure way of determining when crops other than those listed on the label can be grown and is conducted as follows:

1. The accuracy and reliability of any field bioassay is largely dependent on the location and number of strips planted. Be sure to select areas of the field previously treated with "Ally" that are representative of the various field conditions. Be sure to consider factors such as field

size, soil texture, drainage, turnaround areas, eroded knolls or alkaline spots when selecting the sites that are most representative of the soil conditions in the field.

Even in small fields, more than one test strip is required to accurately determine whether it is safe to rotate to a crop not listed on the label. On large fields, several test strips will be needed in order to obtain reliable results based on the field variables mentioned above.

2. Plant the test strips perpendicular to the direction in which the field was sprayed. Each strip should be long enough to cross the width of several spray swathes. A large test strip area is more reliable than a small one. Suggested size is 1/4 to 1/2 acre per test strip.

3. Use standard tillage and seeding equipment to plant the bioassay crop(s).

4. Prepare a seed bed and plant the crops and varieties you want the option of growing the following year. IT IS IMPORTANT TO USE THE SAME PLANTING TIME, CONDITIONS, TECHNIQUES AND CULTURAL PRACTICES YOU NORMALLY USE TO PLANT AND GROW THE BIOASSAY CROP(S). If possible, plant into an adjacent area not treated with "Ally" to use as a comparison.

5. Do not overspray the test strips with herbicides that may damage the bioassay crop(s).

6. If the crop(s) in the test strip(s) grow to maturity with a normal harvest, the assay is positive and you may now rotate to the new crop. However, if crop(s) in the test strips die, are stunted, or fail to yield a normal harvest, the assay is negative and you should not rotate to the new crop(s). Run the assay until positive results are obtained before rotating to the new crop(s).

7. If the bioassay indicates that "Ally" residues are still present, do not rotate to crops other than wheat, barley, oats, rye, or triticale or those listed on label until bioassay results indicate that the assay crop(s) are growing normally.

SPRAYER CLEANUP

AT THE END OF THE DAY

It is recommended that during periods when multiple loads of "Ally" will be applied, at the end of each day of spraying rinse the interior of the tank with fresh water, then partially fill the tank and flush the boom and hoses. This will prevent the buildup of dried pesticide deposits which can accumulate in the application equipment.

AFTER SPRAYING "ALLY" AND BEFORE SPRAYING CROPS OTHER THAN PASTURE AND RANGELAND GRASSES, CRP GRASSES, WHEAT, OR BARLEY.

To avoid subsequent injury to desirable crops, thoroughly clean all mixing and spray equipment immediately following applications of "Ally" as follows:

1. Drain tank; thoroughly rinse spray tanks, boom, and hoses with clean water. Loosen and physically remove any visible deposits.

2. Fill the tank with clean water and one gallon of household ammonia* (contains 3% active) for every 100 gallons of water. Flush the hoses, boom and nozzles with the cleaning solution. Then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 minutes. Again flush the hoses, boom and nozzles with the cleaning solution and then drain the tank.

3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.

4. Repeat step 2.

5. Rinse the tank, boom and hoses with clean water.

6. The rinsate may be disposed of on site or at an approved waste disposal facility.

*Equivalent amounts of an alternate strength ammonia solution or a Du Pont approved cleaner (listed below) can be used in the cleanout procedure. Carefully read and follow the individual cleaner instructions.

Du Pont approved cleaners:

- Protank Cleaner, Manufactured for Cenex/Land O'Lakes Agronomy Co.
- Chem-Tank Cleaner & Neutralizer, Manufactured by Farmbelt Chemicals, Inc.
- Incide-Out, Precision Laboratories, Inc.
- Nutra-Sol, Compounded for Thomas G. Kilfoil Co., Inc.
- Tank and Equipment Cleaner, Manufactured by Loveland Industries, Inc.
- Tank-Aid , Manufactured for Cornbelt Chemical Company

Notes:

1. A steam cleaning of aerial spray tanks is recommended prior to performing the above cleanout procedure to facilitate the removal of any caked deposits.

2. When "Ally" is tank mixed with other pesticides, all cleanout procedures should be examined and the most rigorous procedure should be followed.

3. In addition to this cleanout procedure, all precleanout guidelines on subsequently applied products should be followed as per the individual labels.

4. Where routine spraying practices include shared equipment frequently being switched between applications of "Ally" and applications to sensitive crops during the same spray season, it is recommended a sprayer be dedicated to "Ally" to further reduce the chance of crop injury.

STORAGE AND DISPOSAL

STORAGE: Store product in original container only. Do not contaminate water, other pesticides, fertilizer, food or feed in storage.

PRODUCT DISPOSAL: Do not contaminate water, food or feed by storage, disposal or cleaning of equipment. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Triple-rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

NOTICE TO BUYER: Purchase of this material does not confer any rights under patents of countries outside of the United States.

NOTICE OF WARRANTY

Du Pont warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness, or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of Du Pont. In no case shall Du Pont be liable for consequential, special or indirect damages resulting from the use or handling of this product. All such risks shall be assumed by the buyer. DU PONT MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

Registered trademarks of:

[1] Sandoz Crop Protection Corporation.

[2] Rhone-Poulenc Ag Company.

[3] The Dow Chemical Company.

[4] Ciba-Geigy Corporation.

[5] American Cyanamid Company.

[6] Hoechst-Roussel Agri-Vet Company.

[7] Bayer AG, Leverkusen.

[8] Delavan Corporation.

[9] D. and W. Corporation.

AG - 7644 9033 3/25/93

DowElanco

CURTAIL*

HERBICIDE

For Selective Control of Broadleaf Weeds in Wheat and Barley Not Underseeded With a Legume, Fallow Cropland, Grasses Grown for Seed And Conservation Reserve Program (CRP) Acres

ACTIVE INGREDIENT(S):

Clopyralid (3,6-Dichloro-2-pyridinecarboxylic acid) as alkanolamine salts (of the ethanol and isopropanol series)	7.5%
2,4-Dichlorophenoxyacetic Acid as alkanolamine salts (of the ethanol and isopropanol series)	38.4%
INERT INGREDIENT(S):	54.1%
TOTAL	100.0%

Acid Equivalents:
3,6-Dichloro-2-pyridinecarboxylic acid 3.9% - 0.38 lb/gal
2,4-Dichlorophenoxyacetic acid 20.9% - 2.0 lb/gal

E.P.A. Registration No. 62719-48 E.P.A. Est. 464-MI-1

KEEP OUT OF REACH OF CHILDREN

DANGER

PELIGRO:

PRECAUCIÓN AL USUARIO:
Si usted no lee ingles, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUSES EYE DAMAGE AND SKIN IRRITATION • HARMFUL IF SWALLOWED

Do Not Get In Eyes, On Skin Or On Clothing • Wear Goggles Or Face Shield When Handling • Wash Thoroughly With Soap And Water After Handling • Remove Contaminated Clothing and Wash Before Reuse

STATEMENTS OF PRACTICAL TREATMENT:

If in eyes, flush with plenty of water for at least 15 minutes. Get medical attention. If on skin, wash with plenty of soap and water. Get medical attention if irritation persists. If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Call a physician. Do not induce vomiting or give anything by mouth to an unconscious person.

ENVIRONMENTAL HAZARDS

Keep out of lakes, streams or ponds. Do not contaminate water when disposing of equipment washwaters. Do not contaminate water used for irrigation or domestic purposes. Do not apply directly to any body of water or wetlands. See additional precautionary statements elsewhere on this label.

NOTICE

Read and understand the entire label before using. Use only according to label directions.

Before buying or using this product, read "WARRANTY LIMITATIONS AND DISCLAIMER" elsewhere on this label. If terms are not acceptable, return unopened package at once to seller for full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under WARRANTY LIMITATIONS AND DISCLAIMER.

IN CASE OF AN EMERGENCY
endangering life or property involving this product, call collect 517-636-4400

AGRICULTURAL CHEMICAL
Do Not Ship or Store with Food, Feeds, Drugs, or Clothing

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irrigation system.

CURTAIL Herbicide is recommended for selective, postemergence control of the following broadleaf weeds in wheat and barley not underseeded with a legume, fallow cropland (including summer fallow, post-harvest, and set-aside acres) and land in the Conservation Reserve Program (CRP).

alfalfa	nightshade, cutleaf
artichoke, Jerusalem	nightshade, hairy
buckwheat, wild	pennycress, field (fanweed)
buffalobur[1]	pigweed, redroot
burdock, common	
chamomile, false (scentless)	pineappleweed
chamomile, mayweed (dogfennel)	plantain
clover, sweet	radish, wild
clover, red	ragweed, common
cocklebur, common	ragweed, giant
coffeeweed	salsify, meadow (goatsbeard)
cornflower (bachelor button)	shepherdspurse
dandelion	sicklepod
dock, curly	smartweed, Pennsylvania
flixweed[1]	sorrel, red
groundsel, common	sowthistle, annual
hawksbeard, narrowleaf	sowthistle, perennial[1]
horseweed	starthistle, yellow
jimsonweed	sunflower, common
knapweed, diffuse	tansymustard, pinnate[1]
knapweed, Russian[1]	thistle, Canada
knapweed, spotted	thistle, musk
kochia (2-4 leaf)[1]	thistle, Russian (1-3 leaf)
ladysthumb	velvetleaf
lambsquarters, common	vetch
lettuce, prickly	volunteer beans
locoweed, white	volunteer lentils
locoweed, lambert	volunteer peas
marshelder	
mustard, tumble (Jim Hill)	
mustard, wild	

[1] These weeds may only be supressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree of weed control and duration of effect will vary with weed size and density, spray rate and coverage, and growing conditions before, during and after the time of treatment.

For perennial weeds, CURTAIL Herbicide will control the initial topgrowth and inhibit regrowth during the season of application (season-long control). At higher use rates shown on this label, CURTAIL Herbicide may cause a reduction in shoot regrowth in the season following application, however, plant response may be inconsistent due to inherent variability in shoot regrowth from perennial root systems.

Timing: Apply to actively growing weeds. Extreme growing conditions such as drought or near freezing temperatures prior to, at and following time of application may reduce weed control and increase the risk of crop injury at all stages of growth. Only weeds which are emerged at the time of application will be affected. Wet foliage at the time of application may decrease control. The CURTAIL Herbicide treatment will be rainfast within 6-8 hours after application.

Rate: Generally, lower labeled application rates will be satisfactory for young, succulent growth of sensitive weed species. For less sensitive species, perennials and under conditions where control is more difficult (plant stress conditions such as drought or extreme temperatures, dense weed stands and/or larger weeds) the higher rates will be needed. Weeds in fallow or other areas where crop competition is not a factor will generally require higher rates to obtain control or suppression.

Coverage: Adequate spray coverage and drift control are important. Obtaining a balance between spray coverage and drift control may sometimes be difficult but can be achieved, provided the applicator understands the factors affecting coverage and drift. Factors affecting spray coverage include spray volume, crop canopy and weed density. As crop canopy and weed density increase, spray volume should be increased to obtain equivalent weed control. Refer to manufacturer's recommendations for informa-

tion on the relationship between gallons per acre, spray pressure, sprayer speed, nozzle type and arrangement, nozzle height above the target canopy, droplet size and drift potential for respective application equipment. Do not apply less than 2 and not more than 40 gallons per acre total spray volume. For best results, apply 5 or more gallons per acre by air and 10 or more gallons per acre by ground. Reducing total spray volume may result in decreased coverage and weed control. Use enough total spray volume and a delivery system to provide thorough coverage and a uniform spray pattern. Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants.

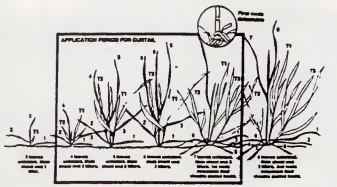
Use of Surfactants: Addition of wetting and/or penetration agents is not usually necessary when using CURTAIL Herbicide; however, if a surfactant will be added to the spray solution, use a nonionic surfactant approved for use on growing crops, such as X-77, of at least 80% active ingredient and do not exceed 4 pints per 100 gallons of spray solution (0.5% v/v). Adding a surfactant to the spray mixture may increase effectiveness on weeds but may reduce selectivity to the crop, particularly under conditions which promote plant stress.

Use With Sprayable Liquid Fertilizer Solutions: CURTAIL Herbicide is compatible with most non-pressurized liquid fertilizer solutions, however, if these solutions are to be sprayed with CURTAIL Herbicide, a compatibility test (jar test) should be made prior to mixing. Jar tests are particularly important when a new batch of fertilizer or pesticide is used, when water source changes, or when tank mixture ingredients or concentrations are changed. A compatibility test is performed by pouring the spray components (in the desired order and proportions) into a clear glass jar before mixing in the spray tank. Use of a compatability aid such as Unite or Compex may help obtain and maintain a uniform spray solution during mixing and application. Agitation in the spray tank must be vigorous to compare with jar test agitation. For best results, liquid fertilizer rates should not exceed 50% of the total spray volume. Premix CURTAIL Herbicide with water and add to the liquid fertilizer/water mixture while agitating contents of the spray tank. Apply the spray the same day it is prepared while maintaining continuous agitation. NOTE: Foliar-applied liquid fertilizers can cause yellowing or leaf burn of crop foliage.

WHEAT AND BARLEY

Timing: Apply CURTAIL Herbicide in the spring to actively growing wheat or barley once 4 leaves have unfolded on the main stem and tillering has begun up to the jointing stage (first node of main stem detectable). To control or suppress weeds listed above, make application after maximum emergence of the target weeds but before they exceed 3 inches in height or diameter (for rosettes). To obtain season-long control of perennial weeds such as Canada thistle, apply after the majority of the weed's basal leaves have emerged from the soil, but before bud state. A later timing of application (when the grain is between the jointing and boot stages) may be used to treat later-emerging weeds, however, do not apply unless the risk of injury is acceptable. Do not apply after the boot stage. **NOTE:** Do not permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within 1 week after treatment. Do not harvest hay from treated grain fields.

Rate: Apply 2 to 2½ pints of CURTAIL Herbicide per acre. The higher rate may be used when the condition of the weeds and/or crop at the time of treatment may prevent optimum control. **Note: Higher rates of CURTAIL Herbicide or CURTAIL Herbicide applications following spring postemergence treatments with 2,4-D or MCPA may increase the risk of crop injury.**



TANK MIXTURES FOR WHEAT AND BARLEY

This product may be tank mixed with the following herbicides for control of additional weeds in wheat and barley. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions. When tank mixing, use in accordance with the most restrictive of label limitations and precautions. No label dosages should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

Active Ingredient	Product	Formulation	Amount of Product Per Acre
bromoxynil[1]	Buctril	2 lb/gal	½ to 1 pt
	Buctril 4EC	4 lb/gal	½ to ½ pt
	Buctril ME4		
chlorsulfuron	Glean	75% DF	¼ to ½ wt oz
dicamba[1,2]	Banvel	4 lb/gal	½ to ¼ pt
difenzoquat	Avenge	2 lb/gal	2½ to 4 pt
diuron	Diuron 4L	4 lb/gal	1 to 1½ pt
	Diuron 4L		
	Diuron 80 WDG	80% DF	½ to 1 lb
	Diuron DF	80% WP	
MCPA or 2,4-D[2]		4lb/gal	Up to ½ pt
metribuzin	Lexone DF	75% DF	2½ to 4 wt oz
	Sencor DF		
metsulfuron methyl	Ally	60% DF	⅛ wt oz
terbutryn	Igran 80 WR	80% WP	6 to 10 wt oz
thiameturon	Harmony	75% DF	½ to 1½ wt oz
DPX L-5300	Express	75% DF	¼ to ¼ wt. oz.

[1] Buctril or Banvel tank mixes with CURTAIL Herbicide may be useful in broadening the annual weed control spectrum but may reduce control of perennials, such as Canada thistle.

[2] Note: Do not tank mix CURTAIL Herbicide with 2,4-D or dicamba unless the risk of crop injury is acceptable.

FALLOW CROPLAND

Timing: CURTAIL Herbicide can be applied either postharvest, in the spring/summer (during fallow period) or to set-aside acres to control or suppress weeds listed above (refer to rotation restrictions). Apply to young, emerged weeds under conditions that promote active growth. For best results on tough perennial weeds such as Canada thistle, apply after the majority of the basal leaves have emerged, but before bud stage. Later applications may result in less consistent control. Extreme growing conditions (such as drought or near freezing temperatures) prior to, at, and following the time of application may reduce weed control.

For best results, wait 14 to 20 days after application before cultivating or fertilizing with shank-type applicators to allow for thorough translocation. To avoid potential phytotoxicity, allow at least 20 days after the application before seeding to wheat, barley or grasses.

Rate: Apply 2 to 4 pints of CURTAIL Herbicide per acre. Use the higher rate on perennial weeds or when the condition of the weeds at the time of treatment may prevent optimum control.

Tank Mixtures For Fallow Cropland: To improve control of certain broadleaf weeds, CURTAIL Herbicide at 2 pints per acre may be applied with up to 1.5 lb ae per acre additional 2,4-D. When mixing, read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions. When tank mixing, use in accordance with the most restrictive of label limitations and precautions. No label doses should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

GRASSES GROWN FOR SEED

Timing: Apply only to established grasses before the boot stage. Applications in the boot stage and beyond will result in increased injury. Do not apply to bentgrass unless injury can be tolerated.

Rate: Use 2 to 4 pints of CURTAIL Herbicide per acre for control of annual weeds and Canada thistle. The potential for crop injury exists due to the 2,4-D component of this product and must be balanced against the benefits of improved weed control. Potential for crop injury increases with higher rates. Re-treat as necessary, but do not exceed 4 pints per acre of CURTAIL per season.

Note: Do not graze (dairy) cattle in treated areas for 14 days after application. Remove meat animals from freshly treated areas for 7 days before slaughter. Withdrawal is not needed if 2 weeks or more have elapsed since application. Do not cut treated grass for hay within 30 days after application.

CONSERVATION RESERVE PROGRAM (CRP) FOR SEEDING TO PERMANENT GRASSES ONLY

Do not use CURTAIL Herbicide if legumes or bentgrass are a desired cover during CRP.

Grass grown on CRP acres cannot be grazed or used for hay.

Conditions that stress grasses, such as drought, will increase potential for injury to the grass at all stages of growth. Do not use in newly seeded areas until grass is established.

Timing: CURTAIL Herbicide can be applied when perennial grasses have become established (tillering, with at least 1.5 inches secondary roots, and good vigor). For control of weeds such as musk thistle, Canada thistle and knapweed (diffuse, spotted and Russian), apply to actively growing weeds after the majority of the basal leaves have emerged, but before bud stage. Later applications may result in less consistent control.

Rate: Apply 2 to 5 quarts of CURTAIL Herbicide per acre.

USE PRECAUTIONS

Apply only once per 12-month period, except for grass grown for seed (see Directions for Use). A fallow treatment that precedes or follows a small grain application is also allowed.

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. Therefore, do not apply CURTAIL Herbicide directly to or allow spray drift to come in contract with vegetables, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Wheat, barley, oats, grasses, or sugar beets (including beets grown for seed) may be planted less than 12 months after treatment.

Alfalfa, asparagus, canola, cole crops, mint, onions, safflower, and strawberries may be planted 12 months after treatment. Dry beans, soybeans and sunflowers may also be planted at 12 months after treatment, except in soils with less than 2% organic matter receiving less than 15 inches of natural precipitation in the 12 month period following treatment. For these areas see SPECIAL CONDITIONS below.

To avoid potential phytotoxicity all other crops including peas, lentils, potatoes, and broadleaf crops grown for seed should not be planted for 18 months after treatment unless the risk of injury is acceptable.

SPECIAL CONDITIONS: CURTAIL residues in plant tissues which have not completely decayed may affect succeeding susceptible crops. In areas defined previously as low in organic matter and precipitation, sensitive crops such as dry beans, soybeans, and sunflowers may be injured when planted 12 months after treatment. Unless the risk of injury is acceptable, these crops should not be planted until 18 months after treatment. The potential for injury may be reduced by burning, removal, or incorporation of treated crop residues with a minimum of 2 supplemental Fall irrigations.

Avoid Spray Drift: Applications should be made to avoid spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. Fine droplets can present a drift hazard. A drift control or deposition agent such as Nalco-Trol may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

Ground Application: To minimize spray drift, apply CURTAIL Herbicide in a total spray volume of 10 or more gallons per acre as a large-droplet, low pressure spray. Refer to manufacturer's recommendations for additional information on gallons per acre, spray pressure, sprayer speed, nozzle types and arrangements, nozzle heights above the target canopy, etc., for respective application equipment. Spot treatments should only be applied with a calibrated boom to prevent misapplications. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying no more than 20 gallons of spray per acre; by using no more than 30 pounds spraying pressure with large droplet-producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 6 to 7 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by applying a coarse spray; by using no more than 30 pounds spray pressure at the nozzles; by using straight-stream nozzles directed straight back; by using a spray boom no longer than ¾ the wing span of the aircraft; and by spraying only when wind velocity is less than 6 mph.

Do Not Apply By Aircraft When An Air Temperature Inversion Exists. Such a condition is characterized by little or no wind and with lower air temperature near the ground than at higher levels. The use of a smoke device on the aircraft or continuous smoke column at or near site of application will indicate air direction and velocity, and whether a temperature inversion is present, which is shown by layering of the smoke.

Do not move treated soil and avoid situations where treated soil particles may blow into areas where susceptible crops are grown. Violent windstorms may move soil particles. If this product is on soil particles and they are blown onto susceptible plants, visible symptoms may appear. Serious injury is unlikely. The hazard of movement of this product on dust is reduced if treated fields are irrigated or if rain occurs shortly after application.

