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DECEMBER, 1930

# Montana Insect Pests for 1929 and 1930

The Twenty-Third Report of the  
State Entomologist of  
Montana

BY

R. A. COOLEY, STATE ENTOMOLOGIST



FOUR HUNDRED SIXTY-ONE WIREWORMS TAKEN  
FROM A FIELD OF APPROXIMATELY 40 SQUARE  
FEET. THIS IS EQUIVALENT TO 500,000 WIRE-  
WORMS PER ACRE.

Photo by G. A. ABEI

UNIVERSITY OF MONTANA  
AGRICULTURAL EXPERIMENT STATION  
BOZEMAN, MONTANA

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## LETTER OF TRANSMITTAL

Bozeman, Montana  
December 1, 1930

To His Excellency,  
Governor John E. Erickson,  
Helena, Montana.

My dear Sir:

I have the pleasure and the honor to hand you herewith my twenty third report as State Entomologist of Montana.

Since I have resigned as head of the Department of Entomology at Montana State College, this will be my last report as State Entomologist. The State Entomologist law was recommended to the Legislature in 1903 and was passed and became a law during the same session. Several other laws have since been placed on the statutes; they are all related and together make up what has been found to be an effective system. In recent years the State Entomologist has cooperated with the Extension Service of Montana State College and the Assistant State Entomologist has been the Extension Entomologist. It has in this way been possible for us to do an effective work with a very small appropriation. The advantages of this system will be appreciated from a perusal of the early part of this report.

It is remarkable that so small an appropriation as was made by the last Legislature (\$2710) could be made so effective in saving crops and aiding the tax-payer. A very small increase is asked of the coming Legislature and this is made necessary by the large amount of labor occasioned by the duties of the office. It is fortunate that it is possible to get the needed assistance in pay by the hour or by the month from entomology students at the college.

Very respectfully,

R. A. COOLEY,  
State Entomologist.

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# Twenty-Third Report of the State Entomologist

## ENTOMOLOGY SERVICE IN MONTANA

The organization of services in entomology in the State of Montana has grown up during the past thirty-two years. The natural divisions of such services in any State are four in number:

1. Instruction, or the organized teaching of college classes in entomology. It can scarcely be said that there is any teaching of entomology in the high schools or graded schools.

2. Investigation, or the study of the insect problems of the region. These studies may be very special and worthy of the term "research" or they may be general and directly practical. The agricultural experiment stations carry on most of the investigations of insects done by the States.

3. Extension, or the taking of the results of investigation or research to the farmer and tax-payer in an effort to save crops, relieve domestic animals of parasites, destroy granary or household pests, or to destroy any insects that become injurious.

4. Regulatory service, or the enforcing of such laws on inspection or quarantine as the State has found it necessary to enact.

There is yet another class of service which has to do with the solving of special problems which often are large and of much importance, and involve the expenditure of considerable sums of money. States pass laws on these problems, appropriate money and set up special organizations to care for them. Many States have such special problems. In Montana the problem of the woodtick is an excellent example and the State in the year 1913 set up the State Board of Entomology to care for it.

In Montana the first three of the above headings quite naturally fall to the State College and Experiment Station. The fourth one has been assigned to the State Department of Agriculture where it naturally belongs.

Insect pest problems often come up as emergencies. Grasshoppers, cutworms, or other insects suddenly increase to alarming numbers and would do damage amounting to millions of dollars if not promptly

brought under control. It is perhaps worth while to point out how the Montana system works out.

The Experiment Station is continually investigating, and stands ready so far as possible to give on short notice the up-to-date information on the control of any insect pest. Since the Experiment Station entomologist is by law also the State entomologist and since the Extension entomologist is the assistant State entomologist, an emergency arising becomes at once a cooperative matter and can be promptly handled. Information can be distributed immediately through the county agricultural agents. If special funds are needed they may be obtained by appealing to the county commissioners in any county that is in trouble. The county commissioners can appropriate money from a general fund and replace it by a special tax.

The skeleton organization is at all times set up and in readiness for an emergency. This form of organization could not work effectively were it not for the fact that the assistant State entomologist is always on hand and provided with the information on methods and sources of the necessary supplies and equipment.

The county pest law is used in one or more counties every year for emergencies do arise every year. If there were to be a year without an emergency the circumstances would only serve to give the assistant State entomologist an opportunity to become better acquainted with conditions in the State, and particularly to detect any new trouble that may be brewing. This assistant also cares for the correspondence, which at times is heavy, as is noted at another place in this report.

#### OPERATION OF THE COUNTY INSECT PEST LAW

Expenditures under the county insect pest law have been very small during the past two years. One of the advantages of the arrangement set up under this law is its flexibility. No expenditure or levy is made unless an emergency arises, and if there is an emergency the county can act very quickly. Before the law was passed there were years in which damage amounting to many hundreds of thousands of dollars was done which might have been largely prevented had the law been in effect.

