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Montana Insects Pests 1947 and 1948

Thirty-Second Report of the State Entomologist

MONTANA STATE COLLEGE
AGRICULTURAL EXPERIMENT STATION
BOZEMAN, MONTANA

Bozeman, Montana

To His Excellency
Governor John W. Bonner
State House
Helena, Montana

My Dear Sir:

I am submitting herewith the Thirty-second Report of the State Entomologist of Montana. This report contains information concerning insect control programs, the status of the more important and unusual insects, and newly introduced pests.

Demands on this office have greatly increased during the last biennium. Insect control has become larger in scope and it has been necessary to organize and direct new programs. During the last biennium the State Entomologist's office conducted 35 educational meetings with a total attendance of 1,391 persons; 7 demonstrations were given with an attendance of 75 persons; 184 field contacts were made; 837 inquiries concerning insect identification and control were answered; and 12 publications and newsletters were issued.

The demands for demonstrational and educational work have become so heavy that additional personnel will be required if these demands are to be met. Unless the State Entomologist appropriation is increased to take care of these additional activities, some important phases of the State Entomologist's programs will have to be curtailed.

Respectfully submitted,
James H. Pepper
State Entomologist

MONTANA INSECT PESTS 1947 and 1948

THIRTY-SECOND REPORT OF THE STATE ENTOMOLOGIST

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INTRODUCTION

The entomological outlook for Montana presents a number of ramifications which have not been previously stressed. Our insect problems have increased in the last decade and the possibility of further serious situations arising is almost certain.

During the last few years, we have had infestations of a number of insects new to the state. Likewise, some native insects that have not previously been pests have caused considerable damage to agricultural crops. It had been predicted by earlier workers that two of these new insects, the alfalfa weevil and the differential grasshopper, could not become established in Montana because of our ecological conditions. At the present time both of these insects have become serious pests. The differential grasshopper was first found in Dawson County in 1932. Since that time it has spread over much of the eastern and southern parts of Montana and is now found in economically important numbers as far west as Yellowstone and Big Horn counties. The alfalfa weevil was first observed in 1938 and has been a serious pest to alfalfa in Southeastern Montana since 1945. It has spread every year and at the present time it is as far north and east as Terry and as far west as Reed Point. This pest has become so serious in some sections that it has threatened the alfalfa seed and feed growing industries.

It was assumed by many of the early workers that climatic factors were primarily responsible for limiting the distribution of many of these pests. It is apparent from the above examples that the ability of an insect to adapt itself cannot be overlooked in predicting the limits of its geographic distribution.

The wheat stem sawfly, which is a native insect of Montana, did not become important economically until 1941. Since that time this insect has become one of our most serious pests of spring and winter wheat, at present confining itself largely to the northern part of the state.

Changes in our agricultural crops and farm practices have resulted in bringing about conditions which are more favorable to some insects. It is interesting to note that the spread of the wheat

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stem sawfly and increased losses caused by this insect paralleled the development of the practice of strip farming. It is now known that this practice produces the optimum conditions for sawfly activities. In the case of other pests, the reasons for their increased activities are not so apparent but are in all probability related to the increase in production of certain favorable host plants or the adoption of certain cultural practices which may favor their development.

The complications which may arise from the indiscriminate use of new organic insecticides should not be overlooked. In many cases these new materials are extremely toxic to all animal life and are being used so that beneficial insects such as parasites, predators, and pollinators are being almost completely eliminated from treated areas. The results of this usage may complicate our problems greatly; however, it is too early to tell how this may effect our whole insect complex. Already there are indications that serious situations may arise from the promiscuous use of these materials. A great deal of research and study will be necessary to properly evaluate the above situation.

It is difficult to tell whether or not livestock pests are becoming more serious or whether the increased interest is because farmers and ranchers are becoming insect-conscious. It is obvious that stock-growers are becoming increasingly aware of the losses caused by insect parasites, and are requesting information and demonstrational programs to acquaint them with the insects involved and the methods for controlling them.

With the development of new insecticides that are effective in controlling mosquitoes, there has been a marked increase in attempts to eliminate these pests in and around urban areas. Many towns throughout the state have organized control programs, some of which have been very successful in eliminating mosquitoes as well as flies. Other programs have not been so successful because they were not correctly planned or correctly executed. Increased emphasis on educational programs, demonstrations, etc., will go a long way in remedying the above situations.

HARMFUL AND DESTRUCTIVE INSECTS

INSECTS INJURIOUS TO CROPS IN GENERAL

GRASSHOPPER CONTROL

1947 SEASON

Since 1942, when grasshopper populations were the lowest they had been in several years, there has been a gradual and general increase in grasshopper numbers. The infestation in 1947

was more severe than that of the previous year. Their appearance was late because of cold, rainy weather in May and June, which retarded the development and hatch of the eggs. Because of these weather conditions, the hatch was extremely irregular and it extended over a period of approximately three months. One of the most severely infested areas was in the Big Horn, Yellowstone, Treasure, Rosebud, Custer, Powder River, Prairie, Dawson and Richland counties, with heaviest populations occurring along the Yellowstone River and its tributaries. The most heavily infested localized area in the state included eastern Glacier, southern Toole, and northern Pondera counties. Small spotted infestations of a more localized nature were also found in sections of the northern and central parts of the state. The dominant species in the northern part of the state were *Melanoplus bivittatus, Melanoplus packardii*, and *Camnula pellucida*. The build-up of the latter species was quite pronounced in limited areas within the above region. In the eastern part of the state the dominant species were *Melanoplus bivittatus, Melanoplus differentialis*, and *Melanoplus femur-rubrum*. The 1947 infestation was characterized by the continued build-up of *M. bivittatus* and *M. differentialis* and an apparent decline of *M. mexicanus*, which had been the dominant species for many years. The damage caused to crops by these insects was relatively light considering the heavy populations which were present. This was due largely to the fact that barrow pits, fence rows, rights of ways, and other marginal areas maintained a heavy succulent growth of weeds which remained green during most of the season. Heavy migrations from these areas were not observed until the harvesting of most crops was well under way. Some damage did occur to new growths of winter wheat in the late fall.

