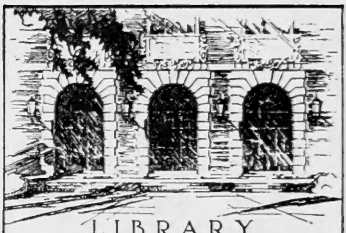


c
4

ROUT *the* WEEDS!

WHY, WHEN AND HOW

R. TEHON

ILLINOIS NATURAL HISTORY SURVEY

Circular 34

Rout the Weeds!

WHY certain weeds are classed as pernicious.
widespread control measures are needed.

WHEN these weeds do the most damage.
control measures are most effective.

HOW these weeds cause injury.
to control them.

L. R. TEHON

STATE OF ILLINOIS
Dwight H. Green, Governor
DEPARTMENT OF REGISTRATION AND EDUCATION
Frank G. Thompson, Director

NATURAL HISTORY SURVEY DIVISION
Leo R. Tehon, Acting Chief

Urbana CIRCULAR 34 September 1946
Fourth Printing, With Revisions

Printed by Authority of the State of Illinois

This paper is a contribution from the Section of Applied Botany and Plant Pathology.
(15611—5M—4-46)

CONTENTS

Acknowledgments

In the preparation of this circular we have had the cordial cooperation of Dr. A. C. Baxter, formerly Director of the State Department of Public Health, Springfield, who furnished the text on the relationship of weeds to public health; of Dr. J. J. Pieper, late Professor of Crop Production in the University of Illinois College of Agriculture, Urbana, who prepared the text on weeds as economic factors, and on control methods; of W. P. Flint, late Chief Entomologist of the State Natural History Survey Division, Urbana, who prepared the text on weeds as harborers of insects; and of Dr. Carl O. Mohr, Associate Entomologist and Artist of the Natural History Survey, who made the drawings for the illustrations of the thirteen noxious and pernicious weeds which this circular specifically discusses.

Courtesy New York State Museum, A

WHITE SNAKEROOT

ROUT the WEEDS!

L. R. TEHON

13 ***Noxious and Pernicious Weeds of Illinois, pictured and described, with instructions for control and eradication, leading to improvement of agriculture and public health, and beautification of the state.***

THE IMPORTANCE OF WEEDS

EVERY person who deals with plants sooner or later makes his own definition of a weed. When civilization was young, a weed undoubtedly was any plant that could invade man's crudely cultivated fields, increase faster than his own none too energetic efforts at cultivation could keep it down, and endanger his existence by threatening his harvest. With time much has been learned about plants, and the meaning of the term has been extended to include plants with other evil effects. Today any plant that, for any reason whatever, is a nuisance to mankind may be called a weed. Plants that do not grow in cultivated fields but which harbor insects or diseases destructive to crops are regarded as weeds. Plants that carry the menace of ill health to individuals because of their ability to cause mild or severe kinds of poisoning are commonly looked upon as weeds. And still other plants that threaten, during short or long seasons, the health of individuals or communities because of their pollen or because of poison transmitted in milk are considered very dangerous weeds. There are, also, plants whose greatest crime is that they merely inconvenience man in his daily life, and these likewise are weeds.

Usefulness of Weeds.—The fact that in some respect a plant may be enough of a nuisance to humanity to be classed as a weed does not mean that the plant is without usefulness. It has been

said that the greatest usefulness weeds have is that they are weeds. Their universal presence and their habit of springing up year after year necessitate tilling the soil, and tillage contributes to profitable yields. The cover of weeds and wild plants that springs up on land after a crop has been harvested in midsummer gives protection against blowing of the soil by winds and washing by floods, and the green material, plowed under for humus, returns fertility to the soil.

Among the weeds described in the following pages, Common Ragweed stands preeminent in this respect, for its universal abundance in harvested grain fields during late summer gives it title to the description, "most abundant weed in the state." Both it and Giant Ragweed furnish cover and food for game birds in late fall and winter, at a time when other food is scarce, and the survival of natural game such as prairie chickens and quails in certain parts of our state is very possibly due to the food furnished at critical times by these plants. Pokeweed, notwithstanding that it harbors and provides a means of overwintering for the very destructive mosaic disease of cucumbers and muskmelons and that its berries and roots contain a poison, furnishes a drug which has been used extensively in alleviating certain human pains. Moreover, young Pokeweed shoots may be cooked and eaten like asparagus. Even Great Burdock and its much more abundant relative, Common Burdock, ugliest plants, as many think, of the countryside, furnish roots and seeds of medicinal value, and in Japan the Great Burdock is cultivated for its roots, which are eaten as a vegetable.

Sentiment for Weed Control. Because today weeds intrude into many of man's affairs, their importance is more thoroughly appreciated than ever before. This appreciation has made itself evident both in the revision of the Illinois weed law to include European Bindweed as a noxious weed along with Canada Thistle and Perennial Sow Thistle, and in Joint Resolution No. 25 of the Illinois House and Senate, dated May 5, 1937, which requests the Governor to designate a period of the year as "Weed Destruction Days" and instructs the Director of the State Department of Agriculture specifically to encourage destruction of the weeds described in the following pages.

This pamphlet has been designed and printed as a contribution both to the general problem of weed control and to the specific task imposed by the legislative resolution. The pictures and descriptions which follow are intended to aid in identifying

these weeds, and the accounts of their distribution and habitat, their blossoming and seeding times, their biological interest and methods of control are intended to make available to the people of this state information which will enable them to protect themselves against the dangers, both direct and indirect, that these weeds present.

Noxious Weeds.—Canada Thistle, Perennial Sow Thistle, and European Bindweed are noxious weeds, the destruction of which is required by law. Because of their great importance in agriculture, the Illinois Agricultural Experiment Station and Extension Service has undertaken investigations bearing upon their life history and control and maintains projects for their control in rural areas in cooperation with farm bureaus and the State Department of Agriculture.

WEEDS AS ECONOMIC FACTORS

The actual loss from weeds is not known. There are but few experiments which give a basis for an intelligent estimate. An experiment which was completed a few years ago at the Illinois Agricultural Experiment Station shows that the yield of corn was reduced about 80 per cent by omitting cultivation and permitting the weeds to grow. The Michigan Agricultural Experiment Station came to the conclusion that sugar beets are cultivated primarily because of weeds. Quack Grass was found to cut the yield of potatoes from one-half to two-thirds. At one of the Canadian experiment fields Russian Thistle seed was sowed with wheat and observed to cut the yield 40 per cent.

Loss to the United States.—A common but conservative estimate of the loss to agricultural products by weeds is 10 per cent. This estimate would place the loss at times at as much as a billion dollars for the United States.

The Agricultural Service Department of the U. S. Chamber of Commerce, in a report submitted to the Federal Farm Board, estimated the weed loss to agriculture at 3 billion dollars. This amount is equivalent to about 30 per cent of the value of all agricultural products at the time the report was made.

Loss per Farm.—In 1930 Indiana estimated the weed loss per farm at $210, and Wisconsin in 1927 put the figure at $244 per farm.

While actual figures, as a basis for an intelligent estimate of weed loss, are scarce, they are sufficient to show that the amount

is enormous. Because of the rapid spread of weeds, one close to the subject must conclude that weed damage is increasing.

How Weeds Cause Loss.—The major ways in which weeds cause loss are (1) reduction in crop yields, (2) increase in expense of growing the crop, (3) decrease in quality of the product, (4) reduction in the value of the land, (5) poisoning of livestock, and (6) interfering with public health.

Poorer Yields.—Weeds reduce crop yields by utilizing plant food materials and moisture in the soil, and by shading the plants. A weed like dodder reduces crop yields by being parasitic upon the host plant from which it draws its nourishment.

Expense of Growing.—It is all too evident that weedy lands require extra cultivation and considerable hand work to keep the weed loss to a minimum. Weed vines interfere with tillage and harvesting operations, while weedy seeds and grain often must be cleaned before they can be put on the market.

Poorer Quality Crops.—The quality of many agricultural products is on the downward trend because of weeds. For example, the loss to small grain in dockage alone in four spring wheat states has about doubled in 25 years and is now estimated at more than 8 million dollars. The loss to winter wheat from wild onions and garlic is increasing and is estimated at one-third of a million dollars in southern Illinois. When we consider, in addition to these, the lower grades in hay, wool, milk, and other animal products, we can see that weeds lower very definitely the quality of our agricultural products.

Reduced Land Values.—That the value of land is being materially affected by noxious weed infestations is noted from reports of loan companies which reduce the appraised value of land from one-third to one-half because of weeds. The reduction is often equivalent to the cost of eradication. No one wants a weedy farm, and in some cases weeds have forced abandonment of the land for agricultural purposes. The enormous rate at which agricultural land is becoming infested with noxious weeds has led to definite weed projects by many agricultural experiment stations.

Livestock Poisoning.—In the United States the loss of animals from poisonous plants is estimated at 15 million dollars annually and for Illinois 1 million dollars. A few animals dying here and there go almost unnoticed, but the total for any one state or region mounts to a sizable sum.

Injury to Health.—The effect of weeds on public health is

definite and in many cases serious. Discussion of this injury is given on page 7.

WEEDS AS HARBORERS OF INSECTS

The 13 weeds described in this circular have some effect on the abundance of injurious insect species.

Hosts to Injurious Insects.—Probably the most important way in which these weeds influence the abundance of injurious insects is by acting as hosts for certain of these insect pests. Wild Parsnip is apparently relished by the worms of the carrot swallowtail just as much as are carrots and parsnips in the gardens. It is certain that this weed aids in maintaining an abundance of these caterpillars. Poison Ivy in orchards acts as a host for certain leafhoppers that also attack apple. A distinct connection has been noted between the abundance of Poison Ivy under the apple trees and the number of leafhoppers found on the trees. Leafhoppers are generally more abundant in apple orchards where Poison Ivy is common. Burdock is a highly favored food for young grasshoppers, and also acts to some extent as an alternate host for the rhubarb curculio. Ragweed, particularly the Horseweed or Giant Ragweed, is one of the most highly favored hosts of the common stalk borer. This weed acts as a reservoir for the stalk borer, and more of these borers are produced in the Giant Ragweed than in cultivated crops. However, the borer will work in so many other hosts that the ragweed cannot be considered particularly important in maintaining this species. European Bindweed is a host for several of the tortoise beetles which also feed on sweet potato. The morning-glory flea beetle feeds on bindweed and also on corn. This insect may be of importance as a carrier of Stewart's disease.

Shelter for Injurious Insects.—Another way in which weeds act as protection for insects is by affording winter shelter for them. However, none of the weeds mentioned here is of particular importance in this respect. Adults of the southern corn rootworm are very common on Wild Parsnip in late September and October, and probably some of the adults of this beetle hibernate in the Wild Parsnip leaves. Poison Ivy affords hibernation shelter to a considerable number of insects, including leafhoppers, chinch bugs and flea beetles. The eggs of the common stalk borer are frequently carried over the winter on the stems of ragweed.

Hosts to Beneficial Parasites.—Another relationship between weeds and insects is, on the whole, beneficial to the farmer. In it, insects that normally live entirely in weeds, such as certain borers in ragweed, act as alternate hosts to parasites which also prey on injurious insect species. A borer in ragweed acts as an alternate host to parasites of the oriental fruit moth. This is a rather important relationship and in several cases important parasites can be maintained only in areas where an insect normally infesting weeds serves as the alternate host. In this respect, weeds are a decided aid in keeping down injurious insect species.

WEEDS AS HARBORERS OF PLANT DISEASES

From time beyond memory weedy fields have symbolized the poverty that is the result of idleness and neglect. And sanitation, foremost among measures advocated to maintain the public health, has been symbolized by the trim neatness of homes and fields free of weeds.