The use made of the county insect pest law during the past biennium is tabulated below, together with amounts used:

Insect Pest	County	Amount	Year
Grasshoppers	Custer	\$187.00	1930
Grasshoppers	Judith Basin	72.70	1930
Grasshoppers	Beaverhead	935.00	1930
Mormon crickets	Sanders	80.00	1929
Mormon crickets	Sanders	71.00	1930

#### GRASSHOPPER FORECAST FOR 1931

In past years the Experiment Station has done a great deal of work on grasshoppers, particularly through Doctor J. R. Parker who, within the past two years, has resigned from the Experiment Station and taken up duty under the United States Bureau of Entomology with headquarters at Montana State College. While Doctor Parker's work on grasshoppers will be primarily that of research, his office gets information on grasshopper occurrence and damage in Montana as well as in the other western States, and in this way the State entomologist's office is relieved of a considerable amount of work.

While no detailed and complete survey of grasshopper abundance in Montana was conducted during the season of 1930, some information gathered by Doctor Parker indicates that if weather conditions are favorable to these insects during the spring and early summer of 1931, grasshoppers may be expected to cause local damage to crops in many parts of the State.

In Beaverhead County, along the Montana-Idaho line, the Warrior grasshopper (*Camnula pallucida* Scudder) was present in large numbers during 1930, and in one locality near Lakeview it was necessary to scatter 40 tons of poisoned bran mash to save the hay crop. Large numbers of eggs were laid in the area around Red Rock Lake and in the vicinity of Henry's Lake, just over the Idaho boundary. Some poisoning will probably be necessary next spring.

In western Montana, in Ravalli, Missoula, Lake, and Flathead counties, more grasshoppers were present during the late summer than at any other time since the series of bad outbreaks which began in 1917 and ended in 1925. The Red-legged grasshopper (*Melanoplus femur-rubrum* DeGeer) and the Two-striped grasshopper (*Melanoplus bivittatus* Say) were especially numerous in the irrigated sections and may be expected to cause local damage to irrigated crops in 1931.

In the "Triangle" area in north-central Montana, increased abundance of grasshoppers was noted in Pondera, Chouteau, Liberty, and Hill counties. In the irrigated section in the vicinity of Conrad

and Valier, the Red-legged grasshopper and the Two-striped grasshopper were very numerous in alfalfa fields while the Migratory grasshopper (*Melanoplus mexicanus mexicanus* Saussure), which did great damage in the same locality from 1923 to 1925, was conspicuous by its absence. The first two mentioned species seldom cause widespread damage over large areas, but if their increase in 1931 is proportional to the numbers present in the fall of 1930, considerable local damage to irrigated crops may be expected.

In the dry-land section in the southern parts of Liberty and Hill counties and in the northern part of Chouteau county, the Migratory grasshopper is decidedly on the increase and is approaching the numbers present just previous to the severe outbreak of 1922-1924, when this species devastated nearly the whole Triangle area. At least a dozen species of grasshoppers ordinarily found in small numbers were unusually abundant in sod land throughout the Triangle area, and if they increase next year some damage to native grasses is expected.

From Havre east to the North Dakota line, along the Great Northern railroad, grasshoppers were more numerous than for several years. In the irrigated sections, the Two-striped and Red-legged grasshoppers predominated, while in the dry-land grain sections the Migratory grasshopper was generally the most abundant. Local damage by all three species is to be expected in this territory next year, but no widespread outbreak is anticipated.

In the eastern end of the State, grasshoppers were on the increase during 1930 in Richland, Dawson, Wibaux, Fallon, Custer, Carter, and Powder River counties, but from their present numbers extensive outbreaks are not expected.

Along the Northern Pacific railroad in southern Montana, from Miles City to Bozeman, the number of grasshoppers has been below normal for several years, but during the past season has increased to approximately the normal level.

It is felt that 1931 will be a critical year from the standpoint of grasshopper abundance. In many localities enough eggs have been laid to provide for an enormous *possible* increase if weather conditions should prove favorable. On the other hand, it is entirely possible that unusually warm weather in April may cause premature hatching of the eggs, or that a prolonged period of wet weather may so reduce their numbers as to wipe out the gains in population made during



the past season when weather was favorable to the increase of grasshoppers.

In case local outbreaks occur, it will be highly important to apply control measures promptly and to wipe out all large centers of grasshopper population. Such efforts should not be adopted with the sole aim of preventing local injury to the present crop, but with the more important objective of preventing further increases which might lead to county-wide grasshopper outbreaks in 1932. It is entirely within reason that a few hundred dollars spent for grasshopper prevention in 1931 may save thousands of dollars that would otherwise be spent for grasshopper control in 1932.

### WIREWORMS

Wireworms, the young of click beetles, must be ranked as among the most injurious of insect pests in Montana. Unlike grasshoppers, cutworms, and many other pests, they continue year after year. In this State the chief damage is to cereals and potatoes. The farmer knows when grasshoppers are doing damage, and often he sees the damage being done by cutworms, but in the case of wireworms the wheat plant becomes stunted and looks sickly and the farmer seldom suspects the real cause of the trouble. In the case of potatoes the grower gets his first evidence of damage when he digs the potatoes and finds the holes in the tubers caused by the wireworms. Again, while we know a remedy or control for grasshoppers and many other insects, there is no control by insecticides for wireworms and the farmer must depend on changes in farm practice. Wireworms are undoubtedly doing great damage each year and the Experiment Station, in cooperation with Mr. M. C. Lane of the United States Bureau of Entomology, is continuing and extending studies conducted by this station during recent years. The wireworm situation in Montana in 1930 was as follows:

Two species, *Ludius acripennis* Kirby and *Ludius inflatus* Say, were found at South Cottonwood in Gallatin County where hitherto no damage from wireworms had been reported. Four farmers were obliged to reseed their winter wheat fields. Three seeded with spring wheat in the damaged fields and one planted peas. Heavy damage was done to the peas following irrigation, the vines being cut off just below the surface of the ground. The spring wheat was also damaged to some extent.