The weather during the egg laying season was favorable for egg deposition; consequently, heavy egg deposits were found in the infested areas. Western Glacier County had one of the heaviest egg populations that has ever been recorded in the state. In many sections fifty egg pods per square foot was not an uncommon count.

1948 SEASON

The grasshopper infestation of 1948 was more severe than any of those occurring during the previous five years. The areas infested were in the same regions as in the previous year but were more extensive. In addition, heavy populations were also present in the Judith Basin area. In general, heavier populations were likewise found in the northern part of the state. The dominant species in the above areas were *M. bivittatus, M. differentialis*, and *M. packardii*. In the late summer extremely heavy grasshopper populations developed in the range areas in the eastern part of the

state. Heavy damage was caused to the range, in some instances necessitating the disposal or movement of cattle from these badly infested ranges. An adult survey of the range populations showed that 32 species of grasshoppers were present. The following is a list of species and the percentage in which they occurred:

29.8 *Melanoplus mexicanus* (Saussure)
18.9 *Phoetalictea nebrascennis* (Thomas)
18.0 *Ageneotettix deorum* (Scudder)
6.9 *Drepanoterna femoratum* (Scudder)
2.7 *Opeia obscura* (Thomas)
2.6 *Melanoplus keelari* (Thomas)
2.3 *Melanoplus femur-rubrum* (DeGeer)
2.2 *Philbostroma quadrimaculatum* (Thomas)
2.1 *Trachyrpachis kiowa* (Thomas)
1.9 *Encoptolophus costalia* (Scudder)
1.7 *Hesperotettix viridis* (Thomas)
1.3 *Melanoplus packardii* (Scudder)
1.2 *Spharagemon* sp.
1.0 *Amphitornus coloradus* (Thomas)
1.0 *Arphia* sp. *Arphia*
1.0 *Aulocera elliotti* (Scudder)
1.0 *Melanoplus dawsoni* (Scudder)
.8 *Hypochlora alba* (Dodge)
.7 *Hadrotettix trifasciatus* (Say)
.7 *Melanoplus gladstoni* (Scudder)
.5 *Melanoplus bivittatus* (Say)
.3 *Melanoplus infantilis* (Scudder)
.3 *Mermiria maculimennis* (Bruner)
.3 *Metator pardalinus* (Saussure)
.2 *Melanoplus bowditchi* (Scudder)
.2 *Melanoplus differentialis* (Thomas)
.1 *Melanoplus angustipennis* (Dodge)
.05 *Acrolophitus hirtipas* (Say)
.05 *Aecloplus turnbulli* (Thomas)
.05 *Boonedon nubilum* (Say)
.05 *Dissosteira carolina* (Linneaus)
.05 *Trimerotropis* sp.

It is of interest to note that 29.8 percent of the hoppers collected were *Melanoplus mexicanus*. The heavy build-up of this species seems particularly significant because it has not been the

dominant species in this area for several years. Some flights of *M. mexicanus* were observed in the eastern part of the state and a heavy flight was reported to have moved into Northern Montana. As in 1947, the grasshopper damage to crops was relatively light in 1948 because of the succulent marginal growth. In some cases, even though heavy populations of *M. bivittatus* and *M. packardii* were observed in grain fields, the actual damage to these fields was slight. Some damage did occur, however, due to leaf and head feeding. The above species do not cut the heads and cause the severe destruction that occurs when *M. mexicanus* are present.

Large amounts of organic insecticides were used in grasshopper control—the most common of which were Toxaphene and Chlordane. These materials gave excellent control when used as sprays or dusts in succulent foliage. They serve to replace baits which are generally ineffective under these conditions.

In scattered localized areas, hopper populations were greatly reduced by scarcophagid flies. Fungus and bacterial disease were also responsible for slight reductions in grasshopper populations in alfalfa and mustard fields. Unfortunately, these parasites did not occur over large enough areas to be of great significance.

THE OUTLOOK FOR 1949

The 1948 fall surveys of adult and egg populations indicate that the grasshopper infestation for the coming season may be one of the most severe since the 1939-40 outbreak. As was previously pointed out, all of the infested areas have increased in size and heavy populations have developed in many new areas. This is especially true in the northern and central part of the state. The heavy build-up of *M. mexicanus* and the apparent spread of this species from the eastern part of the state as well as from other areas, indicates that it may soon be the dominant species in Montana. If this infestation does occur, increased crop losses are imminent.

OTHER IMPORTANT PESTS

WIREWORMS (*Elateridae*)

During the last biennium the damage from wireworm activities has increased considerably. Their presence was confined to limited areas spotted throughout Montana. In the eastern two-thirds of the state most of the wireworm damage occurred in small grains. In the western third, damage commonly occurred in potatoes and sugar beets. During the last season, wireworm damage to sugar beets was considerably heavier than in previous years.

GARDEN SLUGS (*Agriolimax agrestis*)

During the 1948 season, garden slugs were a major pest in the

western half of the state. They caused severe damage to garden crops, especially potatoes, lettuce, cabbage, and strawberries. This build-up was apparently due to the high amount of rainfall which occurred during the growing season.