Weed eradication is as important in the protection of valuable plants from attack by disease as it is to public health. And not infrequently it happens that, in the eradication of a weed for the protection of human health, plants of economic value are benefited.

Bacteria capable of causing serious diseases of certain crop plants are harbored by weeds that grow in the fields or on adjacent land. Parasitic fungi, by which the majority of plant diseases are caused, very often are capable of attacking weeds as well as valuable plants, and weeds or other native plants are necessary, as alternate hosts, to the persistence of certain fungi. The viruses that cause mosaic diseases of plants often have wide host ranges and are able to attack many wild and weedy plants as well as important crop plants.

Of the weeds described in the following pages, Wild Parsnip is subject to attack by a fungus that is parasitic also on cultivated parsnip and celery and often does much damage in celery beds. Pokeweed is one of the wild hosts of the virus that causes the destructive mosaic disease of cucumbers, and the virus finds in the large roots of Pokeweed an excellent place in which to overwinter.

Bacterial and fungous diseases are transmitted from weeds to cultivated plants by winds, by splashing and running water,

and by insects. In the case of virus diseases, transmission by insects is especially common. Weed eradication becomes the more important because, in addition to the damage weeds themselves do, they present the interrelated problems of disease control and insect control.

RELATION OF WEEDS TO PUBLIC HEALTH

Weeds constitute a public health problem as well as an agricultural one. Many weeds contain poisons which if ingested by man cause severe illness and sometimes death; others may cause external injury to certain individuals, while still others produce pollens which are responsible for hay fever and similar asthmatic conditions.

Weed Poisons Ingested.—A number of cases of accidental poisoning due to the substitution of poisonous plants for similar plant foods have been reported. Water Hemlock has been mistaken for its harmless relative Sweet Cicely, or for artichokes or parsnips in the early spring, the tubers being especially tempting to children because of the sweetish taste. Wild Parsnip, similar in appearance to garden parsnip, has caused death. Fool's Parsley, an acridly poisonous plant, is sometimes confused with true parsley. Children sometimes mistake the poisonous Narrow-Leaved Laurel for young wintergreens. Also they may chew the fruit of Black Nightshade and Pokeweed or the seeds and flowers of Jimson Weed. Severe illness may be caused by the ingestion of Corn Cockle seeds which have been ground with wheat flour.

Cases of milk sickness occur practically every year in Illinois and have been attributed to the use of meat and milk products from animals which have been eating White Snakeroot. The substance believed to be responsible, trematol, is destroyed only very slowly by boiling; therefore pasteurization of milk is of little value in safeguarding against it. Milk sickness appears to result from the continued use of products from affected cows rather than from the occasional consumption of a small amount. This fact probably explains the occurrence of the disease in rural families and its absence in cities. The progress of the disease is rapid and the mortality high, for at the present time there is no satisfactory treatment. Extermination of White Snakeroot and avoidance of the use of milk from affected cows are the only means of combating the malady.

Weed Poisoning by Contact.—A number of plants cause distressing symptoms when they come into contact with the human skin. Poison Ivy and Poison Sumac are the most frequent offenders. Even the slightest trace of the poisonous principle, urushiol, in these two plants will produce a blotching of the skin and itching and burning sensations which may be followed by the appearance of small vesicles that run together and form blisters. Complete immunity to ivy poisoning probably does not exist. Many persons who have believed themselves to be immune have had serious cases of poisoning after handling the plants carelessly. Some persons, however, are much more susceptible than others, and occasionally a fatal case has been reported. Actual contact with the plant is not always necessary for a case of poisoning—shoes, clothing, utensils and even animals may carry the poison to an exceedingly sensitive person.

After exposure to the plant, attempts to remove the poison should be made immediately. Three to four thorough scrubbings with alkali soap and repeated rinsing in running water may be sufficient to protect the skin from irritation. Special attention should be given to finger nails and the skin between the fingers, for careless washing serves only to spread the poison. Space will not permit a list of the various remedies which have been recommended for ivy poisoning, but, if a case is severe, one should consult a physician rather than spread the infection by using a trial and error method with home remedies.

Juice of the leaves of Snow-on-the-Mountain, Painted Leaf, and several other members of the spurge family, as well as that of Smartweed and the roots of Cow Parsnip, is also capable of causing irritation and blistering of the skin.

Weed Poisoning by Spread of Pollen.—The weeds which cause the greatest amount of misery, however, are those which produce pollen causing hay fever. It has been estimated that 1 to 4 per cent of the population of the United States suffers annually from some form of this disease.

Hay fever is characterized by catarrhal attacks of the mucous membranes of the upper respiratory tract and conjunctiva, due to a special sensitiveness to pollen from one or more plants. It may range in severity from mild attacks similar to a cold to severe and persistent asthmatic attacks. Some sufferers feel so wretched that they are forced to leave their work and go to a region where plants causing their illness do not exist.

There appears to be a tendency for hay fever to be heredi-

tary. If both mother and father have hay fever their children are apt to be afflicted early in life. About one-third of all hay fever sufferers show their first evidence of this ailment before 10 years of age and two-thirds before 25 years of age. In other words, the great bulk of these people will be burdened throughout the most important years of their lives with a serious handicap.

Formerly it was believed that plants producing the most showy flowers were responsible for hay fever, but H. M. Hall of California has pointed out that this is seldom the case, for pollen produced by large or showy blossoms is almost always insect carried and is

> therefore, relatively heavy and not produced in great abundance. On the other hand, most plants with small inconspicuous flowers are wind pollinated; their pollen is therefore light and produced in great abundance, and it is this voluminous, light-weight pollen that reaches the nostrils of susceptible people and causes the trouble. The patient, noticing the showy flowers of a neighbor's orchard trees or ornamental shrubbery, is likely to hold these responsible for his hay fever, whereas the cause is more likely to be the homely, neglected weeds of the roadside or of his own back yard.

There are three principal hay fever periods. The first occurs from April to June when the chief pollens are those from trees, such as oak, elm, birch, hickory, and maple. The second overlaps the first, beginning about the end of May and extending to the middle of July; the chief pollens during the period are those from grasses, such as timothy, redtop, June grass, blue grass, and orchard grass. The third period is the most important and extends from the middle of August to frost. It is during this period that the injurious weeds, such as ragweed and its near relatives, pollinate. Approximately 85 per cent of hay fever cases are susceptible to ragweed; therefore the majority of cases occur in the late summer and autumn.

Pollen may be carried long distances by air currents. After storms, pollens have been found 400 miles from their source. O. C. Durham of the Abbott Laboratories has made a survey of ragweed pollen incidence in 22 cities in the United States. Of these cities, Oklahoma City, Okla., was represented as having the highest average daily ragweed pollen concentration, 814 pollen granules per cubic yard of air, while Ann Arbor, Mich., was second highest with an average of 590 granules. Chicago's

average was given as 115. Since only 25 granules per cubic yard of air are necessary to produce symptoms of hay fever in susceptible persons, one ragweed plant, which may throw out into the air as many as a million million pollen grains in one season, may cause a great deal of distress.

Skin tests are valuable in determining which pollens are toxic to an individual. An extract of the suspected pollen is either placed on a scarified area of the skin or injected between the layers of the skin. A marked reddening surrounding the point of inoculation indicates sensitivity to the pollen that is used for the test.

Relief for Hay Fever Sufferers.—In many cases immunization may be accomplished by repeated subcutaneous injections of extracts of the offending pollens in increasing doses. This treatment must be started at least 6 weeks before the onset of the disease if good results are to be obtained.

Filtration of the air of homes and workrooms and air conditioning will remove pollens and afford relief for hay fever sufferers, but obviously people cannot live for weeks within the protection of these rooms. *The only means of affording permanent relief for these victims is the eradication of all varieties of weeds which are common causes of hay fever*—a stupendous task which would require the combined efforts of city, state, and federal organizations, but one which would be well worth undertaking. Not only would physical relief be given to thousands of hay fever sufferers, but also many of the farmer's worst enemies would be destroyed, vacant lots and roadways be cleared of unsightly areas, and a number of cases of poisoning would be prevented. Schools, clubs, and other local organizations can be of enormous value in educating people to cut or otherwise destroy weeds before they produce pollen.

CONTROL METHODS

Practices involved in good husbandry are those for the most part which contribute to weed control and eradication. After noxious weeds have once been introduced to the farm then a knowledge of the character and habits of growth of the individual species is important in effective control and eradication.

Need to Know Biology of Weeds. To control a weed it is necessary that one know the life history of the species, whether

it is annual, winter annual, biennial, or perennial; also its means of reproduction, whether it be by seed alone or seed and some vegetative means, such as stolons, rhizomes, bulbs, and cuttings, or by vegetative means alone. Knowledge of the natural requirements of the plant is also essential. Some weeds, for example, are characteristic of wet lands, sandy soils, cool climates, or humid climates. Likewise certain weeds seem to be very definitely associated with certain crops. For example, Corn Cockle and Cheat are associated with winter wheat; Wild Mustard and Penny Cress with oats; Red Sorrel and Ironweed with pasture lands; Oxeye Daisy and Whitetop with grass meadows; Buckhorn and Curled Dock with red clover; and Lamb's Quarters and Buttonweed with corn.

Weak Stages Best Control Periods.—All weeds have weak stages in their life history at which times they are most effectively controlled or eradicated. Most plants are weak in the seedling and reproductive stages. The farmer takes advantage of this knowledge and tries to eradicate as many weeds as possible in the seedling stage, during seed bed preparation and the early cultivation of the crop. Mowing pastures and waste places when weeds are blooming is another example of man taking advantage of a weak stage in the life cycle of the weed plant.

Suiting Control Methods to Biology.—Methods of eradication of weeds may be put into two classes, depending upon the means of propagation. Weeds which propagate by means of seeds, as do annuals, winter annuals, and biennials, are best controlled by preventing seed production. This is accomplished easily by killing the weeds in the weak germination and seedling stages through cultivation, by mowing when the plants are in bloom but before seed are produced, by plowing shortly after the crop has been removed, and by making the proper use of both the older and the newer chemical herbicides.

Weeds which depend in part or entirely upon vegetative reproduction can be controlled only by preventing top growth from making its appearance above ground. This control may be accomplished by destroying the entire plant either with chemicals or some cultural practice, or it may be accomplished by starving the roots by cutting top growth and thus preventing manufacture of plant food in the leaves.

The means employed to bring about satisfactory control or eradication of weeds are (1) the chemical method, (2) the fallow method, (3) smother crops, (4) livestock, (5) covering

of the plants, (6) burning, (7) good crop rotation, and (8) fertilization of the land.

Chemical Method.—According to their effects, chemical weed killers are classified as: (a) contact herbicides, (b) translocated herbicides, and (c) soil sterilants. The contact herbicides are further subdivided into nonselective and selective herbicides, and the soil sterilants are subdivided into temporary and permanent sterilants.

Nonselective herbicides, used chiefly for the destruction of annual weeds, include strong acid and base solutions, concentrated solutions of such salts as copper sulfate, sodium arsenite, sodium chlorate, sodium thiocyanate, and ammonium sulfate, and a wide range of petroleum, coal-tar, and industrial products and byproducts. They usually are applied as sprays in removing unsightly weed growths, reducing fire hazards, improving visibility along highways, and preventing seeding.

Selective herbicides, also used chiefly for the destruction of annual weeds, include sulfuric acid, salts such as iron and copper sulfate, aromatic organic compounds containing nitrogen, and dusts such as cyanamide and kainite. They are applied as sprays or dusts to kill weeds growing among valuable plants. Nonselective herbicides, in proper dilutions, often act as selective herbicides.