Straw from treated areas, or manure from animals which have grazed treated areas, cannot be used for composting or mulching on ground where susceptible crops may be grown the following season. To promote herbicide decomposition, plant material should be evenly incorporated or burned.

Do not use in a greenhouse. Excessive amounts of this herbicide in the soil may temporarily inhibit seed germination or plant growth.

Do not contaminate water when disposing of equipment washwaters. Apply this product only as specified on this label.

Do not transfer livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants.

PRECAUTIONARY STATEMENTS

ENVIRONMENTAL HAZARDS

Clopyralid is a chemical which can travel (seep or leach) through soil and under certain conditions contaminate groundwater which may be used for

irrigation or drinking purposes. Users are advised not to apply clopyralid where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow, or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into an aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Storage: Store above 10°F or warm and agitate before use.

Pesticide Disposal: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal (Metal): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Container Disposal (Plastic): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

WARRANTY LIMITATIONS AND DISCLAIMER

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions therein under normal conditions of use. THIS IS THE ONLY WARRANTY MADE ON THIS PRODUCT. NO OTHER EXPRESS AND NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE OUTSIDE OF THIS LABEL. Therefore, neither this warranty nor any other warranty of merchantability or fitness for a particular purpose, express or implied, extends to the use of this product contrary to label instructions (including conditions noted on the label, such as unfavorable temperatures, soil conditions, etc.), under abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes, etc.) or under conditions not reasonably foreseeable to or beyond the control of seller.

When buyer or user suffers losses or damages resulting from the use or handling of this product (including claims based on contract, negligence, strict liability, or other legal theories), buyer or user must promptly notify in writing DowElanco of any claims to be eligible to receive either remedy given below. The EXCLUSIVE REMEDY OF THE BUYER OR USER and the LIMIT OF LIABILITY of DowElanco or any other seller will be one of the following, at the election of DowElanco:

(1) **Refund of purchase price paid** by buyer or user for product bought, **or**

(2) **Replacement** of amount of product used.

The seller **will not be liable** for **consequential** or **incidental damages** or **losses.**

The terms of this Warranty Limitations And Disclaimer cannot be varied by any written or verbal statements or agreements. Any employee or sales agent of the seller is not authorized to vary or exceed the terms of this Warranty Limitations And Disclaimer in any manner.

08103-L1 190

* Registered Trademark of DowElanco

This is a specimen label. DowElanco is not responsible for the accuracy of the information contained herein. As labels are subject to revision, always carefully read and follow the label on the product container.

CLASS®
CROP PROTECTION

JUN 2 3 1992

CLASS

MCPA

WEED KILLER

ACTIVE INGREDIENT:	
Dimethylamine Salt of 2-methyl-4-chlorophenoxyacetic acid*	48.72%
INERT INGREDIENTS:	51.28%
Total	100.00%

*Isomer Specific by AOAC Method No. 6.A18-22 (13th Edition)
†Equivalent to 39.72% of 2-methyl-4-chlorophenoxyacetic acid
Contains 3.70 lbs. of MCPA per gallon

KEEP OUT OF REACH OF CHILDREN

DANGER

SEE SIDE PANELS FOR ADDITIONAL PRECAUTIONARY STATEMENTS

®CLASS is a registered trademark of Cenex/Land O'Lakes Agronomy Company

EPA Reg No. 1381-104
EPA Est. No. 407-IA-1; 407-MN-1A
Superscript corresponds to letter in lot number

Manufactured For
CENEX/LAND O'LAKES AGRONOMY CO.
St. Paul, MN 55164

CENEX LAND O LAKES CENEX

CENEX LAND O LAKES CENEX

CENEX LAND O LAKES CENEX

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
DANGER

Corrosive, causes eye and skin damage. Do not get in eyes. Avoid contact with skin. Harmful if absorbed through skin. Wear goggles or face shield when handling. In case of contact, flush eyes or skin with plenty of water for at least 15 minutes. For eyes, call a physician. Get medical attention if skin irritation persists. Remove and wash contaminated clothing before reuse.

Harmful if swallowed. If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person. Seek medical attention.

ENVIRONMENTAL HAZARDS

This product is toxic to aquatic invertebrates. Drift or runoff adversely affect aquatic invertebrates and nontarget plants. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water when disposing of equipment washwaters or rinsate.

Most cases of groundwater contamination involving phenoxy herbicides such as MCPA have been associated with mixing/loading and disposal sites. Caution should be exercised when handling MCPA pesticides at such sites to prevent contamination of groundwater supplies. Use of closed systems for mixing and transferring this pesticide will reduce the probability of spills. Placement of the mixing/loading equipment on an impervious pad to contain spills will help prevent groundwater contamination.

When cleaning equipment, do not pour washwater on the ground; spray or drain over a large area away from wells and other water sources.

Do not apply to or allow drift onto cotton, flowers, fruit trees, grapes, ornamentals, vegetables, or other desirable plants. Even very small quantities of drift, although not visible, can cause severe injury during dormant and growth periods. Follow use precautions listed below.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

Mixers/loaders or applicators are required to use face shields or goggles.

RE-ENTRY STATEMENT

Do not apply this product in such a manner as to directly, or through drift, expose workers or other persons. The area being treated must be vacated by unprotected persons. Do not enter treated areas without protective clothing until sprays have dried.

Because certain states may require more restrictive re-entry intervals for various crops treated with this product, consult your State Department of Agriculture for further information.

Written or oral warnings must be given to workers who are expected to be in a treated area or in an area about to be treated with this product. The PRECAUTIONARY STATEMENTS should be read to workers as well as the instruction not to enter until sprays have dried. When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings must be given if there is reason to believe that written warnings cannot be understood by workers. Written warnings must include the following information: "DANGER: Area treated with MCPA on (date of application). Do not enter without appropriate protective clothing until sprays have dried."

STORAGE AND DISPOSAL

STORAGE: Store in a secure area, in original container only, away from fertilizers, food, or feed. Do not store near insecticides or fungicides.

PESTICIDE DISPOSAL: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. Do not contaminate water, food, or feed by storage or disposal.

CONTAINER DISPOSAL: Metal Containers: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

CONTAINER DISPOSAL: Plastic Containers: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

USE PRECAUTIONS

With ground equipment, spray drift can be minimized by keeping the spray boom as low as possible, by applying 3 to 20 gallons or more of spray per acre; (unless otherwise specified) by using flat fan or flood tan nozzle tips and by stopping spraying when wind velocity exceeds 5 to 7 miles per hour. DO NOT apply with nozzles that produce fine droplet sprays. For aerial application, apply using the volume of water indicated under each crop listing, at 20 pounds or less nozzle pressure using nozzles that produce a coarse spray pattern. Spray only when wind is blowing less than 5 miles per hour.

Do not apply this product through any type of irrigation system.

SUSCEPTIBLE WEEDS: Arrowhead lily, beggartick, bullrush, burdock, burhead, buttercup, cocklebur, curly indigo, Oregon Head Mint, field pepper grass, goatsbeard, hempnettle, hoary cress, honeysuckle, jimsonweed, ladysthumb, lambsquarters, marsh elder, mustards (except blue), pigweed, plantain, pennycress, poison hemlock, prickly lettuce, puncturevine, ragweed, redstem, shepherdspurse, stinkweed, water hyssop, water plantain, whitebrush, wild jute, wild mangold, wild pet onion, wild radish, wild sage, witchweed, yellow rocket.

LESS SUSCEPTIBLE WEEDS: Canada thistle, dandelion, nutgrass, sedge, sunflower, wild carrot.

MIXING INSTRUCTIONS: WATER-BASED SPRAY — Fill the equipment half full of water, agitate while adding this product, then add rest of water.

NITROGEN FERTILIZER — The compatability of this product must be tested with the fertilizer before its use in application equipment. This is done by means of a quart jar test as follows: The amount of this product to add to one pint of liquid nitrogen fertilizer is determined by using this table —

AMOUNT OF MCPA PER ACRE	GALLONS OF FERTILIZER PER ACRE				
	10	20	30	40	50
	TEASPOONS OF MCPA PER PINT OF FERTILIZER				
1/2 pint	2/3	1/2	1/3	1/4	1/8
1 pint	1-1/4	1	3/4	1/2	1/4
2 pints	2-1/2	2	1-1/2	1	1/2
4 pints	5	4	3	2	1

The amount in the table is based on gallons of finished spray per acre. Different spray volumes will require appropriate changes in the amount of this product added to one pint of fertilizer. Add the required amount of this product to one pint of fertilizer in a quart jar and shake to mix well. Let the mixture stand and examine it after 5 minutes and again after 30 minutes. The product is incompatible if it balls up, forms flakes, sludges, gels, oily films, layers, or other precipitates. If the precipitate can be suspended with agitation the combination can be used if the equipment has vigorous agitation throughout mixing and spraying operations.

In some cases, when incompatibility occurs, the addition of 1/4 teaspoon of a compatibility agent cleared for applications to growing crops (such as Cenex/Land O'Lakes Baffast) to the jar before adding this product may solve the problem (1/4 teaspoon is equal to 2 pints per 100 gallons of fertilizer). IF THIS DOES NOT WORK, DO NOT ATTEMPT THE ADDITION OF THIS PRODUCT TO THE FERTILIZER.

— Fertilizer Mixing Sequence: If a compatibility agent is not required, add half the fertilizer to the tank, make a premix of 1 part this product and 4 parts water and add premix to tank with agitation ON. Then add balance of fertilizer. Apply at once with agitation ON. — If a compatibility agent is required add it to half full tank before premix addition. Then proceed as above. MAKE SURE TO FOLLOW ALL DIRECTIONS ON THIS AND THE FERTILIZER AND

CENEX

CENEX LAND O'LAKES CENEX

UMPATIBILITY AGENT LABELING.

ALL GRAIN CROPS: Do not forage or graze meat animals on treated areas within 7 days of anything

N PLANTED (Oats, Barley, Rye, & Wheat Not Underseeded to Legumes): Apply 1 1/2 to pint per acre. For aerial application, apply the recommended amount in a minimum of 1 gallon water per acre. Use 3 or more gallons under adverse growing conditions. For ground pplication, apply the recommended amount in a minimum of 3 gallons of water per acre, when ain is in 3 to 5 leaf stage or up to early boot stage. Apply 10 or more gallons under adverse owing conditions. Apply when weeds are small. Do not apply during boot to dough stage.

FALL PLANTED (Oats, Barley, Rye, & Wheat Not Underseeded to Legumes): Use 1/2 to 1 nt per acre. For aerial application, apply the recommended amount in a minimum of 1 gallon of ater per acre. Use 3 or more gallons under adverse growing conditions. For ground applica- on, apply the recommended amount in a minimum of 3 gallons of water per acre, in early spring hen weeds are small and grain is fully tillered, but before boot stage. Use in 10 or more gallons ider adverse growing conditions.

RESCUE TREATMENT (For Perennial Broadleaf Weeds in Wheat): Treat in spring after grain is tillered and at least 8 - 10" tall. Apply 3 pints per acre. For aerial application, apply the ecommended amount in a minimum of 1 gallon of water per acre. Use 3 or more gallons under dverse growing conditions. For ground application, apply the recommended amount in a minimum of 3 gallons of water per acre, when weeds are approaching bud stage, but do not pray when grain is in boot to dough stage. Use 10 or more gallons under adverse growing onditions. This application can produce injury to wheat. Use good judgement in determining he severity of weed infestation against possibility of crop damage. When weeds are scattered, pot treatment will lessen damage.

SMALL BRAINS (Underseeded with Alfalfa, Birdsfoot Trefoil, Lespedeza, Red and White lover): For mustard, yellow rocket and other susceptible broadleaf weeds, apply 1/4 to 1/2 int in not more than 6 gallons of water per acre, by either aerial or ground application, (higher olumes may result in injury to legumes). Apply after grain is tillered (4 - 8" tall) and before ert stage. The combination of the nurse crop, and weed canopy and low water volume can uce legume damage. DO NOT apply to small grains underseeded with vetch or sweet clover O NOT apply unless legume injury can be tolerated.

ESTABLISHED ALFALFA and NEW SEEDLINGS or OLDER STANDS of RED CLOVER: For control of llow rocket, pennycress (lanweed), and other susceptible weeds. Apply 1 pint per acre. pply the recommended amount in a minimum of 1 gallon of water per acre for aerial pplication. Use 3 or more gallons under adverse growing conditions. For ground application, pply the recommended amount in a minimum of 3 gallons of water per acre. Use 10 or more allons under adverse growing conditions. Apply in late fall following frost or early spring when ass is dormant. The temperature at time of spraying should be above 40°F.

CONSERVATION RESERVE PROGRAMS AND SET-ASIDE ACRES: NOTE: DO NOT use on alfalfa, over, other legumes or newly seeded areas. Apply 1 - 4 pints per acre. For aerial application, pply the recommended amount in a minimum of 1 gallon of water per acre. Use 3 or more allons under adverse growing conditions. For ground application, apply the recommended mount in a minimum of 3 gallons of water per acre, when weeds are small and growing. Use 10 or more gallons under adverse growing conditions. Use higher rate for whitetop, Canada thistle, lueweed and other hard to control weeds. Spray perennials in early bud to full bloom and regrowth in fall. Spray other weeds in spring and fall. DO NOT spray legumes, if present, unless injury can be tolerated.

For control of whitebrush on rangeland apply 3 pints in 1 gallon of diesel oil and 6 to 10 gallons water per acre by aircraft. Apply in spring or fall when foliage is developed and growing. Spray during bloom but not after blossom shed. Retreatment may be necessary. NOTE: Add MCPA to water, then add oil with agitation. Agitate while spraying.

CONSERVATION RESERVE PROGRAMS — DO NOT harvest or graze at any time.

RANGELAND AND ESTABLISHED PASTURES: Apply 1 to 4 pints per acre. For aerial application, pply the recommended amount in a minimum of 1 gallon of water per acre. Use 3 or more gallons under adverse growing conditions. For ground application, apply the recommended amount in a minimum of 3 gallons of water per acre, when weeds are small and growing. Use 10 or more gallons under adverse growing conditions. Use higher rate for whitetop, Canada thistle, buttercup and other hard to control weeds. Spray perennials in early bud to full bloom and regrowth in fall. DO NOT spray legumes, if present, unless injury can be tolerated.

For control of whitebrush on rangeland apply 3 pints in 1 gallon of diesel oil and 6 to 10 gallons water per acre by aircraft. Apply in spring or fall when foliage is developed and growing. Spray during bloom but not after blossom shed. Retreatment may be necessary. NOTE: Add MCPA to water, then add oil with agitation. Agitate while spraying.

NON-CROP SPRAYING (For Canada thistle, Whitetop, Meadow buttercup and similar hard to control weeds): Use 1/4 pint in 3 to 4 gallons water for spot treatment or 6 pints in minimum of 3 gallons of water per acre for aerial application, 30 to 100 gallons of water for ground application. Spray to wet weeds thoroughly when weeds are in bud to early bloom and again in fall. DO NOT forage or graze livestock on treated areas within seven days of treatment.

BRASSES BROWN FOR SEED: Apply 1 to 2 pints per acre. For aerial application, apply the recommended amount in a minimum of 1 gallon of water per acre. Use 3 or more gallons under adverse growing conditions. For ground application, apply the recommended amount in a minimum of 3 gallons of water per acre. Use 10 or more gallons under adverse growing conditions. Use higher rate for heavy weed stands. In established grasses, apply in spring before head comes into boot and on seedling grasses after tillering. NOTE: Repeat treatment may be needed. Legumes present may be injured or killed. Bent, Buffalo, Carpet, and St. Augustine grasses may be injured.

FLAX: Apply 1/2 pint in a minimum of 3 to 5 gallons per acre for aerial application, 8 to 10 gallons for ground application, when flax is 3 to 6" tall before buds begin to form. A rate of 3/4 to 1 pint may be needed to control wild buckwheat, smartweed and thistles to prevent seed head formation, but flax may be injured. DO NOT forage or graza meat animals on treated areas within seven days of slaughter.

RICE: For arrowhead, water plantain and redstem, apply 1/2 to 2 1/2 pint in a minimum of 3 to 5 gallons of water per acre for aerial application, 10 to 30 gallons of water per acre by other means. Use 2 to 3 pints when sedge, nutgrass and bullrush are present. Apply when rice is fully tillered and 6 to 8" above water no sooner than 35 days before or later than 65 days after seeding or when rice stem begins to elongate. DO NOT apply when rice is in early seeding, boot, early heading or when the temperature is over 90° F. Consult your Area Extension personnel to determine tolerance of rice varieties to MCPA. DO NOT grow crayfish or catfish in treated rice fields.

PEAS: Use on peas to control susceptible weeds only when recommended by local agricultural Extension Service or Experiment Station specialists. Use 1/4 to 1/3 pint in a minimum of 10 gallons of water per acre for aerial application, 15 to 30 gallons of water for ground application, when peas are 3 to 7 inches tall, before first flowering and weeds are small. Higher rates of 1/2 to 3/4 pint per acre may be used to improve control of difficult weeds but crop injury is more likely to occur. Do not apply if peas are taller than 7 inches or when they are stressed for lack of soil moisture. Do not apply when air temperature is over 90° F. DO NOT feed forage or graza treated fields. DO NOT feed treated vines to livestock. **NOTE: This product may cause injury and delayed maturity in the pea crop.**

NOTICE OF WARRANTY: Buyer assumes all risk of use, storage, or handling of this product when not in strict accordance with directions given herewith.

APPENDIX 8

EMERGENCY PROCEDURES

In the event that an accident, herbicide spill, or other probelm arises Region 8 should be contacted immediately. It may also be appropriate to call the County Sheriff. The telephone numbers are given below.

DFWP Region 8	444-4720
Lewis & Clark County Sheriff/Ambulance	911
Broadwater County Sheriff/Ambulance, Townsend	911
Jefferson County Sheriff/Ambulance, Boulder	225-4266
Posion Control	1-800-525-5042
Highway Patrol	444-7000 1-800-525-5555

APPENDIX 9

AQUATIC AND FISHERIES MITIGATION CALCULATION NOEL/EEC

All proposed spray projects within the sensitive ground and surface water management areas would be reviewed by the Region's fisheries biologist. Projects using picloram (Tordon) or 2,4, D should ensure that the Expected Environmental Concentration (EEC) from storm runoff could not exceed the No Observed Effect Level (NOEL) for trout. The formula (USDA-FS 1989), given below, will be used to test the NOEL against the EEC (NOEL ≤ EEC). The formula is designed to prevent herbicide effects on aquatic organisms by setting a limit on the amount of herbicide that could be applied near any stream.

EEC (ppm) = [(r x a x p) / w] x c where:

EEC	=	Expected Environmental Concentration
r	=	herbicide application rate (lbs/acre)
a	=	sprayed area within 500 feet of stream (acres)
p	=	portion of herbicide reaching stream during first storm (p = 2.7%)
w	=	weight of receiving water (lbs) (lbs = cfs x (900 sec) x 62.409 /b/ft3)
c	=	a constsant to convert concentration to ppm (106)

Thus: EEC = [r x a x 0.027) / (cfs x 900 x 62.409)] x 106
= [(r x a) / cfs] x 0.4807

The above formula will give the EEC for an herbicide application, provided that three variables are assigned project-specific values: application rate, acres treated within 500 feet of the stream, and flow rate (cfs) of the stream. The formula is based on the following assumptions:

- Maximum herbicide concentration would result from storm runoff in an intense summer thundershower.

- During an intense summer rain shower, rainfall duration would be 1/2 an hour, and the resulting overland flow carrying surface runoff into the stream would last 15 minutes, or 900 seconds (15 min x 60 sec/min).

- Longer storms would result in lower concentrations beause overland flow would be stretched out over a longer period. Peak herbicide concentration in the runoff would occur during the initial 15 minute flush.

- Only herbicide within 500 feet of the stream would be carried to the stream; maximum of 3% of the herbicide within 500 feet of the stream would be carried to the stream; a maximum of 90% of that 3% would be carried to the stream in the first storm.

- Thus, a maximum of 2.7% (3% x 90%) of the herbicide applied within 500 feet of the stream would enter the stream during the first 900 seconds of the first storm.

Finally, a safety limit can be set by changing the formula from an equation to an inequality. The plan states that the EEC should not exceed the NOEL for trout. Since the NOELs are based on relatively long-term exposure, using the NOELs should provide a safety margin because the EEC is expected to peak during a matter of minutes, rather than days. If the EEC calculated for a project is greater than the trout NOEL for the planned herbicide, then the project would have to be redesigned so that the EEC would be equal to or less than the NOEL. This could be done by reducing the amount of herbicide applied within 500 feet of the stream (either by reducing the total area treated, or reducing the application rate), by using a chemical with a higher NOEL, and/or by changing the timing of application to a period when the stream has a higher flow rate.

APPENDIX 10

MULTI-DISCIPLINARY TEAM

A Multi-disciplinary Team (Team) will provide technical and professional reviews for annual program evaluation including each site-specific plan. Members of the Team may include but not be limited to those listed below.

Region 8/Field Services/RegionalSupervisor

Region 8/Field Services/ Assistant Regional Supervisor

Region 8 Fisheries Biologists

Wildlife Biologists for the Canyon Ferry Reservoir and Lake Helena Wildlife Management Areas

Region 8 Parks Manager

Cultural Parks Supervisor

Property Superintendent

Warden Sergeant

DRAFT

ENVIRONMENTAL ASSESSMENT
INTEGRATED NOXIOUS WEED MANAGEMENT PLAN

REGION 8
MONTANA DEPARTMENT of FISH, WILDLIFE and PARKS

May 1993

CHAPTER I. The Purpose of and Need For Action

This Draft Environmental Assessment (EA) discloses the direct, indirect, and cumulative effects of a proposed action and alternatives for implementing a noxious weed management program for Region 8 of the Montana Department of Fish, Wildlife and Parks (DFWP).

