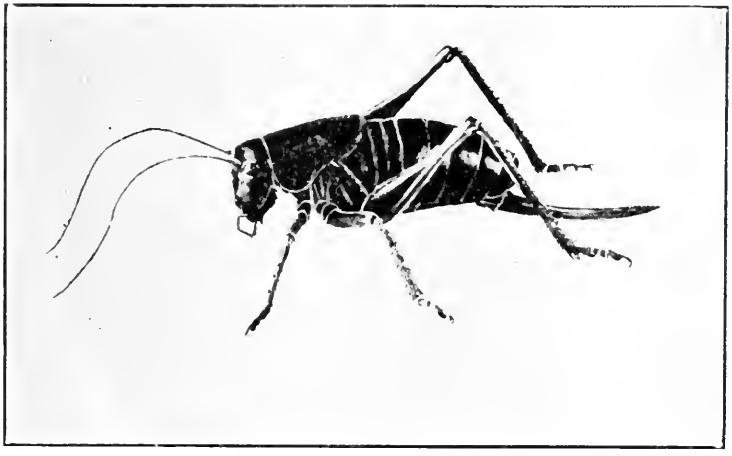
NO. 216 DECEMBER, 1928

Montana Insect Pests for 1927 and 1928

The Twenty-Second Report of the State Entomologist of Montana

BY

J. R. Parker, Acting State Entomologist
W. B. Mabee, Assistant State Entomologist



Female Mormon Cricket (Anabrus simplex Hald.)

UNIVERSITY OF MONTANA
AGRICULTURAL EXPERIMENT STATION
BOZEMAN, MONTANA

LETTER OF TRANSMITTAL

Bozeman, Montana, December 1, 1928.

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

My dear Sir:

As Acting State Entomologist during Professor R. A. Cooley's absence in South Africa and France, I have the honor to submit the twenty-second report of the State Entomologist which covers the calendar years of 1927 and 1928. As in the past, this report will be printed in the bulletin series of the Agricultural Experiment Station.

Very respectfully yours,

J. R. PARKER,
Acting State Entomologist.

TABLE OF CONTENTS

Twenty-Second Report of the State Entomologist

HOW INSECT PESTS ARE FOUGHT IN MONTANA

WHAT THE LAW REQUIRES OF THE STATE ENTOMOLOGIST

The original law providing for a State Entomologist, passed in 1903, includes the following statement:[1] "When it becomes known to the State Entomologist that an outbreak of an insect has occurred in any part of the state, it shall be his duty to go to the scene of the outbreak or send a suitably qualified assistant. The State Entomologist or said assistant shall determine the extent and seriousness of the outbreak and when necessary publish or make public demonstration of the best remedies to be employed."

The county insect pest law, passed in 1921, contains the following statement:[2] "The board of commissioners of any county in the state where there are any insect pests are hereby authorized and empowered to appoint some suitable person or persons whose duty it shall be, *acting under the direction of the state entomologist*, to poison, kill, catch and exterminate insect pests within such counties."

From the above quotation it is seen that it is the duty of the State Entomologist or his assistants not only to keep in touch with and to control minor insect outbreaks all over the state but also to direct the larger control campaigns in which county funds are used to wholly or partly meet the cost of field operations in actually fighting insects.

HOW THE LAW WORKS OUT IN PRACTICE

In the past these two laws have worked out very well in practice. Instances of insect damage, if at all severe, are either discovered by the State Entomologist or his assistant or are quickly reported by county agents or individual farmers. The State Entomologist or his assistant visits the locality and, if the damage is restricted to a single farm or community, control

[1]See Chapter 72, Revised Codes of the State Entomologist Law, No. 914.

[2]See Revised Codes of the County Insect Pest Law, No. 4503.

measures are recommended to the owner, who puts them into operation at his own expense. If control operations on a large scale are needed or if dangerous insects are breeding on public lands and thereby becoming a menace to crops on privately owned land, the county authorities are appealed to and the county pest law is used. In the latter case the State Entomologist or his assistant spends considerable time in the county, selecting and training the local men who are to be left in charge and outlining a control campaign. After the county organization begins to function successfully the State Entomologist is free to give aid in some other section of the state, returning frequently enough to make sure that the local organization is operating successfully.

In addition to field work in connection with insect outbreaks, surveys must be conducted to determine whether unusually dangerous insects like the European corn borer and the alfalfa weevil are already within the state. To wait until their presence is indicated by damage to crops would be disastrous, for the insect would have such a start that it would be very difficult to prevent it from spreading to all parts of the state.