Translocated herbicides, used for the destruction of deep-rooted perennial plants, include toxic substances that penetrate plants and move downward into their roots. Best known and most widely used in this region are sodium chlorate and calcium chlorate, but an acid arsenical, oils, and various arsenic, ammonium, and copper salts are also effective. These herbicides are usually applied as sprays, although some can be applied as dusts. They are especially valuable because they act quickly and can be used economically.

Herbicides containing as active ingredients such organic chemicals as ammonium sulfamate and certain chlorophenoxyacetic acids (2, 4-D, or DCP, and 3, 4, 5-T, or TCP) can be applied directly to weed foliage as sprays. They are absorbed and then translocated to all parts of the plant, where they act as internal poisons. If applied at proper times or in adjusted dosages, they can be used as selective herbicides, particularly in controlling broad-leaved lawn weeds, poison ivy, and many other weeds difficult to control. They have little or no sterilizing effect on the soil.

Temporary soil sterilants, used chiefly for the destruction of weeds in small infested areas, include salts such as sodium chlorate, boron compounds, and ammonium thiocyanate and volatile liquids such as carbon bisulfide and chloropicrin. They are applied as sprays, as dusts, or with special applicators when it is important to return treated soil to cultivation quickly.

Permanent soil sterilants, used only for the prevention of all plant growth in special areas, include common salt, arsenic and boron compounds, sodium chlorate, and petroleum byproducts. The particular material used must be selected after careful consideration has been given to all factors involved, such as future use of the land, weeds and other plants to be killed, and poison hazards to livestock and wild animals.

Fallow Method.—The fallow method is used in the main to eradicate noxious perennial weeds which propagate vegetatively. The method consists of plowing the land, followed by thorough disking so as to cut up the rootstocks in pieces as fine as possible and at the same time to prepare a good seedbed. As often as the weeds begin to show growth above ground, they are cut off underground by means of a weed cultivator or some other implement which will do a good job. These cultural operations are repeated every week or 10 days or as often as new growth shows itself. If at any time cultivation will not kill all top growth, the land should be plowed again somewhat deeper than the first time, followed by the weed cultivator as before. Late in the fall the land should be plowed deep. The next spring the cultivation should be renewed and continued until late spring or early summer, at which time a rank growing crop should be seeded. Most of the weeds should be killed, but, if they are not, the land should be plowed and the cultivation continued.

The object of the fallow method is to starve the roots by drawing upon their food supply to produce new shoots and at the same time prevent leaf formation and the manufacture of food. The fallow method is most effective upon shallow-rooted perennials where one is able to plow up the rootstocks and cut them into small pieces. For each small piece to live, it must send up a new shoot. The food supply in small pieces is soon exhausted and the root compelled to die.

Deep-rooted perennials require a much longer period of fallowing since their food storage cannot be divided into small pieces by disking.

Smother Crops.—There are very few weeds which can be

eradicated by smother crops, but most perennial weeds are weakened by these crops, thus making the fallow method easier. Alfalfa, hemp, and soybeans are good smother crops. Canada Thistles may be eradicated by seeding alfalfa on the land after it has been well fertilized and prepared.

Use of Livestock.—Livestock such as goats and sheep is often used to graze weedy land in the hope that the animals will keep the weeds eaten off close to the ground and thus starve out the roots. This method is effective provided the animals can be induced to eat the weeds and provided the land is grazed over a period of years. Most weeds are not relished by grazing animals. Grazing is most helpful when used in combination with other methods.

Covering the Plants.—Small areas of weeds may be eradicated most cheaply by covering them with a heavy paper so as to shut out all light to prevent growth. Tar paper or heavy building paper will be satisfactory. The paper must be lapped sufficiently and weighted down so that the plants will not grow between the sheets. Straw has been used as a temporary covering and then burned off as soon as the plants make their appearance through the straw. Straw stacks and sawdust have also been used, with varying degrees of success, to cover weed patches.

Burning.—While it is not good farm practice to burn organic matter in the form of crop residues on agricultural land, yet occasionally one must choose between the destruction of organic matter and the eradication of some weed pest. There is, however, little objection to burning waste places for the destruction of weeds. Where a noxious weed exists and mowing and burning will destroy seed production and the resultant spread of the plant, it is to be recommended until more definite eradication methods can be put into practice. Several kinds of weed burners are manufactured to be used for fence rows and other places not accessible for other means.

Crop Rotation.—A well-designed crop rotation will go a long way to control and eradicate weeds. The one- or two-crop system is most conducive to the weedy farm. Cornfield weeds, for example, thrive and spread best by continuous growing of corn or some similar crop on the same piece of land. On the other hand, grain field weeds are kept under control by putting the land to a cultivated crop like corn, soybeans or potatoes. Even pasture has its place in a well-designed rotation as far as weed control is concerned. When pastures become highly infest-

ed with their characteristic weeds nothing is more practical in their control than to put the pasture land to a cultivated crop.

FERTILIZATION.—The fertilization of pastures and meadows is an accepted method of weed control. Where the turf is heavy annual weeds cannot become established. A dense growth of any grain or forage crop makes it difficult or almost impossible for most weeds to become established. Poor stands and poor growth are almost sure to be associated with an abundance of weeds. If legumes are to be grown successfully, limestone and phosphorus are necessary; without these a weed patch develops. Marked reduction in the amount of weeds in clover and alfalfa fields has been recorded as a result of applying different fertilizers.

The weed-free farm or garden does not exist, so that the best that one can hope to do is to eradicate the most noxious weeds and control the others to such an extent as to reduce to a minimum the loss from weeds.

Three Steps in Weed Control.—Only pure weed-free seeds should be sown, since nearly 75 per cent of our worst weeds are not native in the United States but have been introduced in impure seed. Weedy hay and commercial feed often introduce new weeds to the farm. We should stop traffic in weed seeds to and from the farm.

Preventing weed seed production on the farm by every method adaptable to the situation at hand is the second most important step in reducing the weed loss.

The third step is to design some program of eradication for the most noxious weeds and to carry it out in every detail.

Thirteen Noxious and Pernicious Weeds of Illinois

EUROPEAN BINDWEED	Convolvulus arvensis L.
PERENNIAL SOW THISTLE	Sonchus arvensis L.
CANADA THISTLE	Cirsium arvense (L.) Scop.
COMMON RAGWEED	Ambrosia elatior L.
WESTERN RAGWEED	Ambrosia coronopifolia T. & G.
LANCE-LEAVED RAGWEED	Ambrosia bidentata Michx.
GIANT RAGWEED. HORSEWEED	Ambrosia trifida L.
POISON IVY	Rhus radicans L.
POISON SUMAC	Rhus Vernix L.
WILD PARSNIP	Pastinaca sativa L.
WHITE SNAKEROOT	Eupatorium urticaefolium Reich.
POKEWEED	Phytolacca decandra L.
COMMON BURDOCK	Arctium minus Bernh.

EUROPEAN BINDWEED

Convolvulus arvensis L.

Appearance.—European Bindweed, known also as Field Bindweed and Small-Flowered Morning Glory, is a twining or trailing vine with smooth, slender stems 1 to 6 feet long, often branched, which bear characteristically shovel-shaped leaves and small morning-glory-like flowers. The leaves, placed alternately upon the stem, are stalked and smooth, and pointed or bristle-tipped at the end, and their bases have two spreading, backward-pointing lobes. The pink to nearly white, funnel-shaped flowers are nearly an inch wide and occur singly or occasionally in groups of two to four together on slender, long stalks rising from the angle between leaf and stem. The dark brown seeds, four of which usually are borne in each globular two-celled pod, are nearly a quarter inch long, rough and pear-shaped, with one side flat and the other rounded. The plant, although it dies down to the ground each winter, is really perennial and survives by means of horizontal rootstocks and vertical roots that penetrate very deeply into the earth.

Distribution.—European Bindweed, native in both Asia and Europe, was introduced from Europe many years ago. It has become very widely distributed in North America and ranges from Nova Scotia westward to Manitoba and southward into Virginia, Missouri, Kansas, and California. Throughout this region it grows in fields, gardens, and meadows, along railroads and in neglected places, wherever rich, moist soil is available. It has been known in Illinois since at least 1879. This weed now occurs throughout the state but is more abundant in the northern two-thirds than in the southern part.

Biology.—The flowering period for European Bindweed in this state extends throughout the summer, beginning late in May in southern Illinois and early in June in the northern part. Seeds ripen in July in southern Illinois and continue to ripen until frost kills the above-ground parts of the plant. They are a common contamination in agricultural seeds and, as such, spread the weed to new localities. Shoots sent up from buds on the rootstocks become so numerous that they twine about other plants and choke them or form a dense, smothering mat on the ground. In ordinary cultivation the cordlike rootstocks are broken into pieces, which are carried to other parts of the field. Even very small pieces may send up new shoots, and field culti-

EUROPEAN BINDWEED. FIELD BINDWEED

vation tends to spread the plant and increase its destructiveness.

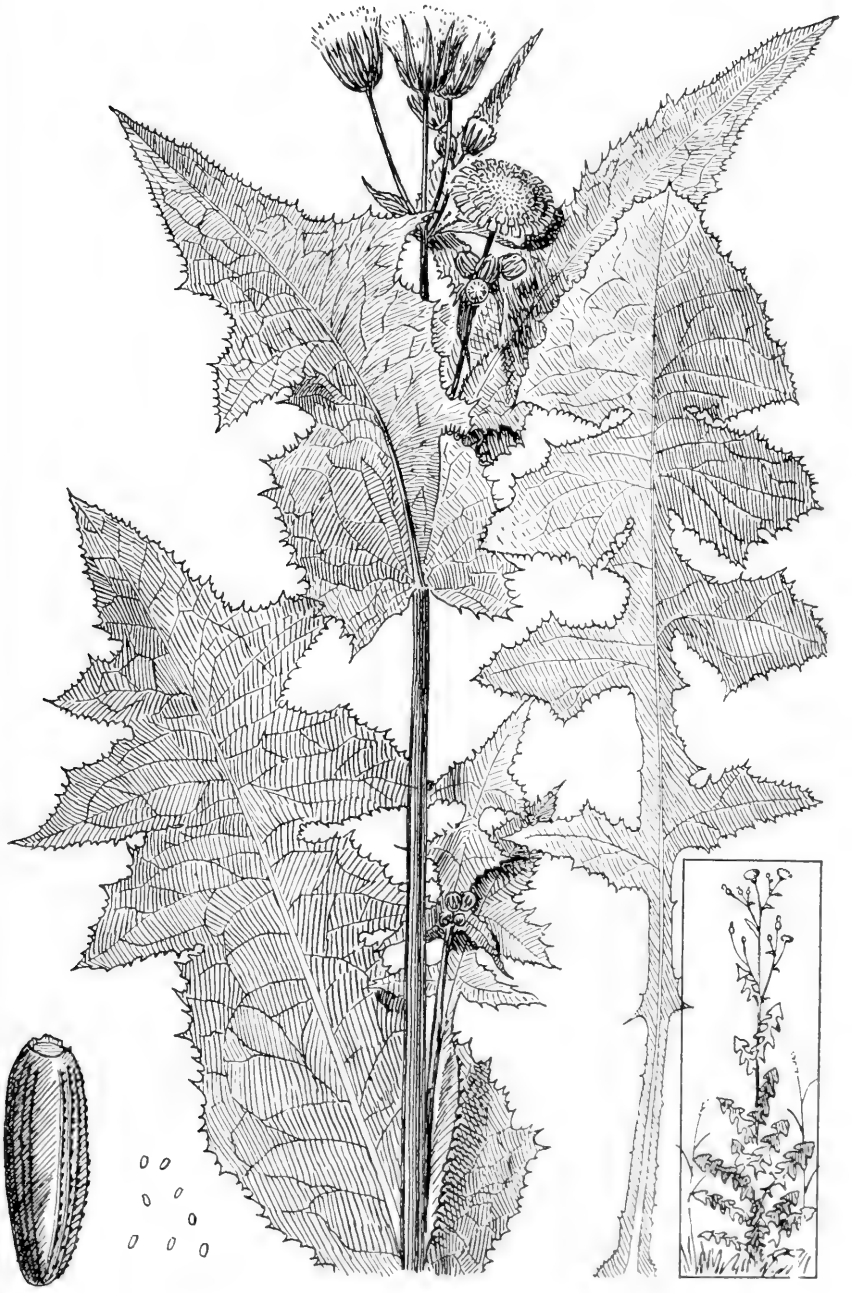
Control.—Controlling the European Bindweed involves, first, prevention of seeding and, second, starving to death both the underground rootstocks and the deep vertical roots by which the plant overwinters and spreads in the ground. On small infested areas, sodium chlorate, calcium chlorate, ammonium sulfamate or 2, 4-D can be used successfully. These chemicals are sprayed on the weed patches in midsummer or later. Common salt, used at the rate of 1 pound to 1 square foot in gardens, will kill most of the plants. Treatment with chlorates or salt is not practical for large areas, however, because it makes the soil sterile for one or two years. For large infestations, bare fallowing is probably the most advisable procedure, with a duckfoot cultivator or weed eradicator used at 12- to 21-day intervals to keep down the shoots that constantly push up through the ground. It is possible, also, to use a smother crop, such as alfalfa, but even then it is necessary first to cut down the quantity of bindweed by cultivation and to have the ground in condition to insure the best possible stand and growth of alfalfa.