1.1 The Proposed Action

As required by the County Noxious Weed Control Act of 1979 (MCA 7-22-2115), "it is unlawful for any person to permit any noxious weed to propagate or go to seed on his land..." In order to comply with this statute and DFWP goals and objectives, Region 8 proposes to implement a program to manage noxious weeds on twelve property groups totalling approximately 8800 acres managed by Region 8 (Figure 1). The proposed program would operate under provisions of the Final Integrated Noxious Weed Management Plan (Plan). The Plan, to be updated every five years, provides for an integrated approach to weed management and would be used to guide site-specific, annual weed control treatments beginning in the spring of 1993. The Plan would also be used to guide weed treatments under cooperative weed control projects in which Region 8 may participate.

Overall program direction is provided by DFWP's recently adopted Vision statement (DFWP 1992):

> "to provide for the stewardship of the fish, wildlife, parks and recreational resources of Montana, while contributing to the quality of life for the present and future generations."

The primary goal of the program continues to be that stated in a general, Department-wide weed control plan adopted by DFWP in 1983:

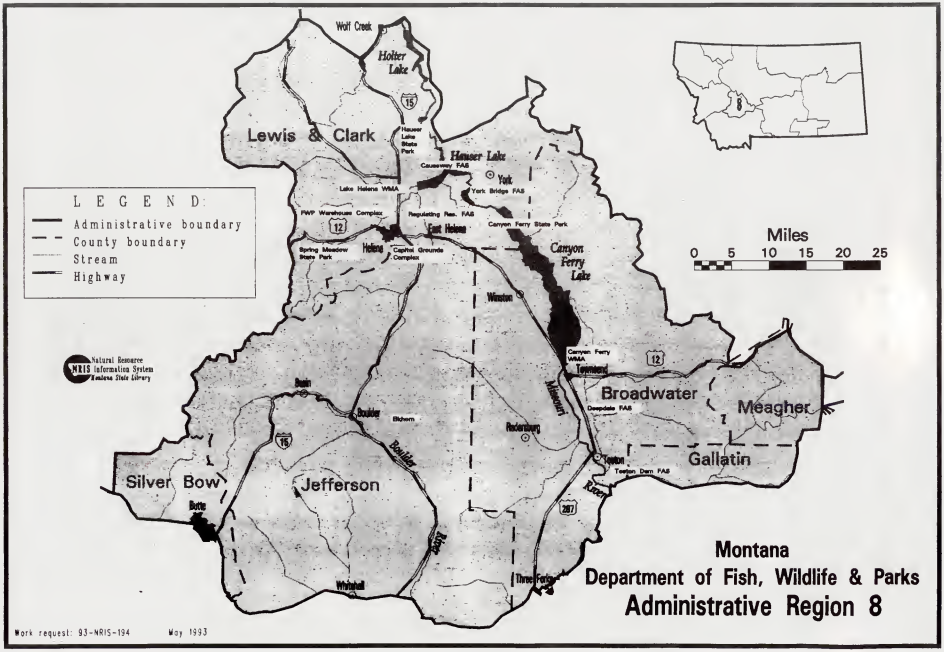
> "to prevent to the extent feasible, the reproduction and distribution of agriculturally undesirable plant species throughout department lands or from department lands onto adjacent lands".

The plant species of concern are those declared as noxious weeds by the State of Montana or the Broadwater and Lewis & Clark County Weed Boards (Designation of Noxious Weeds (ARM 4.5.201:204). Region 8 may also see the need to control other species which locally threaten habitat or other resources.

1.2 The Noxious Weed Problem on Region 8 Lands

1.2.1 The Setting and Current Condition

The spread of noxious weeds is reducing important wildlife habitat, range and agricultural land productivity, and is diminishing the value of many state resources. The weed problems on each property are discussed in detail in Section VII of the Plan. The Draft Programmatic Environmental Impact Statement (EIS) for the State of Montana's Noxious Weed Trust Fund (Trust Fund DEIS) provides an excellent


Wolf Creek
Holter Lake
Lewis & Clark
Hauser Lake
Hauser Lake State Park
Causeway FAS
York
York Bridge FAS
Lake Helena WMA
PWP Warehouse Complex
Regulating Res. FAS
East Helena
Canyon Ferry State Park
Canyon Ferry Lake
Spring Meadow State Park
Helena
Capitol Grounds Complex
Weston
Canyon Ferry WMA
Townsend
Broadwater
Deepdale FAS
Meagher
Missouri
Radersburg
Boulder
Elkhorn
Boulder
Toston
Toston Dam FAS
Gallatin
Silver Bow
Jefferson
Butte
Jefferson
Whitehall
Three Forks
LEGEND
Administrative boundary
County boundary
Stream
Highway
Miles
0 5 10 15 20 25
Natural Resource Information System
Montana State Library
Montana
Department of Fish, Wildlife & Parks
Administrative Region 8
Work request: 93-NRIS-194
May 1993

discussion of the origins of noxious weeds as well as the environmental and economic effects once they become established (Montana Department of Agriculture 1991, pp. 2-1 to 2-5). An additional concern for Region 8 is that noxious weed seeds produced on its properties, many of which are adjacent to water, provide a seed source to downstream sites.

Region 8 includes portions of Lewis & Clark, Broadwater, and Jefferson Counties and invloves management of12 property groups (Figure 1). Most of the properties are managed as parks, wildlife management areas, and fishing access sites. These sites provide for wildlife and wildlife habitat, fisheries enhancement, and general recreation. The Custer Avenue property and portions of the Capitol Complex are used as DFWP administrative sites and for other state government functions. The area around the Capitol is unique in that it is also maintained as a tourist attraction with urban park attributes. Table 1 lists the size, ownership, and management authority within the department for each property. Table 2 lists the noxious weed species and shows the occurrence on Region 8 lands. Noxious weed inventories were recently completed on these lands (OEA Research, Inc. 1991, 1992).

Of the fifteen State-declared noxious weeds, eight occur on Region 8 properties (Table 2). These are spotted knapweed, diffuse knapweed, Russian knapweed, field bindweed, leafy spurge, Dalmatian toadflax, white top, and Canada thistle. Each site had at least one noxious weed species present and reproducing to some degree on the property. Spotted knapweed occurs on eleven sites, Canada thistle on ten sites, diffuse knapweed and Dalmatian toadflax on five sites, white top on four sites, leafy spurge on three sites, Russian knapweed on two sites, and field bindweed on one property. Infestations were typically light to moderate. However, in several locations dense infestations were found.

Infestations that will be most difficult to control are the Canada thistle, leafy spurge, and spotted knapweed populations because they occur in riparian communities and Dalmatian toadflax because of its high rate of spread and resistance to traditional control methods.

Other noxious weeds found in Lewis & Clark County that are potential threats to Region 8 properties include purple loosestrife and sulfur cinquefoil. Purple loosestrife has been reported in two locations (Hoffman 1992). This species is an aggressive aquatic weed that rapidly overtakes desirable wetland habitats. The state as well as the counties have taken a very aggressive approach on inventory and control of purple loosestrife. Because many of Region 8 lands are on water or include wetlands, purple loosestrife poses a significant problem and will require control to prevent invasion.

Table 1. Properties Managed Under the DFWP Region 8 Noxious Weed Plan

Property Name	Acreage	Ownership/ Administration*	DFWP Management Division
Black Sandy State Park	43	State of Montana	Parks
Spring Meadow Lake State Park	56	State of Montana	Parks
Lake Helena Wildlife Management Area	157	State of Montana	Wildlife
Canyon Ferry Reservoir**	~3000	Reclamation***	Parks
Canyon Ferry Reservoir Wildlife Management Area	5000	Reclamation***	Wildlife
Helena Valley Reservoir	450	Reclamation***	Parks
Lake Helena Causeway Fishing Access Site	1	State of Montana	Parks
York Bridge Fishing Access Site	10	State of Montana	Parks
Deepdale Fishing Access Site	16	State of Montana	Parks
Toston Fishing Access Site	37	leased private land	Parks
Townsite of Elkhorn	0.25	State of Montana	Parks
Custer Ave. Warehouse	5	State of Montana	Administration
Capitol Grounds	55	State of Montana	Parks

* Management authority has been turned over to DFWP under a Memorandum of Understanding or lease agreement with the landowner

** Lands other than Wildlife Management Area managed by Region 8 Wildlife or Parks Division; includes lease sites, recreation areas, public campgrounds, concessionaires, open lands.

*** U.S. Department of Interior Bureau of Reclamation

Table 2. State of Montana Listed Noxious Weeds and Presence on DFWP Region 8 Properties

		LEWIS & CLARK COUNTY								BROADWATER COUNTY		BROADWATER and LEWIS & CLARK COUNTIES		JEFFERSON COUNTY
Common Name	Scientific Binomial	Black Sandy SP	Spring Mdw Lake SP	Lake Helena WMA	Helena Val Res	Causeway FAS	York FAS	Custer Ave. Warehouse	Capitol Grounds	Deepdale FAS	Toston FAS	CFR Recreation	CFR WMA	Town of Elkhorn
Category 1*														
White top	Cardaria draba			X						#		X	X	
Diffuse knapweed	Centaurea diffusa			X	X					X		X	X	
Spotted knapweed	Centaurea maculosa	X	X	X	X		X	X	X	X	X	X	X	X
Russian knapweed	Centaurea repens											X	X	
Canada thistle	Cirsium arvense	#	X	X	X		X			X	X	X	X	X
Field bindweed	Convolvulus arvensis											X		
Leafy spurge	Euphorbia esula									#		X	X	
St. Johnswort+	Hypericum perforatum													
Dalmatian toadflax	Linaria dalmatica	#				X	X	X				X		
Category 2*														
Dyers woad+	Isatis tinctoria													
Purple loosestrife^	Lythrum salicaria													
Sulfur cinquefoil^	Potentilla recta													
Category 3*														
Yellow starthistle+	Centaurea solstitialis													
Rush skeletonweed+	Chondrilla juncea													
Common crupina+	Crupina vulgaris													

* County Noxious Weed Act designations:
Category 1 = currently established and generally widespread
Category 2 = recently introduced to the state or are rapidly spreading
Category 3 = not yet detected in the state or are found only in scattered, localized infestations

X observed in 1991 and 1992 inventories
not observed in '91 or '92 inventories but listed by weed district spray record
^ limited occurrence in Lewis & Clark County
+ does not occur in Lewis & Clark or Broadwater counties

Sulfur cinquefoil has recently been identified in Lewis & Clark County, but was not observed in recent inventories of Region 8 properties. This species rapidly invades rangelands and requires monitoring by Region 8. Sulfur cinquefoil may be more prevalent than previously noted as it is very similar in appearance to several native cinquefolls thus making it difficult to identify. Also, the public has not been alerted to its presence or the consequences of its taking hold (Hoffman 1992).

Additional species declared noxious by Broadwater County include burdock, common tansy, henbane, houndstongue, musk thistle, perennial sowthistle, polson hemlock, water hemlock, and yellow toadflax. An assessment of the occurrence of these species on Region 8 properties has not been done.

Yellow mignonette is currently being considered for listing as a noxious weed in Montana. It is not known to occur in this area of Montana. It is typically a cropland invader.

Three other species not declared as noxious weeds, but of special concern to Region 8 include perennial pepperweed, Eurasian watermilfoil, and tamarisk (salt cedar). Perennial pepperweed is found extensively in the Helena area and often occurs in moist and wet areas. This species is a declared noxious weed in all adjacent states. Infestations occur at the Lake Helena Wildlife Management area and several sites along Canyon Ferry Reservoir.

Eurasian watermilfoil has not been identified east of the Continental Divide, but this species is an extremely aggressive water weed found in Oregon, Washington, and Alberta. It has made in-roads into Idaho along the Columbia River system and has been observed in the Missoula area (D. Workman 1992). It invades shallow shoreline areas, especially reservoirs, however it is not clear whether this species could survive the typically severe climate of Montana east of the Continental Divide.

Tamarisk, which requires great quantities of water, has taken over many riparian corridors in the arid southwest. It is now making its way into Montana and has been observed along the Tongue, Yellowstone, and Bighorn Rivers. A few plants have been seen locally as landscape plants in Helena gardens and one plant was found at the York Bridge fishing access site. If this species begins spreading in the eastern rivers, it likely poses a real threat to Region 8 lands.

1.2.2 Weed Control History

Weed control efforts have varied on each of the Region 8 properties. As shown in Table 1, the Parks and Wildlife Divisions are responsible for separate areas. Mowing, hand-pulling, herbicide applications, and, indirectly, landscaping have been the primary control methods. Herbicides have been used for control of lawn weeds at the Capitol Complex (DFWP 1991) for a number of years. Since 1992, herbicide use on the

other properties has been limited to non-chemical methods pending the development of a weed control program and this environmental analysis.

Picloram and 2,4-D have been used to treat spotted knapweed, Dalmatian toadflax, and Canada thistle on some properties (Rauser 1992, Hohn 1992, Hoffman 1992). Prior to 1991, limited herbicide applications have been conducted by contracted services as funding has allowed on most sites.

1.3 Program Objectives to Address the Problem

Region 8's specific program objectives are derived from statutory requirements, DFWP policies and goals, as well as ecological considerations.

- Control of plants declared as noxious weeds by the State, Broadwater, Jefferson, and Lewis & Clark County Weed Boards, and Region 8.
- Develop an integrated approach to noxious weed management and a strategy to prioritize treatment areas.
- Attempt to contain, reduce or eradicate weed populations, depending on the location and density of infestations.
- Prevent the introduction of new weed species.
- Work cooperatively with adjacent landowners and the county weed boards to enable consistent and sound weed control efforts.
- Conduct treatments in the best way to maintain fish, wildlife and vegetation resources and protect human health and safety.
- Involve the public in the planning process.

1.4 Programs and Legal Framework Affecting Region 8's Weed Plan

There are several on-going programs which will affect DFWP in the implementation of the proposed Plan. Also, there are a number of policies, law, and regulations that may directly affect DFWP's program. These are briefly discussed below.

1.4.1 Canyon Ferry Resource Management Plan and Environmental Assessment

The United States Bureau of Reclamation (Reclamation), owns the lands surrounding Canyon Ferry Reservoir. However, wildlife and recreation resource management authority for much of the 9,360-acre area has been given to the State of Montana through a series of agreements. Since 1965, DFWP has fulfilled this function. The DFWP and Reclamation are currently developing a plan that will directly affect the development and implementation of Region 8's proposed noxious weed management program. This planning process is detailed in the Canyon Ferry Resource Management Plan and Draft Environmental

Assessment (March 1993). This plan provides for a balancing of recreational development and expansion with important wildlife values, conservation, and environmental protection (p. 4-1). The plan specifically addresses weed control under Goal 13 and objective c:

> "Identify, protect, and enhance native species and other important vegetation and wildlife habitat within and adjacent to the study area... Prepare a weed management plan for the study area and involve cabin and concession site lessees".

1.4.2 Canyon Ferry Weed Management Plan and Environmental Assessment

In 1992, a new three-way agreement was signed among Reclamation, the Bureau of Land Management (BLM) and DFWP to address management of lands surrounding Canyon Ferry Lake. To meets its obligations for resource management, Reclamation has developed a noxious weed management plan for Canyon Ferry State Park. This weed management plan will also directly affect Region 8's program. This effort was completed with review from a committee representing DFWP, BLM, the counties, and local sportspeople, users and environmental groups. When adopted, the portions of Reclamation's plan and EA that address lands under management by Region 8 Parks and Wildlife Divisions will be incorporated into the Region 8 Plan.

1.4.3 Wildlife Management Area Management Plans

Management plans have been developed for the Lake Helena WMA and the Canyon Ferry WMA. These plans detail management objectives, current conditions, and strategies to meet desired future conditions. Noxious weed management using an integrated approach is a key element in both plans. Region 8's overall Plan addresses specific treatments at the WMAs that are consistent with weed management goals for each area.

1.4.4 County Weed District 5-Year Plans

The DFWP is committed to coordinating with local County Weed Boards (p. 2 DFWP Weed Control Program 1983, appendix A). Lewis and Clark and Jefferson Counties published 5-year plans in 1991 and 1992, respectively (Hoffman 1992, Mendenhall 1992). Broadwater County is in the process of updating their 5-year plan (Rauser 1992). The kinds of activities that typically require inter-agency coordination include "War on Weeds" community projects (that may be implemented with funds approved through the State's Noxious Weed Trust Fund Grant Program (see also Section 1.4.5)), education program development, and release of bio-control agents (see Chapter 2 for a discussion on bio-control). The DFWP submits all plans to the appropriate Weed Board for approval for activities such as park and fishing access improvements to insure that weed control and revegetation are addressed. The DFWP has utilized contracted services with each District over the years to conduct herbicide applications on some of its properties.

1.4.5 Other Noxious Weed Management Plans

The Montana Department of Transportation is in the initial stages of developing a weed plan. This plan would have bearing on Region 8's program if road reconstruction activities occurred or if weed control efforts were completed on state highways that border Region 8 lands. The Forest Service has some lands adjacent to DFWP properties on the Helena and Deerlodge National Forests. Each have adopted Noxious Weed Plans and completed EIS's (Helena National Forest 1987 and Deerlodge National Forest 1989). The BLM also holds properties adjacent to Region 8 lands. A region-wide BLM weed control program has been adopted and reviewed with the EIS completed for BLM's Northwest Area (1986). The DFWP Regions 2, 3, and 4 which surround Region 8 are also in the process of developing weed management plans. The Helena Valley Irrigation District has undertaken a weed management plan that will directly affect the Helena Valley Reservoir (Hoffman 1993).

1.4.6 Noxious Weed Trust Fund Environmental Impact Statement

As previously mentioned, the Montana Department of Agriculture (MDA) recently completed an environmental impact statement on the State's Noxious Weed Trust Fund Grants Program (1991). If DFWP were to participate in any grant program, as a sponsor or as a cooperator, DFWP's activities would have to meet the findings in this document which include: meeting grant application requirements (p. 5-1) and environmental review by MDA (p. 5-2).

1.4.7 Other Applicable Laws and Regulations

- Federal Insecticide, Fungicide, Rodenticide Act (P.L. 92-516, FIFRA) and Code of Federal Regulations 40 CFR (Part 171) administered by EPA provide for the Certification of Pesticide Applicators. Montana has taken primacy for this program under the Montana Pesticides Act (MCA 80-8-801). The program is administered by MDA.

- Montana Environmental Policy Act (MCA 75-1-101 *et seq.*, MEPA) and rules (ARM 12.2.401 *et seq.*) provide for analyzing and disclosing the potential impacts of state actions on the human environment.

- Montana Weed Control Act (MCA 80-7-801 *et seq.*) gives MDA the authority to provide technical assistance and to seek federal funds for weed control on federal lands in cooperation with the federal entity and any local government entity responsible for weed control.

- Montana Water Quality Act (MCA 75-5-101 *et seq.*) via the Department of Health and Environmental Sciences (DHES) provides a framework for the classification of surface and ground water, establishes surface and ground water quality standards and provides a permit program to control discharges into state waters.

- Montana Agricultural Chemical Ground Water Protection Act (MCA 80-15-100 *et seq.*) administered jointly by MDA and DHES provides for development of agricultural chemical ground water plans, water quality standards, and monitoring. Both agencies are charged with enforcement authority.

1.4.8 Other entities that may require coordination efforts for implementation

- Lewis & Clark County Water Quality Protection District
- Lewis & Clark, Broadwater, and Jefferson County Conservation District Boards
- Boards of County Commissioners - Lewis & Clark, Broadwater, and Jefferson Counties

1.5 Decisions to be Made

The proposed action addresses noxious weed control on Region 8 lands through implementation of an Integrated Noxious Weed Management Program. This program is detailed in Region 8's Integrated Noxious Weed Management Plan (Plan). In accordance with MEPA (The Montana Environmental Policy Act (MCA 75-1-101 *et seq.* and rules (ARM 12.2.401*et seq.*) , this environmental assessment identifies potential impacts on the natural and human environment that may result from the implementation of this proposed action or one of several reasonable alternatives. It should provide the Regional Supervisor of Region 8 (decision maker) with adequate information to determine whether or not significant impacts would occur if the action were to be implemented.

The Regional Supervisor must decide whether to continue to control noxious weeds in the same manner that has been done in the past (no action); accept one of the other three alternatives presented and examined in this document; or accept one of the alternatives with changes such as additional management constraints and mitigation measures.

Once an alternative is selected, the Regional Supervisor will decide whether or not the proposed action will have significant adverse impacts on human and natural environments. If no significant adverse impacts would result, then the final EA will state the reasons for this finding and that the EA is the appropriate level of analysis. The Plan would be revised to incorporate findings of the EA and implemented. If impacts are considered to be significant, an environmental impact statement may be completed to further investigate the proposed action.

1.6 Issues and Concerns Identified

The DFWP held scoping meetings on two occasions which were advertised in legal notices in the Helena Independent Record and in the Boulder Monitor:

- February 25, 1993 at DFWP offices in Helena
- March 3, 1993 at Town Hall in Boulder

Additional concerns related to DFWP's program development were recorded at a scoping meeting held by the Bureau of Reclamation on January 21, 1993, at the Lewis & Clark County library for the Canyon Ferry

Weed Management Plan. The following issues have been distilled from these comment opportunities and by DFWP staff and consultants.