WHO DOES THE WORK

The Entomologist of the Experiment Station is by law the State Entomologist; he also gives half of his time to teaching entomology in the Montana State College. Since he receives no salary from the State Entomologist fund his first duty is to the Experiment Station and to the College, each of which pays half his salary. It is obvious that the State Entomologist could not satisfactorily perform his duties in the Experiment Station, teach classes in the State College, and have much time left to travel about the state demonstrating insect control. The actual field work is therefore carried on to a large extent by an assistant working under the supervision of the State Entomologist. The present Assistant State Entomologist is W. B. Mabee, a graduate of Montana State College and for several years Extension Entomologist in North Carolina. He is employed on a part-time basis, giving half of his time to the Experiment Station and half to the work of the State Entomologist's office.

Although the State Entomologist law authorizes the payment of both the salary and the traveling expenses of the Assistant State Entomologist, his salary is at present paid by the Extension Service since his work makes it unnecessary to employ an Extension Specialist in Entomology. His traveling expenses are paid from the State Entomologist fund.

DOES INSECT CONTROL WORK PAY?

When State funds are used for any purpose the taxpayer very naturally is inclined to ask "Does it pay?"

It is difficult to make even an approximate guess as to how much the services of the State Entomologist's office have saved the farmers of Montana. Each year hundreds of letters are received from individuals who wish to know how to stop insect damage of various kinds. Their letters are answered, and information is given through the press to hundreds of others. This information is bound to result in the saving of considerable money but it is so scattered that it would be foolish to even guess at the amount.

During insect outbreaks in which large acreages are involved much more definite ideas of the value of insect control can be obtained. During such campaigns county agents and others keep an account of the number of acres treated and the percentage of control obtained. By knowing the approximate acre value of the crop a rather close estimate can be made as to the saving effected. Some of the most outstanding insect outbreaks in which definite data are available as to the amount saved, are as follows:

Army cutworm, 1915, estimated saving	$ 450,000
Grasshoppers, 1921-1924, estimated saving	5,391,300
Mormon crickets, 1927, estimated saving	120,000
	$5,961,300

These three items alone give a total saving of farm crops valued at close to six million dollars while the appropriations for the work of the State Entomologist since the office was created in 1903 total about $40,000. It would be difficult to point to any other expenditure of State funds which has returned as great a saving for the money invested.

INSECT PESTS OF 1927 AND 1928

MORMON CRICKETS

During the past biennium, Montana has been fortunate in having only one insect outbreak of major importance, namely, the Mormon cricket outbreak, in Lake and Sanders counties. The legislature of 1927 increased the appropriation to the State Entomologist fund from $500 to $2,250, which made insect control work possible during the season of 1927. Although the crickets had doubled the area which they infested in the spring of 1926 and had shown a tremendous increase in numbers, control work was so successful that the crop damage was negligible, being confined to a few acres of alfalfa. Due to the increased numbers of crickets and the greater infested area, the damage in 1927, had no control work been done, would undoubtedly have been much greater than that in 1926 which was conservatively estimated to amount to $120,000. At least, then, it can be said that damage similar to that in 1926 had been prevented. The cost of the control campaign, materials, equipment, and labor was paid for by the counties involved through the insect pest law and from funds supplied by the Indian Department through Mr. Charles E. Coe, superintendent of the Flathead Agency. The total cost of the campaign amounted to $7,500. Figuring this way, the work shows 1600 per cent on the investment for insect control. Mormon cricket control was continued during the spring of 1928. An assistant was placed in charge of the work in Lake county and also one in Sanders county. Very few crickets hatched and only a small amount of poisoning was necessary. The work was completed the first of June. There will probably be no need for cricket control work in this territory for several years, or at least until climatic conditions are favorable for a sufficient time to allow the crickets to build up their population to menacing proportions. A complete and detailed report of Mormon cricket control work is being published in another bulletin.

MORMON CRICKET PARASITES

During the Mormon cricket campaign, two parasites were discovered working on crickets. One, a large sphecid wasp. (*Palmodes laeviventris* Cress) was observed in the fall of 1926

in the cricket-infested area, but it was not particularly abundant and no attention was paid to it. During the late summer of 1927, however, these large black wasps were quite conspicuous and were consequently closely watched. They were seen attacking crickets and stinging them. The sting apparently paralyzed but did not kill the cricket. When attacked the cricket would extend its large hind legs above its body in an endeavor to protect itself, and, if a male, it would chirp distressingly. The wasp usually succeeded in stinging the cricket but not without considerable difficulty. After stinging several crickets, the wasp would search for a suitable place, then dig a hole into which it would laboriously drag the cricket. It would then deposit one of its eggs on the cricket, always attaching the egg to the soft membrane which joins the large legs to the body. The cricket was then covered with dirt. After filling the hole level with the surface, the wasp would carry small straws, sticks, and stones, and pile them on the surface in an attempt to make the opening appear like the surrounding soil. Very often, however, they would overdo this camouflaging so that their burrows could be found by searching for the little piles of sticks and stones. As many as five parasitized crickets have been taken from a single burrow, each one, however, separately buried with an individual egg. One cricket was placed on top of the other, separated by a layer of dirt. Sometimes a burrow consisted of several branches, each containing a cricket.