PERENNIAL SOW THISTLE

Sonchus arvensis L.

Appearance.—The Perennial Sow Thistle, often also called Field Sow Thistle and Corn Sow Thistle, grows to a height of 2 to 4 feet; and its erect, stout, smooth and finely grooved stem, which bears large, deeply lobed, waxy, dark green leaves toothed with small, weak spines divides toward the top into a number of nearly leafless branches, each capped by a showy, yellow flower head. Each leaf ends in a large, spearhead-shaped lobe, behind which backward-pointing lobes on each side grow smaller until the heart-shaped base clasps the stem. The lowest leaves often have margined leafstalks. The flower heads, often nearly 2 inches across and an inch high, spread out into bright yellow, petal-like flowerlets that are five-toothed at the end, and their bases as well as their stalks are covered with tiny, sticky bristles. The reddish-brown, wrinkled, oblong seed is crowned with a dense tuft of white, silky hair and has about 10 lengthwise ribs. The plant dies down every winter, but it comes up again in spring from deep perennial roots and creeping rootstocks.

Distribution.—Introduced many years ago from Europe,



PERENNIAL SOW THISTLE. FIELD SOW THISTLE

Perennial Sow Thistle has spread from coast to coast across Canada and southward in the United States to New Jersey, Illinois, and Colorado, growing in cultivated fields, along roadsides and railroads, and on neglected lands. It has been known in Illinois since at least 1860 and has become established from time to time in many localities in the northern two-thirds of the state.

Biology.—The flowering period for Perennial Sow Thistle in Illinois extends from the middle of June into late August, and seeds mature from early July until September. The many flower heads produce large quantities of seeds and some of these, mixed with grains at harvest, carry the weed into new regions. Also when shed from the plants, the seeds can be blown long distances. Once established, a plant of this weed sends out thick, yellowish-white rootstocks, and these in turn send up new plants, so that a plant, starting from a single seed, develops rapidly into a large patch, which may become so dense as to crowd out all other vegetation on the land that it occupies. A rootstock, if broken up and scattered in small pieces by cultivating implements, is capable of producing a new plant from each small piece, and ordinary cultivation is therefore very apt to spread the weed. Young plants, when they first appear, are readily mistaken for dandelions or, a little later, for prickly lettuce and wild lettuce. Hence it is important to use great care in identifying them, so that eradication can be undertaken as early as possible.

Control.—Control measures for Perennial Sow Thistle are nearly identical with those required for Canada Thistle. Eradication involves starving to death the underground rootstocks and roots by keeping the aboveground shoots cut off. When Perennial Sow Thistle gets started in pastures, two or three years of close pasturing by sheep, which have a liking for it, will so weaken it that it can be destroyed by cultivation when the pasture is broken up. For infestations in cultivated fields, repeated use of duckfoot or special weed-eradicating cultivators is successful, since new shoots sprouting from the rootstocks are kept cut off before they get above ground. Both sodium chlorate and calcium chlorate can be used for chemical eradication. But their use makes the ground sterile for an additional year and they consequently are desirable only when small infested areas are to be treated. Several applications are necessary. The chemical 2, 4-D is also useful.

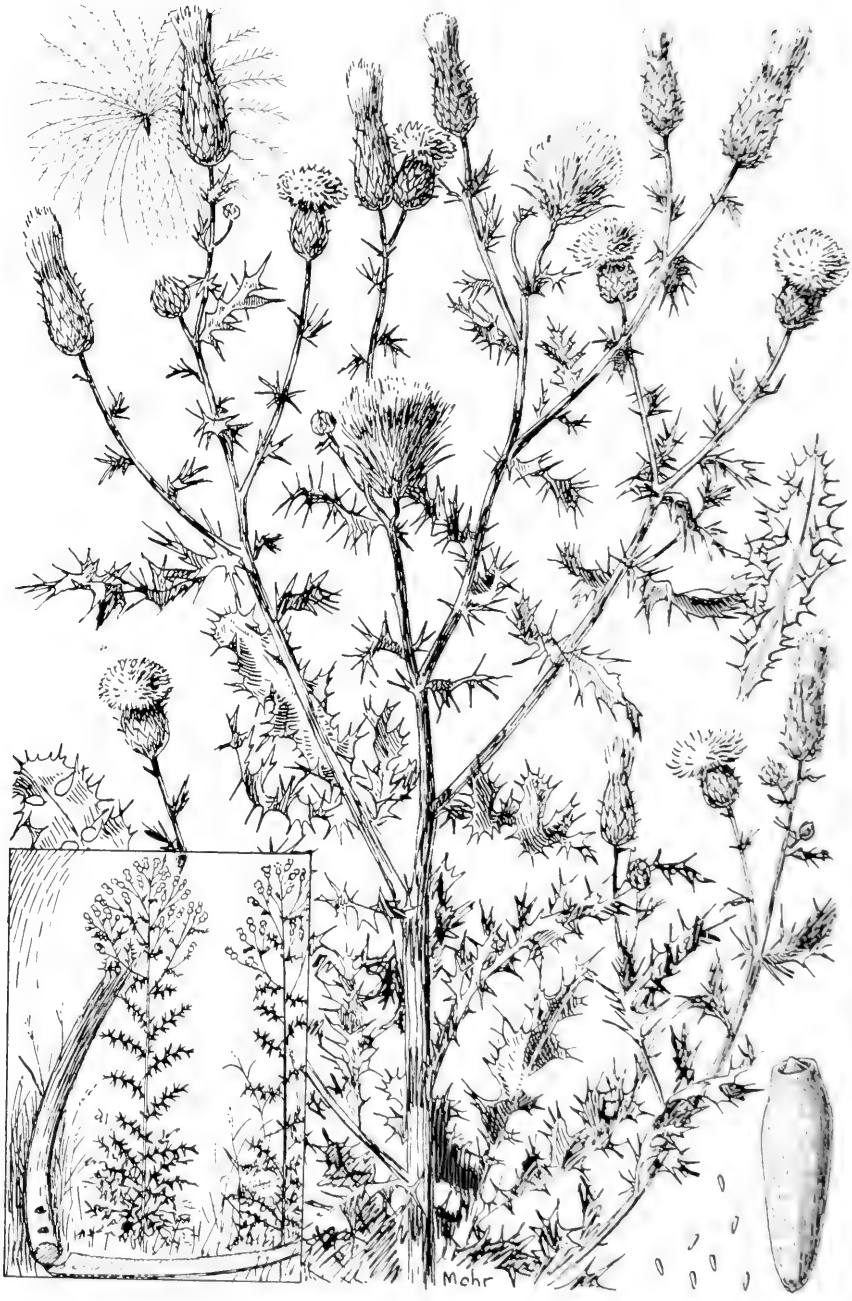
CANADA THISTLE

Cirsium arvense (L.) Scop.

Appearance.—Canada Thistle, sometimes called also Creeping Thistle, grows to a height of 1 to 4 feet. Its smooth, green, grooved, woody stem, which bears numerous deeply lobed leaves heavily armed with very sharp, hard, white spines, divides near the top into a number of short, leafy branches, each capped by a globular head of purple to white flowers. Although the plant dies to the ground in winter, it is perennial and springs up each year from an underground rootstock. The leaves, sometimes woolly on the underside, have no stalks, and the base of the blade tends to clasp the stem. The flower heads, each nearly an inch long and as broad, are of two kinds that are borne on separate plants. One, with the shorter and less conspicuous flowers, bears seeds, and the other, with the longer and more conspicuous flowers, bears pollen only.

Distribution.—Although now known as Canada Thistle, this plant came originally from Europe. It has become naturalized and grows in fields and neglected areas from Newfoundland to British Columbia and southward to Virginia and Kansas. It has been known in Illinois since at least 1876 and at the present time is found throughout the length and breadth of the state. As a weed, however, it has economic importance at present in only about the northern half of Illinois.

Biology.—The flowering period of Canada Thistle begins the latter part of June in southern Illinois and extends into late August or early September in the northern counties. Seeds begin to ripen within a short time after the first flowers open. They begin to mature early in July in the southern part of Illinois and in the north continue to mature until well into September. Canada Thistle is carried to new regions and is spread to some extent locally by seed. Once started, a plant will spread rapidly by means of underground rootstocks to form a large patch. The slender, round, white rootstocks lying deep in the ground often extend for rods in every direction and send up plants at short intervals. The plants or plant patches that bear only pollen-producing flowers do not bear seed; but patches that have the other type of flower head do produce seed. Rootstocks, if broken up and dragged about by farm implements, are likely to develop new plants from each piece, and ordinary deep cultivation is on this account more likely to spread the weed



CANADA THISTLE. CREEPING THISTLE

than to control it. Although insects often destroy a considerable proportion of the seed produced, there generally is enough left, at least in the northern part of Illinois, to be an important means of spreading the plant. Seeds in the soil remain alive for several years.

Control.—To control the Canada Thistle it is necessary to starve its underground rootstocks to death by keeping the aboveground plant parts cut off or destroyed. Either chemical treatments or special methods of cultivation will do this. Sodium chlorate, calcium chlorate, or 2, 4-D may be applied as a spray when the plants begin to blossom, or patches may be mowed at blossom time and sprayed when the tops grow up again. Usually several sprayings are necessary. On small areas, carbon bisulfide may be used. If a burner is available, three searings, one at blossom time and the others when the plants are large, may be effective in one season. The use of duckfoot and specially devised weed-eradicating cultivators has also proved successful. Set at shallow depth, they cut off the growing plants without breaking up the rootstocks. Repeated cultivation cuts off new, growing shoots before they reach the top of the ground, and the stored vitality of the underground roots and rootstocks is thus rapidly exhausted.

COMMON RAGWEED

Ambrosia elatior L.