1. What weed control methods does DFWP propose to use? How will these methods affect the natural and human environment?

2. Herbicide use can have negative impacts if handled improperly or used in sensitive areas. What are the potential impacts to resources such as air, ground water, surface water, fisheries, wildlife and wildlife habitat. What are the potential impacts to recreationists and DFWP workers?

3. Certain weed species have become well established on Region 8 lands, while others have not. Some areas are heavily infested while others are weed-free. How will Region 8 prioritize areas for treatment?

4. The noxious weed problem does not stop at DFWP property boundaries. How will the DFWP address weed problems on adjacent lands? How will DFWP work with other interested parties (such as county weed boards, state and federal agencies, adjacent landowners, lessees, and volunteer groups) to deal with shared aspects of the noxious weed situation?

5. Poor land management practices such as activities that extensively disturb the ground provide the conditions for weed invasion. How will the DFWP monitor and modify these activities to control the spread of noxious weeds?

6. Public education and awareness about noxious weeds and their control are very important. What role will DFWP have in public awareness? Also, what involvement will the public have in management decisions?

CHAPTER 2. Alternatives

2.1 Description of Alternatives

A four-alternative system for analysis is described below. The alternatives differ by types of treatment, treatment levels and constraints on noxious weed management to benefit other resources, and environmental effects. Thereby, the Plan can be used as the information base for all alternatives and should be referenced while reading this document.

Alternative 1: No Action

Noxious weed control would continue as it has in the past several years. Funding for Region 8's weed control program would remain at current levels to promote public awareness and education about the weed problem. At present herbicides cannot be used because of the need for MEPA review. If this alternative is selected under this EA, then herbicide use would be limited. For example, limited herbicide use would continue to be utilized on the Capitol Complex Grounds where public visibility is of high concern. Other Region 8 lands would receive little attention. Biological control agents that have already been introduced would continue to spread on Region 8 lands. Preventive measures that would not require major funding commitment by Region 8 would be the primary methods of weed control. Weed populations would continue to be monitored. Coordination with the county Weed Boards and Reclamation would continue but active participation would be curtailed.

Noxious weeds would continue to spread from infested Region 8 lands. Currently weed-free areas managed by Region 8 would likely become infested from seed sources in Region 8 and adjacent lands. Where possible, such as is currently proposed at Canyon Ferry State Park, management authority may be returned or shifted to another entity.

Alternative 2: Integrated Management Approach

Under this alternative, which is the proposed action, a program that integrates preventive, biological, manual, mechanical, and herbicide control methods would be implemented. The Plan details this approach. Highlights of the Plan are briefly discussed later in Section 2. This approach allows flexibility for consideration of and planning for other resource management objectives. A long-term goal may be to hire a specialist that would develop and supervise the program.

Alternative 3: Herbicide Control Approach

Weed control emphasis would be toward eradication and reduction under this alternative. Multiple resource management objectives would be given less consideration. Weed species treatment priorities proposed under Alternative 2, Integrated Management Approach, would have to be re-evaluated. Herbicides would be the chosen method of control except in cases where there is a high risk of environmental contamination or label directions preclude the use of herbicides. Preventive measures would still be implemented. Biological control agents (insects and pathogens) already established would continue to spread. However, herbicide use may limit their viability.

Alternative 4: Non-Chemical Control Approach

Weed control emphasis would be toward containment of current weed infestations and prevention of the entry of new noxious weeds onto Region 8 lands. Herbicides would not be used nor would Region 8 participate in cooperative programs which use or emphasize herbicides. Manual, mechanical, and biological control methods would be used. Biological control methods would be emphasized. New pathogens would be introduced as they become available. Preventive methods that would not require major spending by Region 8 would be implemented.

2.2 The Proposed Action

The proposed action, Alternative 2, Integrated Pest Management, is described below. Elements of Alternative 2 would also be used under Alternatives 1, 3, and 4.

Region 8 has chosen a tiered approach to address noxious weed control needs priorities. The approach is based on site-specific treatments which include species-specific directives, control objectives based on size or location of weed infestations, special management areas (zones) which require modification of general treatment techniques and policies, and weed control efforts on adjacent land.

Weed species and control objectives are shown in Table 2. Weed species control priorities are based on the state list, followed by county lists and then for Region 8 lists. Treatment efforts would be based on location, size and level of infestations and tailored on a site-specific basis for each property. Control objectives also dictate control priorities. Control objectives are targets that give direction for the intensity of control actions. These include prevention, eradication, reduction, containment, and tolerance.

The Plan also identifies management areas of special concern which require special management or protection. These areas would be considered when developing the treatment program for specific weed species. The management areas include:

- Critical surface and ground water areas (including wetlands and riparian areas)
- Sensitive wildlife areas
- High human use areas

Management direction and guidelines are given in the Plan to ensure that the quality and value of these areas are protected based on their environmental and public importance.

Treatment area planning would be done annually for each Region 8 property or property group. Sites selected for treatment would be ranked in order of priority for treatment using factors such as size and pattern of infestation, whether t is new or well established, desirable plants present. To facilitate

monitoring and implementation, Canyon Ferry State Park has been divided into geographic units that reflect Region 8 Wildlife and Parks Divisions, Reclamation, and BLM responsibilities (Reclamation 1993).

Pre-treatment reviews would be conducted on each proposed treatment area within the geographic units to evaluate potential impacts, treatment options and costs, and requirements for project implementation. In effect, each proposed treatment project would undergo multi-disciplinary, environmental checklist review in accordance with MEPA to ensure that site conditions or public concerns had not changed and that actions were properly documented.

Post-treatment monitoring would be conducted on each treated area to evaluate project effectiveness, environmental impacts and the need for retreatment, corrective measures or mitigation. Region 8 is in the process of developing specific monitoring requirements.

2.3 Comparison of Alternatives

Each alternative incorporates some or all of these treatment methods. However, each alternative would have different impacts on the resources and different outcomes on weed control. The ultimate goal of implementing a weed control program is to effectively control noxious weeds over time, with as few negative impacts on the state's resources as possible and with the greatest cost efficiency.

Table 3 provides a comparison of potential impacts and benefits anticipated under each alternative addressed.

The result of Alternative 1, No Action, would be the continued and accelerated spread of noxious weeds throughout Region 8 properties. This alternative includes a limited control program but the number of treatment areas would be limited and methods would rely primarily on preventive measures. Herbicides would not be used. This approach would not protect state resources adequately nor would DFWP management goalsbe met. The potential loss of forage base for wildlife, the decline in vegetative community integrity, and decreases of aesthetic quality, especially from the public's perspective, would be significant.

Alternative 3, Herbicide Control, would utilize herbicides as the primary control method. This approach would achieve short-term control of some weed populations. However, an accelerted risk of over-application or accidental spills of herbicide is more likely under this alternative as is the chance of adversely affecting non-target plant and animal species. This would not be due to herbicides or the willfull use in inappropriate ways or places, but rather because broad-spectrum application methods would probably be

Table 3. Comparison of Alternatives for DFWP Region 8 Noxious Weed Management Plan

	Alternative 1 No Action	Alternative 2 Integrated Approach	Alternative 3 Herbicide Approach	Alternative 4 No Chemical Approach
Air Quality	No significant effects.	Short-term, minor effects due to chemical vapor, noise, odors, dust or smoke in the project vicinity.	Short-term, minor effects due to chemical vapor, noise, or odors; potential greater than under Alternative 2.	Smoke or dust would increase particulate levels.
Soils	Potential to reduce total plant cover leading to increased erosion.	Reduced potential for contamination due to greater flexibility in choosing treatment methods.	Possible soil contamination due to lack of flexibility in choosing treatment methods.	Manual and mechanical treatments may cause erosion and losses in productivity.
Water Quality	Low potential for surface or ground water contamination.	Reduced potential for contamination due to greater flexibility in choosing treatment methods.	Greatest potential for chemical contamination to surface/ground waters.	Low potential for sedimentation if manual or mechanical treatments result in erosion.
Wildlife	Reduced wildlife habitat quality due to noxious weed invasion	Reduced potential for negative impacts with mitigative measures and management guidelines.	Greatest potential for chemical ingestation and dermal exposure to wildlife species.	Reduced wildlife habitat quality due to noxious weed invasion.
Fisheries	Low potential for sedimentation increases.	Minimal impacts expected due to treatment flexibility and implementation of mitigation measures.	Greatest potential to adversely affect fisheries.	Potential for increased sedimentation may adversely affect habitat quality.
Vegetation	Decline of desirable plant communities due to weed competition.	Lowest potential for impacts to native/domestic plant damage through mitigation.	Greatest potential for adverse impacts to non-target vegetation.	Some adverse effects expected to non-target vegetation due to plowing.
Recreation	Greatest potential to reduce recreation values.	Allows flexibility in treatment methods, while protecting ecological and aesthetic qualities.	Greatest potential to arrest encroachment or establishment of weeds.	Long-term physical removal of weeds required at each infested site.
Human Health	Increased potential for allergies, respiratory or skin ailments from weeds.	Possibility of exposure to chemicals or personal injury from equipment.	Increased possibility of exposure to chemicals.	Greatest potential for physical injury and respiratory ailments from smoke or dust.

chosen over focused application methods. Also, the overall amount of chemicals used would be significantly higher than under Alternative 2 (Integrated Management). A generalized herbicide program could not be monitored as effectively. Ground and surface water and the aquatics/fisheries resources would be at the greatest risk. Concerns for human health would also be an issue.

Long-term effectiveness of Alternative 4 (Non-Chemical Control), would likely be high only in areas where infestations are relatively small, confined and the rate of weed species spread is relatively slow. Biological control would have some impact on rate of spread but many researchers believe that more control organisms (insects and pathogens) need to be developed and introduced to make biological control an effective tool (Story 1989). Also, several Region 8 properties are too small to sustain bio-control organisms. Coordination with adjacent landowners would be essential for this Alternative to be even marginally successful.

Alternative 2 (Integrated Pest Management), provides the best opportunity for long term weed control with minimal impact to the environment. The Plan allows for flexibility in prioritizing weeds for control and treatment areas. It allows a variety of methods to be implemented as site specific conditions warrant and incorporates many mitigation measures to ensure that resources are not adversely affected. Herbicide use would still present some risks, but they would be considerably less than those expected under Alternative 3 (Herbicide Control). Realistic monitoring procedures are also built into the Plan which will document negative impacts as well as the success of the program.

Some impacts discussed are unavoidable. Mitgation measures for weed prevention and other control methods can lessen but not eliminate these impacts. There will always be the likelihood that the mitigation measures will not be 100 percent effective.

2.4 Cumulative Effects

The irreversible commitment of resources refers to the consumption or loss of resources that cannot be reversed, except possibly in the extreme long term. The classic example would be when a species becomes extinct. None of these alternatives would result in the irreversible commitment of resources. If mitigation measures are not properly followed, it is possible that some rare plant populations could be lost in certain sites, especially due to herbicides.

The irretrievable commitment of resources refers to the consumption or loss of resources for a short period of time such as 50 to 100 years. Assuming that certain resources are restorable once degraded, wildlife cover and forage, and recreation values, and aesthetic values would be the most likely resources lost or degraded with no weed control efforts. None of the action alternatives would result in the

irretrievable commitment of resources. Continuation of the current management direction (Alternative 1, No Action) would likely result in the continued spread of noxious weeds and further degradation of resource that DFWP is charged to maintain or enhance.

Connected actions to be considered for cumulative effects of Region 8's weed control program include adjacent landowner and other federal, state, and county weed control efforts. Of primary concern would be the cumulative effects on ground and surface waters. Without coordinated efforts (communication, planning and monitoring), the potential for contamination is possible.

2.5 Treatment Methods

Noxious weed control treatments proposed for use include preventive, manual, mechanical, biological, and chemical methods. These methods are the primary focus of analysis of impacts associated with each alternative. Of the alternatives addressed, chemical methods are proposed under Alternative 2, Integrated Pest Management and Alternative 3, Herbicide Control. These methods are briefly described below. The Plan provides more detail on how and when these methods would be used.

2.5.1 Non-Chemical Methods

Prevention of new noxious weed species introductions or of established weeds spreading into uninfested areas is the first line of defense for a successful weed control program. In the long term it is very cost effective. Preventive measures require an understanding of how seeds spread and become established, a strong public awareness program, and the administrative flexibility to modify land management activities when appropriate. Transportation and utility corridors are probably the largest contributors to noxious weed spread and establishment. Waterways including streams, irrigation systems and waste water collection ditches are also excellent thoroughfares for weed spread.

Manual methods involve grubbing and topping with hand tools and hand-pulling. These methods may be effective in controlling weeds in small or light infestations of annual or biennial plants. Annual retreatment is required. Because these methods are labor intensive, their application would be limited primarily to environmentally or culturally sensitive areas.

Mechanical methods include mowing, tilling and reseeding, grazing, and other agricultural techniques. These methods may be effective in controlling some noxious weeds, although implementation is often limited by topography and access. These methods can be costly and time consuming. Burning, as a weed control measure by itself, is generally considered to be of limited effectiveness.

Biological control methods include the introduction of insects or pathogens which are natural enemies to weed species. Biological control agents can be very effective in stressing noxious weeds and severely reducing seed production and viability. Use of biological agents would not eliminate the species but can reduce the population to a tolerable level, particularly when used in combination with other control methods. Biological control methods may be the only treatment possible in some areas. These areas may include those that are inaccessible or where other treatment methods are not possible or cost effective to implement. The only costs associated with this method are the collection and release of new agents and monitoring to insure insect spread or pathogen infection.

Land management activities such as wildlife enhancement projects or recreation site/parks developments are not considered primary weed control measures. However, weed control planning and treatment could be integrated into the planning and execution of these activities, depending on need.

2.5.2 Chemical Methods

The herbicides 2,4-D, picloram, dicamba, glyphosate, metsulfuron, MCPA, and clopyralid are proposed for use on Region 8 lands. These herbicides may be used alone or in combination as recommended by label directions. Table 4 lists the chemicals and formulations proposed for use. Because of the potential negative impacts associated with some herbicide use, herbicides are discussed in detail in this section. Table 5 summarizes herbicide properties. Table 6 lists the target weed species and the expected herbicide effectiveness for control.

Table 4. Herbicides Proposed for Use on Region 8 Lands

Common Chemical Name	Registered Trade Name	Application Rates*
2,4-D amine	Weedar 64, various	1 - 3 qts
picloram	Tordon 22K	1 pt - 2 qts
dicamba	Banvel	1/2 pt - 6 qts
glyphosate	Rodeo**	3 - 7 1/2 pts
glyphosate	Roundup**	2 - 5 qts
clopyralid	Stinger	1/4 - 1 1/3 pts
metsulfuron	Ally***	1/10 oz
clopyralid + 2,4-D	Curtail	2 - 2 2/3 pts
MCPA amine****	various	1 - 4 pts

* Per Acre basis; taken from manufacturer label recommendations for general weed control on rangelands/pasture unless otherwise noted.

** Glyphosate is a non-selective herbicide. The Rodeo formulation of glyphosate can be used near water because toxicity to fish is relatively low.

*** Ally is proposed for use on white top.

**** MCPA is proposed for use on rangelands.

Table 5. Herbicide Properties

Active Ingredient (Trade Name®)	Selectivity	Surface Potential*	Soil Leaching Potential**	Persistence in Soil /Soil Half-life	Primary Degradation	Toxicity			
						Aquatic Organisms ◊		Animal ◊◊	
						Trout	Bluegill	Rat	Mallard
2,4-D									
(amine)	broadleaves	medium	medium/1	≤1 mo/10 days	microbial	100	168	no effect	2000
(ester)	broadleaves	medium	medium/1	≤1 mo/10 days	microbial	1.2	100	620	2025
picloram									
(Tordon 22K)	broadleaves	low	high/1	1-5 year/90 days	microbial	22.2	8.2	10,300	>2000
glyphosate									
(Rodeo)	non-selective	high	low/2	1 mo/30 days	microbial	1000	1000	>5000	---
(Roundup)	non-selective	high	low/2	1 mo/30 days	microbial	110	14	5400	---
dicamba									
(BANVEL)	broadleaves	low	high/1	3-12 mo/14 days	microbial	35	130	2629	>2510
clopyralid									
(Stinger)	broadleaves	low	high/1	1-4 mo/20 days	microbial	103.5	125.4	>5000	>4640
metsulfuron									
(Ally)	non-selective	medium	high/1	up to 34 mo/ 7-42 days	microbial	>150	>150	>5000	>2510
MCPA									
(amine)	broadleaves	low	high/1	1-6 mo/14 days	microbial	relatively	relatively	relatively	relatively

* Surface Potential - relative tendency to move with run-off.

** Leaching Potential - relative tendency to dissolve in soil water so can move through soil profile/herbicide affinity to soil: 1-readily adsorbed; 2-not readily adsorbed

◊ 96 hour LC-50 - the lethal pesticide concentration rate at which 50% of test animals will be killed: <1 mg/kg = highly toxic; 1-10 mg/kg = toxic; >10 mg/kg = slightly toxic. 48 hour LC-50 for dicamba. 1 mg/kg = 1 part per million (ppm).

◊◊ LD-50 - the dosage of toxicant, expressed in milligrams of toxicant/kg of animal body weight, required to kill 50% of the test organism in a specific test situation.

References: USDA-Forest Service 1984; Weed Science Society of America 1989; US-EPA 1983, 1988; Lolo N.F. 1989; Whitson et al. 1989

Table 6. Herbicide Efficacy on State Declared Noxious Weeds Proposed for Treatment on DFWP Region 8 Lands

	Efficacy Rating*				
	Excellent	Good	Fair	Poor	Insufficient data
Category 1					
Canada thistle	D,P,C	G	2,M,A	—	—
Dalmatian toadflax	—	D,P,G	2	—	—
Field bindweed	—	D,P,G,2	M	C	—
Leafy spurge	—	P	D,G	2	—
Diffuse knapweed	2,D,P	—	—	—	G
Russian knapweed	—	D,P,G,C	M	2	A
Spotted knapweed	D,P,G,C	—	2***	2	—
St. Johnswort (goatweed)	—	P	—	2	D,G
Whitetop (hoary cress)	—	D,G	2,A	P,M	—
Category 2					
Dyers woad	D**	2,P,G	—	—	—
Purple loosestrife	G	2,D	—	—	—
Sulfur cinquefoil	D,P,G	2	—	—	—
Category 3					
Rush skeletonweed	P	D	2	—	G
Yellow starthistle					—
Common crupina	—	—	—	—	—

* Control ratings for the herbicides are as follows:
Excellent = >95% of weed population killed by single treatment
Good= one treatment per year maintains 85-94% suppression
Fair = 60-84% of weed population killed by single treatment
Poor = 10-59% of weed population killed by single treatment
Insufficient data = insufficient data exists to determine effectiveness

** C=clopyralid, D=dicamba, G=glyphosate, P=picloram, A=metsulfuron, M=MCPA, 2 = 2,4-D

*** Data sources conflict on 2,4-D efficacy for spotted knapweed; Data ranges from poor to excellent.

References: USDI-Bureau of Land Management 1985; Nelson et al 1990; McCone 1991; Johnson 1991.

Descriptions for each active ingredient proposed for use are given below. Appendices in the Plan contain a summary of herbicide formulations for target species and the label instructions for use of these herbicides in Montana, respectively. Other herbicides, which have been approved by the U.S. Environmental Protection Agency (EPA) and have been licensed for use in Montana, may be considered in the future following hazard assessment by DFWP resource staff.

♦ **Picloram** is commonly known by the trade name of Tordon®. Picloram is a restricted-use pesticide (can only be used by certified applicators) labeled for non- cropland, forestry, rangeland, right-of-way, and roadside weed control. Picloram acts on broadleaf plants as a growth regulator, absorbed through leaves and root uptake. It is easily translocated in plants and accumulates in new growth causing leaves to cup and curl. Picloram is water soluble and can move in sandy soils low in organic matter. It may affect nearby desirable plants that have roots growing into a treated area. Degradation by soil micro-organisms is slow and primary breakdown is by ultra-violet light. Picloram is relatively persistent (can effectively control many weeds for three years following one application), but persistence and effectiveness vary by soil type and precipitation levels. Use is restricted near surface or ground water.

♦ **2,4-D** is labeled for a wide variety of uses and is an active ingredient in many products offered by several manufacturers, many marketed for home use. It acts on broadleaf plants as a growth regulating hormone absorbed by leaves, stems, and roots. It moves throughout a plant and accumulates in growing tips. Salts of 2,4-D can move in sandy soils. 2,4-D is less persistent than picloram (soil micro- organisms break it down in a matter of weeks so annual application is required), but can be used closer to water. Both the amine and ester formulations are proposed for use. Only the amine formulation would be used in human occupation areas or near water.

♦ **Glyphosate** is a non-selective herbicide marketed as **Roundup®** and **Rodeo®**. Glyphosate is labeled for a wide variety of uses. It is readily absorbed by leaves and disrupts the photosynthetic process. It affects a wide variety of plants, including grasses. Glyphosate binds readily to organic matter in soil and is readily degraded by micro-organisms. Its movement in soils is very slight. The **Roundup®** formulation contains a surfactant that is toxic to aquatic organisms. The **Rodeo®** formulation does not contain this additive so is approved for use near, or even in, water.

♦ **Clopyralid** is a selective post-emergence herbicide that controls many annual and perennial broadleaf species especially in the sunflower, legume, and buckwheat families. It is marketed as **Stinger®**. Grass species are especially tolerant to clopyralid. Woody species, with the exception of those in the legume family, are also tolerant. Although it is readily absorbed by both foliage and roots of target species, clopyralid does not strongly adsorb to soil particles and so it is subject to leaching. Therefore, use should be avoided in highly permeable soils. The product **Curtail®** is also proposed for use. The active ingredients are 2,4-D and clopyralid. This formulation would not be used when retention of woody species is desirable. This formulation is recommended for plants in the sunflower, buckwheat, and legume families.