There was a severe infestation in the Orchard Homes section near Missoula where truck crops were severely damaged. In one case 12,000 cabbage seedlings were destroyed. The species here involved was *Limonius* sp. In Sanders County near Thompson Falls, many farmers have been obliged to stop growing potatoes, though the soil is admirably adapted to the crop, because the wireworms destroy the tubers. All crops in this region are attacked. County agents in many other counties have reported wireworm damage.

In Fallon County dry-land wheat was destroyed in spots where the damage amounted to 20 per cent. In Pondera County 1500 acres of wheat were destroyed in 1929. In Stillwater County both dry-land and irrigated potatoes are being increasingly damaged. In Cascade County increasing damage is being done to both wheat and potatoes. In Blaine County dry-land wheat and irrigated potatoes are being damaged from 25 to 50 per cent in some localities. In Chouteau County dry-land and irrigated wheat and potatoes are being damaged every year though the injury is not yet serious. In Roosevelt County dry-land wheat, corn, potatoes, and onions are being damaged in some localities. In Hill County there is local damage to dry-land wheat and in spots the damage is always severe. Wireworms are not a serious pest in Flathead County but they do attack wheat. In Phillips County dry-land wheat and oats and irrigated potatoes are always thinned to some extent, but the pest is not yet considered serious. In Custer County beans and onions are being damaged. In Broadwater County severe damage to irrigated root crops and corn is reported in some areas. In Ravalli County potatoes and truck crops are severely damaged.

#### THE MORMON CRICKET

*Anabrus simplex* Hald.

A campaign to eradicate this insect in western Montana was begun by Mr. Mabee in 1927 and further work has been done each season since, including 1930. The worst of the trouble is over, but some work may be necessary in 1931. At least it will be necessary to examine the affected area.

A surprise occurrence of Mormon crickets at Pryor Gap (Big Horn County) late in August, 1930, was reported by Mr. Fred Morton, an assistant entomologist in the Board of Entomology, who was placing out tick parasites. An army of the crickets was moving

across country and had done some damage. In previous years serious trouble from this insect has occurred only west of the continental divide.

#### THE RED-BACKED CUTWORM

*Euxoa ochrogaster* Guerr.

This widely distributed cutworm has been prevalent in Montana during the past two years. In 1929, sugar beets south of Manhattan were seriously damaged at about thinning time, the damage becoming noticeable after thinning when the worms concentrated on the plants that were left for the crop, thereby seriously reducing the stand. In the Bitter Root Valley a more serious and more extensive damage was done both in 1929 and 1930. In the vicinity of Helena this cutworm also attacked sugar beets. It is one of the common cutworms of the garden and has at times been injurious to barley.

#### THE PALE WESTERN CUTWORM

*Parosagrotis orthogonia* Morr.

Doctor Cook, formerly of this staff, has shown that the pale western cutworm appears as a pest in "eyeles," that is, under certain climatic conditions in the State, such as a rainfall from May 1 to July 31 of less than four inches, it may increase to destructive numbers. From his weather records in Montana he had predicted that the pale western cutworm would be on the increase in 1929 in certain regions in Montana. In June, 1930, Doctor Cook made a field survey to determine the extent of damage. In general the prediction was verified. Damage had occurred in fields near Harlowton, Square Butte, and north of Willow Creek. If dry weather continues during the next few years, it may be expected that very severe damage will be done by this insect, particularly in wheat fields.

A bulletin embodying the results of the field studies has been issued by the Experiment Station and is available for research workers. The Extension Service has published a bulletin giving control methods, which is for popular distribution.

#### THE ALFALFA-SEED CHALCIS-FLY

*Bruchophagus funebris* How.

This minute insect feeds in the individual alfalfa seeds and is capable of doing damage ranging to as high as 50 or 60 per cent. The insects do not feed or mature on stored seeds, but develop in

the seed pod in the growing crop and emerge by gnawing small, circular holes through seed and pod about the time the crop is harvested. A second generation matures in the seed in the spring.

This insect has been in parts of Montana for some years and came to prominence in 1930, when seed-houses found rather severe infestations in seed from Montana growers. This insect is of importance not only because of the actual loss to the seed crop, but because of a natural fear of spreading it through sale of infested seeds.

There is need for further work on this chalcid fly in Montana to determine in just what parts of the State it is present and whether the method of early cutting of the crop for hay, in advance of the date when the adult "flies" are ready to lay eggs, as practiced in Canada, would be effective under our conditions.

#### THE WOOLLY APHIS OF THE APPLE

*Schizoneura lanigera* Haasm.

The woolly aphis has been a persistent enemy in some parts of Montana for years, particularly in the commercial orchards in the Bitter Root Valley. During the season of 1930, an effort was made to determine whether or not the well-known parasite, *Aphelinus mali*, was present in the Bitter Root Valley.