Appearance.—Common Ragweed, less frequently known as Bitterweed, Roman Wormwood, and Wild Tansy, is a freely branching herb that grows 1 to 3, or sometimes 5, feet high. Its hairy green stems and branches bear many finely divided, feathery, thin leaves, deep green on the upper surface and pale beneath, and in late summer end in long spikes of green flowers dusted with yellow pollen. There is, however, a second kind of flower. It produces seed and occurs singly or in clusters nearly hidden in the angles between upper leaves and the stem. The tiny seeds, which are seldom seen, are encased in hard fruits. These fruits, only about an eighth of an inch long, are grain-like, somewhat top shaped, beaked at the tip and crowned with four to six spiny points. Common Ragweed is an annual plant which springs up each year from seed.

Distribution—Common Ragweed is an American plant with a natural range that extends across Canada and throughout most

COMMON RAGWEED. BITTERWEED

of the United States. It grows everywhere in Illinois and is one of the commonest weeds in the state. Its importance is due chiefly to its pollen, which is the main cause of hay fever in late summer. After harvest of small grains, it springs up in stubble, often in stands as pure as though it had been planted. In meadows and pastures it often is a pest, and in cities, towns, and villages every area of land not thoroughly sodded with grass or cleanly cultivated is almost certain to harbor a number of plants. Cattle, lacking better food, will eat it, and if it is mixed with clover or alfalfa pasture or hay the bitterness of its juice causes a bitter taste in milk.

Biology.—The flowering period of Common Ragweed usually begins about the first of July in the southern part of Illinois and about the first of August in the northern part. But pollen does not become abundant enough to cause severe hay fever for two to three weeks after blossoming starts. The blossoming period often continues into October, but after September production of pollen usually is not sufficiently heavy to cause severe hay fever. Seeding time ranges from about the first of August in southern Illinois and the middle of August in northern Illinois until frost. Ragweed spreads and reproduces entirely by means of its grainlike fruits. These are borne in great numbers and are very easily distributed with harvested grains and by wind. When buried in the soil, they retain their vitality for years.

Control.—Control measures for ragweed have two purposes: first, to prevent pollen production in and near populous areas so as to control hay fever and, second, to destroy the weed in agricultural regions because of its pernicious habits. When the plants are young, the thin, widespreading foliage is easily killed by copper sulfate or iron sulfate solutions. These solutions are not harmful to grasses and may be used both on farms and in cities. Another chemical which may be used is 2, 4-D, which should be applied before pollination starts. Enforcement of laws requiring cutting of weeds on vacant and neglected lots, if done when the plants start blossoming, tends to control the pollen nuisance. Cultivating stubble immediately after harvest kills plants already up and encourages germination of seeds in the soil, which may be killed later with the harrow, although this is contrary to good farm practice. Mowing pastures, grain fields, and clover fields to prevent Common Ragweed from blossoming and setting fruit is especially important, and eventually accomplishes control of the weed.

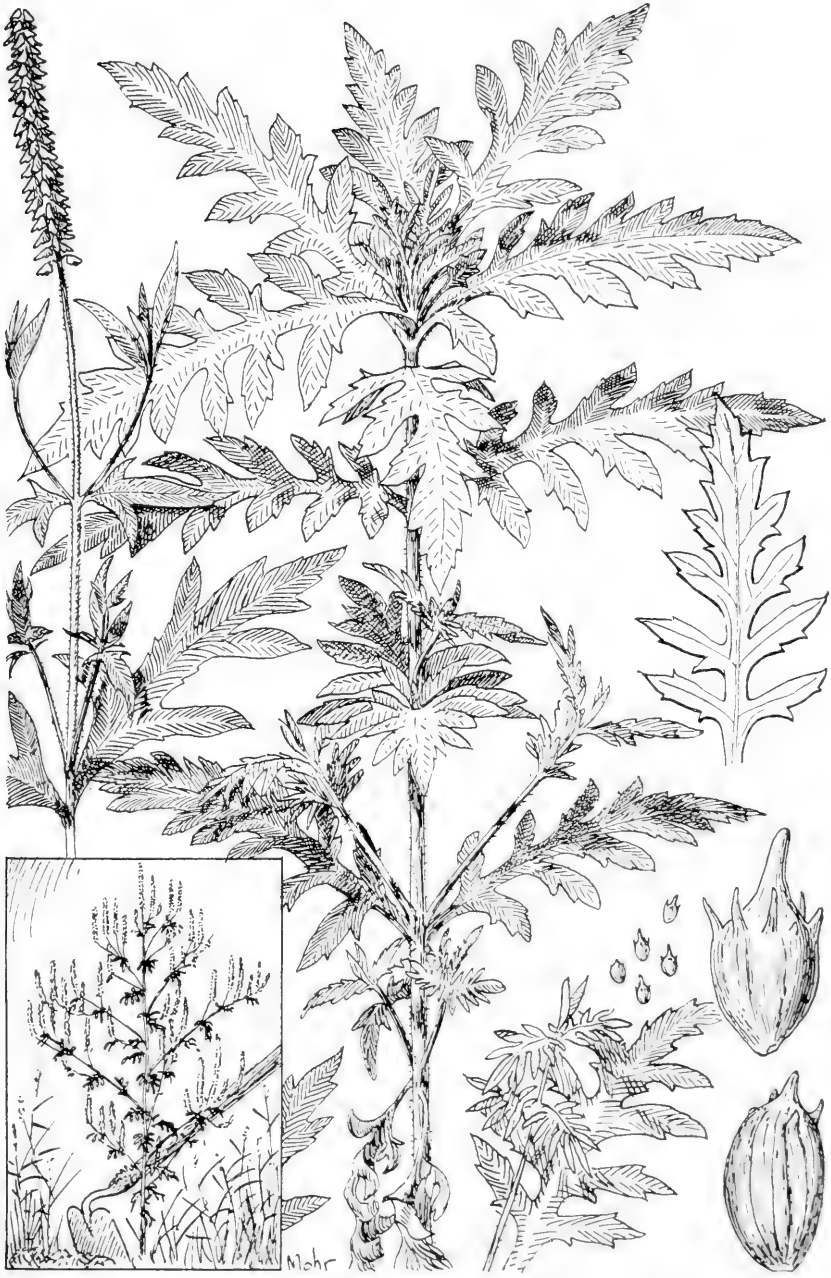
WESTERN RAGWEED

Ambrosia coronopifolia T. & G.

Appearance. The Western Ragweed, also known as Perennial Ragweed, grows commonly to a height of 1 to 3 feet, less often to 5 or 6 feet, and its rather stout, erect, usually much-branched, clustered stems, which are round and heavily covered with grayish-white hair, bear alternately placed, rather thick, stalkless, white-hairy leaves and, in late summer, end in long spikes of green pollen-bearing flowers. The leaves are deeply divided into narrow lobes, giving the plant an aspect similar to that of the Common Ragweed, but they are coarser, less feathery in appearance and hairy on both surfaces. Inconspicuous seed-bearing flowers are borne for the most part singly in the axils of the small upper leaves. The tiny, brown fruits that contain the seed are somewhat top-shaped, hairy, short-pointed, and usually crowned by a circle consisting of a few tiny teeth. Although it dies to the ground each autumn, the Western Ragweed is perennial and springs up year after year from creeping, underground rootstocks.

Distribution.—The Western Ragweed is an American plant with an original range extending from Illinois far into the Northwest Territory and into Texas, Mexico, and California. Its natural range in Illinois covered the western third of the state, where it grew chiefly in prairies and sandy regions. Its seeds are transported as contaminations in grass and clover seed, and plants cut and baled with hay carry seed wherever the hay is shipped. Western Ragweed now is known to occur as far east as the state of New York and it probably is a more abundant weed pest than reports indicate, since it can be readily mistaken for the Common Ragweed.

Biology.—The flowering period of Western Ragweed in Illinois begins late in July and continues until frost, and seeds ripen from early August until frost. The long spikes of pollen-bearing flowers open most abundantly from mid-August through September and add appreciably to the pollen content of the air during the hay fever period. The pollen of the plant is an active agent in causing hay fever. Where Western Ragweed is abundant, its seeds serve as food for game birds during late fall and winter. The seeds are long lived and probably are able to persist in the ground for years. And the creeping rootstocks, it is reported, are the means by which the plant is spread locally



WESTERN RAGWEED. PERENNIAL RAGWEED

when they are broken up and strewn over a field by cultivation.

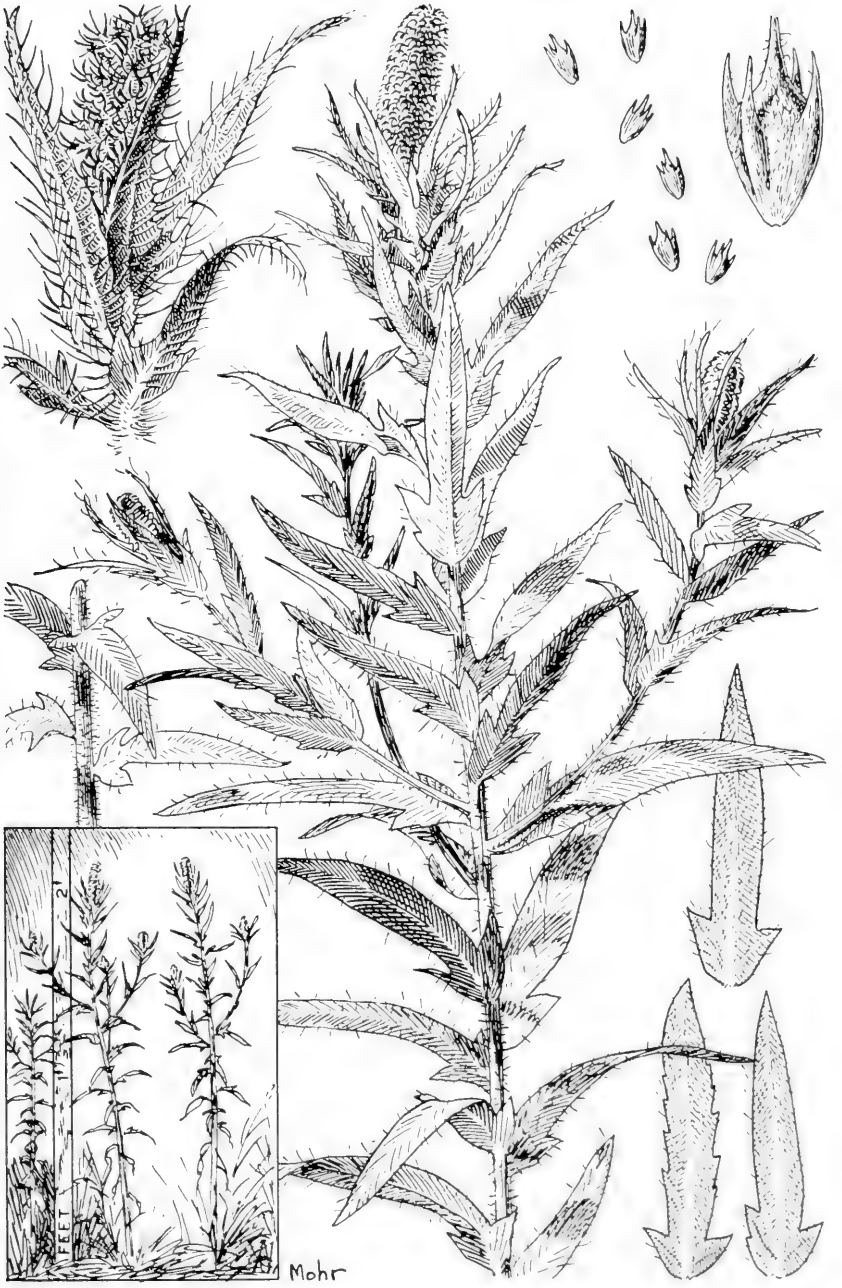
Control.—Much harder to control than its annual relatives, the Western Ragweed demands the same strict attention as other dangerous perennial weeds. In serious infestations, this requires keeping the tops cut back continuously, so as to starve and kill the roots. Small, newly infested areas may be given treatment with chemicals such as sodium chlorate and calcium chlorate. The milder chemicals, copper sulfate and iron sulfate, effective against Common Ragweed, are not likely to give permanent results with this plant. Whether or not eradication is attempted, the plant is one of those that should be kept mowed close to the ground during the pollen producing season, to reduce as much as possible the amount of pollen in the air.