During the fall of 1927 these large black wasps were unusually abundant and holes were evident every few inches over tracts of 40 acres or more. Upon hatching, the larva or grub of the wasp remained attached to the cricket, eating and growing until the entire contents of the cricket's body were consumed. The larva would then spin a tough cocoon in which it would pass its pupal or resting stage, emerging as an adult wasp late the following summer (July) just in time to begin work on the new crop of adult crickets.

The other cricket parasite was a tiny dark wasp *(Sparaison pilosum* Ashmead) less than one-fourth inch long. It was a parasite of the cricket eggs. Although considerable time was spent observing this parasite, we never learned just when or how it deposited its eggs. In any event, the tiny larva of this

wasp was found within the cricket egg, where it grew, developed, and consumed the entire contents of the egg. Instead of the cricket hatching from the egg in the spring, these parasitized eggs would remain in the soil until late July, at which time an adult wasp would emerge from the cricket egg in time to begin work on the newly laid cricket eggs of the following season. Neither of these parasites developed in large numbers until most of the control work had been completed and killing of the crickets in the control campaign depleted their numbers seriously. However, had no control practices been used, these parasites would undoubtedly have destroyed a large proportion of the crickets during the next few years.

THE BERTHA ARMY WORM

The Bertha army worm, *Barathra configurata* Walk., made its first appearance in Montana in outbreak numbers during the late summer and fall of 1928. Dr. W. C. Cook, of the Experiment Station, has taken occasional individuals of the adult moth in light traps for some years past, but not until this year has the worm appeared in large numbers in this state. This insect has been a rather serious pest during the last few years in the provinces of Saskatchewan and Alberta, Canada. On August 3rd, the writer first found these insects near the Canadian border north of Eureka. Soon thereafter specimens began

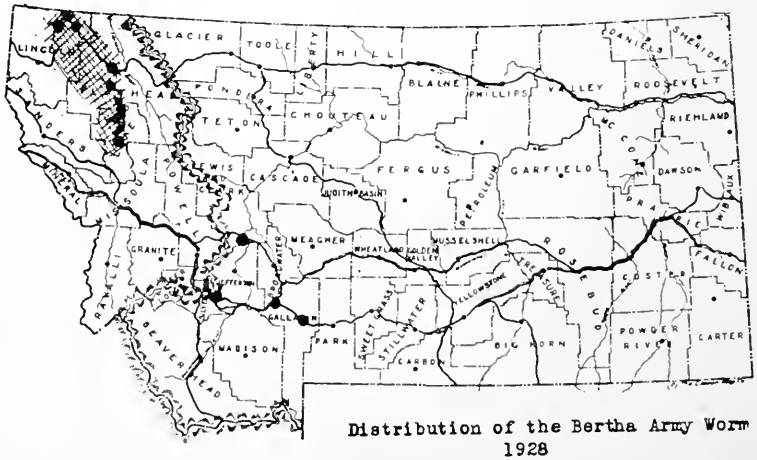


FIGURE 1

arriving at the office with complaints of damage and requests for control. On the accompanying map (fig. 1) are indicated the places where this insect has done some damage.

The major damage was done to alfalfa. However, sugar beets in the Ronan district and cabbage plants in one field in Gallatin County also suffered. Although the damage was very slight this year, this insect undoubtedly built up its population and under favorable conditions it may appear in outbreak numbers next season.

Dr. Cook and the writer are now working on the history and records of Canadian outbreaks in the hope that some clue may be had as to what to expect the coming season. This insect will be carefully watched for, and if necessary control operations will be organized.

MOSQUITOES

During 1926 many requests for mosquito control work were received. Most of these requests came from the Milk River Valley. Although very little was known regarding the habits of mosquitoes in this state, it was decided to attempt some control measures during the season of 1927. A study of our records showed that thirty-eight different species of mosquitoes occurred in Montana. In records from Milk River Valley, although many species of mosquitoes occurred, it was apparent that only four were responsible for the majority of the complaints, namely *Aedes spenceri* Theo., *Aedes nigromaculis* Ludl., *Aedes vexans* Meig., and *Aedes dorsalis* Meig. A man was sent to the Milk River Valley who was paid partly by the Malta Chamber of Commerce and the Chinook Lions' Club, and partly by the Experiment Station. Much interesting information was secured concerning the life history and habits of mosquitoes. In 1928 work was confined to the Malta district, as with the funds available much more information could be had by concentrating study in one locality. Excellent cooperation was secured through Mr. T. L. Larson, secretary of the Malta Commercial Club. Fine control was secured until about the middle of May when, due to exceedingly dry weather, irrigation was started on a large scale. Normally irrigation is not started until July. In 1928, however, the irrigation produced a July crop of mosquitoes during the last part of May. The man in

charge of control operations was swamped with work and could not begin to oil all of the irrigation water that contained mosquito larvae. As a consequence, although dead mosquito larvae were so thick in many fields as to create a strong stench, enough of them matured to produce a heavy crop of mosquitoes in June. Then came the rains in July, the total precipitation being 5.17 inches as compared with the normal rainfall of 1.73. Two and four-tenths inches of the July rainfall came in two hours' time, which produced more or less of a flood. This