BLISTER BEETLES (*Meloidae*)

The eastern part of Montana had a severe infestation of blister beetles in 1948. Most of the damage occurred to alfalfa and garden crops. In limited areas throughout the state large numbers of blister beetle larvae were found feeding on grasshopper eggs. In some instances as high as 60 percent of the egg pods were destroyed.

FLEA BEETLES (*Epitrix spp.*)

Flea beetles have a state-wide distribution. During the last two years these insects have caused considerable damage to garden crops. In some sections, spotted throughout the state, flea beetle infestations almost completely destroyed garden plantings of cabbage, cauliflower, broccoli, radishes, beets, and turnips. In the western part of the state, they were also recorded doing damage to sugar beets.

WHITE GRUBS (*Phyllophaga spp.*)

White grubs caused some damage to new strawberry plantings in the Bitterroot Valley during the last biennium. This damage was especially noticeable where strawberries were set out on land that was previously in sod. These insects were observed doing some damage to flower gardens in the vicinity of Billings. In all cases, the infestations were of a localized nature. It appears that white grubs are becoming more common throughout the state.

MORMON CRICKETS (*Anabrus simplex*)

Mormon crickets have not occurred in outbreak numbers in the state since 1941. There was a noticeable increase in the numbers of this insect in 1947 and an even greater increase in 1948. It is possible to find a few mormon crickets in almost every locality in the state.

At present these crickets seem to be scattered, as no bands have been observed. From the observations that have been made, however, it appears that a mormon cricket outbreak within the next one to three years is likely.

EAR WIGS (*Forficula auricularia*)

During the last two years an ear wig infestation has appeared over much of the western half of the state. These insects are gen-

erally nocturnal; coming out at night to attack many kinds of plants including flowers, ornamentals, fruit trees, vegetables, grains and grasses. They also enter houses to become a nuisance. Although they apparently do not damage household materials, their presence is extremely annoying. They seem to prefer dark, moist habitats such as may be found around kitchen sinks and in bathrooms; however, their activities are not confined to these places. Since the first report of ear wigs occurring at Thompson Falls in 1938, this pest has spread rapidly over a large part of the state.

INSECTS INJURIOUS TO FIELD CROPS

SMALL GRAINS

WHEAT STEM SAWFLY (*Cephus cinctus*)

The wheat stem sawfly continues to be one of the most serious insect pests of wheat in Montana. All counties east of the mountains are now known to be infested. Economic losses, however, have been confined to Glacier, Pondera and Teton counties on the west, and the adjoining northern tier of counties east to the North Dakota line. McCone, Richland, Dawson, Wibaux, and Fallon counties in the eastern part of the state have likewise been subject to economic losses. An isolated area where sawflies are present also exists in northern Fergus and Judith Basin counties in the vicinity of Garneill. The most severe damage has been to spring wheat, except in Glacier, Toole, Pondera, and Teton counties where winter wheat losses have been severe.

The areas where sawfly populations of economic importance are found have increased considerably from the localities originally recorded. Just how this extension of infested areas is occurring and how far it will go are questions that remain unanswered. An extension of the infested winter wheat area seems to be in progress and this presents a potentially dangerous situation.

Control of the sawfly is still based upon crop rotation and the use of resistant crops and varieties. Compana barley and Rescue wheat, a resistant variety, have been planted with excellent results in hundreds of thousands of acres where sawfly damage was severe. The original two bushels of Rescue wheat obtained in 1944 from Canadian workers was increased to 1,250,000 bushels by the fall of 1947, to furnish a sufficient supply of seed for seeding all seriously infested acreage in 1948. An appreciable amount of the 1948 crop of Rescue wheat was directed into commercial channels.

Just what effect the extensive use of Rescue wheat will have on the overall problem remains to be seen. Where Compana barley and Rescue wheat have been planted on individual farm units, significant sawfly population reductions based on reduced damage,

have been observed. In the extreme northeastern counties, late seeding plus extensive use of Rescue wheat, have resulted in very decided reductions in sawfly population. In the western area where Rescue wheat was used, populations were greatly reduced in spring wheat, but the amount of infested winter wheat will probably equalize any general reduction in population resulting from the increased Rescue wheat acreages.

The performance of Rescue wheat is as yet a debatable question. In the northeastern counties it appeared to yield significantly less than Thatcher, when sawfly damage was not a factor. In addition, it appeared to be less drouth hardy, and more susceptible to lodging. In the western area, yields were excellent and lodging was on the same level with other standard varieties. Some discussion was heard regarding combining difficulties, both in handling the straw and knocking out the kernels. On the other hand, claims were made that it shattered easily. From these widely divergent opinions, it would seem that more experience with Rescue wheat is needed before it can be best evaluated. It is then very probable that it will be found better suited to some areas than others.

Milling and baking tests have shown Rescue wheat to be a satisfactory bread wheat. When used alone it has about 3 percent less water absorption than does Thatcher, a rather important criticism from the standpoint of the millers and bakers. In other milling characteristics it is equal to Thatcher and there are indications that proper blending will reduce the absorption difficulties. Most of these tests have been conducted by the Northwest Crop Improvement Association and cooperating cereal laboratories.

The problem of controlling the sawfly in winter wheat is made more difficult by the lack of any resistant winter wheat varieties. A breeding program has been initiated by the Department of Agronomy and Soils at Montana State College which is attempting to breed some of the resistance from Rescue wheat into our better winter wheat varieties. A program has also been started as a cooperative effort of the Department of Zoology and Entomology and the Department of Agronomy and Soils of Montana State College together with the United States Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry, Soils and Agricultural Engineering to test 2,000 foreign wheat introductions for new sources of sawfly resistance.