♦ **Dicamba** is commonly known by the trade name **Banvel®**. A growth-regulating herbicide used for broadleaf weed control, dicamba has a wide variety of uses that include cropland, non-crop sites (such as fence rows, roadways, and wastelands), rangeland, and forest lands. It is moderately persistent in soil and water, does not readily adsorb to soil particles, and is highly mobile. It is primarily lost from soil and water from microbial decomposition. Its use should be avoided near high water tables and highly permeable soils.

♦ **Metsulfuron**, commonly marketed as **Ally®** is generally a non-selective, post-emergence herbicide used for control of broadleaf weeds. Suggested use for metsulfuron is for eradication or control of whitetop on croplands. Metsulfuron will not kill wheat, barley, rye, and oats. Metsulfuron is moderately to

very mobile in soils depending on organic matter content and soil texture. It has a large potential for leaching especially through loamy and sandy soils.

♦ **MCPA** is a post-emergence, selective, translocated phenoxy herbicide similar to 2,4-D but less phytotoxic to some crops. It is absorbed through leaves or roots and readily translocated in plants. The amine formulation is proposed for use on range lands. Because it is not readily adsorbed to soil particles, MCPA amine can be readily leached from soil under conditions of high precipitation and permeable soils. It is not recommended for use in human occupation areas.

Herbicides would be applied according to label directions and the management guidelines and constraints contained in the Plan. Changes in application rates, recommended by selected research institutions, would be considered if these rates do not exceed label directions. Chemical applications would be supervised or conducted by licensed applicators and in compliance with Federal requirements.

Aerial applications of herbicide are not proposed. Vehicle-mounted sprayer (hand gun, boom, and injector) applications will be used primarily in open areas that are readily accessible by vehicle. Injection methods are computer controlled and allow flexibility in the type of chemical applied and in targeting infestations of varying densities. Boom sprayers, which are fixed, provide less flexibility so would be used only where feasible to treat concentrated weed infestations. The hand gun would be used for spot treatment of weeds. Spot treatments would be selected over broadcast methods. Regardless of spray method used, sprays would be applied in a manner that gives the best possible coverage with the least amount of drift.

Hand applications would utilize backpack spraying and wiper application. Backpack sprayers would be used on small or scattered patches in rough terrain or environmentally sensitive areas. Contact systemic herbicides such as glyphosate would be used to treat individual plants or for seed bed preparation.

Precautions for use would include at a minimum:

- During application periods, weather conditions (including forecasted precipitation events) and temperatures would be monitored hourly by contractors and weed management personnel. Additional tests such as soil moisture determinations and weather forecasting may be conducted.
- Calibration checks would be conducted at the beginning of the spraying season and periodically throughout to ensure that equipment is functioning correctly.
- Label requirements would be followed for all herbicide applications. Further precautions may be determined to be necessary during the pre-treatment review process.
- When feasible, a dye will be mixed with the herbicide solution to aid in identifying where spraying has occurred. This should prevent "double-spraying" and provide a method to check coverage for monitoring purposes.

Site-specific plans would be developed for all proposed herbicide treatments as part of the treatment area planning process. The use of herbicides would depend on the treatment objective, season of application, stage of plant growth, topography, species present, control effectiveness, equipment limitations, and potential environmental impacts. Herbicide and application rate selection would depend on the target species, other vegetation present, presence of sensitive plant or animal species, soil type, presence of surface waters, wetlands, shallow ground water or ground water recharge areas, and proximity to human habitation or use sites. A site specific environmental checklist would be conducted annually on each treatment area.

Costs of an herbicide program are usually high due to investment in spray equipment, insurance, support facilities and materials, and cost of chemical. Therefore, Region 8 proposes to contract with licensed applicators for most spraying services. Only a limited spray program would be maintained by the Region 8. The herbicide program would be evaluated annually through a multi-disciplinary process as part of the overall weed monitoring and evaluation program. Region 8 would administer and manage the weed management program under the general guidance of DFWP. Region 8's Assistant Regional Supervisor would be responsible for implementing the program.

CHAPTER 3. Affected Environment and Evaluation of Potential Impacts

Based on the issues identified in Section 1.6, this section of the EA describes the natural resources that may be affected by implementation of the proposed action or one of the alternatives or that may have a bearing on how the plan is implemented. These discussions pertain to Region 8 as a whole. When specific sites possess characteristics that would affect implementation of any Alternative or treatment method, these characteristics are pointed out. Region 8's Plan describes each property in detail. Specific weed control approaches are given and important resources are evaluated in light of the proposed treatments.

Potential impacts are analyzed in relation to the treatment methods proposed. The impacts of allowing weeds to spread are also addressed. Potential impacts are addressed in two ways. First they are discussed generally for all Region 8 lands and for each Alternative because most kinds of impacts could occur on any site. Secondly, site specific impacts are discussed where site specific resources may be negatively affected or where site conditions or characteristics may affect program implementation. This chapter provides the basis for comparing the alternatives presented in Chapter 2. The summary of impacts and final comparison of alternatives is presented in Chapter 2 and is not repeated here.

3.1 Setting

Region 8 is located in Lewis & Clark, Broadwater and Jefferson Counties in west central Montana. Most of the properties (8 of 12) managed by Region 8 are located in Lewis & Clark County. Two are in Broadwater County, one is in Jefferson County and one (Canyon Ferry State Park) lies in both Lewis & Clark and Broadwater Counties. Canyon Ferry encompasses, by far, the greatest land base totalling some 8800 acres. The other properties range in size from 1/4 acre to 450 acres. In addition, the uses or management direction among the properties are very different. The Elkhorn Townsite is listed on the National Register of Historic Places and includes two buildings set on two narrow mining claim lots. The Capitol Complex and Custer Avenue properties include a number of scattered parcels which house state government offices, maintenance facilities and the Capitol in the City of Helena. The remaining eight sites are primarily recreational, yet the management emphasis ranges from concentrated visitor use to dispersed recreation to wildlife management areas. All of these properties are along streams or lakes adjacent to or tributaries of the Missouri River (Figure 1). The Plan (Section VII) provides more detail on each property.

3.2 Air Quality

3.2.1 Current Conditions

Air quality within Region 8 is generally very good. However, the Helena Valley experiences occasional periods of high particulate counts due to dust, vehicle emissions, and wood smoke, especially in the winter months when temperature inversions trap cold air in the valley. At any time of the year, winds can create localized high particulate counts.

3.2.2 General Impacts

Air quality would not be significantly affected by implementation of any of the alternatives. Under Alternative 2, Integrated Pest Management, and Alternative 3, Herbicide Control, in which herbicides would be used, short-term, minor effects would be associated with chemical odors in the immediate area of a spray site. Herbicides are not a regulated class of chemical under the Clean Air Act regulations. In any event, the amount of chemical in the air would be elevated for only a short time. To minimize this effect, applications would be conducted when weather conditions (wind speed and turbelence) are suitable, nozzles on spray equipment would be adjusted to prevent aerosol dispersion, and herbicide formulations with relatively low volatility would be used.

Burning as a control method may temporarily affect particulate matter levels. All burning activities would be conducted in accordance with policies adopted by Montana Department of State Lands which include the development of a burning plan to maintain acceptable air quality standards are not violated. Intensive cultivation to control weeds could result in short-term elevated dust levels.

3.2.3 Site Specific Impacts

Region 8 properties that may be more affected by changes in air quality would include those sites that have higher human use whether it be by recreationists, tourists or administrative staff. The primary concern would be for chemical odors from application of herbicides (whose odor is the result of carrier mediums which are usually a petroleum products) and where these odors would be perceived to be unpleasant or offensive. Determining when low use periods occur (for example, time of day or day of the week) at a particular site and then confining spraying to those periods would reduce the potential for impact. Also, Region 8 would plan to announce the annual spraying schedule and to post signs at spray sites before and after spraying. In this way, users who were bothered by herbicide odors could avoid the site.

3.3 Geology and Soils

3.3.1 Current Conditions

The Helena and Townsend Valleys have been formed by tectonic, erosional and depositional processes. The mountain ranges surrounding these valleys are composed of rock ranging in age from pre-Cambrian to Cretaceous. Folded sedimentary, metamorphic, and igneous rocks underlie the valleys. Tertiary age lake bed deposits and more recent alluvial deposits derived from these rocks have filled the valleys with deep unconsolidated materials ranging in texture from coarse gravels to clays. The Missouri River, prior to the filling of Canyon Ferry Reservoir, had downcut deeply into the Townsend Valley. The Helena Valley still remains broad and flat drained by several streams which empty into Lake Helena.

Soils found in the valley areas, which are derived from these geologic materials are generally silty or clayey, moderately calcareous, and low in organic matter. Also, these soils are underlain by more coarse sands and gravels, however the depth to these more permeable materials varies from a few feet to more than 20 feet. Most of the Region 8 properties are on soils similar to those described above.

The Elkhorn Townsite is located in the the southern end of the Elkhorn Mountains. It sits on the Boulder Batholith, a granitic intrusion. Soils are rocky and sandy with moderate to high permeability.

Areas of exposed bedrock and soils where bedrock is close to the surface occur at the Black Sandy State Park (Schmidt et al. 1986), along the northwest shore of CanyonFerry reservoir (DFWP 1993), and at Elkhorn.

Soils that are wet much of the year or have a water table within five feet of the surface are limited in extent. They are associated with streams, lakes, and depressions where ground water is near the surface, where 'perched' water tables occur in clayey soils, or where irrigation practices maintain an elevated water table. Soil profile characteristics vary widely. Soils may be sandy, silty, clayey, or mucky (very high in organic matter). Extensive areas of wet soils occur at Lake Helena and Canyon Ferry Wildlife Management Areas (WMA).

3.3.2 General Impacts

Soils could be adversely affected under all alternatives. Soil loss, reduced site productivity, and herbicide contamination are the primary concerns. The nature and extent of these impacts vary for each alternative. Soil characteristics will also impose some constraints on the implementation of Region 8's program. However, these soil properties are tied to potential impacts to groundwater and will be discussed in Section 3.4.3.

Under Alternative 1, No Action, weeds would continue to spread. This would result in increased soil erosion. Weed infestation tends to create monocultures which usually reduces total plant cover so that more of the soil surface is exposed (Rice et al. 1992). Removal of solid stands of noxious weeds by way of manual, mechanical, and chemical methods may result in increases of surface erosion until these areas are revegetated with more desirable vegetation.

Manual treatment including hand-pulling and mechanical treatments such as mowing and grazing by sheep and goats require frequent or one-time intensive applications. This could denude or overexpose the soil surface, making it susceptible to erosion. These activities could also cause soil compaction which would increase the potential for surface run-off as well as reduce water infiltration necessary for revegetation. Tilling and reseeding would leave soils temporarily exposed and more susceptible to erosion by wind and water.

Burning would generally be conducted in conjunction with wildlife habitat enhancement projects and clearing unwanted vegetation. Burning intensities would likely be relatively low, however the potential for out-of-control, higher intensity burns exists. In addition to removal of vegetative cover by burning and increasing the potential for temporary surface erosion, there is a potential for causing losses of organic matter (the major source of nitrogen and sulfur in the soil), as well as other nutrients such as calcium, potassium, and phosphorus. Soil microorganisms, significant in the breakdown of some herbicides, may also suffer losses from burning. The result of the losses mentioned above may cause a temporary decline in soil productivity in these areas.

The intensity of impacts to soil from chemical applications of herbicides depends on several properties related to both the herbicide and the soil environment. The behavior of the herbicides proposed for use in soils is discussed in the impacts to ground water section of this environmental assessment. Table 5 summarizes pertinent herbicide properties in soils.

Under Alternative 3, Herbicide Control, the control objective would be toward eradication and reductionof weeds. In tem, this approach would rely primarily on chemicals for control. The greater use of chemicals, especially those that are relatively persistent (picloram, dicamba, and metsulfuron) could potentially cause soils to become contaminated. The use of broad-spectrum application methods (such as vehicle mounted boom sprayers) which are not targeted to individual plants would more likely be the chosen application method. This would increase the likelihood that over-applications could occur. On the other hand, if this Alternative were to be selected, a ll precautions detailed in the Plan would be implemented, thus minimizing the risk of contamination from these situations.

Under Alternative 2, Integrated Management, the risk of contamination due to these over-application situations would be greatly reduced because more precise methods, such as directed on-the-ground techniques, would be employed more often than broadcast methods. As mentioned previously, precautions, such as the use of a marker dye with the herbicide mixture, would employed so the potential for over-application due to unintentional respraying would be reduced.

Herbicides that are persistent in the soil can provide for residual weed control for up to five years depending on the soil conditions and the herbicide. For herbicides that target broadleaf plants, grass species will rebound and tend to out-compete broadleaf plants including target noxious weeds. However, if grass populations are slow to recover, the soil surface may be exposed, thus increasing the erosion potential on steep slopes. The litter layer created by dead plant material may offset erosion potential by mitigating raindrop impact and promoting infiltration. No evidence was found showing that herbicide use adversely affects soil productivity or microorganism populations.

Alternative 4, Non-Chemical Control, would eliminate the potential for herbicide impacts to soils, however, as discussed above, manual and mechanical treatments may potentially cause erosion and productivity losses.

3.3.3 Site Specific Impacts

Each Region 8 site would be susceptible to erosion or loss in soil productivity, however no significant losses are anticipated with the implementation of any of the action alternatives.

3.4 Ground Water

3.4.1 Current Conditions

Ground water is an important resource for Region 8. In the Helena area, ground-water supply comes from the Helena Valley aquifer (Moreland and Leonard 1980) which is considered to be a sole source domestic water supply (DHES 1993). Region 8 properties outside of the Helena city limits use wells to provide water for some park sites for drinking and limited irrigation. Ground water in the Canyon Ferry Reservoir area is supplied by the Townsend Valley aquifer (DFWP 1993). Well water provides drinking and irrigation water for cabin site and concessionaires lessees, and at the recreation sites around Canyon Ferry Reservoir. There is no ground water development at Elkhorn. The Capitol Complex is augmented by an on-site well.

Water quality in the Helena area is generally acceptable for domestic use but some areas experience elevated coliform levels resulting from agricultural operations and septic tank drainfield effluent (Drake 1992). Dissolved solids and nitrate concentrations vary but are within drinking water standards (Moreland

and Leonard 1980). An on-going statewide survey conducted by DHES includes private and public well monitoring (Hoffman 1992). No information is available to date on possible presence of herbicide residuals in the ground water. The Helena Valley Groundwater Protection District was established in 1992 to address current conditions and trends, potential degradation sources, and to assess long-term protection of the aquifer.

Water quality in the Canyon Ferry area is generally of high quality. However, occasionally high coliform counts are found at various recreation sites. There is concern that with increased use at the cabin sites and proximity of fractured bedrock to the soil surface septic tank drainfields could be a significant source of nitrates (DFWP 1993).

3.4.2 General Impacts

Herbicides have the potential to leach through soils and contaminate ground water. Several factors influence this occurrence. These include the herbicides' behavior in soil (i.e. persistence, mobility, adsorption, and microbial degradation), soil properties (texture, permeability, organic matter content, and depth), water solubility, and depth to ground water. Conditions that enhance herbicide capability to leach through the soil profile to ground water include high persistence in soil, high mobility, high water solubility, poor soil adsorption, low organic matter content, permeable soils such as sandy and sandy loams, shallow ground- water and relatively high precipitation. Table 5 lists general herbicide properties for the proposed active ingredients.

The U.S. Geological Survey sampled soil and ground water for pesticide residues at sites near Ronan, Havre, and Huntley (USGS 1990). Of the herbicides proposed for controlling weeds on Region 8 lands, dicamba was found in the Havre area. The authors concluded that irrigated agricultural areas of Montana might be susceptible to the transport of soluble pesticides through permeable soils to shallow ground water systems.

Lateral movement of picloram has been reported in soils (National Research Council of Canada 1977). Also of concern are soils which are shallow to bedrock (0-20"). Soils 'saturated' with herbicide could potentially leach through to bedrock, migrate along the bedrock surface, and arise downslope in off-target areas. Also, bedrock fissures could become conduits to ground water. The extent to which this could occur is unknown.

The half-life of an herbicide is the time required for half the amount of a herbicide introduced into a living system to be eliminated or disintegrated by natural processes. Half-life is also dependent on application rate. According to the USDA's Pesticides Background Statements (1984), picloram can have a half-life of

more than four years in arid regions and approximately one month under highly favorable soil conditions (i.e. moist soils, high organic matter content). Cryer et al. (1991) report a picloram half-life of 236 ± 69 days at a rate 1.16 lb/acre (1 pound acid equivalent) on rangeland soils in Missoula County. This relatively long persistence in soil and a poor affinity to soil (Watson et al. 1989), could result in leaching if picloram is applied to recharge or shallow ground-water areas (within 10 feet of the surface) and/or highly permeable soils. Studies of various soil types indicate that picloram is usually confined to the upper 1 foot (30 cm) when application rates are low (less than 1 lb/acre) (USDA Forest Service 1984, Rice et al. 1992). However, at rates of 3 to 9 lb/acre, picloram can readily move to depths greater than 3 feet (approximately 1 meter), even in relatively arid regions. The Plan recommends the Tordon 22K® formulation of picloram, which suggests rates of 1 lb/acre or less for broadleaf weeds on non-cropland, range, and pasture. Use would be precluded on lands with water tables that reach within 5 feet of the soil surface.

Dicamba has a relatively low affinity to soil particles, a high water solubility, and is highly mobile under non-arid, low soil moisture conditions (US EPA 1988). Therefore, dicamba poses a potential threat to enter ground water under certain conditions. However, its persistence in soil (3 to 12 months) is much less than picloram and is primarily lost from soil via microbial decomposition (Weed Science Society of America 1989). Metsulfuron, MCPA, and clopyralid all exhibit poor soil adsorption properties and moderate to high water solubilities and pose a threat to leach into ground water but are generally less persistent in soil than picloram and dicamba. Rice et al. (1992) found that clopyralid applied at rates of <1 lb/acre in bunchgrass communities does not persist for more than one year nor is the herbicide detectable below 25 cm. Leaching of 2,4-D is possible but limited due to microbial degradation, some soil adsorption, and low persistence in soil. Glyphosate strongly adsorbs to soil particles and is easily broken down by microbial decomposition. Therefore glypyhosate does not generally threaten ground-water quality (USDA Forest Service 1984).

Under Alternative 1, No Action, herbicide use would be limited but, the more rigorous review and monitoring mechanism that would be implemented under the proposed action would not likely be implemented. There would be a slight risk for herbicide contamination.

Under Alternative 3, Herbicide Control and Alternative 2, Integrated Pest Management there is potential to contaminate ground water because herbicides with moderate to high leaching potential (picloram, 2,4-D, dicamba, metsulfuron, MCPA and clopyralid) would be used. However, many precautions would be implemented to minimize any risks. Precautions include: the use of mechanical and manual treatments in

sensitive ground-water areas (Table 7); site reviews would identify sensitive ground water areas including recharge locations that may preclude application of certain herbicides. This review would also reduce the risk that herbicide applications will threaten sensitive ground-water areas. See the following Section for additional discussions. The use of methods that allow targetting specific plants would be used.

Because of the extent of sensitive ground-water areas on most of the Region 8 properties, herbicide use would be restricted in a number of situations. Since Alternative 3 emphasizes herbicide use, choices for weed treatments would not be as flexible as under Alternative 2 which emphasizes an integrated approach.

Repeated applications of herbicides to specific areas could potentially cause an accumulation of herbicides and thus enhance their potential to leach into ground water. This potential effect would be eliminated or minimized because mitigation measures such as the following would be implemented: use of marker dyes; strict record keeping of chemicals used and spraying schedules; monitoring; and following herbicide label directions.

Alternative 4, Non-Chemical Control, would not affect ground water on Region 8 properties.

3.4.3 Site Specific Impacts

To assess potential impacts to ground water on specific sites, a procedure developed for the Lewis & Clark County Conservation District was used (Lacey 1991). Risk factors included depth to seasonal or permanent water table, soil permeability, organic matter content, flooding hazard, and percent slope. A risk index was calculated on a scale of 1 to 100 and divided into 4 classes. Risk factors and classes were assigned to each soil map unit. Mapping was completed for much of the Helena Valley. Where mapping did not occur for Region 8 sites, the same procedure was used to identify sensitive ground-water areas. Table 7 shows the rating system used.

Using this approach, some portions of eight to the twelve Region 8 properties would be susceptible to potential ground-water contamination. Recommendations as shown inTable 7 would be followed as would the additional precautions listed in Section 2.5.2.

Areas where fractured bedrock lies close to the soil surface are also of concern. Portions of the Black Sandy State Park and along the northwest shore of Canyon Ferry Reservoir do have shallow soils over fractured bedrock. Large, broadscale applications with high herbicide rates are not recommended on these sites. Decreasing application frequencies and reducing theconcentration of active ingredient in herbicide formulations would also reduce contamination risks.