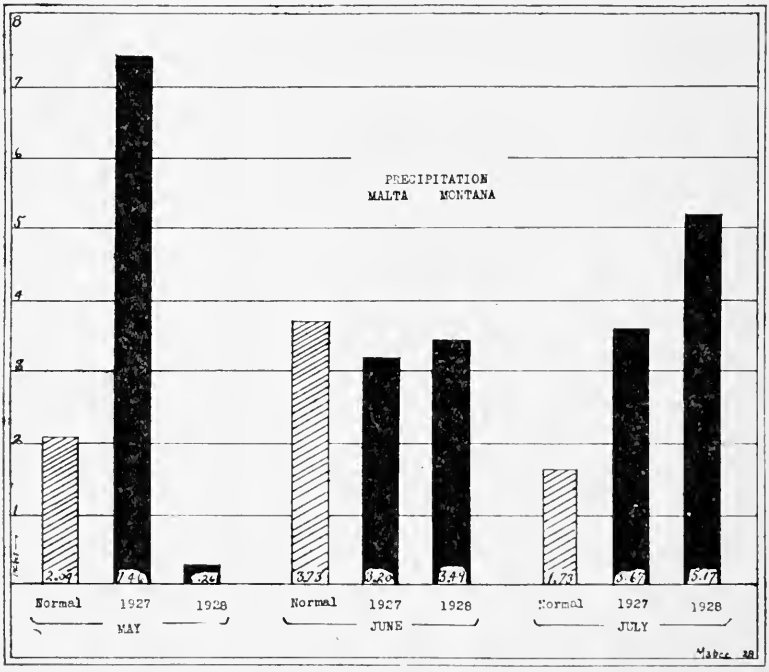


FIGURE 2

high water distributed the mosquito larvae, that were at that time in pools and irrigated fields, all over the country, so that mosquitoes were maturing out of road-side pools, drainage ditches, and almost every place where standing water was found. Needless to say, there was much more water containing mosquito larvae than could be oiled by one man or by the quantity of oil available. The accompanying chart (fig. 2) graphically shows the abnormal conditions under which this

work was conducted during 1927 and 1928. The average rainfall for May for a 25-year period is 2.09 inches.

In May, 1927, the rainfall was excessive—7.46 inches. This produced abnormal flooded conditions during that season and made control nearly impossible. On the other hand, during May, 1928, there was only 0.26 inch, an excessively dry condition which, as before mentioned, made irrigation necessary on a large scale and developed a July crop of mosquitoes in May. During June, both in 1927 and 1928, conditions were very nearly normal as indicated by June rainfall, but during both years mosquitoes were unusually abundant, due to May conditions, 1927 having excessive rainfall and 1928 having excessive irrigation. During July the rainfall in 1927 was 3.67 inches and July, 1928, 5.17 as opposed to a normal of 1.73 inches. In 1927 the rainfall was more evenly distributed during July, and control work was partially successful. However, during July, 1928, the rains coming in almost a cloudburst and producing flooded conditions made control work impossible. However, during these two years much was learned about the habits of mosquitoes and considerable data were compiled which will help materially in control work in the future.

Mr. G. A. Mail, who spent considerable time in Phillips County doing experimental work during 1928, secured a considerable amount of information regarding the life history and habits of various species of mosquitoes, determining the time necessary for mosquito eggs to hatch and discovering where and how several species deposited their eggs as well as discovering several new species that have not hitherto been recorded in Montana. These mosquito studies should be continued for several years, or until definite, practical recommendations for control can be made. In the Milk River Valley, mosquitoes are a major pest from an agricultural standpoint and are of sufficient importance to justify considerable time and money in working out control measures.

SUGAR-BEET LEAFHOPPER

The sugar-beet leafhopper, *Eutettix tenella* Baker, often called the white fly by the sugar-beet people, has been the subject of study for the past biennium. In cooperation with the United States Bureau of Entomology, through their representa-

tive, Doctor Walter Carter of Twin Falls, Idaho, a survey of the state has been attempted. The solid dots on the accompanying map (fig. 3) show where this insect has been found in Montana.

The circles indicate where search has been made, but as yet this insect has not been found. During the past two years the United States Bureau of Entomology has been supplying part of the funds for this survey work. The coming season this money ($500) will not be available. This survey, however, should be continued over a period of years to determine whether this insect will spread and increase under favorable conditions.