ARMY CUTWORMS (*Chorizagrotis auxiliaris*)

These cutworms, although not a serious problem during the last biennium, caused some damage in small areas in the eastern two-thirds of the state. They were observed feeding on small

grains in this area. Another cutworm species was reported to have damaged the terminal buds of sour cheery plantings in the Bitterroot Valley.

PALE WESTERN CUTWORMS (*Agrotis orthogonia*)

Pale western cutworm damage was observed in the vicinity of Great Falls and Havre during 1947 and 1948. The infestations were small and occurred in localized areas. Heavy flights of pale western cutworm moths were observed in the north-central part of the state during the fall of 1948.

The practice of trash fallowing in the above area may produce conditions more favorable for egg deposition by the adult moths. Since the moths select uncrusted soil in which to lay their eggs, the action of the wind on the trash present in this type of fallow may prevent the formation of a crust adjacent to the exposed stems, thus increasing the areas within a field which are suitable for egg laying. This may be another instance where cultural practices are at least in part responsible for producing conditions which are favorable for the spread of an insect during the outbreak years. Further investigations are necessary to determine the exact effect of these practices on the relationship which exists between this insect and the condition of the fallow.

HESSIAN FLY (*Phytophaga destructor*)

The Hessian fly occurs in the northern and eastern parts of Montana. In 1924 and again in 1944 this insect caused considerable damage to wheat in these areas. During the last two years, hessian flies have been observed in small numbers but sufficient populations have not developed to make this pest of any great economic importance.

WHEAT STEM MAGGOT

During the 1948 season, the stem maggot has been observed occurring in large numbers over the state. It has been especially noticeable in Big Horn, Yellowstone, and Cascade counties. While it has caused some damage to wheat, it has been more destructive to crested wheat grass in these counties. To date actual determination of the species involved has not been made.

CORN

CORN EAR WORM (*Heliothis armigera*)

No report of the corn ear worm having caused damage in 1947 was received. In 1948 a field of sweet corn near Park City was observed to have a corn ear worm infestation. Approximately 30-40 percent of the ears were damaged. No other infestations were reported or observed in the state.

SEED CORN MAGGOT (*Hylemya cilicrura*)

Some damage to bean fields, caused by the seed corn maggot, was observed in the Billings area in the spring of 1947, and in the Bitterroot Valley a small acreage of beans was severely damaged. No damage was reported in 1948.

BUMBLE FLOWER BEETLE (*Euphoria inda*)

Specimens of the bumble flower beetle were received from the Billings area in September of 1948. It was reported that the ears in a field of mature corn were being damaged by this insect. This pest was previously recorded occurring in the same area in Montana in 1911, 1912, 1915, and 1916. In all of these cases it was found to be damaging corn. The bumble flower beetle has apparently never occurred in large enough numbers to be of particular economic importance. It has not been recorded as occurring in any other section of the state.

ALFALFA

ALFALFA WEEVIL (*Hypera postica*)

Since the first outbreak of alfalfa weevil in southeastern Montana in 1946, this insect has continued to be one of our most serious pests of feed and seed alfalfa. The infested area has increased from year to year until, at the present time, the infestation extends over the southeastern section of the state from Terry to Reed Point. The alfalfa weevil has become so serious a pest that many farmers have discontinued the growing of alfalfa. Since this insect has been able to establish itself in the state and has continued to spread, it appears likely that a further spread may be expected. The State Entomologist's office and the Montana Agricultural Experiment Station have carried on considerable research in an effort to develop more satisfactory control measures. From the results of this work, a more satisfactory control method has been developed.

LYGUS BUGS (*Lygus sp.*)

Lygus bugs are found in all sections of the state and are pests in many areas where alfalfa and clover seed are grown. In 1947 heavy populations of lygus bugs were observed causing damage to alfalfa along Pryor Creek, south of Billings. Alfalfa fields from which hay crops have been removed each year for a period of years, generally have a lighter lygus infestation than fields which are left for seed. This may account for some of the fluctuations in numbers.

ALFALFA SEED CHALCID (*Bruchophagus funebris*)

This insect is distributed over the entire clover and alfalfa seed-producing areas of Montana where it is found to damage seed production of these crops. Samples of seed obtained in 1947 from the Camas Prairie section showed chalcid damage to approximately 40 percent of the seeds. It has also been a serious pest of clover seed in the vicinity of Charlo.

PEA APHIS (*Illinoia pisi*)

The 1948 season showed higher populations of pea aphis in both alfalfa and clover in western Montana than were present in 1947. In some fields, populations were severe enough to necessitate the application of control measures.

POTATOES

COLORADO POTATO BEETLE (*Leptinotarsa decemlineata*)

The Colorado potato beetle was observed damaging potato fields in the vicinity of Kalispell in 1947 and around Great Falls in 1948. In both cases the infestation was severe enough to necessitate a control program over much of the potato acreage. Some damage to potatoes has been noted in the Bitterroot Valley during the last two years.

POTATO PSYLLID (*Paratrioza cockerelli*)

On occasion the potato psyllid has been a serious pest in the eastern part of the state. Surveys to determine its presence have been conducted for the last two years throughout the potato growing areas of eastern Montana during the month of June. No adult psyllids were found in the areas surveyed in either 1947 or 1948. These areas were determined by previous investigations to be the areas most likely to give an indication of general psyllid populations.

SUGAR BEETS

SUGAR BEET WEBWORM (*Loxostege sticticalis*)

In 1947 sugar beet webworms appeared in economic numbers in Cascade and Teton counties and in Ravalli, Missoula, and Lake counties. Heavy moth flights were observed in the spring of 1948 from Billings west to the Bitterroot and north to the Chinook-Choteau area. Infestations of the webworm were spotted throughout this entire region. Populations as high as 25-30 worms per plant could be found on sugar beet plants and other hosts. Considerable control work was carried on throughout the infested areas.