In the introduction of parasites for the control of an insect pest, it is necessary to determine first whether or not the parasite it is proposed to bring in is already present. The woolly aphis is usually spread to new localities on the roots of nursery stock and on the roots there is little chance of parasites being present. This is one of the pests on which parasites have been used artificially with much success. It is proposed to bring in and liberate parasites in the Bitter Root Valley, in case they are not already there. This season's work did not reveal any of the parasites in the orchards of the Bitter Root Valley.

#### THE DIAMOND-BACK MOTH

*Plutella maculipennis* Curtis

One of the unexpected developments of the year 1930 was the appearance of great numbers of this very small caterpillar on mustard crops grown for seed. More commonly this insect is a pest on small areas of field and garden cabbages and related plants. The trouble was brought to our attention too late for assistance to be given this year, but farmers were advised that the insect can be controlled by

dusting with arsenic compounds. It is possible, and even probable, that the insects will die off naturally this winter and not cause trouble in 1931.

#### THE VIRGINIA CREEPER LEAF-HOPPER

*Erythroneura ziezae* Walsh

From Livingston eastward along the Yellowstone River during recent years, we have received numerous complaints that this insect is destroying much-prized Virginia creepers. These insects multiply to astounding numbers and by their attacks destroy the foliage, which turns whitish, dries up, and falls off. If the vine is shaken, the insects arise in a cloud, scatter, and soon settle again. Rose bushes are sometimes similarly attacked by a related insect.

This pest appears to be spreading westward. Apparently it has not yet reached Bozeman. The insect is difficult to control at reasonable expense and further attention should be given to it.

#### SHELTER-BELT INSECTS

In recent years there has been great interest in planting shelter belts on Montana farms. During the past three years Professor Harrington, head of the Department of Horticulture, has cooperated in selecting and planting such shrubs and trees on nearly two thousand farms in Montana. These plantings are creating a new insect pest problem.

The shrubs and trees that are being planted are the following: caragana, Russian olive, box elder, laurel willow, golden willow, native cottonwood, Canadian poplar, Northwestern poplar, Chinese elm, American elm, green ash, Colorado blue spruce, Black Hills spruce, jack pine, Scotch pine, western yellow pine.

Some of the insects involved are the following: plant lice of many kinds, gall aphids, leaf-cutter bees, leaf beetles, blotch miners (*Chrysomellidae*), leaf caterpillars, canker worms, wood borers, scale insects, sawflies, blister beetles, June beetles, bark boring cutworms, leaf-hoppers, and red spiders. This is a formidable array when it is realized that under some of these names a dozen or more separate insects are included.

To work out the problem of these pests would call for the full time of at least one man, but the pressure of other work has not permitted anything to be done so far. Some of the insects involved are already known as pests of shrubs and shade trees in the gardens

and parks in Montana. The combined attack of the many insects on these trees and shrubs is sufficient in many instances to kill the trees or make them useless.

#### THE MONTANA INSECT SURVEY

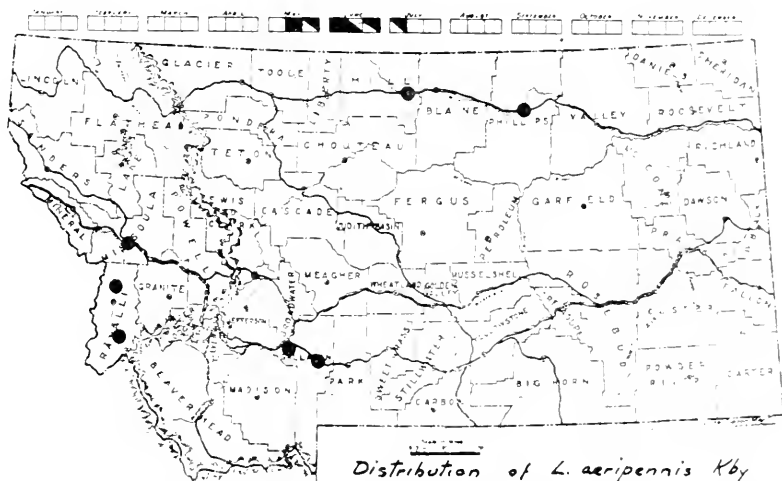
A State insect survey is primarily a system of records backed up by authentically named specimens of the insects recorded. The process of making the survey involves visiting the various parts of the State and making collections and observations. An insect survey is much more than dead records; it is a living thing, contributing almost daily to the general welfare of research and extension. It is effective and useful very largely in proportion to its completeness. In many cases the individual farmer does not know whether or not a given pest is on his farm. The grasshoppers he does know, and if wheat or the hay crop is being destroyed he knows this also; yet in many cases a loss sufficient to wipe out his margin of profit is not noticed. Failure to detect the loss often occurs with cutworms, wireworms, alfalfa-seed chalcis-fly, wheat-stem sawfly, and many others. In many cases the farmer does not even know of the existence of a given pest.

This is why it is essential that the Extension entomologist as he makes his trips over the State should make this insect survey. The survey is a cumulative record, easily consulted. The information so accumulated is of value to the research staff as well and has a definite bearing on what insects shall be the subject of research. A specimen survey card is shown herewith.