LANCE-LEAVED RAGWEED

Ambrosia bidentata Michx.

Appearance.—The Lance-Leaved Ragweed is an erect, noticeably hairy plant 1 to 3 feet high with very leafy, straight, round stems usually abundantly branched above. Both stem and branches terminate in very dense, often clublike heads, 3 to 7 inches long, of green flowers, which produce great quantities of yellow pollen. The alternately placed, stalkless, rough-hairy leaves have one prominent vein and are quite variable in shape. Generally in the form of a lance head, they are sharply pointed at the tip and may have two or more sharp lobes near the base and none to several small sharp teeth along the edges. Seed-bearing flowers, borne in the axils of the small upper leaves, occur singly or in clusters. The brownish fruits, about one quarter inch long, that enclose the seeds are hairy, top-shaped, sharp-pointed at the tip, and provided with a crown of four distinct, sharp spines, from which ridges run down along the sides of the fruit. The Lance-Leaved Ragweed is an annual plant and propagates only by seed.

Distribution.—A native of American prairies, the Lance-Leaved Ragweed ranges from Illinois westward into Kansas and southward into Louisiana and Texas. As a weed it appears not to have strayed widely beyond its natural range. In Illinois, it grows only in the southern half of the state. But in this region it has found an ideal habitat in cultivated fields and fallow land and is as abundant and troublesome there as the Common Ragweed is in the north.



LANCE-LEAVED RAGWEED

Biology.—In the northern part of the Lance-Leaved Ragweed's range, the blossoming and pollen-shedding period begins in late July and continues until growth of the plant is checked by frost. Southward, blossoming occurs later. Seed begins to be ripe by mid August, and the abundant seed production makes this plant an important source of winter food for game birds. Permanently incased in its hard, heavy-walled fruit, the seed is well protected and long lived.

Control.—Because this plant is one of the chief producers of hay fever pollen, the tops should be kept mowed close to the ground from the beginning of the blossoming period. Its general habits make it subject, as an agricultural pest, to control and eradication by the same methods as the Common Ragweed.

GIANT RAGWEED. HORSEWEED

Ambrosia trifida L.

Appearance.—Giant Ragweed, frequently known also as Kinghead and Horseweed, is a huge, coarse herb that grows usually 4 to 6 feet high and not uncommonly to 10 or 15 feet. Its upright, stout woody stem, covered with rough and bristly hairs, branches widely and bears oppositely placed leaves that often are a foot long or more, rough and hairy like the stem, three-nerved, commonly divided into three large lobes, and coarsely toothed. Flowers are of two kinds. Those that bear the pollen are closely crowded on the straight or branched leafless tips of the main stem and branches, forming pollen-dusted green spikes sometimes more than a foot in length. The seed-bearing flowers, their clusters hidden between leaf stalk and stem in the upper part of the plant, are not often noticed. The brownish, top-shaped, ribbed, seedlike fruits, about three-eighths inch long, end in a short beak and are crowned just below this with a ring of 5 or 6 short spines. Giant Ragweed is an annual and is propagated only by seed.

Distribution.—Giant Ragweed is native to North America, ranging from Nova Scotia across Canada to Manitoba and southward to Florida and Mexico. In Illinois, it ranges throughout the state. Although naturally a plant of stream banks and shores, it has adapted itself successfully as a weed and has become established in the country, in towns, and in cities wherever moist soil is available. It is abundant along streams, ditches, fence rows, and neglected roads.

GIANT RAGWEED. HORSEWEED

Biology.—Blossom time for Giant Ragweed begins about the middle of June in southern Illinois and early in July in northern Illinois and extends into September. The terminal shoots that carry the pollen-bearing flowers are so numerous, so long, and so thickly covered with flower heads that this plant adds materially to the ragweed pollen content of the air during hay fever time. Frequently its growth is so rank above ground and so extensive below ground that other plants are completely crowded out or starved. Its hard, light fruits, in which its seeds are borne, are produced in great abundance and are distributed with agricultural seeds, blown about on frozen soil and snow in winter, and carried long distances by streams. From October through December its fruits are an important part of the food of upland game birds. The seeds in buried fruits remain alive for several years.

Control.—In the case of Giant Ragweed, control measures should be aimed to reduce the amount of ragweed pollen, prevent seed production, and destroy the plant as a weed. In any case, efforts should be directed chiefly toward killing while the plants are still young. The hard, woody stems of tall, mature plants are difficult to cut. Young plants in fields and gardens are readily killed by cultivation and hoeing. In waste places, mowing as the weeds come into flower but before pollen is produced will kill them. In fallow land, grassy plots, and elsewhere they can be killed easily by spraying with copper sulfate or iron sulfate. Enforcement of weed-cutting laws in cities and towns and the cutting of weeds on vacant land is important in reducing the amount of pollen.

The ragweeds described and pictured on the preceding pages are the chief producers of hay fever pollens in Illinois during late summer and early fall. But the pollens of all members of the same botanical family, the Ambrosiaceae, have the same irritating effect when inhaled. The following plants belonging to this family also are native or grow in Illinois as weeds: Rough Marsh Elder (*Iva ciliata* Willd.), Burweed Marsh Elder (*Iva xanthifolia* Nutt.), Spiny Clotbur (*Xanthium spinosum* L.), Great Clotbur (*Xanthium speciosum* Kearney), Beach Clotbur (*Xanthium echinatum* Murr.), Pennsylvania Clotbur (*Xanthium pennsylvanicum* Wallr.), Chinese Clotbur (*Xanthium chinense* Miller), Common Cocklebur (*Xanthium commune* Britton), and American Cocklebur (*Xanthium americanum* Walt.). When

abundant locally, these plants should be prevented from blossoming, as an additional measure in hay fever control.

POISON IVY

Rhus radicans L.

Appearance.—Poison Ivy grows both as a vine and as a shrub. Its outstanding characteristic is that each leaf is made up of three large, separate leaflets, and because of this it often is called Three-Leaved Ivy. As a shrub Poison Ivy may grow 3 or 4 feet high but usually is much smaller. It often is called Poison Oak because of the resemblance of its leaflets to young oak leaves. As a vine Poison Ivy climbs high on tree trunks, and on fence posts and other supports. Its woody stem can be recognized always by the short roots sent out in great numbers along its sides, which attach it to the support. The stems bear alternately placed, long-stalked leaves with irregularly lobed, toothed or sinuate margins. The end leaflet stands on a long stalk, and the two side leaflets, the blades of which are unequal at the base, stand on very short stalks. Clusters of small, greenish-white flowers are borne on stems 1 to 3 inches long that grow out from the angles between leaves and stem. The fruit is a greenish-white, smooth, waxy, dry berry containing one small hard seed. A fruit cluster resembles a small currant cluster. Both shrub and vine are perennial. Poison Ivy spreads by creeping rootstocks and is scattered extensively by multitudes of seeds.

Distribution.—Poison Ivy is an American plant with a range that extends across the continent from Nova Scotia to British Columbia and southward to Florida and the desert regions of the southwest. It grows throughout Illinois, being especially abundant along fence rows and roadsides, where it generally is seen as a shrub. But frequently in the borders of woods and sometimes along fences it grows as a vine. It seldom persists on cultivated ground; hence it does not often contaminate agricultural seed.

Biology.—Blossom time for Poison Ivy in Illinois begins the latter part of May and extends well into July. The berries enlarge and ripen slowly, maturing from mid August to October. They remain on the vines until late winter. Birds, especially crows, eat them without harm and carry the seeds long distances. Poison Ivy is important chiefly because all parts of it, but

POISON IVY

especially the leaves and bark, produce an oleo-resin, urushiol, which causes ivy poisoning. The plant is, quite justly, feared by many persons, and little effort is made to eradicate it. A few persons are apparently immune, however, and it is possible that many poisoned by other plants blame Poison Ivy.

Control.—The only satisfactory control for Poison Ivy is eradication. Grubbing is sometimes necessary close to shrubbery or trees too valuable to endanger by other treatment. Plowing and cultivating fields and gardens keep it under complete control. Elsewhere chemical treatment gives most satisfaction with least danger. Common salt solution, prepared by dissolving 3 pounds of salt in 1 gallon of water and poured on the ground around the plant, kills the foliage. Or salt may be applied dry. The first application should be made in early summer, and later applications as new foliage appears, until the rootstocks and roots have been starved to death. Ammonium sulfamate and 2, 4-D give good results and can be used where Poison Ivy plants have to be poisoned without damage to nearby plants. On agricultural lands sodium chlorate is satisfactory.

To prevent ivy poisoning, the best advice that can be given is to take all possible precautions to avoid contact with the plants. Susceptible persons may, however, obtain a reasonable degree of protection by applying to hands, arms, and face a protective ointment containing sodium perborate. If poisoning is suspected, immediate washing of all exposed parts of the body with soap and water, followed by thorough rinsing with clean water, is the best procedure. After the rash appears, several materials can be used to hasten recovery. But persons severely poisoned should consult a physician and remain under his observation until the poisoning has abated.

POISON SUMAC

Rhus Vernix L.

Appearance.—Poison Sumac, often also called Swamp Sumac and Poison Elder, is a shrub or small tree that grows usually 10 to 12, but rarely 25, feet high. Its stems are normally 2 to 3 inches in diameter, but on large specimens the trunk may be as much as 6 inches in diameter. What are commonly called leaves are but leaflets, and the 7 to 13 of them on one stalk form a single leaf 6 to 12 inches long. The leaves occur alternately on the twigs. The leaflet at the end of each leaf stands on a

POISON SUMAC. SWAMP SUMAC

distinct stalk, but the other leaflets are in pairs along the leaf stem and are nearly stalkless. The leaflets are oval but they vary considerably in shape and size, even on the same leaf. They are green on both sides, pointed at both ends, and even or somewhat wavy along the margin. The leafstalk is somewhat swollen at the base where it attaches to the stem. Clusters of greenish-white, very small flowers are borne on the current year's twigs on much-branched stalks 3 to 8 inches long, which arise in the angles between leaves and twigs. The fruit that develops from these flowers is a small, greenish-white, smooth, shiny, waxy berry. Each fruit contains a single much-wrinkled or ridged seed. Poison Sumac reproduces entirely by seed.

Distribution.—Poison Sumac is a native American shrub. Its natural range extends from Maine westward through Ontario to Minnesota and south to Florida, Mississippi, and Texas. Throughout this region it is found only in bogs or boggy areas. In the northern part of its range it is typically an inhabitant of tamarack bogs. In Illinois it maintains this habit and consequently occurs only in the northeastern corner of the state, where it is abundant in the old tamarack bogs of Lake County.

Biology.—The blossoms of Poison Sumac open in June. The fruit ripens slowly, becoming mature in September, and clings to the shrubs until winter. Of all the plants that grow in this state, there is none so poisonous to the touch as Poison Sumac. It is even more poisonous than its close relative, Poison Ivy. Poisoning is due to a plant oil, known as urushiol, which is produced by the shrub in all its parts, but especially in the bark and leaves. Exceedingly severe cases of poisoning develop on susceptible individuals who come in contact with this shrub, but as with Poison Ivy there are some who apparently are immune to poisoning.