The sugar-beet industry is important in Montana and the State Entomologist should be prepared to advise the growers and the manufacturers alike as to the probable dangers from this insect which has closed many factories in other states.

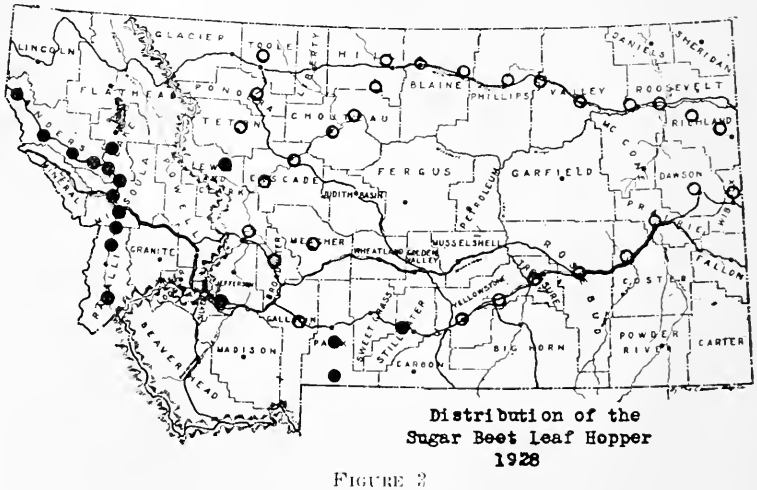


FIGURE 3

A NEW INSECT IN MONTANA

The Golden Spider beetle, *Niptus hololeucus* Fald., a household pest, has been found in Butte. In the middle of October, 1928, a tiny gold-colored beetle about 1/8 inch long, was sent in from a residence in Butte with the complaint that it was very abundant and a nuisance around the house. Upon investigation, this insect proved to be a native of Asia Minor, now oc-

curring as a general household and stored-product pest throughout Europe. One specimen of this insect was recorded from Halifax in 1899, an infestation was found in Montreal in 1904, and another in Boston in 1920. Together with the recent record from Butte, these are the only places the insect is known to occur in North America. In the Old World this tiny beetle has been recorded as feeding on almost any kind of stored product. It has been found living in all sorts of spices and drugs. It has been reported as injuring carpets in England, stored grain in Sweden, and has done considerable damage in chocolate factories, and in stored wool and leather in Switzerland. It is certainly a household nuisance and an undesirable addition to our list of injurious insects. This beetle has undoubtedly been in Butte for several years. An attempt is being made to exterminate it in the one house that it is known to infest. It probably occurs in other places in the city, and we would be pleased to hear from any person who has seen it. It is hoped that Montana conditions will not be favorable for its development and that it will not become the pest that it is in Europe. The adult beetle is 1/8 inch in length, quite round in shape, and of a satiny gold color. The beetle is unable to fly and it is only in shipments of various products that it can be dispersed to any great distance.

INSECTS OF MINOR IMPORTANCE

As has been previously stated in this report, Montana has been particularly fortunate in having but one outbreak of major importance during the past two years. When we will again be visited with a large grasshopper or cutworm outbreak can not now be prophesied. However, aside from these insects of major importance which have just been discussed, there are many others of minor importance which have done, in the aggregate, considerable damage during the past two years.

Figures 4 and 5 show the distribution throughout the state of communities which have requested information on insect control.