Mr. W. B. Mabee did a valuable service for Montana in devising this system of records and in getting the work well under way. He went over the State collection of some 125,000 specimens accumulated during the past thirty-two years and from this and the large accumulation of records made some 2260 cards.

*Ludius aeripennis* Kirby

RECORD NO.	LOCALITY	DATE	COLLECTOR	REMARKS
	Missoula	6. 6. 03	Cooley	} Trans: from old record system.
	Bozeman	5. 27. 20	J. R. Parker	
	Darby	6. 28. 22	"	
1050	Bitter Root	6. 12. 23	"	Dr Portin. Stevensville Apple Orchard
1104	Bozeman	5. 10. 24	H. E. Gray	Crawling over summer fallow
1321	Bozeman	6. 5. 27	Mabee	On vegetation at edge of potato patch
1374	Ravalli Co.	5. 28. 28	mail	Adult emerged in laboratory
1390	Malta	7. 6. 28	mail	Dug up from wheat stubble - at 7 inches
1402	Haure	6. 8. 29	mail	crawling over wheat stubble.



Montana Insect Survey Card, showing (above) records of distribution and times of year when catches were made; (below) the reverse side of the same card.

## CORRESPONDENCE ON INSECT PESTS

Following is a tabulation of the subjects of correspondence during 1929 and 1930, with the names of the insects, localities, and dates. Each entry in this table called for at least one letter, and in many instances for extended studies and rearing or breeding of the insect sent. Each correspondent was advised of the best known sprays or methods of control. This list of insect pests giving trouble in Montana is far from complete because many of the inquiries go directly to the county agricultural agents. For the information of county agents this office supplies them with mimeographed sheets dealing with many of the leading insect pests.

## ALFALFA

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Blister beetle	<i>Epicauta maculata</i> Say	Laurel	June	13
Bertha army worm	<i>Barathra configurata</i> Walk.	Victor	Aug.	24
Do	do	Conrad	Aug.	21
Do	do	Miles City	Aug.	23
Do	do	Missoula	Aug.	28
Do	do	Whitefish	June	8
Blister beetle	<i>Cantharis nuttali</i> Say	Butte	July	3
Do	do	Edwards	July	9
Alfalfa-seed chalcis-fly	<i>Bruchophagus funebris</i> How.	Sidney		Aug. 13
Do	do	Malta	Sept.	6
Blister beetle	<i>Macrobasis unicolor</i> Kirby	Chinook	Aug.	6
Mormon cricket	<i>Anabrus simplex</i> Hald.	Alder	Jan.	3
Do	do	Pryor Gap	Aug.	2

## ANIMAL PARASITES

Wood tick	<i>Dermacentor andersoni</i> Stiles	Frazer	May	31
Do	do	White Sul. .Spr.	July	31
Do	do	Onefor, Alta.	Sept.	9
Hen flea	<i>Echinophaga gallinaceus</i> Westw.	Judith Gap	July	31

## APPLES

Leaf-roller	Sp. undetermined	Helena	Sept.	11
Pear slug	<i>Eriocampoides limacina</i> Retzius	Billings	Mar.	13

## CURRANTS

Currant fruit fly	<i>Epochra canadensis</i> F. Loew.	Conrad	Aug.	21
Do	do	Virginia City	May	7
Do	do	Drummond	May	26
Do	do	Whitehall	June	19
Do	do	Great Falls	June	28
Do	do	Butte	Apr.	9



CURRENTS (Continued)

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Do	do	Helena	July	31
Do	do	Chester	Aug.	6
Currant aphid	Myzus ribis Linn.	Livingston	May	1
Do	do	Clyde Park	July	9
Currant stem borer	Synanthedon tipuliformis Linn.	Helena	May	3
Cottony maple scale	Pulvinaria vitis Linn.	Dixon	Aug.	21
Currant span worm	Itame ribearia Fitch	Pray	Aug.	6
Plant lice	Aphididae	Livingston	May	15

CHERRIES

Pear slug	Eriocampoides limacina Retzius	Bridger	July	24
Red-humped apple caterpillar	Schizura concinna Sand A.	Roman	Aug.	16
Do	do	Kalispell	Sept.	3

FLOWERS

Rosebud curculio	Rhynchites bicolor Fab.	Forsyth	June	18
Do	do	Sand Coulee	July	9
Do	do	Sand Springs	June	18
Do	do	Highwood	June	20
Mites	Acarina	Conrad	May	11
Thrips	Frankliniella Sp.	Delphia	Apr.	20
Moth	Coleophoridae	Kalispell	May	1
Black vine weevil	Brachyrhinus sulcatus Fab.	Helena	Mar.	4
Saw-fly	Tenthredinidae	Boulder	Sept.	16
Aphids	Aphididae	Virginia City	July	17
Raspberry caneborer	Oberca bimaculata Oliver	Choteau	July	12