Table 7. Groundwater Risk Classes used to Identify Sensitive Ground-Water Areas*

Numerical Value	Risk Class	Example of Soils
100+	Very high	Soils with water tables within 3 ft, moderately rapid to very rapid permeability; herbicide use not recommended on these sites.
80-99	High	Soils with water tables within 3-6 ft, moderate to rapid permeability, no flooding or soils with water tables within 15 ft., moderately rapid to very rapid permeability, high flooding risk, and low organic matter; spot treatments with herbicides may be utilized in some areas; reduced herbicide rates and application frequency will decrease contamination risk; low leach potential, short residual herbicides recommended for any large scale applications.
60-79	Moderate	Soils with water tables within 6 -10 ft. and moderately slow to very slow permeability; or soils with water tables within 15 ft. and rapid to very rapid permeability; these soils often occur in association with high water table soils; Herbicides can be used for spot treatments on these sites; large broadscale applications with high herbicide rates not recommended; decrease application frequency to reduce risk.
40-59	Slight	Soils with water tables within 15-25 ft., moderate to moderately rapid permeability, occur on similar landscapes as high water table soils but not in association with these soils. May be located on benches and terraces adjacent to perennial or intermittent streams; few restrictions for herbicide use.

* After Lacey (1991).

3.5 Surface Water

3.5.1 Current Conditions

Eight of the twelve property groups managed by Region 8 are associated with water and have high recreation values. Black Sandy State Park, Lake Helena Wildlife Management Area (WMA), Canyon Ferry State Park, Canyon Ferry WMA, Lake Helena Causeway Fishing Access Site (FAS), York FAS, Deepdale FAS, and Toston FAS are directly part of the Missouri River system. Indirectly, the Helena Valley Reservoir is part of the Missouri system because water is pumped from it and stored for irrigation and eventually returns to Lake Helena via waste-water collection ditches. Spring Meadow Lake State Park is part of the Ten-Mile creek drainage that connects with Lake Helena.

The Capitol Complex and Custer Avenue properties depend on the City of Helena Water System for drinking and irrigation water. The Capitol Complex is augmented by an on-site well.

Overall surface water quality in the Helena Valley is good with low total dissolved solids, low metals concentrations and near neutral pH (DHES 1993). Total dissolved solids and sediment loading varies seasonally and is usually higher during low flow periods (DHES 1993).

Canyon Ferry Reservoir is primarily fed by the Missouri River but eleven other perennial streams also flow into it. Water quality of Canyon Ferry Reservoir and the Missouri River above the reservoir is suitable for supporting a cold-water fishery, safe for water sports and is potable after filtration and treatment. Reservoir waters contain high levels of naturally-occurring phosphorous and arsenic (DHES 1993). Canyon Ferry's water quality, as indicated by a number of parameters, has been relatively stable (Knapton 1992, as referenced in DFWP 1993).

Elkhorn Creek runs through the Town of Elkhorn, near Region 8's property. This creek is classified as highly impaired due to elevated heavy metal concentrations from miningand is a partially-supporting cold-water fishery (Tralles 1993).

3.5.2 General Impacts

There is general public and agency concern for agricultural chemical (including herbicide) contaminated ru-off in the area. However, neither the existence of contaminants has been quantified nor has a systematic risk assessment been conducted.

All Federal and state laws and guidelines concerning the maintenance and enhancement of water quality are applicable to Region 8. For example, the Federal Safe Drinking Water Act establishes maximum contaminant levels for potentially toxic substances in drinking supplies (Table 8). These are legal standards. The EPA's Gold Book provides additional protection guidelines (US EPA 1986) for the health and welfare of aquatic life and wildlife. Instream concentration for 2,4-D is listed at 100 µg/l (parts per billion). Currently, 2,4-D is the only herbicide listed that is proposed for use by Region 8. Revisions to and/or inclusion of new substances in EPA's Gold Book occur periodically.

Under all the Alternatives, mechanical methods that would disturb soil increase the risk of sediment delivery to streams and lakes.

Under Alternative 3, Herbicide Control, in which weeds would be controlled primarily with herbicides, the highest potential to cause surface water contamination exists.

Herbicides could enter lakes or streams via accidental spills, run-off from treated areas, or aerial drift during application. Also, if streams or lakes are used as water sources to mix chemicals, back-siphoning could occur resulting in discharge of herbicide mix directly to surface water. Of these three avenues of entry into surface waters, aerial drift has the lowest potential to cause measurable contamination. At the application

Table 8. US EPA Maximum Contaminant Levels for Drinking Water*

Compound/ Formulation	Status of Listing**	Maximum Contaminant Level (µg/l)	Drinking Water Equivalent Level (µg/l)
Clopyralid/Stinger	-	no data available	no data available
Dicamba/Banvel	L	no data available	1000
2,4-D/amine	P	70	400
Glyphosate/Rodeo®	P	700	4000
MCPA/amine	-	100	53
Metsulfuron/Ally	-	no data available	no data available
Picloram/Tordon 22K®	P	500	2000

* Concentrations not to be exceeded in drinking water supplies, for herbicides proposed for use by Region 8; source = USEPA (Office of Drinking Water) 1990; µg/L ∫ parts per billion.

** L = listed for regulation; P = proposed

rates proposed, incidental drift into water bodies would result in very low, usually undetectable, in-stream or in-lake concentrations of these substances. Furthermore, if label instructions are followed and treatment areas are carefully planned with use of buffer zones, even incidental drift into surface waters should not occur.

Very little surface water contamination due to herbicide run-off from treated areas would be expected after major or small storm events. In the first case, in-stream dilution rates would be greatly enhanced; while in the latter, run-off would be insufficient to mobilize any herbicides not bound to vegetation or soils. Sassman et al. (1984) found that the highest potential for herbicide contamination via run-off occurred if a

moderate-sized storm event happened shortly after an area had been treated. In these situations, as much as three percent of the chemical applied to the watershed was found to enter surface waters. However, in a highly porous, granitic watershed in Montana, Watson et al. (1989) were unable to detect any picloram in surface waters during 90 days of monitoring after application of 1 lb/acre of this herbicide. Erickson and Essig (1981) found no detectable levels of 2,4-D (<.05 ppm or Banvel® < .25 ppm) in a routine survey of surface waters in the Mission Valley.

Accidental chemical spills pose the greatest potential threat to surface water quality. The point-source introduction of large quantities of toxicants could contaminate drinking water supplies and other in-stream uses for several miles below the spill. But, even in this worst-case situation, surface water contamination would be predominately short-term and acute rather than long-term in duration. This is because the herbicides planned for use by Region 8 are low to moderate in toxicity and relatively short-lived in the environment (Table 5). Any potential for cumulative impacts to surface water quality would be further reduced by the scheduling, monitoring and record-keeping prescribed in the Plan. These basicoperational policiesof Region 8's proposed program would, in effect, reduce the likelihood of repeated chemical treatments at a given site.

Similar effects could occur under Alternative 1, No Action, but the extent of potential impacts would be less because the total use of herbicides would be lower. Funding and other program constraints would be the main limiting factors.

The proposed action, Alternative 2, Integrated Pest Management, attempts to minimize the environmental consequences of herbicide treatments. All precautions/restrictions that apply to shallow ground water areas will also be utilized during treatments near surface waters. In addition, herbicide loading, mixing, and storage areas will be located at least 500 feet from open water or shallow ground water. If mixing and loading of chemicals were to occur on site, open water would not be used for mixing to prevent contamination that may result from backsiphoning. Picloram, the most persistent of the herbicides proposed for use, will not be applied on the immediate banks of a water body, below the high water level of a stream, or in identified sensitive ground water areas.

3.5.3 Site Specific Impacts

As mentioned previously, all but three of the properties are along lakes or streams where potential herbicide contamination of surface water would not be a concern. At the other properties, precautions listed in Section 2.5.1 would be implemented, therefore potential impacts would be minimized.

3.6 Wildlife and Fisheries

3.6.1 Current Conditions

The Canyon Ferry Reservoir area provides a unique combination of habitats with components of open water, wetlands, riparian areas, rangeland and sparsely timbered areas. The other Region 8 properties all provide the same combination of elements but in smaller parcels. As a result, Region 8 possesses a wide variety of mammal, avian, fish, and other species.

There are over 300 vertebrate wildlife species known to occur in latilongs 27 and 28 which encompass Region 8. A latilong is a unit of land encompassed by one degree of latitude and one degree of longitude. Appendix B, compiled from DHES (1993) and DFWP (1993), lists the species that could occur in the Region 8 area. Seven big game species, 41 other mammal species, over 250 bird species, 3 amphibian species, 8 reptile species, and 28 fish species are known to occur in this area (Skarr et al. 1985; Thompson 1982; DFWP 1992; DFWP 1993; DHES 1993; Helena Audubon Society 1992). With the exception of the Capitol Complex, Custer Avenue, and Elkhorn properties, many of these species would use Region 8's properties for seasonal or year-round habitation. Waterfowl, upland bird and big game hunting, wildlife viewing, and fishing are primary recreational uses and management focuses of Region 8. Key species are shown in Table 9.

Table 9. Key Wildlife Species for DFWP Region 8

Terrestrial		Avian		Aquatic
	Raptors	Waterfowl	Upland Game/Other	
White-Tail deer	Bald eagle^	Canada geese	Ring-necked pheasant	Brown trout
Mule Deer	Golden eagle*	Mallard	Grouse	Rainbow trout
Elk	Peregrine falcon^	Pintail	Hungarian partridge	Kokanee
Pronghorn antelope	Osprey	Gadwall	Caspian tern*	Yellow perch
Beaver	Swainson's hawk	Widgeon		Westslope cutthroat*
Muskrat	Red-tailed hawk	Teals		Mountain whitefish
Mink	American kestrel	Double-breasted cormorant*		
Weasel	Northern harrier	Common loon*		
Coyote	Ferruginous hawk*	Great blue heron*		
Red fox		Sandhill crane		
Striped skunk		White pelican*		
Rocky Mountain goat				
Black bear				
Moose				

* Species of concern as identified by DFWP and Montana Natural Heritage Program
^ Endangered species listed under the Endangered Species Act

Federally listed endangered species found in the area include the peregrine falcon and bald eagle. Concentrations of bald eagles occur below Canyon Ferry Dam in the fall and early winter to feed on the

kokanee and other fish. Three bald eagle nests are located along Hauser Reservoir. Peregrines reintroduced to sites established along this same stretch of the Missouri have successfully adapted. Nesting by these two species is likely to increase as populations of these birds expand (DFWP 1993). Other species of concern include the west slope cutthroat trout, golden eagle, white pelican, double-breasted cormorant, great blue heron, ferruginous hawk, common loon, and Caspian tern (Montana Natural Heritage Program 1993).

3.6.2 General Impacts

Wildlife

Wildlife populations everywhere suffer from loss of habitat caused by resource development and other human activities. Region 8, as part of the larger management direction for DFWP, is charged with protecting and enhancing wildlife habitat. One of the greatest threats to native vegetative habitat is encroachment by non-native plant species including noxious weeds. Plants not native to a particular vegetative community usually create an imbalance in the species structure of the community, often crowding out native species that are important to wildlife populations for food and cover.

There are also some consequences to wildlife and wildlife habitat that may result from the treatment methods used to manage noxious weeds. Vegetative habitat is lost directly by removal and indirectly by factors that affect plant health and productivity.

A few wildlife species benefit directly from noxious weeds. Some birds eat weed seeds and others seek cover in heavy infestations, but most native plant communities provide diversity and quality in food and cover not available in heavily weed-infested areas (USDI-BLM 1987). Although there does not appear to be any discussion in the literature for the toxic effects of weeds on wildlife, there is a significant effect on livestock from ingestion of certain weed and plant species. According to the USDI-BLM (1985) there are annual estimates of one percent mortality in cattle and 3.5 percent mortality in sheep in areas where there has been some poisonous (not necessarily noxious) weed control. Species included in this analysis that variously affect horses, goats, sheep, cattle, and swine are St. Johnswort, yellow starthistle, leafy spurge, and Russian knapweed. Only the latter two have been identified on Region 8 lands. It ispossible that some of the weed species poisonous to livestock may also be poisonous to wildlife species.

The proposed action, Alternative 2, Integrated Pest Management, utilizes an approach combining manual, mechanical, biological, and herbicide control methods. By using an integrated approach to weed management, areas critical to wildlife species during specific seasons could be treated at times or by techniques that would have the fewest negative impacts. Careful application of herbicides in sensitive

areas or use of biological, manual, or mechanical techniques would offer the best solutions for wildlife in terms of halting or ending weed infestations.

The integrated approach, because it allows targetted treatment of weeds in important wildlife habitats, has built-in attention to mitigative measures. This approach assures that the proper technique will be used in sensitive areas, rather than using a generalized or 'stop-gap' method to repair damage done after inappropriate techniques have been used. The Plan's management objective for wildlife is to "protect existing, diverse wildlife habitats from encroachment by weeds while ensuring that threatened, endangered, rare, or unique species are not adversely affected by weed treatments". The Plan lists several management guidelines which offer the built-in mitigative aspects of the integrated approach. These address specific and general approaches to treating sensitive areas and threatened and endangered species that will be determined and delineated for each project, regardless of the treatment method.

Alternative 3, Herbicide Control, could affect wildlife directly through the ingestion of treated plants or by dermal absorption if wildlife species come into contact with treated vegetation. If properly applied, it is unlikely that any species would receive toxic doses of pesticides. However, in cases where animals are directly sprayed or feed exclusively on sprayed vegetation, some could receive toxic doses (USDI-BLM 1985). Toxicities of various chemicals considered for use cover a wide range. Tests on domestic animals have shown that the LD_{50} for 2,4-D is the lowest (most toxic) of pesticides considered in this assessment (Tables 5 and 10). For cattle (or for comparison, elk) grazing immediately after spraying 2,4-D at prescribed rates and only on sprayed vegetation, ingestion of the chemical would only be about 20% of the LD_{50} (Lolo National Forest 1989). For dogs (or for comparison, coyotes), ingestion of a large quantity of meat from an animal that has eaten heavily on sprayed vegetation would result in less than 1/400 of the LD_{50}. Based on the Lolo data, it appears that neither elk nor coyotes could ingest enough of any pesticide through normal eating behavior to be fatal. It is difficult to extrapolate the level of effects on domestic animals to wildlife. But based on the LD_{50} ranges shown in Tables 5 and 10, for a wide range of animal sizes, it appears that pesticides are not a great threat to wildlife species. Studies by Monnig (1988) demonstrated that warm-blooded animals, when fed high concentrations of 2,4-D, picloram, and glyphosate, excrete the chemicals rapidly and do not retain pesticides in internal organs. Thus, it seems that most wildlife species are not likely to be affected directly by ingestion of pesticides or pesticide-covered vegetation.

Table 10. LD_{50}s for Domestic Animals (mg/Kg)*

Species	Picloram	2,4-D	Glyphosate
mouse	2,000-4,000	368	na*
(rat)	8,200	375	4,320
dog	na	100	na
cat	na	820	na
chicken	6,000	541	15,000 no effect
(mallard)	>2,000	na	>2,000
pigeon	na	668	na
rabbit	2,000	424	3,800
cow	540	100	na
(mule deer)	na	400-800	na

* The data in this table were taken from Lolo National Forest Noxious Weed Management DEIS (1989); Sassman and others (1984); Southern Region Vegetation Management DEIS (USDA Forest Service 1988: Appendix A, Section 6). The reader should consult those documents for thorough discussions of herbicide toxicity.

** na = data not available

In risk analysis studies performed for the FEIS on Eradication of Cannabis on Federal Lands in the United States (USDI-BLM 1985), it was shown that most large animals cannot receive lethal doses of herbicides (2,4-D or glyphosate) and that it is very unlikely in even the most extreme dose cases that small animals (such as mice or toads) would die (Table 11). This table demonstrates that in a worst-case situation, no listed animal would receive a dose greater than eleven percent of its median lethal dose for 2,4-D or one percent for glyphosate (USDI-BLM 1985).

Other studies reviewed for this assessment outlining affects of herbicides on wildlife species did not mention treatment in areas used for calving, fawning, nesting, or rearing of young. It is possible that young animals could be negatively affected through direct contact with or ingestion of herbicide.

Indirectly, Alternative 3, Herbicide Control, may affect wildlife negatively over the short term by killing native broadleaf plant species important seasonally for food and cover. Depending on the rate of application and the techniques used to apply herbicides, there can be short-term losses of non-target vegetation important to wildlife species (USDI-BLM 1985).

Table 11. Wildlife Dose Levels of 2,4-D and Glyphosate

2,4-D

Species	Routine Case Dose	Extreme Case Dose	Median Lethal Dose LD 50*	Lab Animal
Flicker	13.7	123.33	472 (T)	Pheasants
Dove	8.71	41.35	472 (T)	Pheasants
Jay	12.85	97.95	472 (T)	Pheasants
Kingfisher	0.017	0.42	472 (T)	Pheasants
Owl	7.93	23.63	472 (T)	Pheasants
Mouse	39.64	197.90	380 (BE)	Mouse
Rabbit	5.52	44.70	424 BE)	Rabbit
Deer	1.14	13.76	400 (A)	Mule Deer
Fox	2.02	9.27	100 (A)	Dog
Toad	18.04	139.9	200 (M)	Tadpoles (96/hr)
Snake	19.82	59.1	200 (M)	Toad TL_{50} (96/hr)
Eggs	9.42	47.1	No adverse effects at up to 35mg/kg	Hen eggs

Glyphosate

Flicker	7.21	64.90	4,640	Quail
Dove	4.59	21.78	4,640	Quail
Jay	6.76	51.51	4,640	Quail
Kingfisher	0.0087	0.22	4,640	Quail
Screech Owl	4.17	12.44	4,640	Quail
Mouse	20.86	104.20	4,000	Rat
Rabbit	2.91	23.53	3,800	Rabbit
Deer	0.60	7.22	3,800	Rabbit
Fox	1.06	4.88	3,800	Rabbit
Toad	9.49	73.65	**	
Snake	10.43	31.10	**	
Bird Eggs	4.96	24.78	**	

* BE = Butyl Ester, A = Acid, T = Technical, and M = Amine
** No studies available

Table adapted from USDI-BLM Northwest Area Noxious Weed Control Program Final EIS 1985.

Bio-accumulation of contaminants in the food chain was of critical importance with the now-banned insecticides DDT and DDE, particularly for sensitive species such as raptors. Herbicides proposed for use under the Plan have been shown to metabolize readily and be excreted by mammals. Dicamba, glyphosate, 2,4-D, and picloram do not bio-accumulate in fish and animals (US EPA 1983, 1986, 1988; USDA Forest Service 1984). Metsulfuron does not bio-accumulate in fish (US EPA 1988). No evidence was found in the literature to support adverse bio-accumulation problems from these herbicides, MCPA, or clopyralid.

Vigorous application of manual and mechanical controls under Alternative 3, Non-Chemical Control, could temporarily arrest the rapid encroachment of weeds in weed-free areas, but would probably not effectively control weed infestations in critical habitats presently containing weeds. Recovery of native species would also probably be a slow process.

Biological control methods would not reduce weed populations quickly and might not be able to stay ahead of further weed encroachment. The use of biological control agents (insects or pathogens) should not have any negative effects on wildlife. The use of grazing livestock such as sheep or goats to eliminate areas of weed infestation could cause temporary displacement of big game animals and cause short-term loss of some non-target native vegetation.

Scarified, cultivated, or other disturbed soils could be infested by weeds if revegetation of native species is not quickly and carefully performed. Mechanical methods of weed control could also cause short-term displacement of large and small animals and could destroy non-target vegetative species.

Prescribed burning could destroy terrestrial animals incapable of escape including nesting birds and their young. Short-term destruction of wildlife habitat would also occur, particularly for small animals. If improperly timed, this could have a significant impact on some species. Cover and forage species would be temporarily eliminated.

If Alternative 4, Non-Chemical Control, is selected, weed infestations will likely expand and continue to crowd out important native plant species, resulting in a decline in plant species diversity, which, in turn, would have a negative effect on wildlife populations.

Wildlife populations and habitats can be positively and negatively affected by all alternatives except Alternative 1, No Action. This alternative would have only negative affects on wildlife. Diminished grass and forb production due to weed invasion may negatively affect habitats for most wildlife species during all seasons of the year. French and Lacey (1983) found that forage production (primarily grass species)

dropped from 891 to 54 pounds per acre in a short period of time as spotted knapweed became established.

Lower quality and quantity of prime, native forage plants can affect natality and mortality of wildlife species by weakening animals at critical times of the year. Spring green-up of native vegetation is also critical to the survival and productivity of many species.

Under all alternatives, weed treatment activities could disturb wildlife using an area. However, disturbance or displacement would be expected to be temporary. Region 8 biologists would, each year, identify particularly sensitive areas or times for species that should be avoided. Under all action alternatives, Section 7 consultations would be conducted with the U.S. Fish and Wildlife Service for threatened and endangered species for each treatment project as necessary.

Fisheries

No adverse impacts to fisheries are anticipated under Alternatives 3 and 4, the Non-Chemical and No Action options, respectively. For reasons discussed in the surface water section, Alternative 3, Herbicide Control, which would emphasize herbicide use for weed control, has the greatest potential to affect fisheries. Direct impacts could occur if instream concentrations of herbicides exceed levels that are toxic to resident fish (Table 5). Indirect, food-chain impacts could occur if in-stream levels become elevated enough to become toxic to aquatic vegetation, particularly algae.

The toxicity of herbicides to fish and aquatic life varies greatly depending upon the formulation, percentage of active ingredient, and species affected (Table 5). According to criteria established by the U.S. Fish and Wildlife Service (1980), none of the chemicals proposed for use are highly toxic to fish and aquatic life; i.e. having an LC_{50} less than 1.0 ppm. For example, the ester formulation of 2,4-D, which is highly toxic to trout with an LC_{50} of 0.8 to 1.2 ppm (Woodward 1979) will not be used in riparian areas or near water bodies.