In the Bitterroot and Gallatin valleys a heavy second generation moth flight was observed. However, no second generation larvae were reported.

SPINACH LEAF MINER (*Pegomya hyoscyami*)

This insect may be found wherever sugar beets are grown in Montana but generally it is of little economic importance. However, it caused some damage to sugar beet fields in the vicinity of Great Falls and Conrad in 1948.

SUGAR BEET ROOT MAGGOT (*Tetanops aldrichi*)

In the western Montana sugar beet growing area, the sugar beet root maggot causes light damage every year. In the Bitterroot Valley, considerable damage occurred in 1948. Some fields were abandoned because of the heavy infestation. It seems that the populations of this insect have been increasing for the last five years. The poor growing conditions prevailing during the early part of 1948 probably contributed to the damage caused by this insect by lessening the plants ability to recover.

PEAS

PEA WEEVIL (*Bruchus pisorum*)

The first mention of this pest having been introduced into Montana was in 1912, at which time it was found in seed shipped into the Gallatin Valley. Its occurrence in economically important numbers has been periodic throughout the years from 1912 to the present time. It has been found in the Yellowstone and the Clarks Fork valleys in south-central Montana and in the western part of the state. In general, the populations of the pea weevil in the Bitterroot Valley were lighter in 1947 than in 1948. In some areas of south-central Montana and western Montana populations were sufficiently high to necessitate control measures in both 1947 and 1948. To what extent this insect has been able to overwinter under Montana conditions has not yet been established.

INSECTS INJURIOUS TO GARDEN AND TRUCK CROPS

CRUCIFERA

CABBAGE MAGGOT (*Hylemya brassicae*)

The cabbage maggot is distributed throughout Montana and its activities generally result in some damage every year. This insect attacks the roots of all cruciferous plants. No severe outbreaks have been reported in the last two years. However, in years previous to these this pest has been recorded as causing damage in the Bitterroot Valley.

IMPORTED CABBAGE WORM (*Pieris rapae*)

This is one of the more common pests of cruciferae in the state of Montana. In some sections, it has become impossible to grow these crops in gardens unless stringent control practices are carried out. Generally, attacks of this pest are associated to some extent with the cabbage looper (*Autographa brassicae*), and the diamond back moth (*Plutella maculipennis*).

CABBAGE APHIS (*Brevicoryne brassicae*)

As was the case with most aphis species, the cabbage aphis was more prevalent in 1948 than in 1947. It is a state-wide pest which will attack cabbage, cauliflower, turnips, etc., commonly planted in the home garden.

ROOT CROPS

ONION MAGGOT (*Hylemya antiqua*)

Present distribution records indicate that this insect is present over most of Montana. During 1948 most of the damage occurred in the western portion of the state with one grower near Hamilton reporting an approximate 20 percent loss of onions due to the presence of this pest.

ASPARAGUS

ASPARAGUS BEETLE (*Crioceris asparagi*)

In 1948 this pest was found on Findley Point, Flathead Lake, which is about ten miles from the point where it was first discovered in the spring of 1946. It has now been observed to be present from the south shore of Flathead Lake to Findley Point. During the last two years, damage has occurred late in the season after the plants have gone to seed.

INSECTS INJURIOUS TO FRUIT CROPS

APPLES

CODLING MOTH (*Carpocapsa pomonella*)

The codling moth is found in varying numbers wherever apples are grown in Montana, with heavy infestations often occurring in the Bitterroot Valley and in the Clarks Park Valley in Carbon County. In 1947 the populations of codling moths were at a low level in western Montana as a consequence of the very light apple crop of the previous year. The numbers of codling moths were higher in 1948 than in 1947.

OYSTER SHELL SCALE (*Lepidosaphes ulmi*)

Oyster shell scale is present in all fruit-growing areas of the state. In addition to attacking fruit trees, it often attacks shade trees and ornamental plantings. It may become a serious problem where home and commercial orchardists do not apply proper insecticidal sprays.

WOOLY APPLE APHIS (*Eriosoma lanigerum*)

During the last two years, there has been an increase in wooly aphis populations in apple orchards where D.D.T. has been used for codling moth control. This increase is thought to be due largely to a reduction of aphis predators brought about by the action of D.D.T.

APPLE APHID (*Aphis pomi*)

This is a common pest thoughout the apple-growing regions of Montana. During the last biennium, infestations have been rather constantly becoming a problem in unsprayed orchards.

ROSY APPLE APHIS (*Anuraphis roseus*)

Wherever apples are grown in this state, the rosy apple aphis is commonly encountered. During the last two years, the population levels of this insect have apparently remained static. A spray program appears necessary to prevent damage.

EYE-SPOTTED BUD MOTH (*Spilonota ocellana*)

As far as is known, this pest, which feeds on the buds and blossoms of apples, cherries, and plums, is widely distributed over western Montana. The populations of this insect have increased to such an extent that they are now becoming of economic importance.

CHERRIES

BLACK CHERRY APHIS (*Myzus cerasi*)

This is one of the principal cherry pests of the Flathead area. Infestations of this aphis have been severe enough during the past two years to necessitate the application of control measures.

CHERRY FRUIT FLY (*Rhagoletis cingulata*)

At the present time, this pest is known to occur in sour cherries in certain districts of the Flathead area. In 1947, unsprayed sour cherry trees were found to have 5 to 10 percent wormy fruit. As yet, little is known about the adult fly, its activities, or its distribution.

YELLOW JACKETS (*Vespidae*)

Various species of *Vespidae* are minor pests in the Flathead and other areas in the western part of Montana. Some damage occurs to the ripe fruit each year due to the feeding activities of the yellow jackets. Equally important is the nuisance value they have during the picking season.