GENERAL GARDEN CROPS

False chinch bug	Nysius ericae Schill	Wibaux	July	2
Do	do	Chinook	July	24
Do	do	Cutbank	June	18
Do	do	Dillon	July	12
Do	do	Lewistown	July	31
Do	do	Harlowton	July	31
Do	do	Kalispell	Sept.	3
Wireworms	Elateridae	Kabo	May	1
Do	do	Waterloo	Aug.	16
Do	do	Canton	June	1
Do	do	Harrison	Sept.	5
Do	do	Helena	June	13
Blister beetles	Cantharis nutalli Say	Helena	June	13
Do	do	Townsend	July	12
Do	do	Kremlin	July	11
Do	do	Townsend	July	31
Do	do	Deer Lodge	July	25
Do	do	Dillon	July	26
Do	do	Arlee	July	26
Do	do	Big Sandy	July	26
Cutworm	Chorizagrotis auxiliaris Grote	Livingston	May	26
Do	do	Butte	June	9

## GENERAL GARDEN CROPS (Continued)

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Do	do	Walkerville	June	9
Do	do	Billings	July	12
Do	do	Missoula	July	31
Do	do	Anaconda	July	31
Aphids	Aphididae	Gateway	May	7
Flea beetles	Chrysomelidae	Livingston	May	26
Do	do	Great Falls	July	12
Red-back cutworm	<i>Exuoia oehrogaster</i> Guen.	Missoula	May	26

## BEANS

Red Spider	<i>Tetranychus telarius</i> Linn.	Ballantine	Sept.	10
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## CABBAGE

Cabbage worm	<i>Pieris rapae</i> Linn.	Missoula	Feb.	28
Do	do	Martinsdale	Aug.	21
Do	do	Joplin	July	30
Do	do	Big Timber	May	7
Do	do	Bridger	June	16
Do	do	Worden	June	28
Do	do	Townsend	July	31
Do	do	Livingston	July	31
Do	do	Elgin	Sept.	10
Cabbage maggot	<i>Phorbia brassicae</i> Bouche	Lewistown	Jan.	3
Do	do	Missoula	Feb.	28
Do	do	Paradise	Apr.	20
Do	do	Helena	Apr.	12
Do	do	E. Helena	May	9
Do	do	Eureka	May	9
Do	do	Stevensville	July	1
Onion and cabbage maggot	<i>Hylemyia eilicrura</i> Rd.	Sixteen	Aug.	2
Diamond-back cabbage moth	<i>Plutella maculipennis</i> Curtis	Whitefish	July	2
Do	do	Choteau	July	31
Do	do	Great Falls	July	31
Do	do	Great Falls	Aug.	6
Do	do	Arlee	Aug.	30
Cabbage aphid	<i>Aphis brassicae</i> Linn.	Hingham	June	28
Do	do	Anaconda	Aug.	6

## CORN

Pale western cutworm	<i>Porozagrotis orthogonia</i> Morr.	Wibaux	June	18
Bumble flower beetle	<i>Euphoria inda</i> Linn.	Wolf Creek	Aug.	31
Common corn ear worm	<i>Heliothis obsoleta</i> Fab.	Canton	May	25
Do	do	Bozeman	Sept.	9
Do	do	Cardwell	Sept.	19

## ONIONS

Onion maggot	<i>Hylemyia antiqua</i> Meig.	Missoula	June	18
Do	do	Philipsburg	May	7
Do	do	Laurel	June	9
Do	do	Bridger	June	28

## GOOSEBERRIES

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Aphids	Aphididae	Dagmar	July	3

## HOUSEHOLD INSECTS

Millipedes	Millipedes	Hardin	Oct.	10
Do	do	Emigrant	Oct.	9
Bedbugs	Cimex lectularius Linn.	Whitehall	July	9
Do	do	Flaxville	Mar.	21
Cockroaches	Blattidae Sp.	Helena	July	24
Do	do	Outlook	Jan.	3
Do	do	Helena	Sept.	8
Golden spider beetle	Niptus hololeucus Fald.	Butte	Oct.	10
Do	do	Butte	Sept.	18
Black crickets	Gryllus assimilis Fab.	Miles City	Sept.	19
Clothes moths	Tineola biselliella Hun.	Bridger	June	28
Do	do	Dillon	Aug.	20
Red clover mite	Bryobia pratensis Garman	Pineview	May	29
Do	do	Whitehall	May	29
Ants	Formicidae	Lambert	Aug.	12

## LAWNS

Ants	Formicidae	Bridger	June	28
Do	do	Great Falls	July	31
Do	do	Laurel	July	31
Do	do	Butte	July	26
Do	do	Three Forks	May	7
Do	do	Three Forks	May	7
Angle worms	Lumbricus terrestris	Danvers	Mar.	5
Do	do	Great Falls	Apr.	9
Do	do	Choteau	Apr.	23
Do	do	Conrad	July	31

## OATS

Hemiptera	Abe	Sept.	2
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## PLUMS

Aphids	Aphididae	Park City	June	4
Plum gonger	Coccotorus scutellaris Lec.	Ballantine	Aug.	2
Do	do	Red Lodge	Sept.	24
Do	do	Billings	Feb.	11
Do	do	Joliet	June	28
Do	do	Musselshell	July	31

## RASPBERRIES

American raspberry beetle	Byturus unicolor Say	Missoula	June	11
Do	do	Plains	July	31
Raspberry caneborer	Oberia bimaculata Oliver	Savage	Jan.	5
Do	do	Savage	Sept.	9
Red spider	Tetranychus telarius Linn.	Missoula	June	11
Do	do	Havre	Apr.	9
Do	do	Havre	Mar.	27
Do	do	Shelby	Aug.	6
Yellow jackets	Vespidae	Ronan	July	25