The Plan further minimizes potential consequences to fish by requiring that only the amine formulation of 2,4-D and the Rodeo® formulation of glyphosate be applied near surface waters. Both of these herbicides have been shown to be only slightly toxic to trout; i.e., having LC_{50} values ranging from 100 to 1000 ppm. These compounds also quite readily adsorb to soils, which minimizes their mobilization into surface waters, and they do not persist in the environment for long periods (Table 5). The Plan also suggests using a model, developed by the Forest Service (Lolo National Forest 1989), to calculate whether trout would be affected. The procedure for calculating a "No Observed Level of Effect" (NOEL) is

presented in the Plan.

There is some potential for cumulative impacts to occur on some Region 8 sites because of the number of entities (state and local agencies and private landowners) that use herbicides to control noxious weeds. These impacts are expected to be minimized under Alternative 2, Integrated Approach, because Region 8 would coordinate with all adjacent landowners and managers. Other precautions and mitigation measures built into the Plan that would minimize impacts include: following label instructions; developing scheduling and monitoring procedures; calculate NOELs when appropriate. These measures would not allow repeated applications of herbicides within a given treatment area.

3.6.3 Site Specific Impacts

Wildlife

Direct negative effects to wildlife species are likely to be minimal or none as discussed previously. However, potential indirect effects of herbicide applications on vegetative food sources does exist. If chemical treatment of these areas is not carefully conducted, important forb and shrub species could be killed or greatly reduced. Of particular concern are the shallow lake and wetland habitats associated with the Lake Helena and Canyon Ferry Wildlife Management areas which presently possess very high quality waterfowl habitat. Emergent, floating, and submergent vegetation important to waterfowl and other species could be negatively affected. If precautions and mitigation measures outlined in the Plan are followed, the risk of negatively affecting wildlife resources is minimal.

Threatened and Endangered Species

As discussed previously, potential toxic effects from herbicides is minimal for wildlife. The primary concern for bald eagles and peregrine falcons is disturbance during nest building and incubation (March through June). The proximity of nests to the York FAS and to Black Sandy State Park makes implementation of weed control efforts of some concern. Weed treatments would usually occur between late May through September. The level of actvities should be no greater than that expected from typical recreationist use at these sites. Mitigation measures that would be considered include following guidelines recommended by the Montana Bald Eagle Working Group (1991).

Fisheries

Eight of the 12 properties are associated with lakes or streams, all of which have established and valuable fisheries. Trout (and presumably other cold water species such as kokanee) are likely to be the most sensitive species to herbicides, as previously discussed. Therefore, all sites could be potentially

adversely affected by inappropriately or improperly applied herbicides. If precautions and mitigation measures outlined in the Plan are followed, the risk of negatively affecting the fisheries resource is slight.

3.7 Vegetation

Vegetation resources on Region 8 lands include rangelands, wetlands, riparian areas and forested areas. Wheatgrass and fescue bunchgrass communities dominate on gentle slopes with loamy to coarse textured soils. Finer textured soils support short grass communities dominated by blue grama, prairie junegrass, and needle-and-thread. Upland shrub/grassland communities include big sagebrush, fringed sagewort, and antelope bitterbrush with Rocky Mountain juniper and mountain mahogany occurring in rockier areas. Ponderosa pine and Douglas-fir forests with bunchgrass understories are found at the higher elevations and on steeper slopes. Riparian communities include cottonwood, aspen, willows and numerous other mesic shrub species. Significant wetlands are found at the south end of Canyon Ferry Reservoir which include the wildlife amanagement area (OEA Research, Inc. 1991), and at the Lake Helena WMA. Wetland communities include rooted emergent species such as cattail and bulrush, sandbar willow, floating aquatic, sedge, spikerush, common reed, and seasonal mudflat (OEA Research, Inc. 1991, 1992). All but the Custer Avenue, Capitol Complex and Elkhorn sites have some wetland and riparian components.

Wetlands and riparian areas provide critical wildlife habitat for a number of species. Noxious weeds are established in some areas and threaten the remaining resource. Spotted knapweed and Canada thistle, are the most prevalent weeds. Leafy spurge and other knapweeds are also well established locally.

Plant Species of Concern

Rare plant species are protected under the Federal Endangered Species Act of 1973, PL 93-205 as amended and rules 50 CFR Part 402. At this time, there are no plant species listed as threatened or endangered under these authorities. The Natural Heritage Program system, a partnership between The Nature Conservancy and state governements, was established in part as a clearinghouse to aid states in identifying and studying rare species. The Montana Natural Heritage Program has identified species of concern that may be sensitive, threatened, endangered, or otherwise rare in the State of Montana. Table 12 lists species of concern that are known to occur in the vicinity of Region 8 properties.

Table 12. Plant Species of Concern in the Vicinity of Region 8 Lands*

Scientific Name	Common Name	Status**	Potential Occurrence***
Astragalus convallarius var. convallarius	lesser rushy milkvetch	G5 S2	2
Carex vallicola	a sedge	G5 S2	3
Cirsium longistylum	long-styled thistle	G2 S3	3
Lesquerella klausii	divide bladderpod	G3 S3	2
Oxytopis lagopus var. conjugans	rabbit-foot crazyweed	G4 S3	1
Polygonum douglasii ssp. austinae	Austin's knotweed	G5 S2	2

* Montana Natural Heritage 1993 data base search; Lesica and Shelley 1991.

** Global ranks:
- G2 imperiled 6-20 occurrences
- G3 threatened throughout range
- G4 apparently secure
- G5 demonstrably secure

State ranks:
- S1 critically imperiled in Montana ≤5 occurrences
- S2 critically imperiled in Montana 6-20 occurrences
- S3 rare in Montana, (≥ 21 occurrences)

*** Potential for occurrence (developed for this analysis) ranks the likelihood that the species may occur in Region 8
1. Species known to occur (MNHP database record) on or very close to Region lands
2. Species could occur due to presence of suitable habitat
3. Species not likely to occur due to general habitat requirements but may occur incidentally outside preferred range.

3.7.2. General Impacts

The nature and extent of impacts on vegetation resources would vary under each alternative.

Under Alternative 1, No Action, noxious weeds would continue to spread and new species would likely begin to invade or spread from Region 8 lands. In general, weed species compete very effectively for nutrients and space and tend to be pioneer species. Also, some species (knapweeds and leafy spurge) may produce toxins that inhibit growth, although there is debate among researchers as to what extent this occurs (Kelsey and Bedunah 1989; Harvey and Nowierski 1989). These factors would result in the decline of native and other desirable species and the establishment of near mono-cultures. The ecological integrity of native plant communities becomes disrupted. Animal and insect populations adapted to life in a particular community are forced to move out or change behavior. However, as is pointed out in the Lolo N.F. DEIS (1989), man has introduced many exotic species into plant communities so that noxious weed impacts become a matter of degree since ecological community disruption has already occurred.

Some noxious weeds have beneficial uses. Several species that have been designated as noxious by federal, state, and local governments were brought to an area because a species was known to be useful somewhere else or a use has been found since its introduction. For example, spotted knapweed, introduced from Eurasia, arrived in Montana as a food source for honey bees. Purple loosestrife, a Eurasian native which may not have been intentionally introduced, is used as a landscape ornamental. Dalmatian toadflax is also used as an ornamental. Spotted knapweed has a high protein content and is utilized to a limited extent by big game where infestations are heavy (Lavelle 1988). Leafy spurge has a very high protein content and is readily eaten by sheep or goats that are conditioned to it, although some bio-types of spurge are moderately toxic.

On the other hand, species, such as knapweed which have a high rate of spread onto susceptible areas. The estimated cost to Montana's range livestock industry is approximately $4.5 million annually in lost forage (French and Lacey 1983). The annual loss would be expected to increase until noxious weeds are established in most susceptible areas. Losses to livestock also mean losses to wildlife, especially big game. Forage production loss predictions (for spotted knapweed) are high for susceptible plant communities (Willard et al. 1988) with an estimate of 18 percent forage loss in 50 years (Lolo N.F. 1989).

Under Alternative 3, Non-Chemical Control, the emphasis on manual, mechanical, and biological controls would have some adverse impacts on non-target vegetation. Low-intensity burning conducted to improve range habitat may reduce weeds (at low infestation levels), as well as forbs, and shrubs in favor of grass species. Losses of desirable vegetation would be temporary and at the same time would improve grass forage.

However, the effectiveness of burning as a direct weed control measure is questionable. Unpublished studies conducted on spotted knapweed in Montana and on leafy spurge in North Dakota indicate that low-intensity fire does not damage roots or seeds (Lacey 1991). Control of leafy spurge is minimally enhanced when old stands of spurge are burned off and then followed with herbicide treatment (Lacey 1991). Burning dense spotted knapweed stands followed by reseeding with desirable vegetation without herbicide treatment has also been shown to be an ineffective control measure (Lacey 1991).

Manual methods would be used in localized situations and should have no adverse impacts on desirable vegetation. Mowing is a short-term solution to preventing weeds from going to seed. Effects on desirable vegetation would be similar. Tilling would be considered only for areas that had previously been cultivated because ground disturbance increases the likelihood of infestation. Use of grazing animals to control weeds would have little impact on desirable vegetation as long as herds are confined and use is carefully

monitored. Indirectly, compaction of a site could slow the recovery of desirable plants. Because biological control organisms attack a single species, no adverse impacts to desirable vegetation would occur.

Under Alternative 2, Herbicide Control, adverse impacts to desirable vegetation could occur. Impacts would depend on the application rate, method, carrier, and the herbicide. Broad spectrum application methods (aerial and vehicle-mounted boom application) would likely be used more frequently, thus increasing the chances that non-target vegetation would be damaged. Herbicides which are selective for broadleaf weed species (such as 2,4-D and picloram) also kill native forbs, shrubs, and trees, thereby decreasing natural diversity, at least for the short-term. Grasses are tolerant and would benefit from treatment. Non-selective herbicides (glyphosate) can kill all vegetation which has been shown to provide a good seedbed for the re-establishment of weeds.

The Plan outlines precautions and use standards that are designed to minimize or eliminate the potential adverse effects of herbicides on desirable vegetation. Special attention is given to riparian and wetland areas. If these are followed, then impacts would be low.

Under Alternative 1, Integrated Pest Management, impacts would be similar to those described for Alternative 2, Herbicide Control, and Alternative 3, Non-Chemical Control. However, Alternative 1 allows for flexibility in approach and use of optimum treatment methods for specific sites. The potential impacts are expected to be low.

Plant Species of Concern

Species of concern are declared as such because their numbers are greatly reduced and/or their habitat is declining or threatened. Studies addressing how weed infestations may affect species of concern are few. Shelly (1991) showed reductions in reproductive output of sapphire rockcress (*Arabis fecunda*) where spotted knapweed had invaded. It is known that weeds are very competitive and would, therefore, likely crowd out these species. For those species whose habitat coincides with areas susceptible to weed invasion, the threat may be very high. Currently, the rate of spread of spotted knapweed and sulfur cinquefoil appears to be the highest of the noxious weeds considered by Region 8.

Typically, rare plants occur in very small populations. Use of herbicides could cause a significant loss by eliminating the plant or reducing numbers. Mechanical methods could cause uprooting or physical damage, loss of seed production, or outright destruction. Identification of rare plant populations during treatment area planning would help to minimize or prevent losses.

3.7.3 Site Specific Impacts

All region 8 properties have desirable vegetation including native and introduced landscape plants that would be vulnerable to herbicide treatments. Spot spraying and use of appropriate herbicide formulations would reduce the potential for short- term injury or long-term plant community damage.

Plant Species of Concern

Of the species listed in Table 12, rabbit-foot crazyweed is known to occur in the cabin lease area on the northwest shore of Canyon Ferry Reservoir. It is rare in Montana but apparently common locally. Suitable habitat exists in the other areas along Canyon Ferry Reservoir, at Black Sandy State Park, and York FAS. Divide bladderpod, which is critically imperiled in Montana, could also occur on these sites. Lesser mushy milkvetch occurs in the Mt. Helena and Ascension area. There is a possibility that this species could occur at Spring Meadow Lake or on the some of the Capitol Complex properties, however, these areas have been so altered that the chances would be slim. Austin's knotweed occurs along the Missouri between the Deepdale and Toston FAS and may well occur on these sites. Spotted knapweed infestations in this area may pose a serious threat to the knotweed's viability. It is suggested that surveys be conducted soon for these species. If populations were located, DFWP would complete a conservation plan.

3.8 Recreation

3.8.1 Current Conditions

Region 8's lands offer a wide variety of recreational opportunities such as waterfowl, upland game bird and big game hunting, year-round fishing, camping, picnicking, swimming, sailboarding, motorboating, canoeing, waterskiing, ice skating, and wildlife viewing. The Capitol grounds and the Town of Elkhorn provide additional tourist and historic site attractions.

3.8.2 General Impacts

The most heavily used trails, campsites, picnic areas, and fishing accesses have problems associated with compaction, braiding (trails), and weed infestation.For some recreationists, weed infestations are unaesthetic and are a nuisance. For those uninformed about noxious weeds, their activities result in the spread of weed seeds because weed seed can be moved around in many ways such as by vehicles, trailers, pets, and picking.

Alternative 1, No Action, would have the greatest negative impact on recreation resources. Healthy, native plant communities are a significant part of the recreational experience, both from the ecological and the aesthetic perspectives. Allowing weeds to infest these areas and crowd out the native vegetation

would diminish the quality of the experience. Indiectly, hunting oportunities may decline if adverse changes in the forage base affect game population size or movements.

Under Alternative 3, Herbicide Control, and Alternative 3, Non-Chemical Control, weed encroachment or establishment could be arrested to some degree. The proposed action, Alternative 2, Integrated Pest Management, would allow selection of the best technique for a particular area and would guarantee that the ecological and aesthetic qualities would be protected.

Alternative 2 would include a significant effort to educate recreationists to the problems associated with noxious weed invasion and how they may exacerbate the problem. Education would help recreationists assist in identification of problem areas, understand where the most sensitive areas exist, instruct them on areas to avoid, and give them the opportunity to be involved in weed control. An education program would include an interpretative sign program; distribution of a noxious weed flyer through the vehicle, boat, and trailer registration system and through hunting and fishing license dealers.

3.9 Human Health

Weed spread is likely to increase under Alternative 4, No Action. As a result, some people may suffer increased problems with respiratory or skin ailments. Under Alternatives 1, 2, and 3, manual and mechanical methods pose some risk to workers. These risks include suffering injuries typical of occupations requiring moderate to heavy physical labor such as lifting, pulling, walking over rough terrain, and operating equipment that may result in extremity injuries. These risks should be kept to a minimum if OSHA work practices and standards are followed. Risks associated with burning would additionally include smoke inhalation and burns. Use of biological control methods would not affect human health.

The effects on human health associated with herbicide use would occur under Alternative 3, Herbicide Control, and Alternative 2, Integrated Pest Management. Detailed discussions on this subject can be found in: Lolo National Forest Noxious Weed Mangement DEIS (1989); Human Health Risk Assessment of Herbicide Applications to Control Noxious Weeds and Poisonous Plants in the Northern Region of USDA Forest Service (Monnig 1988); and Bureau of Land Management's Northwest Area Noxious Weed Control Program EIS, Final and Supplement (USDI-BLM 1985; 1987). We rely on these analyses and highlight the discussion.

The Northern Region assessment is a "worst-case analysis" using several conservative assumptions that purposely over-estimate the likelihood and severity of exposure, accidents, and resulting effects. Those assumptions include: higher application rates than label recommendations; continuous application over an entire project area; mixing and application errors that would not generally occur; residences and food

sources much closer than would occur in most projects; skin exposure estimates for workers failing to wear recommended protective clothing; and that there are no threshold or safe levels for exposure to carcinogens (cancer-causing agents).

Other exposure routes include consuming wild foods such as chokecherry, mushrooms, and asparagus; dermal adsorption from picking plants such as willows for basket-making, that have been sprayed; and drinking water.

Unlike DDT, picloram, 2,4-D, and glyphosate do not bio-accumulate. These herbicides are water soluble and are excreted rapidly. A small percentage of the population is hypersensitive to one or more of these chemicals and can suffer severe and longlasting symptoms after small doses. Workers are at the highest risk. Using proper application techniques and wearing recommended protective clothing can reduce this risk.

Additional precautions would be implemented when herbicides are applied to high human use areas such as workplaces, campgrounds, and parks. Formulations of glyphosate and 2,4-D registered for use in human occupation areas would be preferred. Public review would be a significant element in project planning.

Of the chemicals proposed for use, 2,4-D presents the highest cancer risk based on animal feeding studies. However, this risk is considered to be very low. Again, workers would be at the highest risk. The Lolo N.F. EIS states that "although human carcinogenic risk levels for these herbicides appear to be quite low, scientific uncertainty still exists regarding the exact level of these risks".

Synergism, the possible interaction of herbicide active ingredients with other chemicals in the environment (pollutants and other herbicides), has not been well studied. Therefore, the possible effects of synergism are not assessed.

Inert ingredients in herbicide formulations include surfactant, emulsifiers, diluents, and other additives which have lately come under scrutiny for toxicological and carcinogenic effects. Again, this is an area where little research has been conducted. As of 1990, the EPA had listed about 115 inert substances which require further regulation or testing. Acute toxic effects of POEA (family of chemicals), a surfactant used in the Roundup® formulation of glyphosate, have been debated (O'Brien 1990).

Another concern is the presence of dioxin (family of chemicals) contaminants in chlorophenol-type herbicides (2,4-D, MCPA). The isomers of 'dioxin' vary in their toxicity but the highly toxic 'dioxin' isomer

found in the pesticide, 2,4,5-T, is not found in 2,4-D or MCPA (Linnainmaa 1983). The Canadian government appears to have avoided this issue by requiring that 2,4-D formulations have less that 10 parts per billion of any 'dioxin' isomer. This has effectively left only the amine formulation of 2,4-D on the Canadian market (Tosine 1983).

This discussion points out the need for care in the use of all herbicides, especially 2,4-D. Region 8 proposes using amine and low-volatile ester 2,4-D formulations.

Based on data analyses for EISs and supporting documents conducted by other agencies (Lolo N.F. 1989, 1991; USDI-BLM 1985, 1987; Monnig 1988) and mitigation measures that would be implemented by Region 8, the following conclusions are drawn: the risks to human health from herbicide use would be higher under Alternative 3, Herbicide Control, than Alternative 2, Integrated Pest Management, because potential exposure would be higher. However, herbicides would be handled and used in accordance with the EPA approved label instructions and with additional precautions implemented by Region 8. Spraying would likely be contracted. A services contract would include the Plan and EA and require that the contractor follow all regulatory requirements and precautions. In conclusions, it is Region 8's opinion that the probability of contracting cancer or having a toxic response from herbicide exposure under either Alternative 2 or Alternative 3 is low for workers and extremely low for the public.

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APPENDIX A

WEED CONTROL PROGRAM
FOR LANDS MANAGED BY THE
MONTANA DEPARTMENT FISH, WILDLIFE AND PARKS

Justification

Many plants, both native and introduced species, provide food and/or cover to the more than 400 species of terrestrial wildlife in Montana. Some of these plant species are critical to the survival of certain kinds of wildlife by providing dietary staples or trace elements, birthing and nesting cover, etc., while others are utilized simply because they are available. Plants in general are prerequisite to the existence of wildlife.

Some plant species are undesirable from an agricultural viewpoint. Such plants compete with crop and livestock forage plants for nutrients, water and space. When successfully established, these weeds can result in economic losses to private land managers.

Problem

The Department of Fish, Wildlife and Parks owns or leases 375 sites located in 34 counties and comprising 324,800 acres (0.3% of Montana's total land area). These areas are set aside for wildlife management purposes, fish hatcheries, state parks and recreation ares, fishing access sites and administrative sites.

The department has actively pursued a general "good neighbor" policy with regard to agriculturally undesirable plants for many years, and has complied with provisions of the 1979 Montana Weed Control Law. However, there has not been a formal weed control policy in place for department land. To promote understanding of the department's plant management objectives on lands under its control, to further endorse the department's cooperation with agricultural species in minimizing problems with undesirable plant species, and to assure effective application of weed control procedures on department lands, the following program shall be followed.

Program

Objective

To prevent, to the extent feasible, the reproduction and distribution of agriculturally undesirable plant species on/from department lands to adjacent private lands.

Evaluation

The feasibility of controlling undesirable plants on department

lands shall be determined according to the following factors:

1. Declaration of a plant species as a noxious weed by state law and the appropriate county weed board.

2. Occurrence and density of the noxious weed on department land.

3. Sources of the same noxious weed on adjacent and/or upstream/upwind lands.

4. Maintaining the welfare of fish and wildlife resource,s recreational opportunities, and health and human safety concerns.

5. Funds, equipment and manpower available to the department for noxious weed management.

6. Federal and state restrictions on the methods and materials available for noxious weed management.

Analysis

To implement this policy, each regional supervisor will systematically analyze all land under the department's control within his region. The analysis for each area will:

1. Identify noxious weeds present.

2. Identify the source of the noxious weeds whenever possible.

3. Identify past and present control methods employed.

4. Map the current location and extent of each noxious weed species.

5. List the number of complaints, if any, concerning noxious weed occurrence on that land.

6. Solicit input from Weed Board or Weed Supervisor.

7. List the objections to noxious weed management on department lands by individuals or regions.

8. Include any other pertinent information.

Control Plan

Following the analysis, a specific plan will be developed for noxious weed control for each property. The plan will identify the goal as being either **eradication** or **containment** of the noxious weeds present.