PEAR SLUG (*Caliroa cerasi*)

The pear slug is widely distributed throughout the state and is not confined to a single host. Severe defoliation may occur on plums, pears, quince, hawthorne, Juneberry, etc. In general, there are two broods a year, the first appearing in June and the second in August. The second brood usually causes the most damage. In 1948, the slug populations did not build up early in the season because of a high mortality, presumably induced by the cool, wet weather which prevailed during June and July.

RUST MITE (*Phyllocoptes sp.*)

A 1947 survey of sweet and sour cherry trees in western Montana showed that nearly all plantings were heavily infested with a species of rust mite. This was the first authentic record of the rust mite damaging fruit trees in Montana. However, from all indications, this pest has been present for several years but has been overlooked. The trees that are heavily infested have the general appearance of trees suffering from drouth. The leaves become curled longitudinally and show a bronzed discoloration. Sour cherry leaves generally show a more pronounced bronzing than do the sweet cherry leaves. Preliminary life history observations indicate that this pest overwinters as an adult, hidden behind leaf bud scales and in cracks in the bark near the terminal and lateral buds. In the spring, feeding activity begins as soon as the buds show green. Generally, population levels are low throughout the early growing season and a build-up does not occur until the advent of hot, dry weather. In 1947 this build-up occurred early in July whereas in 1948 populations did not build up until late August.

RASPBERRIES

RASPBERRY CROWN BORER (*Bembecia marginata*)

A preliminary survey of raspberry plantings in western Montana shows the crown borer to be present throughout the Bitterroot and Flathead Valleys. In general, infestations are heavy in many of the older plantings throughout both areas. Where vigorous plantings are maintained, a loss of canes has not been severe, however, in areas where the growth is less hardy due to soil

fertility or other factors, some loss of canes has occurred in both 1947 and 1948. In 1948, the first adult activity was noted on August 2nd.

RASPBERRY FRUIT WORM (*Byturus unicolor*)

This insect pest is found in varying numbers throughout the state wherever respberries are grown. During the 1947 and 1948 seasons, damage by this insect was in general, slight. In the Bitterroot sections, a spray application is frequently employed as a precautionary measure.

RASPBERRY SAWFLY (*Blennocampa rubi*)

The raspberry sawfly, although usually present where raspberries are grown in the Bitterroot and Flathead valleys, is of minor economic importance in these areas. In 1948, infestations were more severe than in 1947.

PRUNES AND PLUMS

PLUM GOUGER (*Anthonomus scutellaris*)

The plum gouger was reported from the Billings area in 1948. It has been recorded in past years, over most of the state where plums are grown either as a commercial crop or for home use. In general, it has been of little economic importance during the past two years.

PLUM APHIS (*Aphididae*)

Damage from the plum aphis in sections of the Bitterroot was more severe in 1948 than in previous years. Light to moderate infestations occurred along the shores of Flathead Lake. Varietal studies on plantings in the Bitterroot Valley indicate that some varieties of plums, such as the Fiebing, are very susceptible to plum aphis infestations, whereas Superior and other varieties are moderately resistant.

STRAWBERRIES

STRAWBERRY CROWN MINER (*Aristotelia fragariae*)

An infestation of this insect pest was recorded from the Bitterroot Valley in 1948, where it was doing considerable damage to plots of experimental strawberry varieties. Available information indicates that this pest had been present for at least six years. At this time nothing more is known about its distribution throughout the state, except that it was reported from Lake County in 1944.

CURRANTS

CURRANT APHIS (*Capitophorus ribis*)

In general, damage from this species of aphis has been light during the past two years.

CURRANT FRUIT FLY (*Epochra canadensis*)

This insect pest is widely distributed throughout Montana. In general, infestations were light for both years of the biennium.

INSECTS INJURIOUS TO SHADE TREES AND SHRUBS

EVERGREENS

SPRUCE GALL APHID (*Adelges cooleyi*)

The spruce gall aphid has continued to be quite prevalent over the entire state during the last two years. It has caused considerable damage to ornamental spruce trees. It is a difficult pest to control due to the variations in the dates of appearance of the cottony stage. It is only in this stage that control methods are effective.

PINE LEAF SCALE (*Chionaspis pinifoliae*)

Infestations of the pine leaf scale in varying degrees of severity have been observed on ornamental pine trees throughout the southern and western parts of the state. This insect is apparently found all over Montana and has been especially noticeable during the last biennium.

PINE BARK APHID (*Chermes pinicorticis*)

This pest was recorded from Corvallis in 1947. As yet, its distribution in Montana is not known. The presence of this aphid is indicated by spots and patches of white cottony material on the smooth bark of the trunk and on the under sides of the limbs of white pine. The white waxy threads are also seen at the base of the needles, especially at the ends of branches. Attacks by this insect weaken the tree, making it less resistant to the attacks of other insects and of fungus diseases.

RED CEDAR APHID (*Cinara sp.*)

In the Bitterroot Valley, Juniper has been found seriously infested with the red cedar aphid. Where these insects are present usually the damage has been severe, characterized by the killing of the needles to such an extent that the plant dies. The injury produced is similar to that resulting from winter injury or red spider damage.

ASH

GREEN ASH APHIS (*Prociphilus venafuscus*)

In the vicinity of Hamilton, green ash is severely infested every year by this aphis species. To date, it has not been reported from other areas of the state. The principal damage occurs to the leaves on which the aphis feed in the spring and early summer. Their activities result in curling of the leaves and reducing terminal growth. This insect overwinters in the egg stage in cracks in the bark and trunk and on the main laterals of the ash tree. As soon as the buds begin to swell, the aphis eggs hatch and the young migrate to the leaf buds and commence feeding. During June and July, winged forms appear which migrate to an alternate host, returning again to the ash in September and October. These winged adults produce wingless forms which ultimately produce the over-wintering eggs.