Control.—Control of Poison Sumac demands eradication, since all parts of the shrub produce the poisonous oil that is responsible for poisoning. The only satisfactory eradication is to chop down and destroy the stems or to poison the plant with chemicals. Although no experiments have been performed to show the effect of chemicals on this shrub, undoubtedly it would be possible to kill it with common salt by applying dry salt on the soil around the crown of the shrub. Sodium arsenite could be used also, probably with safety except where animals are pastured, but sodium chlorate and calcium chlorate are to be preferred because they are less poisonous to animals.

WILD PARSNIP

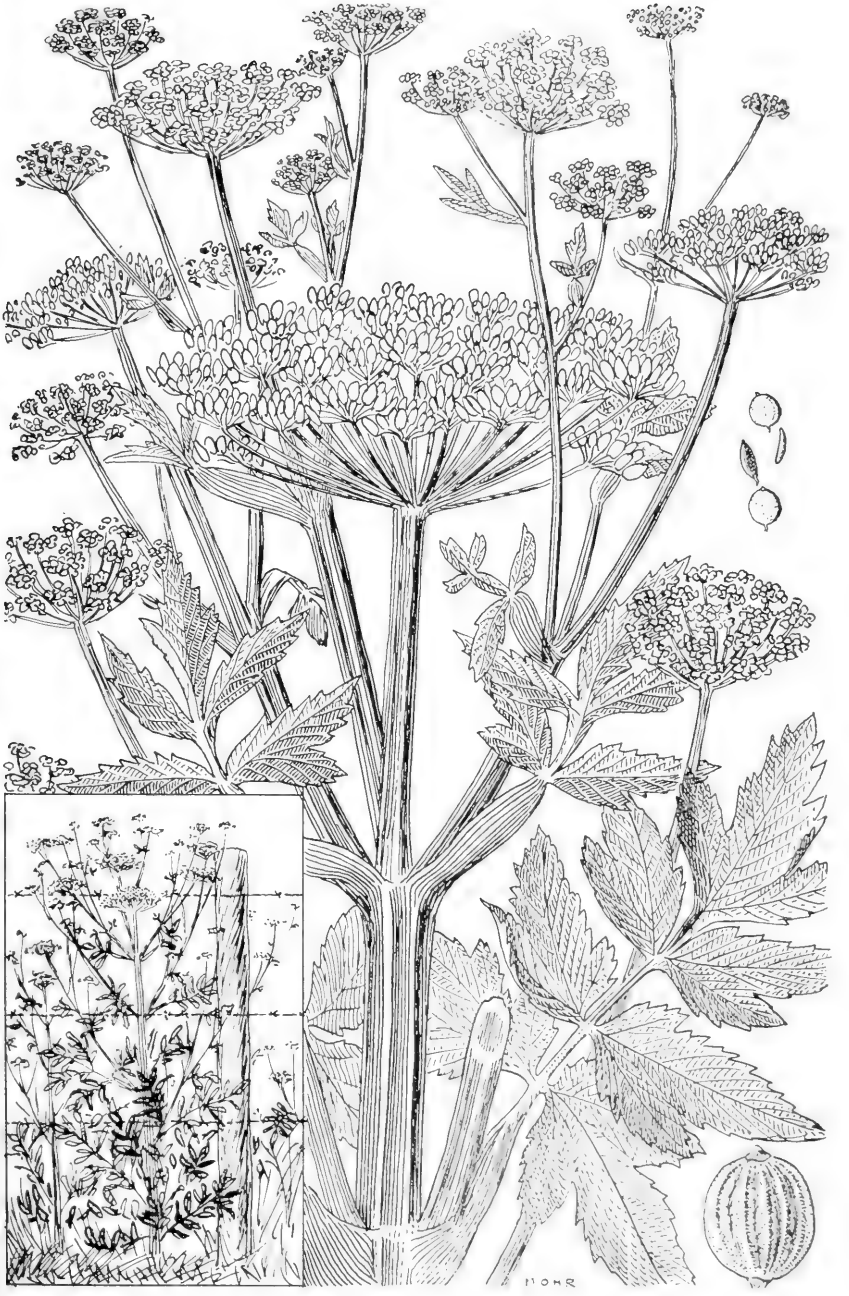
Pastinaca sativa L.

Appearance.—Wild Parsnip, in reality the cultivated or garden parsnip escaped from cultivation, is a large coarse plant that grows 2 to 5 feet high. Generally, its smooth, grooved and ridged, coarse stem bears along its length a number of greatly divided smooth leaves which have a distinct clasping arrangement at the base. The stem ends in great heads of small yellow flowers. Wild Parsnip is a biennial and the first year from seed produces a very short stem, from which a rosette of leaves spreads out on or near the surface of the ground. These leaves are often 1½ feet long, with long, grooved, flat leafstalks and blades very much cut up, closely and sharply toothed, and often lobed. After the flowers wither, the fruit develops in the flower heads at the top of the plant. Each fruit is composed of two broadly oval, smooth, flattened halves, or seeds, about a quarter inch long. Each seed is surrounded by a thin corky ridge. Wild Parsnip reproduces entirely by seeds.

Distribution.—Wild Parsnip has been naturalized from Europe. Apparently it has found this continent exceptionally favorable, for it is now distributed to all parts of the United States and southern Canada. The earliest known record of its occurrence in Illinois is 1861, but undoubtedly it was here prior to that time. It grows throughout the state and is an exceedingly common weed everywhere, except in the extreme southern part. Along roadsides, railroads, fence rows, and on neglected lands it is abundant, but is seldom seen on consistently cultivated land.

Biology.—Wild Parsnip has some importance as a weed of meadows and pastures. It is of interest, also, because some people, after coming in contact with it, develop a skin poisoning quite similar to that received from Poison Ivy and perhaps often confused with it. Although the root of the cultivated parsnip is not poisonous, that of the Wild Parsnip, belonging to the same botanical species, is poisonous, even after it is cooked. In Illinois the flowering period for Wild Parsnip extends from very late May through late August, and seeding time from the last of July into October. Seeds, produced in exceedingly large numbers, are widely distributed by wind and water, but they are rarely contaminants of agricultural seeds.

Control.—Although Wild Parsnip has found American en-



WILD PARSNIP

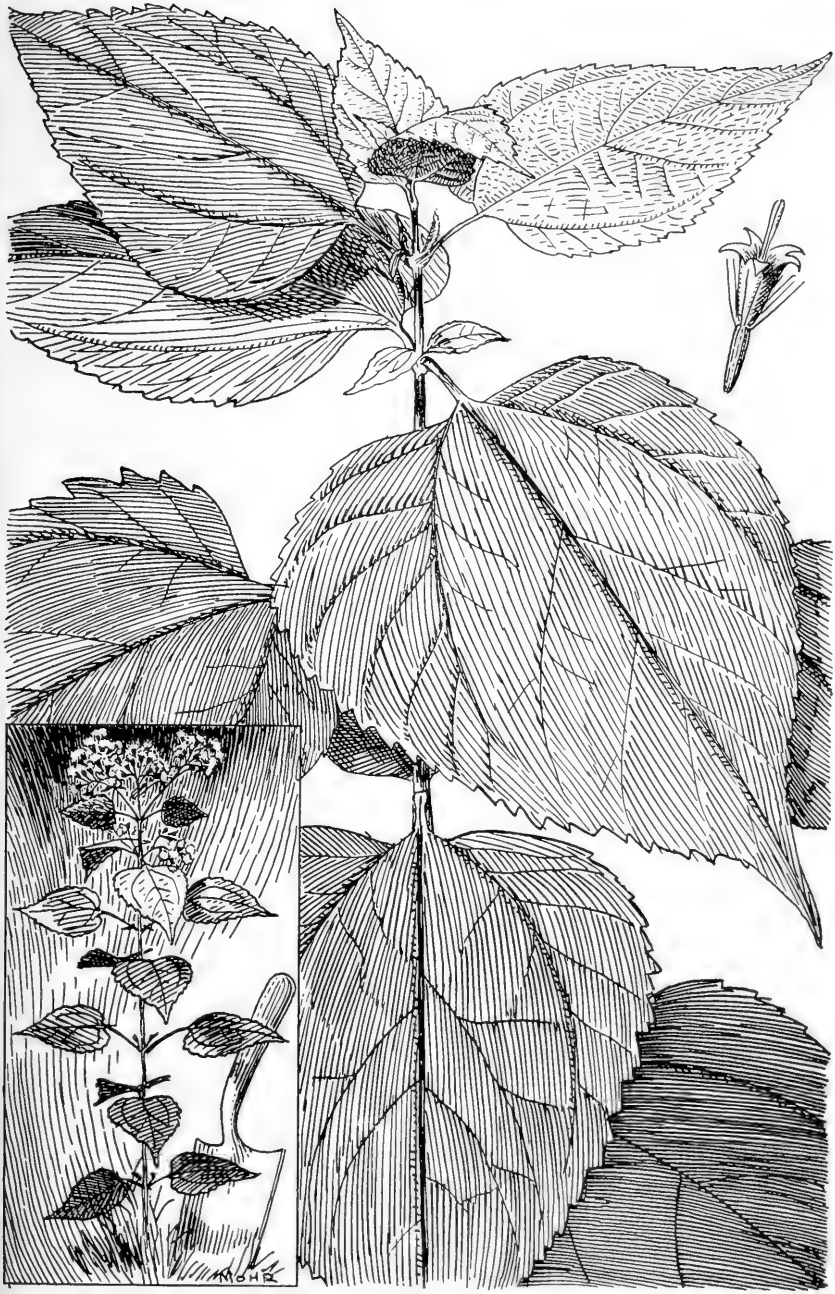
vironment suitable to its persistent spread, control and even eradication are not hard. Because it is a biennial, this weed is readily destroyed by persistent cultivation and is therefore seldom seen on continuously cultivated land. For use in the relatively neglected places where it persists, a number of simple control methods are available. Chemicals such as iron sulfate, sodium arsenite, and sodium manganate are effective in the eradication of this plant. Chlorates also may be used. Hand pulling, early in the spring when the ground is soft, will bring the roots out to such an extent that they do not reproduce. Hoe cutting, so as to remove the leaves from the root crown, if done in late autumn or early spring, is generally sufficient to keep the plants from sending up flowering stalks. For plants that send up flowering stalks, cutting while they are in blossom will prevent the formation of seed and cause the plants' death.

WHITE SNAKEROOT

Eupatorium urticaefolium Reich.

Appearance.—White Snakeroot, in some places known also as White Sanicle and Deerwort Boneset, commonly grows 1 to 4 feet high. Its erect, slender, and much-branched stem bears numerous nettlelike, sharply toothed leaves, and ends in loosely branched clusters of small, bright, white flower heads. The large thin leaves, which are set in pairs on the stem and branches, are smooth and pointed and have three main nerves that spread out from the tips of the long, slender leafstalks. In the upper part of the plant, the clusters of flower heads are borne also on stalks which arise in the angles between leaves and stem. The clusters generally are large, with branched and rebranched flower stalks ending in heads of flowers about one-quarter inch broad, and the tiny pointed flowers give the heads a fringed appearance. The very small, slender, black seeds are five-angled and topped with a crown of fine white bristles. White Snakeroot, though it dies to the ground each winter, is perennial and comes up each year from the wandering underground root for which it is named.

Distribution.—White Snakeroot is a native plant. It ranges naturally from Ontario southwestward to Nebraska and southward to Georgia, Louisiana, and Oklahoma. Although it originally inhabited rich woods, as a result of settlement and the destruction of woods it now is found chiefly in moist fertile soils in thickets and ravines, in open woods along stream banks,



WHITE SNAKEROOT

and in wooded pastures. Infrequently it grows on hillsides and on cleared but unbroken land, seldom in open sunlight. There is no part of Illinois in which the plant is not found, although it is rare in regions which originally were prairie.