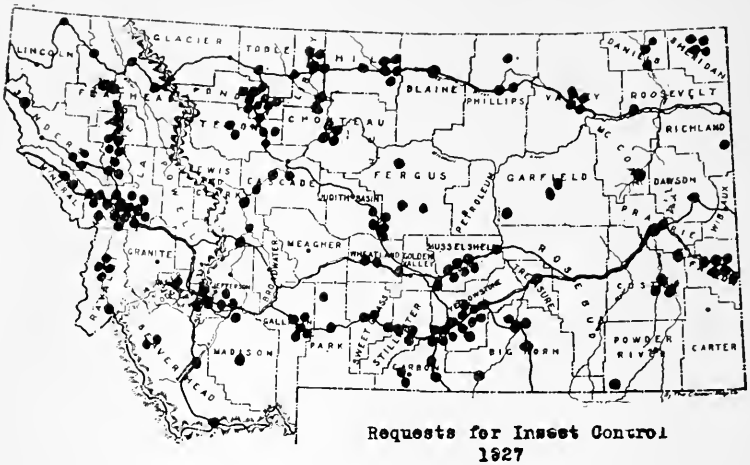


FIGURE 4

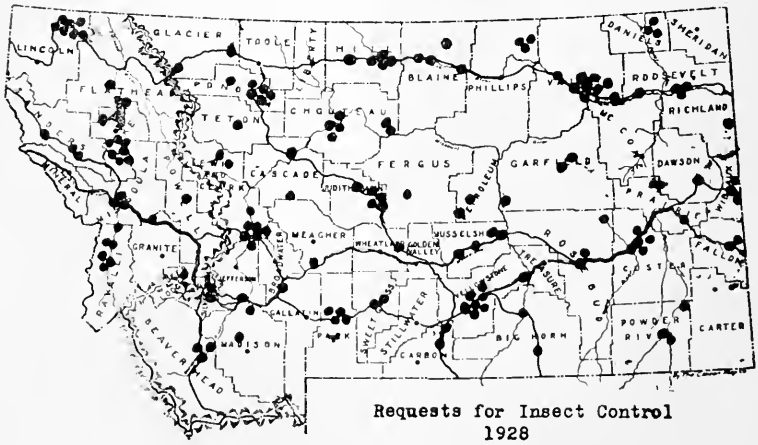


FIGURE 5

Following is a list of the insects that have been reported doing damage to Montana crops during 1927 and 1928:

ALFALFA

Common Name	Scientific Name	Locality	Date 1927	Date 1928
Bertha army worm	*Barathra configurata* Walk.	Whitehall		July 30
" " "	" " "	Eureka		Aug. 18
" " "	" " "	Eureka		Aug. 17
" " "	" " "	Kalispell		Aug. 23
Blister beetle	*Cantharis nuttalii* Say.	Sidney		June 26
Tarnished plant bug	*Lygus pratensis* Linn.	Pablo		Sept. 13
Western thrip	*Frankliniella occidentalis*	Glasgow		June 14

ANIMAL PARASITES

Cattle lice	Anoplura	Brinkman	Mar.	24
Mosquitoes	Culicidae	Monida	June	15
"	"	Ronan	Aug.	8
Woodtick	*Dermancentor andersoni* Stiles.	Fallon	May	2

APPLES

Codling moth	*Carpocapsa pomonella* Linn.	Missoula	May	26
" "	" " "	Missoula	June	14
Cottony maple scale	*Pulvinaria vitis* Linn.	Stockett	Jan.	19
Blister mite	*Eriophyes pyri* Pgst.	Noxon	June	27
" "	" " "	Ronan	Sept.	7
" "	" " "	Plains		July 21
Oyster shell scale	*Lepidosaphes ulmi* Linn.	Polson	Apr.	8
" " "	" " "	St. Ignatius	Apr.	30
" " "	" " "	Missoula	May	26
Apple leaf-hopper	*Empoasca mali* Leb.	Victor		Aug. 17
Apple leaf roller	*Archips argyrospila* Walker	Baker		May 26
Buffalo tree hopper	*Ceresa bubalus* Fab.	Ronan		June 14
Green fruit worm	*Graptolitha* sp.	Elmo		Aug. 3

CURRANTS

Currant fruit fly	*Epochra canadensis* F. Loew	Bozeman	Apr.	5
" " "	" " "	Helena		July 10
Currant aphis	*Myzus ribis* Linn.	Ronan	Apr.	26
" "	" " "	Eureka		July 11
" "	" " "	White Water		Aug. 28
" "	" " "	Livingston		June 15

CHERRIES

Pear slug	*Caliroa cerasi* Linn.	Billings	July	22
" "	" " "	Fromberg	July	14
Maggots	Sp. undetermined	Havre	Aug.	8

FLOWERS

Ants	Formicidae	Big Timber	June	21
Aphids	Aphididae	Glendive	July	25
"	"	Ringling		May 8
Garden slugs	*Agriolimax agrestis* Linn.	Dillon		July 11
White grub	Scarabeidae	Miles City		Aug. 3
Scale insect	Sp. undetermined	Helena		May 3
" "	"	Moccasin		May 8

GENERAL GARDEN CROPS

Common Name	Scientific Name	Locality	Date 1927	Date 1928
Blister beetles	*Cantharis nuttallii* Say.	Bozeman	July 26	
" "	" " "	Moccasin		July 14
Celery leaf-tier	*Phlyctaenia ferrugalis* Hbn.	Kalispell	Sept. 21	
Cutworms	*Chorizagrotis auxiliaris* Grote	Anaconda		June 7
Wireworms	Elateridae	Red Lodge	July 28	
"	"	Missoula	Mar. 9	
"	"	Kabo		July 30
Garden slugs	*Agriolimax agrestis* Linn.	Lewistown	Oct. 17	
" "	" " "	Livingston		Sept. 25
" "	" " "	Livingston		Aug. 18
" "	" " "	Butte		July 30
" "	" " "	Missoula		July 27
Potato bug	*Leptinotarsa decemlineata* Say.	Melstone		Oct. 2

BEANS

Blister beetles	*Cantharis nuttallii* Say.	Plentywood	July 29	
Flea beetle	Chrysomelidae	Billings		June 18
Pea weevils	*Mylabrus pisorum* Linn.	Billings	Mar. 11	
Seed corn maggot	*Hylemyia cilicrura* Rond.	Baker	July 27	
" " "	" " "	Billings	June 24	
" " "	" " "	Hardin	June 20	
" " "	" " "	Baker	June 23	