GENERAL

FOREST TENT CATERPILLAR (*Malacosoma disstria*)

The forest tent caterpillar was one of the most conspicuous insect pests of shade and fruit trees during 1948. A severe outbreak of this insect occurred in the city of Billings, causing considerable damage where, in some cases, complete defoliation of smaller trees was observed. Extensive control measures were applied against this pest.

COTTONWOOD LEAF BEETLE (*Chrysomela scripta*)

Reports have been received of damage caused by the cottonwood leaf beetle to cottonwood trees in shelter belts. This insect occurs over all parts of the state but it has been reported as doing the most damage to trees in the western and northern counties.

BRACHYRINUS MERIDIONALIS

This insect has been a pest of lilac and other shrubs in some sections of the town of Hamilton for several years. Up to this time it has spread very little from the point of its initial introduction into Hamilton. This insect is a European species which has been previously noted only in the San Francisco bay region. The adult beetles are active mainly at night at which time they damage lilacs and other shrubs by completely defoliating them. They may be found during the daylight hours hiding under the trash and other debris in the immediate vicinity of the shrubs on which they are feeding. This pest is similar in appearance to the strawberry root weevil.

INSECTS INJURIOUS TO STORED PRODUCTS

GRAIN INSECTS

In the past the most important insects infesting stored grain and cereal products in Montana have been the confused flower beetle (*Tribolium confusum*), the flat grain beetle (*Laemophloeus minutus*), and the sawtooth grain beetle (*Oryzaephilus surinamensis*). Inspections made during the winter of 1947-48 revealed that many elevators and farm granaries were infested with these insects. In all cases, it was found that the infestations were brought about by either improper storage facilities or by storing grain with too high a moisture content.

Although infestations of these insects occurred in all parts of the state, the largest number of infestations were found in the northwest section of Montana. No granary weevils (*Sitophilus granarius*) were found during the survey.

HOUSEHOLD INSECT PESTS

CEREAL INSECTS

An unusually large number of requests for identification and control of household cereal insects has been received in the State Entomologist's office during the last two years. The most prevalent of these pests seems to be the confused flower beetle (*Tribolium confusum*), and the flat grain beetle (*Laemophloeus minutus*). These have been recorded infesting flour and other cereal products stored in the home and they are common all over the state.

OTHER HARMFUL INSECTS

TERMITES (*Isoptera*)

There has been a marked increase in the number of requests received in the State Entomologist's office for information concerning termites and their control. These requests have come from every section of the state with the exception of the northeast counties. Considerable damage to flooring and studding in homes was observed in Glendive and Billings. It appears that damage attributed to these insects is becoming more common from year to year.

DERMESTIDS (*Dermestidae*)

These insects occur commonly over the state and have been reported causing damage to food, clothing, carpets, and furniture. Dermestids have apparently been especially noticeable during 1948, particularly in the vicinity of Great Falls.

INSECTS INJURIOUS TO MAN AND ANIMALS

MAN

MOSQUITOES (*Culicidae*)

Weather conditions during the last biennium have been very favorable for mosquito breeding. High water and heavy rains during the spring have produced ideal breeding conditions for these insects, and many areas have suffered the heaviest infestations in years. Considerable interest has been shown in mosquito control programs in most of the heavily infested areas. The State Entomologist's office was consulted on mosquito control programs by Glasgow, Chinook, Havre, Miles City, Malta, Harlem, and Twin Bridges. Active control programs have been carried out in Glasgow, Malta, Miles City, and Great Falls, during the last two years. Considerable success has been reported from these campaigns. However, better results will be obtained when it is realized that airplane spraying and wholesale distribution of D.D.T. sprays are not the ultimate solution to the mosquito problem. The distribution of D.D.T. sprays along with a well planned program of eliminating mosquito breeding places, will, over a period of time, result in a less expensive program and more effective control.

LIVESTOCK

CATTLE GRUBS (*Hypoderma bovis* and *Hypoderma lineatum*)

Cattle grubs have been a serious pest to livestock for many years. During the last few years an increased interest on the part of stockmen has been shown in the subject of controlling these pests. Both the early cattle grub (*H. lineatum*) and the late cattle grub (*H. bovis*) are found in practically all sections of Montana. During the last biennium, research has been carried on by the State Entomologist's office and the Montana Agricultural Experiment Station to determine the distribution of these two species. There are some limited areas in the Gallatin Valley, the Big Hole in Beaverhead County, and possibly others, where *H. lineatum* does not occur.

Preliminary studies are under way to determine the emergence dates of these grubs in different parts of the state. Observations show that due to differences in seasonal temperatures, emergence dates may vary rather widely from year to year and from region to region. In some cases such differences may be observed within very narrow geographical limits.

As was stated, the interest in cattle grub control among ranchers has become more evident during the past two years and in some sections the ranchers are now cooperating to carry on control work on an area, rather than an individual basis. In general,

results of such programs have been quite successful. These ranchers report that the incidence of grub infestations has been greatly reduced.

CATTLE LICE

The interest shown by ranchers in louse control parallels that shown in cattle grub control, even though cattle louse problems have existed for years in varying degrees and intensity. While the reasons for seasonal variations in intensity of infestations are fairly well established, the variations which occur from year to year remain unexplained. There are three types of cattle lice which have a general distribution over the state. They are the long nose cattle louse (*linognathus vituli*), the short nose cattle louse (*Haematopinus curysternus*), and the biting louse (*Bovicola bovis*). With the development of new insecticides which are more effective against lice, it is expected that cattle lice control will soon be an established practice in the livestock industry. An increasing number of growers are now including cattle lice control in their herd management programs with very successful results. The State Entomologist's office is being requested to furnish information on materials and methods for setting up and carrying out these programs.