## STRAWBERRIES

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Strawberry leaf roller	<i>Ancyliis comptana</i> Froehl.	Stevensville	June 18	
Do	do	Billings	June 10	
Do	do	Billings	June 16	
Strawberry root weevil	<i>Otiiorhynchus ovatus</i> Linn.	Kalispell	July 8	
Do	do	Kalispell	Aug. 8	
Do	do	Kalispell	Aug. 8	
Do	do	Coram	July 9	
Do	do	Plains	May 29	
Saw-flies	Tenthredinidae	Livingston	July 9	

## STORED PRODUCTS

Moths	Sp. undetermined	Dillon	Apr. 12	
Grain beetle	Cucujidae	Billings	June 4	
Saw-toothed grain beetle	<i>Silvanua surinamensis</i> Linn.	Butte	Aug. 15	
Larder beetle	<i>Dermestes lardarius</i> Linn.	Ronan	May 29	
Do	do	Craig	Aug. 13	

## SUGAR BEETS

Red back cutworm	<i>Exuoa ochrogaster</i> Guen.	Helena	June 13	
Sugar beet webworm	<i>Loxostege sticticalis</i> Linn.	Reed Point	Sept. 16	
Do	do	Dillon	Sept. 16	
Do	do	Bozeman	Sept. 16	
Do	do	Malta	Sept. 11	

## SOIL

Angle worms	<i>Lumbricus terrestris</i>	Baker	July 1	
Do	do	Livingston	July 1	
Do	do	Perma	June 25	

## TREES

Spruce gall louse	<i>Chermes cooleyi</i> Gill.	Ronan	Apr. 25	
Aphis lion	Cyrtopidae	Gasgow	July 8	
Blister beetles	<i>Cantharis nuttali</i> Say	Havre	July 24	
Do	do	Big Timber	June 23	
Fall webworm	<i>Hyphantria cunea</i> Drury	Missoula	Aug. 13	
Plant louse	<i>Mordwilkoja vagabunda</i> Walsh	Sweet Grass	Apr. 8	
Red spider	<i>Tetranychus telarius</i> Linn.	Butte	Aug. 21	
Do	do	Great Falls	Aug. 21	
Scale	<i>Lecanium</i> sp.	Missoula	Feb. 26	
Spruce gall louse	<i>Chermes cooleyi</i> Gill.	Great Falls	July 2	
Do	do	Lewistown	July 2	
Do	do	Square Butte	June 18	
Western ten lined June beetle	<i>Polyphylla decemlineata</i> Say	Hamilton	Aug. 7	

## ASH

Borer	Lepidoptera	Custer	Aug. 14	
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BOX ELDER

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Box Elder aphid	<i>Periphyllus negundinis</i> Thos.	Scobey	Nov.	15
Do	do	Great Falls	Apr.	9
Box Elder bug	<i>Leptocoris trivittatus</i> Say	Reserve	Oct.	24
Do	do	Scobey	Oct.	24
Measuring worm	Geometridae	Choteau	July	2

COTTONWOOD

Aphids	Aphididae	Bridger	June	4
Do	do	Bridger	June	28
Cottonwood leaf beetle	<i>Linna scripta</i> Fab.	Helena	Mar.	23
Do	do	Fort Benton	July	31
Cottonwood leaf miner	<i>Zeugophora scutellaris</i> Suff.	Fort Benton	July	31
Do	do	Shelby	Aug.	29
Cottonwood sphinx	<i>Pachysphinx modesta</i> Harris	Great Falls	July	11
Do	do	Malta	July	31
Cutworms	Sp. undetermined	Butte	July	31
Do	do	Alder	July	31
Sword-tailed borer	<i>Tremex</i>	Fort Benton	Aug.	18
Vagabond gall	<i>Mordwilkoja vagabunda</i> Walsh	Choteau	July	25
Cutworms	<i>Ufeus plicatus</i> Grote	Ryegate	Apr.	29

ELM

Elm borer	<i>Saperda</i> sp.	Billings	May	11
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POPLAR

Plant lice	Aphididae	Pony	July	25
Cutworm	<i>Ufeus hulsti</i> Smith	Pony	July	25
Cottony maple scale	<i>Pulvinaria vitis</i> Linn.	Miles City	June	13
Poplar leaf-folding sawfly	<i>Pontania bozemani</i> Cooley	Butte	Aug.	2
Do	do	Butte	Aug.	6
Vagabond gall	<i>Mordwilkoja vagabunda</i> Walsh	Chinook	Mar.	23
Do	do	Whitetail	July	31

WILLOW

Brown twig aphid	Sp. undetermined	Anaconda	Aug.	6
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VINES

Virginia creeper leafhopper	<i>Erythroneura ziezae</i> Walsh	Livingston	Aug.	6
Do	do	Helena	Aug.	8
Do	do	Melstone	Mar.	27
Do	do	Terry	June	16
Do	do	Terry	June	17
Do	do	Whitehall	July	31
Do	do	Reed Point	Aug.	15
Do	do	Livingston	Aug.	22