CABBAGE

Cabbage worms	*Pieris rapae* Linn.	East Helena		Aug. 16
" "	" " "	Basin		Feb. 7
Cabbage root maggots	*Hylemyia brassicae* Bouche	Hamilton		Aug. 27

CORN

Bumble flower beetle	*Euphoria inda* Linn.	Havre	Sept. 24	
Click beetle	Elateridae	Missoula	June 8	
Corn ear worm	*Heliothis obsoleta* Fab.	Plains	Sept. 14	
" " "	" " "	Kalispell	Aug. 20	
" " "	" " "	Silesia		Aug. 1

ONIONS

Onion maggot	*Hylemyia antiqua* Meig.	Malta	Sept. 23	
" "	" " "	Missoula	Apr. 6	
" "	" " "	Baker	June 23	
" "	" " "	Moore	Aug. 26	
Onion thrips	*Frankliniella* sp.	Bozeman		July 27

POTATOES

Bertha army worm	*Barathra configurata* Walk.	Eureka		Aug. 16
Blister beetles	*Epicauta maculata* Say.	Wibaux		July 16
Cutworms	Noctuidae	Bearmouth	June 24	
Gray garden slug	*Agriolimax agrestis* Linn.	Livingston		Oct. 8
Potato bugs	*Leptinotarsa decemlineata* Say.	Deer Lodge	June 24	
Wireworms	Elateridae	Novary	Jan. 14	
"	"	Plains		Jan. 26

TOMATOES

Common Name	Scientific Name	Locality	Date 1927	1928
False wireworm beetles	*Elcodes hispilabris* Say.	Miles City	Mar. 29	
Indian meal worm	*Tenebrio molitor* Linn.	Miles City	Sept. 27	
Thrips	*Frankliniella* sp.	Hamilton		Aug. 22

GOOSEBERRIES

Gooseberry fruit worm	*Zophodia grossulariae* Pachard	Lodge Grass		Jan. 2
" " "	" " "	Custer		Aug. 15

GREENHOUSE PLANTS

Borer	Undetermined	Billings	Mar. 30	
Scale	"	Virginia City	May 10	
March flies	*Bibio albipennis* Say.	Hamilton	Apr. 26	
White fly	Aleurodidae	Sula	Apr. 21	

HOUSEHOLD INSECTS

Ants	Formicidae	Reed Point	June 7	
"	"	Frenchtown	July 18	
"	"	Glasgow	May 26	
"	"	Laurel	June 18	
"	"	Superior	July 19	
"	"	Jackson	June 13	
"	"	Ft. Benton	Aug. 22	
"	"	Roundup		Mar. 9
"	"	Bridger		Mar. 15
"	"	Charlo		Feb. 10
Bedbugs	*Cimex lectularius* Linn.	Craig	Feb. 17	
"	" " "	Miles City	Mar. 29	
"	" " "	Friel	July 18	
"	" " "	Frenchtown	Aug. 11	
"	" " "	Jordan	Aug. 30	
"	" " "	Harrison		May 14
Dermestids	Dermestidae	Belmont	June 8	
Ground beetles	Bradycellus	Bozeman	Apr. 21	
Cockroaches	Blattidae	Billings		June 1
House flies	*Musca domestica* Linn.	Missoula		June 7
Silver fish	*Lepisma saccharina* Linn.	Havre		Aug. 7
Sow bug	Oniscidae	Helena		June 18
Mealy bug	Pseudococcinae	Butte	Feb. 7	
" "	"	Sheridan		Mar. 23
" "	"	Wilsall	Jan. 29	
" "	"	Wolf Creek		Feb. 1
Plant lice	Aphididae	Loma	July 19	
Clothes moths	*Tinola bisselliella* Hun.	Polson	Nov. 11	
" "	" " "	Cascade	Mar. 31	
" "	" " "	Great Falls	May 10	
German cockroach	*Blatella germanica* Linn.	Outlook		Oct. 19
Golden spider beetle	*Niptus hololeucus* Fald.	Butte		Oct. 12

LAWNS

Ants	Formicidae	Trident		May 1
"	"	Harlem		June 1
"	"	Billings		May 25

NATIVE GRASSES

Common Name	Scientific Name	Locality	Date 1927	Date 1928
Moths	*Scepsis fulvicollis* Hbn.	Whitehall	July 16	

OATS

Cutworms	Noctuidae	Columbus	June 11	

PLUMS

Plum gouger	*Coccotorus scutellaris* LeC.	Melstone		Oct. 2
" "	" " "	Huntley		Apr. 12
" "	" " "	Billings		Apr. 14
Plum gall mites	Undetermined	Stanford		July 11
Sawfly	"	Joliet		July 11