HORN FLIES (*Haematobia irritans*)

For many years these insects have been pests of livestock over the entire state. Now that effective methods of controlling horn flies have been developed, it has become evident that heavy infestations of these insects have been responsible for preventing many animals from making normal gains in weight. In many cases there are indications that the presence of horn flies may be in part responsible for the over-grazing of certain areas and the under-grazing of others because of the animals' attempts to avoid the flies.

SHEEP TICKS (*Melophagus ovinus*)

Sheep ticks often cause considerable loss in the sheep and wool industries. They are common in all of the sheep raising areas of Montana. Heavily infested flocks do not gain weight normally; lambs are occasionally killed by the insects; and a poor grade of wool is often produced. Sheep ticks are apparently more prevalent at the present time than they have been in previous years. The reasons for this increase in tick populations have not been established. Many of the new insecticides show considerable promise in controlling this pest, and growers, in general, have shown an increased interest in sheep tick control.

BIENNIAL REPORT OF THE MONTANA STATE APIARIST

1947 AND 1948

The State Apiculture Law which was passed by the 13th Legislative Assembly in 1947, has done much to stabilize the beekeeping industry in Montana. The enforcement of this law has prevented honey producing areas from becoming over-stocked; it has helped greatly in enforcing disease control; and it has brought about a more harmonious relationship between the beekeepers of this state.

In Lake County in 1946, the honey producing area was extremely overcrowded. Even during the war years, when honey was selling at a high price, the beekeepers in this area were not able to make their operations pay. After the law was passed, these producers called upon the State Apiculturist's office to meet with them to divide this territory into productive, economic units. As a result of this meeting, it was agreed that each of the different producers within this area would voluntarily move their locations as close as possible to their established bases of operation. Conflicting locations were abandoned and for the most part, the crowded conditions were corrected. The following year, honey production in this area was considerably greater than it had been in several years past and reports from that section this year indicate that the 1948 crop will far exceed that of last year. In this same locality in 1946, 6 percent of all of the colonies inspected were diseased. This year's inspection showed that only 1.1 percent of the colonies were diseased. Similar situations have been observed occurring in other parts of the state.

American foul brood is the only bee disease of economic importance in Montana. After a colony has become infected, the only method of controlling this disease is to burn all of the equipment which has come in contact with the diseased bees or honey. One of the main factors which makes disease control difficult is the runaway swarms of bees which locate their nests in buildings, trees, and other natural sites. Such colonies cannot be inspected and are very susceptible to American foul brood. In the past two years nearly seven hundred of these colonies have been destroyed by the State Apiarist. From American foul brood control programs conducted by various State and Federal agencies, it appears that sulfathiazole gives the most effective results in preventing this disease. It is the general belief of most workers that diseased colonies should be destroyed and that the most practical use of sulfathiazole is in preventing the occurrence of the disease. The use of this material has made it possible to reclaim territory that was previously abandoned due to the prevalence of American foul brood. Colonies in the Helena Valley at one time were 85 percent

infected with American foul brood. By careful inspection and the use of sulfathiazole, this figure has been reduced to six-tenths percent infection.

There has been a great increase in the bee industry in the last few years. In 1941, thirty-six thousand colonies were recorded in the state. This year, sixty-five thousand colonies have been registered. It appears, however, that the next few years will show a "leveling off" or even a decrease in bee populations. This statement is based on the fact that many honey producing areas in Montana are now over-stocked. In addition, there has been an appreciable drop in honey prices, while the costs of labor and equipment are steadily increasing. These conditions will make it impracticable for beekeepers to operate bees on marginal territory.

There is much that might be done to aid the beekeeper in producing larger honey crops. This phase of the work of the State Apiarist is necessarily limited because at present, most of his time must be spent on disease control and law enforcement. If adequate personnel were available, more time could be devoted to assisting the beekeepers in solving their problems.

The value of the bee industry in agriculture is generally not recognized. According to the United States Department of Agriculture, bees are 10 to 20 times more valuable as pollinators than they are for the honey or beeswax which they produce. With the extensive use of new organic insecticides which are very toxic to wild bees, many of the natural pollinators are being destroyed and honey bees may become more and more essential for the pollination of agricultural crops.

TABLE OF AMERICAN FOUL BROOD INCIDENCE IN COLONIES INSPECTED BY THE STATE APIARIST

1947

	No. colonies inspected	No. diseased colonies	Percent diseased colonies
Blaine	57	2	3.3
Carbon	24	0	0
Cascade	372	19	5.1
Custer	70	9	10.4
Flathead	231	24	10.3
Gallatin	1007	16	1.5
Granite	600	0	0
Lewis and Clark	26	2	7.7
Madison	54	4	7.0
Musselshell	73	1	1.3
Phillips	171	12	7.0
Ravalli	606	19	3.1
Rosebud	31	1	3.2
Treasure	2	0	0
Yellowstone	308	17	5.5
	3632	125	3.5

1948

Dawson	38	0	0
Fergus	846	87	10.3
Flathead	897	46	5.1
Gallatin	1068	9	.8
Golden Valley	60	0	0
Jefferson	79	0	0
Lake	336	4	1.1
Lewis and Clark	162	1	.6
Madison	586	4	.7
Missoula	302	6	1.9
Ravalli	934	38	4.0
Richland	142	0	0
Roosevelt	37	0	0
Sweetgrass	470	0	0
Valley	212	0	0
Wheatland	35	1	2.8
	6240	109	1.7

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