## WHEAT

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Hessian fly	Mayetiola destructor Say	Baker	Aug.	6
Seed corn maggot	Hylemyia cilicura Rond	Hysham	May	15
Mormon cricket	Anabrus simplex Hald.	Thompson Falls	Apr.	26
Do	do	Shelby	July	11
Do	do	Pryor Gap	Aug.	1
Pale western cutworm	Porosagrotis orthogonia Morr.	Raymond	Nov.	29
Do	do	Homestead	Feb.	21
False wireworm	Tenebrionidae	Hysham	Apr.	20
Tiger moth	Apantesis nevadensis G. & R.	Hysham	Apr.	16
Do	do	Havre	Apr.	12
Cutworms	Noctuidae	Wilbaux	June	8
Do	do	Highwood	June	11
Do	do	Missoula	Feb.	28
Do	do	Valier	June	13
Do	do	Chinook	July	31
Grasshoppers	Orthoptera sp.	Fort Benton	July	30
Do	do	Glasgow	Aug.	2
Do	do	Ronan	Aug.	9
Do	do	Billings	Aug.	16
Do	do	Choteau	Sept.	
Do	do	Lewistown	Oct.	1
Do	do	Albion	Oct.	1
Do	do	Paradise	Oct.	1
Do	do	Coalwood	Nov.	29
Do	do	Lewistown	Apr.	9
Do	do	Glasgow	Mar.	5
Do	do	Thompson Falls	Apr.	26
Do	do	Havre	June	16
Do	do	Winnett	July	11
Do	do	Monida	June	20
Do	do	Big Sandy	Aug.	15
Carolina locust	Dissosteira carolina Linn.	Cirele	July	26
Packard grasshopper	Melanoplus packardi Scud.	Cirele	July	26
Red-leg locust	Melanoplus femur-rubrum DeG.	Camps Pass	Aug.	8
Wireworms	Alaus melanops Lec.	Thompson Falls	June	13
Do	do	Harlem	Sept.	22
Do	do	Chinook	Sept.	16

## SENT IN FOR IDENTIFICATION ONLY

Mormon cricket	Anabrus simplex Hald.	Scobey	Sept.	27
Do	do	Thompson Falls	Apr.	26
June beetle	Phyllophaga sp.	Austin	June	8
Glover's silkworm moth	Samia gloveri Strecker	Great Falls	Aug.	21
Do	do	Billings	July	
Do	do	Scobey	Aug.	
Assassin bug	Phymata fasciata Gray	Scobey	Aug.	31
Wasp	Polisties sp.	Baker	Aug.	28
Do	do	Billings	Feb.	11

## SENT IN FOR IDENTIFICATION ONLY (Continued)

COMMON NAME	SCIENTIFIC NAME	LOCALITY	DATE	
			1929	1930
Centipede	Chilopoda	Chinook	July	30
Grain beetle	Sp. undetermined	Hamilton	July	2
Gall mite		Plentywood	June	29
Ground beetle	Sp. undetermined	Big Sandy	June	18
Spider	Solpugida	Reichle	Aug.	16
Do	do	Great Falls	July	11
Do	do	Geyser	July	11
Do	do	Rock Springs	Aug.	15
Pachysphynx moth	Pachysphynx modesta Herr.	Baker	July	1
Sphinx moth	Celerio lineata Fab.	Rollins	June	29
Do	do	Bear Creek	Aug.	12
Do	do	Troy	Aug.	16
Do	do	Cutbank	Aug.	19
Vancouver sphinx	Sphinx vancouverensis Hy. Edw.	Fort Benton	July	24
Yellow jackets	Vespidae	Livingston	Aug.	6
Do	do	Whitefish	Sept.	5
Do	do	Ronan	Aug.	8
Dragon fly	Sp. undetermined	Columbus	Aug.	16
Do (larvae)	do	Harlem	Aug.	23
American silkworm moth	Samia cercopia Linn.	Flaxville	July	2
Do	do	Armington	May	29
Spring tails	Collembola	Ronan	July	25
Long horn beetle	Cerambycidae	Thompson Falls	Mar.	26
Moth	Ureus hulsti Smith	Rapelje	July	9
Slaughter house cockroach	Periplaneta americana Linn.	Butte	Oct.	24
Worm		Great Falls	Aug.	23
Do		Pineview	Apr.	11
Do		Conrad	Apr.	9
Moth		Vandalia	Mar.	27
Rodent bot fly	Cuterebra tenebrosa Coq.	Laurel	July	26
Cicada	Okanagana rimosa Say	Ronan	June	30
Do	do	Ronan	July	31
Do	do	Missoula	July	31
Scale	Lecanium sp.	Hayre	Apr.	23
Scale		Bozeman	Feb.	26
Carrion beetles		Peerless	May	26
Mites (on house plant)		Conrad	Feb.	11
Tree crickets		Big Sandy	Aug.	15
Jerusalem crickets	Stenopelmatus fuscus Hald.	Roundup	Aug.	27
Do	do	Melstone	Aug.	22
Do	do	Jordan	Aug.	30
Mealy bug	Pseudococcinae	Geyser	Aug.	21
Hornets	Vespidae	Billings	Aug.	20
Robber fly	Asilidae	Eureka	Aug.	25
Caterpillar	Papilionidae	Lewistown	Aug.	21
Do	do	Great Falls	Sept.	3



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