Biology.—Blossoming time of White Snakeroot in Illinois extends from about the middle of June well into October. Seeds ripen the latter part of July and continue to ripen until frost kills the plant. White Snakeroot is of no importance in cultivated fields but may be a dangerous plant in woodlands used for pasture. Both cattle and horses, after feeding on this plant, are affected with a disease known as "trembles." Persons who drink the milk of cattle that have fed on it are apt to contract "milk sickness," because of a poisonous material in the plant known as trematol. Stock poisoning is most apt to occur when pasturage is short or when a weed-infested pasture is overgrazed. Toxicity of White Snakeroot plants varies in different localities. Milk cows that feed on the plant show no symptoms, because the poison is absorbed by the milk and discharged with it, but when a cow goes dry she immediately becomes susceptible to poisoning. White Snakeroot reproduces entirely by seeds. One small flower head produces 10 to 30 seeds, and the number that can be ripened on a single plant is very large.

Control.—Measures directed against White Snakeroot are primarily for prevention of trembles and milk sickness. These should involve eradication of the weed from all areas where stock feed. Practically, the number of plants must be kept as small as possible in pastures and woods where cattle and horses graze. It is especially important not to permit these animals to graze on infested land after about the first of July, since it has been determined that the weed will kill stock that eat it when it is about ready to blossom. Where White Snakeroot thrives there will be little forage, and good timberland management requires that such land should not be pastured. Milk from cows feeding in infested pastures should not be drunk directly, but there is little danger of milk sickness from such milk that is sold to dairies and later mixed with large quantities of milk that is free from trematol. Persistent use of scythes or cutting hooks keeps the plant from going to seed, and this, repeated for several years, will reduce White Snakeroot infestation on any land. In timber tracts and ravines, where the soil generally is moist, it is possible to pull up the plant, along with its entire shallow root system.

POKEWEED

Phytolacca decandra L

Appearance.—Pokeweed, very commonly known simply as Poke and less frequently as Inkberry, stands at maturity 4 to 10 feet tall. Its red- or purple-tinted, stout, smooth, and sometimes branched stem bears smooth, deep green, lance-shaped leaves 6 to 12 inches long and ends in long upright shoots of greenish-white flowers. The alternately placed leaves stand on short stalks, are pointed at both ends, and have no teeth on their margins. The flower clusters, which at first are terminal, become lateral because of continued growth of the stem and are transformed into drooping shoots covered with short-stalked, dark purple berries. Each of the juicy berries bears about 10 seeds. Pokeweed, although it dies to the ground every year, is perennial and lives over winter as a large underground root.

Distribution.—Pokeweed is a native American plant with a natural range extending from Maine westward to Minnesota and southward to Florida and Texas. In Illinois it occurs in every part of the state. It prefers fence rows, thickets, and waste ground in the country, and is a common plant of domestic gardens and disturbed soil of all kinds in towns, cities, and villages. Although in America it is a dangerous weed, Poke has been transported to Europe, where it is considered an ornamental plant and is grown in gardens.

Biology.—Blossoming time for Pokeweed begins during the last of June in southern Illinois and in the early half of July in northern counties. From this time on, blossoms continue to appear until the early part of September. Berries begin to ripen 3 to 4 weeks after the blossoms first appear and continue to ripen until late in November, when the aboveground parts of the plant are killed by frost. Pokeweed is relatively unimportant as a weed as far as cultivated fields and gardens are concerned, and its seeds are not a common contamination in agricultural seeds. Very young shoots from this plant are sometimes cut and eaten like asparagus. Both roots and berries contain a drug, phytolaccin. The berries, when eaten in quantity, cause severe nausea, and the roots are poisonous. The mosaic disease of cucumbers and cantaloupe attacks Pokeweed, causing a mottling of its leaves, and overwinters in its roots. The berries are eaten to some extent by birds, by which the seeds are distributed widely.

POKEWEED. INKBERRY

Control.—Because Pokeweed is perennial, to gain complete eradication it is necessary to kill the root. If the plants are numerous, the roots can be grubbed out, dried, and sold to drug companies. However, hoeing so as to cut the stem off below the crown gives satisfactory control in gardens. Cultivation nearly always disposes of the plant within a short time in fields, and the danger from berries, which exists chiefly on neglected land, can be greatly reduced by keeping the tops of plants cut down so that berries do not ripen. For destruction of the roots in the soil, which is particularly necessary near cucumber and cantaloupe patches, the tops of plants should be cut off with a hoe or spudding instrument, and then a chemical should be used. Either common salt or sodium chlorate is very good for this purpose. When Pokeweed occurs among other, more dangerous weeds, the more drastic methods used on them control it readily.

COMMON BURDOCK

Arctium minus Bernh.

Appearance.—Common Burdock, generally confused with the larger but rarer Great Burdock, seldom exceeds 5 feet when flower stalks are present. Its roughly hairy, stout, ridged stem, which springs from a great mass of very large, wavy-margined, strong-veined leaves, branches extensively near the top, and each small branch carries a cluster of moderate-sized, purplish or, rarely, white flower heads. Both the large leaves in the basal clump and the smaller ones on the stem stand on stout, hollow leafstalks, and are more or less heart shaped, light green above and woolly beneath. The flower heads are globular and the green part of the head below the purplish flowers is armed with hooked spines, so that the flower head, later the seed head, forms a prickly bur. The flat, oblong seeds are dull brown, often curved, and have several lengthwise ribs. Common Burdock is biennial. The first year it produces a large rosette of leaves near the ground, and the second year sends up its tall stem and flowers. It reproduces entirely by seeds.

Distribution.—Common Burdock, like its near relative Great Burdock, is a native of Europe that has become naturalized in America. Since its introduction it has spread practically throughout the United States and is, of course, found in every part of Illinois. Records of its occurrence in this state antedate the Civil War. Although rarely persistent in cultivated

COMMON BURDOCK

ground, it is common in neglected soil, along roadsides, in farm yards, and in pastures.

Biology.—The flowering period for Common Burdock begins in late June in the southern part of Illinois and early July in the northern part, and continues well into November, when frost kills the upper parts of the plant. Seeding time begins in September, when the flower burs, which ripen late, begin to produce ripe seeds. The ripened burs remain closed on the stalks throughout the winter. Both roots and seeds are used to some extent in medicine; the roots, which are often 3 inches thick and extend for more than a foot into the soil before branching, are collected in the autumn of their first year. Cows sometimes feed on the plant, and if they eat it in quantity they yield bitter milk. Burdock seed, not a common contaminant in agricultural seeds, generally is distributed in the burs, which catch on clothing or the fur or hair of animals or are transported in late-cut hay. The two Burdocks, both weeds, are very similar but can be distinguished readily since the leafstalk of Common Burdock is hollow, while that of Great Burdock is solid.

Control.—Since the Common Burdock has such a long and fleshy taproot that it cannot be uprooted after it has passed the seedling stage, effort should be made to destroy seedlings as they appear in the spring. Cultivating fields, hoeing small gardens, or spudding out young plants in lawns and vacant areas does this satisfactorily. In autumn, cutting the large rosettes with a hoe or cutting off the second-year flower stalks below the crown prevents seeding. Since the roots sprout readily at the crown when plants are cut off at the soil line, it is important to hoe deeply and also, whenever possible, to treat each root with salt, waste tractor oil, or some other effective chemical. Herbicides containing ammonium sulfamate or 2, 4-D are effective.

Recent Publications

A.—ILLINOIS NATURAL HISTORY SURVEY BULLETIN.

Volume 22, Article 2.—Studies of North American Plecoptera, with special reference to the fauna of Illinois. By T. H. Frison. September, 1942. 122 pp., frontis. + 126 figs., bibliog., index. $1.00.

Volume 22, Article 3.—Management of Small Artificial Lakes: a summary of fisheries investigations, 1938–1942. By George W. Bennett. February, 1943. 20 pp., frontis. + 7 figs., bibliog.

Volume 22, Article 4.—The Prairie Chicken in Illinois. By Ralph E. Yeatter. May, 1943. 40 pp., frontis. + 18 figs., bibliog. (Bound with Article 5.)

Volume 22, Article 5.—Preferential Rating of Duck Food Plants. By Frank C. Bellrose, Jr., and Harry G. Anderson. May, 1943. 16 pp., frontis. + 16 figs., bibliog. (Bound with Article 4.)

Volume 22, Article 6.—Survey of the Illinois Fur Resource. By Louis G. Brown and Lee E. Yeager. September, 1943. 70 pp., frontis. + 33 figs., bibliog. (Bound with Article 7.)

Volume 22, Article 7.—Illinois Furbearer Distribution and Income. By Carl O. Mohr. September, 1943. 33 pp., frontis. + 24 figs., bibliog. (Bound with Article 6.)

Volume 23, Article 1.—The Caddis Flies, or Trichoptera, of Illinois. By Herbert H. Ross. August, 1944. 326 pp., frontis. + 961 figs., bibliog., index. $1.50.

Volume 23, Article 2.—Duck Populations and Kill. By Frank C. Bellrose, Jr. November, 1944. 46 pp., frontis. + 27 figs., bibliog.

Volume 23, Article 3.—Overfishing in a Small Artificial Lake: Onized Lake near Alton, Illinois. By George W. Bennett. May, 1945. 34 pp., frontis. + 15 figs., bibliog.

Volume 23, Article 4.—Wetwood of Elms. By J. Cedric Carter. August, 1945. 42 pp., frontis. + 30 figs., bibliog.

Volume 23, Article 5.—Fox Squirrels and Gray Squirrels in Illinois. By Louis G. Brown and Lee E. Yeager. September, 1945. 88 pp., frontis. + 42 figs., bibliog.

B.—ILLINOIS NATURAL HISTORY SURVEY CIRCULAR.

32.—Pleasure With Plants. By L. R. Tehon. November, 1942. (Second printing, with revisions.) 32 pp., frontis. + 9 figs.

33.—Controlling Peach Insects in Illinois. By S. C. Chandler and W. P. Flint. August, 1939. 40 pp., frontis. + 32 figs.

34.—Rout the Weeds! Why, When and How. By L. R. Tehon. September, 1946. (Fourth printing, with revisions.) 48 pp., color frontis. + 13 figs.

35.—Diseases of Small Grain Crops in Illinois. By G. H. Boewe. September, 1939. 130 pp., frontis. + 47 figs.

36.—Planting and Care of Shade Trees. By J. E. Davis. March, 1941. 23 pp., frontis. + 16 figs.

38.—Windbreaks for Illinois Farmsteads. By J. E. Davis. February, 1942. (Second printing.) 24 pp., frontis. + 19 figs.

39.—How to Collect and Preserve Insects. By H. H. Ross. May, 1944. (Second printing, with additions.) 55 pp., frontis. + 63 figs.

40.—Control of Roundheaded Apple Tree Borer. By S. C. Chandler and W. P. Flint. April, 1942. 8 pp., 6 figs.

C.—ILLINOIS NATURAL HISTORY SURVEY MANUAL.

2.—Fieldbook of Illinois Land Snails. By Frank Collins Baker. August, 1939. 166 pp., color frontis. + 170 figs., 8 pls. $1.00.

3.—Fieldbook of Native Illinois Shrubs. By Leo R. Tehon. December, 1942. 307 pp., 4 color pls. + 72 figs., glossary, index. $1.25.

List of available publications, about 100 titles, mailed on request.

Address orders and correspondence to the Chief

ILLINOIS NATURAL HISTORY SURVEY

Natural Resources Building, Urbana, Illinois

Payment preferably in the form of U. S. Post Office money order made out to State Treasurer of Illinois, Springfield, Illinois, must accompany requests for these publications on which a price is set.