RASPBERRIES

False chinch bug	*Nysius cricae* Schill.	Missoula	June 22	
Raspberry beetle	*Byturus unicolor* Say.	Florence		July 20
" "	" " "	Missoula		July 30
Red spider	*Tetranychus telarius* Linn.	Eureka		July 11
" "	" " " "	Missoula		Aug. 23
Raspberry cane borer	*Oberea bimaculata* Oliver	Victor		Aug. 16

ROSES

Rosebud curculio	*Rhynchites bicolor* Fab.	Laurel	Mar. 18	
" "	" " "	Miles City		Aug. 3
Garden slugs	*Agriolimax agrestis* Linn.	Dillon		Aug. 11
Raspberry cane borer	*Oberea bimaculata* Oliver	Scobey		July 31
Soft scale	*Coccus hesperidum* Linn.	Wibaux		July 3

STRAWBERRIES

Ants	Formicidae	Livingston	July 20	
Garden slug	*Agriolimax agrestis* Linn.	Conrad		Aug. 17
Plant lice	Aphididae	Big Timber		June 7
Strawberry root weevil	*Otiorhynchus ovatus* Linn.	Broadus		June 14
" " "	" " "	Dryhead	June 15	
" " "	" " "	Columbia Falls	Mar. 20	
Strawberry leaf roller	*Ancylis comptana* Froehl.	Dillon	June 25	
" " "	" " "	Twete		July 27
White grubs	*Phyllophaga* sp.	Plains		May 31
" "	" "	Missoula	July 21	

STORED PRODUCTS

Confused flour beetle	*Tribolium confusum* Duval	Butte	Dec. 3	
Bean weevil	*Mylabrus obtectus* Linn.	Bozeman	Mar. 18	
Dermestids	Dermestidae	Cavern	Apr. 8	
Granary weevil	*Calandra granaria* Linn.	Havre		Aug. 30
" "	" " "	Plains	June 7	
Larder beetle	*Dermestes lardarius* Linn.	Helmville		July 15
Meal snout moth	*Pyralis farinalis* Linn.	Helena		Feb. 25

SUGAR BEETS

Common Name	Scientific Name	Locality	Date 1927	Date 1928
Sugar-beet webworm	*Loxostege sticticalis* Linn.	Roundup	Apr. 2	
" " "	" " "	Hardin		Aug. 17
Bertha army worm	*Barathra configurata* Walk.	Ronan		Aug. 18

SOIL

Crane fly	Tipulidae	Big Fork		May 3
White grub	*Phyllophaga* sp.	Fort Benton		June 26
" "	" "	Conrad		June 19

TREES

Ants	Formicidae	Harlem	July	31
Chrysomedid beetles	*Lina scripta* Fab.	Conrad	June	25
Leaf beetle	*Crysomella multipunctata* Say.	Scobey		Sept. 25
Long-horned beetle	Cerambicidae	Ronan		July 21
Plant lice	Aphididae	Dillon		July 18
" "	"	Augusta		June 23
Pine borers	Undetermined	Mosby	Sept.	22
Red spider	*Paratetranychus populi*	Butte	June	12
Spruce galls	*Chermes cooleyi* Gillette	Lewistown		Sept. 25

ASH

Blister beetles	*Epicauta maculata* Say.	Jordan		July 10
Hawk moth	Sphingidae	Harlem		Aug. 28
Plant lice	Aphididae	Whitefish	June	22
" "	"	Crow Agency	June	21

BOX ELDER

Box elder aphis	*Periphyllus negundinis* Thos.	Havre		Sept. 24
Cottony maple scale	*Pulvinaria vitis* Linn.	Missoula	July	21
Canker worm	*Alsophila pometaria* Harris	Havre	June	10
Glover's silkworm	*Samia gloveri* Strecker	Glasgow		Aug. 17
" "	" " "	White Water		Aug. 28
" "	" " "	Glasgow		Aug. 11
" "	" " "	Culbertson		Aug. 16
Plant lice	Aphididae	Bridger	June	18

COTTONWOOD

Aspen borers	*Saperda calcarata* Say.	Glasgow	Jan.	17
" "	" " "	Terry	July	19
" "	" " "	Hedgesville	July	26
" "	" " "	Melstone	Aug.	15
Cottony maple scale	*Pulvinaria vitis* Linn.	Miles City		Aug. 3
Cottonwood leaf beetle	*Lina scripta* Fab.	Baker		Aug. 3
" " "	" " "	Culbertson		July 31
" " miner	*Zeugophora scutellaris* Suff.	Nashua		July 27
" " "	" " "	Harlem		Aug. 17
" " "	" " "	Chinook		Sept. 22
Big poplar sphinx	*Pachysphinx modesta* Harris	Ronan		Aug. 20