Eradication. Where noxious weeds are in isolated, sparsely occurring groups or clumps, eradication of that plant population may be attempted. Generally, this procedure will be in coordination with similar, intensive eradication attempts by adjacent landowners.

Containment. This level of noxious weed control will be practiced when the occurrences of the target plant species is so extensive that eradication is unfeasible.

This plan will include the prescribed control method or combination of methods of controlling the target plant species. Control methods that may be used individually or in combination to attain the adopted goal include:

1. Mechanical: Includes cultivation, mowing, hand pulling, cutting or burning.

2. Chemical: Herbicides

3. Biological: Includes insects, bacteria, viruses or other plant species. These methods must be approved by qualified weed control scientists.

4. Grazing: by domestic animals and wildlife.

5. Reclamation: Seeding, nurturing, and protection of those plant species that successfully compete against the undesirable plant species.

The plan will state how the control work will be accomplished. Depending on the situation, acceptable methods include work being accomplished by:

1. Department employees - - if necessary, department employees will complete proper training and will receive proper certification and licensing necessary for herbicide application prior to initiating chemical control.

2. Contracting with county weed boards.

3. Contracting with private weed control firms.

4. Cooperative agreements with adjoining or neighboring landowners.

Monitoring

All noxious weed control plans will be monitored at least once per year by the regional supervisor or his designee. If monitoring shows the methods chosen for plant control are not effectively meeting the stated goal for an area, the specific plan will be

modified and another control method or methods will be added or substituted. If the situation warrants a change in the goal for an area, it can be changed.

Communication and Followup

Regional supervisors will meet with each county weed board in his region where the department controls land at least once per year. The supervisor will discuss the department's overall noxious weed control program and will discuss specific weed control plans for the sites under his administration within the county.

The director will appoint a person as statewide noxious and weed control coordinator. Duties assigned to this person will include.

1. Assisting regional supervisors in developing specific weed control analyses and plans.

2. Disseminating information about the department's noxious weed control to the public and to department employees.

3. Assisting in establishing training schedules and opportunities for department employees regarding noxious weeds and their control.

4. Monitor the overall weed control program of the department.

5. Report noxious weed control activity to the director at the end of each calendar year. This report will contain a description of all activities undertaken by the department and will contain recommendations for weed control for the coming calendar year.

/s/ James W. Flynn
Director
Dept. of Fish, Wildlife and Parks

January 18, 1983
Date

APPENDIX B From: Montana Department of Health and Environmental Sciences (1993)

MONTANA AMPHIBIANS, REPTILES, AND MAMMALS THAT MAY OCCUR OR ARE KNOWN TO OCCUR IN THE STUDY AREA[1]

	OCCURRENCE DOCUMENTATION
AMPHIBIANS	
Long-toed salamander *(Ambystoma acrodactylum)*	S
Boreal (western) toad *(Bufo boreas)*	V
Leopard frog *(Rana pipiens)*	S
REPTILES	
Painted turtle *(Chrysemys picta)*	V
Rubber boa *(Charina bottae)*	S
Plains hognose *(Heterodon nasicus)*	V
Racer *(Coluber constrictor)*	S
Bullsnake *(Pituophis melanoleucus)*	V
Common garter snake *(Thamnophis sirtalis)*	V
Western garter snake *(Thamnophis elegans)*	S
Prairie rattlesnake *(Crotalus viridis)*	S
MAMMALS	
Masked shrew *(Sorex cinereus)*	S
Montane shrew *(Sorex monticola)*	S
Long-legged myotis *(Myotis volans)*	V
Long-eared myotis *(Myotis evotis)*	S
Pika *(Ochotona princeps)*	S
White-tailed jackrabbit *(Lepus townsendii)*	S
Yellow-pine chipmunk *(Eutamias amoenus)*	S
Yellow-bellied marmot *(Marmota flaviventris)*	S
Richardson's ground squirrel *(Spermophilus richardsonii)*	S
Columbian ground squirrel *(Spermophilus columbianus)*	S
Thirteen-lined ground squirrel *(Spermophilus tridecemlineatus)*	S
Golden-mantled ground squirrel *(Spermophilus lateralis)*	S
Black-tailed prairie dog *(Cynomys ludovicianus)*	V
Red squirrel *(Tamiasciurus hudsonicus)*	S
Northern pocket gopher *(Thomomys talpoides)*	S
Beaver *(Castor canadensis)*	V
Deer mouse *(Peromyscus maniculatus)*	S
Bushy-tailed woodrat *(Neotoma cinerea)*	V
Gapper's red-backed vole *(Clethrionomys gapperi)*	V
Heather vole *(Phenacomys intermedius)*	S

MAMMALS (Cont'd)	OCCURRENCE DOCUMENTATION
Meadow vole *(Microtus pennsylvanicus)*	S
Montane vole *(Microtus montanus)*	S
Long-tailed vole *(Microtus longicaudus)*	V
Water vole *(Microtus richardsoni = Arvicola richardsoni)*	V
Sagebrush vole *(Lagurus curtatus)*	V
Muskrat *(Ondatra zibethicus)*	S
Porcupine *(Erethizon dorsatum)*	V
Coyote *(Canis latrans)*	V
Red fox *(Vulpes vulpes,* formerly *V. fulva)*	S
Black bear *(Ursus americanus)*	V
Grizzly bear *(Ursus arctos,* formerly *U. horribilus)*	V
Raccoon *(Procyon lotor)*	V
Marten *(Martes americana)*	V
Ermine *(Mustela erminea)*	S
Least weasel *(Mustela nivalis,* formerly *M. rixosa)*	S
Long-tailed weasel *(Mustela frenata)*	S
Mink *(Mustela vison)*	V
Badger *(Taxidea taxus)*	S
Striped skunk *(Mephitis mephitis)*	V
River otter *(Lutra canadensis = Lontra canadensis)*	S
Bobcat *(Lynx rufus = Felis rufus)*	V
Elk = wapiti *(Cervus elaphus,* formerly *C. canadensis)*	V
Mule deer *(Dama hemionus = Odocoileus hemionus)*	V
White-tailed deer *(Dama virginianus = Odocoileus virginianus)*	V
Moose *(Alces alces)*	V
Pronghorn *(Antilocapra americana)*	V
Mountain goat *(Oreamnos americanus)*	V
Mountain sheep *(Ovis canadensis)*	V
Wolf (Canis lupus); Wolverine (gulo gulo)	

Occurrence Key

S indicates records documented by a specimen deposited in a university or other nationally recognized museum, including records from the formal literature in which a specimen record is described or implied. This is considered the highest level documentation.

V indicates visual or auditory evidence, including: specimens taken or found dead but not deposited in a university or other nationally recognized museum; photographs, unmistakable tracks or signs; and records where evidence is not specified.

[1] from Distribution of Montana Amphibians, Reptiles and Mammals, Larry S. Thompson 1982; Latilong #28.

BIRDS IN THE HELENA AREA

COMMON NAMES	SEASON W S S F	HABITAT
Common Loon	U U - U	R
Pied-billed Grebe	- R R R	R
Horned Grebe	- U U U	R
Red-necked Grebe	- R - -	R
Eared Grebe	- C C C	R
•Western Grebe	- C C C	R
American White Pelican	- C C C	R,ST
•Double-crested Cormorant	- C C C	R,ST
American Bittern	- R - R	M
•Great Blue Heron	- C C C	R,ST,M
Snowy Egret	- V V -	M
Cattle Egret	- - - V	M,G
Black-crowned Night Heron	- R R R	R,M
White-faced Ibis	- R - -	M
Tundra (Whistling) Swan	- C - U	R
Trumpeter Swan	- R - -	R
Greater White-fronted Goose	- - - V	R
Snow Goose	- C - C	R
Ross' Goose	- R - R	R
•Canada Goose	C A A A	R,ST,M,G
•Wood Duck	- R R R	R,ST
•Green-winged Teal	- C C C	R,ST
•Mallard	C A A A	R,ST,M
•Northern Pintail	- C C C	R
•Blue-winged Teal	- C C C	R
•Cinnamon Teal	- U U U	R,ST
Northern Shoveler	- U U U	R
•Gadwall	U C C C	R
Eurasian (European) Wigeon	- V - V	R
•American Wigeon	- C C C	R
Canvasback	- R R R	R
•Redhead	- U - U	R
Ring-necked Duck	- R R R	R
Greater Scaup	- - - V	R
Lesser Scaup	- U U U	R
Harlequin Duck	- V - V	ST
Oldsquaw	V - - -	R
Surf Scoter	- - - V	R
White-winged Scoter	- R - R	R
Common Goldeneye	C C U C	R
Barrow's Goldeneye	U U U U	R,ST
Bufflehead	U U U U	R
Hooded Merganser	- R - R	R
•Common Merganser	C C C C	R,ST

COMMON NAMES	SEASON W S S F	HABITAT
Swainson's Hawk	- - R -	G,S
•Red-tailed Hawk	R C C C	G,C,R,S
Ferruginous Hawk	- R - -	G,S
Rough-legged Hawk	C R - R	G
•Golden Eagle	R R R R	G,C,I_S
•American Kestrel	R U U U	G,C,R,S
•Merlin	R R R R	M,G,C,R
Peregrin Falcon	R R R R	R,G,M,ST
Gyrfalcon	R - - -	G
•Prairie Falcon	R R R R	G,CL
•Gray Partridge	U U U U	G
•Ruffed Grouse	U U U U	MR,CF
•Ring-necked Pheasant	R R R R	G
•Blue Grouse	R R R R	CF
•Sora	- - R R	M
•American Coot	U A C A	R
•Sandhill Crane	- C C C	G,M
Black-bellied Plover	- R - R	R
Semipalmated Plover	- U - U	R
•Killdeer	R A A A	R,ST,G
Black-necked Stilt	- - V V	R,M
American Avocet	- C C C	R,M
Greater Yellowlegs	- U U U	R,M
Lesser Yellowlegs	- C C C	R,M
Solitary Sandpiper	- R - R	R,ST,M
Willet	- R - R	R,M
•Spotted Sandpiper	- C C C	R,ST
Whimbrel	- - V -	M,L
•Long-billed Curlew	- R R -	G
Marbled Godwit	- R - R	R
Sanderling	- R - R	R
Semipalmated Sandpiper	- R - R	R
Western Sandpiper	- R - R	R,M
Least Sandpiper	- C C U	R,M
Baird's Sandpiper	- U - U	R,ST
Pectoral Sandpiper	- R U U	R,M
Dunlin	- R - R	R
Stilt Sandpiper	- - - V	R,M
Long-billed Dowitcher	- U C C	R,M
•Common Snipe	R C C C	R,ST,M
•Wilson's Phalarope	- C C C	R
Red-necked (Northern) Phalarope	- R - R	R
Long-tailed Jaeger	- V - V	R

COMMON NAMES	SEASON W S S F	HABITAT
Red-breasted Merganser	- U - U	R,ST
Ruddy Duck	- U U U	R
•Turkey Vulture	- U U U	CR,G,CL
•Osprey	- U U U	R,ST
•Bald Eagle	C R R R	R,ST
•Northern Harrier (Marsh Hawk)	R U U U	M,G
•Sharp-shinned Hawk	R R R R	MR,CR,CF
•Cooper's Hawk	R R R R	MR,CR,CF
Northern Goshawk	U - - -	MR,CR,CF
Northern Saw-Whet Owl	R R R R	CR,CF
Western Screech Owl	R R R R	CR,CF
•Great Horned Owl	C C C C	CR,MR,CF
*Snowy Owl	R - - -	G
•Northern Pygmy Owl	R R R R	CF,CR,MR
•Burrowing Owl	- R R -	G
Long-eared Owl	R R R R	CR,CF,MR
•Short-eared Owl	R R R R	G,M
•Common Nighthawk	- R C R	G,CF
•White-throated Swift	- - R -	CL
Black-chinned Hummingbird	- R R -	MR
•Calliope Hummingbird	- U U -	MR
•Rufous Hummingbird	- U U -	MR
•Belted Kingfisher	R C C C	ST
•Yellow-bellied Sapsucker	- R R R	MR,CF,CR
•Downy Woodpecker	U U U U	CR,MR,CF
•Hairy Woodpecker	U U U U	CR,MR,CF
•Northern Flicker	C C C C	CR,MR,H
•Horned Lark	C C C C	G
Olive-sided Flycatcher	- - R -	CR,CF
•Western Wood-Pewee	- U A U	CR,CF
•Willow Flycatcher	- - C C	CR,MR
•Hammond's Flycatcher	- - C -	CF
•Dusky Flycatcher	- - C -	CF
•Western Flycatcher	- - U -	MR,CF
•Say's Phoebe	- R R R	G
•Western Kingbird	- R R R	G
•Eastern Kingbird	- C C U	G,CR
•Tree Swallow	- A A -	MR,CR
•Violet-Green Swallow	- C C -	MR,CR
•Northern Rough-winged Swallow	- C C -	R,ST,H
•Bank Swallow	- U U -	R,ST
•Cliff Swallow	- A A -	R,ST,CL,H
•Barn Swallow	- C C U	R,ST,CL,H
Gray Jay	R - - -	CF

COMMON NAMES	SEASON W S S F	HABITAT
Franklin's Gull	- R C -	R
Bonaparte's Gull	- R R R	R
•Ring-billed Gull	R A A A	R,ST,H
California Gull	R C C R	R,ST
Herring Gull	- - - R	R
Common Tern	- U U U	R
Black Tern	- U U U	R,M
•Rock Dove	A A A A	H,CL
•Mourning Dove	- C C C	G,CF,CR
Black-billed Cuckoo	- R R -	CR
Hermit Thrush	- U - U	MR,CF
•American Dipper	U U U U	ST
•Golden-crowned Kinglet	R R R R	CF
•Ruby-crowned Kinglet	- C C -	CF
•Mountain Bluebird	- C C C	G,H,MR
•Townsend's Solitaire	U U U U	CF,JS
•Veery	- U U -	CR
Swainson's Thrush	- U - U	MR,CF
•American Robin	R A A A	CR,MR,CF,H
Varied Thrush	V - - V	CR
•Gray Catbirds	- U C R	CR,MR
Sage Thrasher	- - R -	S
Brown Thrasher	- - V -	CR
Water Pipit	- U - U	G
Bohemian Waxwing	A C - A	CR,CF,H
•Cedar Waxwing	R U A A	CR,MR,CF,H
Northern Shrike	U - - -	CR,G
Loggerhead Shrike	- - R -	CR,G
•European Starling	A A A A	CR,G,H
•Warbling Vireo	- - C U	CR,MR
•Red-eyed Vireo	- R R R	CR,MR
Tennessee Warbler	- V - V	CR
•Orange-crowned Warbler	- U U U	MR
•Yellow Warbler	- A A U	CR,MR
•Yellow-rumped Warbler	- C C U	MR,CF
Black-and-white Warbler	- V - -	
•American Redstart	- U U -	CR,MR
•Northern Waterthrush	- U U -	CR,MR
•MacGillivray's Warbler	- U U -	CR,MR
•Common Yellowthroat	- C C U	CR,M
Wilson's Warbler	- U - U	MR
•Western Tanager	- U U U	CF,MR,C
Rose-breasted Grosbeak	- - V -	CR
Black-headed Grosbeak	- - R -	MR,CR
•Lazuli Bunting	- - C -	B,MR,CR
•Rufous-sided Towhee	- C C -	B,CR
•American Tree Sparrow	C U - U	B,G,H

COMMON NAMES	SEASON W S S F	HABITAT
Stellar's Jay	R - - -	CF
Blue Jay	- R - R	CR
•Pinyon Jay	U U U U	JS
•Clark's Nutcracker	U U U U	CF
•Black-billed Magpie	A A A A	CR,G,H
•American (Common) Crow	- C C U	CR,G
•Common Raven	A U U U	MR,CR,G
•Common-capped Chickadee	A A A A	CF
•Mountain Chickadee	C C C C	CR,MR,CF
•Red-breasted Nuthatch	U U U U	MR,CF,JS
•White breasted Nuthatch	R R R R	MR,CR
•Pygmy Nuthatch	R R R R	MR
•Brown Creeper	R R R R	MR,CR
•Rock Wren	- - U -	CL
Canyon Wren	- - R -	CL
•House Wren	- U U U	CR,H
•Red-Winged Blackbird	U A A C	M,G
•Western Meadowlark	R A A U	G
•Yellow-headed Blackbird	- U U U	M,R
Rusty Blackbird	- V - V	CR
•Brewer's Blackbird	R A A C	G,CR
Common Grackle	- - R -	G,CR,H
•Brown-headed Cowbird	- C C -	G,CR,MR
•Northern Oriole	- U U -	CR
*Rosy Finch		
Gray-crowed Race	R - - -	G
Black Race	R - - -	G
Pine Grosbeak	U - - -	CF
Purple Finch	- R - -	MR,H

COMMON NAMES	SEASON W S S F	HABITAT
•Chipping Sparrow	- C C C	MR,CF
•Clay-colored Sparrow	- - U -	G,H
•Brewer's Sparrow	- U U -	S,G
•Vesper Sparrow	- C C C	G
•Lark Sparrow	- U U U	G
Lark Bunting	- - R -	G
•Savannah Sparrow	- C C C	G
Baird's Sparrow	- - - V	G
•Song Sparrow	U C C C	CR,ST,B
White-crowned Sparrow	R - - R	CR,B
Harris' Sparrow	R R - -	CR
•Dark-eyed Junco	C C C C	CF,MR,CR,H
McCown's Longspur	- R - -	G
Lapland Longspur	R - - -	G
Chestnut-collared longspur	- - R -	G
*Snow Bunting	U - - -	G
•Bobolink	- U U -	G
•Cassin's Finch	U A A C	MR,CF,H
•House Finch	C C C C	MR,H
*Red Crossbill	U - - -	CF
White-winged Crossbill	R - - -	CF
Common Redpoll	U - - -	CR,G,H
Hoary Redpoll	V - - -	CR,G
•Pine Siskin	C A A A	MR,CF,H
•American Goldfinch	- - U -	CR,MR
•Evening Grosbeak	C A C A	MR,CF,H
•House Sparrow	A A A A	H

Abundance The abundance of a particular species is shown in the second column, by season of the year. The abundance depends on the frequency with which it is sighted on visits to the appropriate habitat in the appropriate seasons, and on the number of individuals sighted per visit.

A = Abundant	Seen in large numbers on most visits to the proper habitat in the proper season.
C = Common	Seen on only about two-thirds of the visits or in smaller numbers.
U = Uncommon	Seen on no more than about one-third of the visits or never seen in large numbers.
R = Rare	Seen on no more than 5-10% of visits or restricted to a small proportion of the preferred habitat or to a specific limited habitat.
V = Vagrant	Accidental in occurence.
- = Not Present	Not seen in a particular season

Status

•	Breeds locally (From P.D. Skaar, 1985)
*	Irregular. Common or abundant in some years, rare or absent in others.

Season

W	Winter: mid-November to mid-February
S	Spring: mid-February to mid-May
S	Summer: mid-May to mid-August
F	Fall: mid-August to mid-November

Habitat

R	Reservoirs, lakes, ponds
ST	Streams
M	Marshes
S	Sagebrush
CL	Cliffs
G	Grasslands
MR	Mountain riparian
CR	Cottonwood Riparian
JS	Juniper/sagebrush
CF	Conifer forest
B	Brush
H	Human development, Ornamental trees and shrubs

SOURCE: Birding in the Helena Valley, Last Chance Audubon Society, 1986

MONTANA FISHES THAT MAY OCCUR OR ARE KNOWN TO OCCUR IN THE STUDY AREA

Common Name	Genus & Species	Occurrence
Channel Catfish	*Ictalurus punctatus*	N *
Stonecat	*Noturus flavus*	N
Longnose Sucker	*Catostomus catostomus*	N
White Sucker	*Catostomus commersoni*	N
Mountain Sucker	*Catostomus platyrhynchus*	N
Goldfish	*Carassius auratus*	I
Common Carp	*Cyprinus carpio*	I
Utah Chub	*Gila atraria*	I
Flathead Chub	*Hybopsis gracilis*	N
Flathead Minnow	*Pimephales promelas*	N
Longnose Dace	*Rhinichthys cataractae*	N
Yellowstone Cutthroat Trout	*Oncorhynchus clarki bouvieri*	N * C
Westslope Cutthroat Trout	*Oncorhynchus clarki lewisi*	N * C
Rainbow Trout	*Oncorhynchus mykiss*	*n* * *c*
Kokanee	*Oncorhynchus nerka*	I *
Mountain Whitefish	*Prosopium williamsoni*	N *
Brown Trout	*Salmo trutta*	I *
Brook Trout	*Salvelinus fontinalis*	I *
Burbot	*Lota lota*	N *
Mosquitofish	*Gambusia affinis*	I
Variable Platyfish	*Xiphophorus variatus*	I
Pumpkinseed	*Lepomis gibbosus*	I
Smallmouth Bass	*Micropterus dolomieui*	I *
Largemouth Bass	*Micropterus salmoides*	I *
Black Crappie	*Pomoxis nigromaculatus*	I
Yellow Perch	*Perca flavescens*	I
Walleye	*Stizostedion vitreum*	I *
Mottled Sculpin	*Cottus bairdi*	N

SYMBOLS: N = Native I = Introduced P - Possibly native

n = A few populations of native Rainbow Trout persist in the Kootenai River Drainage of northwestern Montana. All other Rainbow Trout populations in the state originated from hatchery fish and are considered introduced.

C = A fish of special concern.

c = The native Rainbow Trout is a fish of special concern. Introduced Rainbow Trout are not (*see n* above).

* = Designated a game fish in Montana statutes.

SOURCE: A Field Guide To Montana Fishes, George D. Holton, 1990