

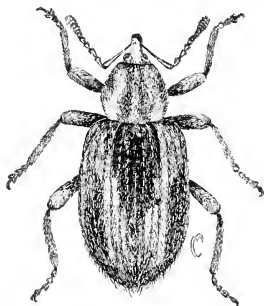
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MONTANA AGRICULTURAL COLLEGE
EXPERIMENT STATION

F. B. LINFIELD, Director

Bulletin No. 98

Eleventh Annual Report
of the State Entomologist of
Montana



The Alfalfa Weevil, a serious pest of alfalfa, not yet found in Montana

BY
R. A. COOLEY

BOZEMAN, MONTANA
February, 1914

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THE MONTANA EXPERIMENT STATION,
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Eleventh Annual Report of the State Entomologist of Montana

INSECT PESTS OF 1913

The season of 1913 was about normal in respect to the abundance of insect pests. As usual some species appeared in more than ordinary numbers and several new to Montana were discovered. A brief record of the insects which were of particular economic importance in 1913 follows. For the sake of convenience they are classified by orders.

ACARINA

Leaf Blister Mite (*Eriophyes pyri* Pgst.). In neglected orchards in the Bitter Root Valley this was the most injurious insect pest of fruits. On both apple and pear it was worse than for several years. Orchards which received the strong lime-sulphur spray just before the buds opened were practically uninjured, which goes to emphasize the importance of the dormant spray in the spraying program of the successful orchardist.

Plum Gall Mite (*Eriophyes padi* Nal.). This close relative of the leaf blister mite was very abundant in the eastern half of the State. We have observed it for a number of years in the Yellowstone Valley and this year it was sent in from Lewistown. It distorts the leaves of both cultivated and wild plums, and in many instances causes a loss of part of the fruit.

The Bulb Mite (*Rhizoglyphus hyacinthi* Boisduv.). This old-world pest was found in a shipment of imported bulbs consigned to a Montana florist.

Clover Mite (*Bryobia pratensis* Garman). Some injury to sweet peas and clover was caused by the clover mite during June and July, but it was as a household pest that it attracted the most attention. In Missoula and in other towns it swarmed over the exterior and into the interior of houses, causing much annoyance to the housewives.

CORRODENTIA

Book-louse (*Troctes divinatoria* Fab.). A sample of wheat contained in a glass exhibition jar was found to be alive with book-

lice. An examination of the grain showed that 35 per cent of the kernels had the germ eaten out. Injured kernels gave a germination test of only 33 per cent, while the sound kernels from the same sample tested 93 per cent.

ORTHOPTERA

Grasshoppers (*Acerididae*). Grasshoppers were again very troublesome in the lower Yellowstone Valley in the vicinity of Sidney, but were not so abundant as in 1912. An assistant was sent into the district to study the situation and to give advice on control measures. The two-striped grasshopper (*Melanoplus bivittatus* Scud) was found to be the most injurious species. Fall plowing to destroy eggs and the use of "hopperdozers" while the grasshoppers were small were the most effective control measures.

THYSANOPTERA

A Clover Thrip (*Haplothrips stativea* Holiday). Found in the heads of red clover in the Gallatin Valley, damaging the seed crop.

HEMIPTERA

Chinch Bug (*Blissus leucopterus* Say). An assistant was sent to Glasgow where the chinch bug was very abundant in 1911, but only a few specimens were found. Interesting facts concerning its life history were learned.

A Plant Bug (*Lygaeus lateralis* Dall.). An interesting feature of the season was the sudden appearance of thousands of these insects upon the streets of Billings one evening early in June. They swarmed about the street lights and covered the sidewalks but in a day or two had entirely disappeared. No injury to vegetation was reported.

False Chinch Bug (*Nysius augustatus* Uhl.). Reported as doing considerable injury to garden crops in many parts of the State.

A Predaceous Anthocorid (*Anthocoris melanocerus* Reut.). This is a beneficial insect inasmuch as it feeds largely upon plant lice.

The Green Apple Aphis (*Aphis pomi* De G.). Although the green apple aphis is abundant every season it was unusually so the past summer. In some instances even the fruit was attacked. Where the skin of an apple was pierced by an aphid beak, a pink spot appeared, resembling very closely the characteristic pinkish blemish

caused by the San Jose scale. This aphid is of growing importance because of recent discoveries by plant pathologists who have demonstrated that it is a carrier of pear and apple blight.

Cabbage Aphid (*Aphis brassicae* L.). Unusually abundant during the past summer. So many inquiries were received that an illustrated circular concerning its life history and control has been prepared and is now being distributed.

The Sugar Beet Root Louse (*Pemphigus betae* Doane). Root lice caused more injury in the sugar-beet district than for several years. It was estimated that in some fields the tonnage was reduced a third. The very complex life history of this important pest has been worked out as an Adams project and will soon be published.

The Green Bug (*Toxoptera graminum* Round.). Found to be quite abundant in several grain fields but apparently doing little damage.

Oyster Shell Scale (*Lepidosaphes ulmi* L.). This is the most injurious scale insect that occurs in Montana and each year it causes considerable loss of fruit. It is being studied under the Adams Fund. This season particular attention was given to ascertaining whether two dilute sprays for apple scab would also control the scale. Our observations indicate that the scale is much reduced by such treatment, but that the strong dormant spray is needed to completely control it.

LEPIDOPTERA

Bee Moth (*Galleria mellonella* L.). Reported from Flathead and Dawson counties.

Sugar Beet Webworm (*Loxostege sticticalis* L.). A bad outbreak of this pest again occurred in the Billings sugar-beet district. Approximately eight tons of Paris green were used in a spraying campaign against the worms and in nearly every instance the beets were saved. The attack occurred in June and, as in 1912, the usual August brood of worms did not appear. In several parts of the State alfalfa was injured by this pest.

Cutworms (*Noctuidae*). Climbing cutworms did considerable damage to young fruit trees in the Bitter Root Valley. In one big orchard where the cutworms had been abundant the previous year

they were completely controlled by banding the trees with Tanglefoot.

Codling Moth (*Cydia pomonella* L.). In the vicinity of Billings and Park City the codling moth was more abundant than ever before, and is year by year becoming more common in Montana.

The Oblique-banded Leaf Roller (*Archips rosaceana* Harris). This was reported in 1912 as a greenhouse pest. This season it was discovered in an apple orchard at Victor. The foliage was quite badly eaten, and judging from the masses of eggs that were deposited serious injury may be expected another year. We have also found it feeding upon cottonwood.

The Imported Cabbage Worm (*Pieris rapae* L.). This is by far the most abundant of the various cabbage worms. Its life history and control have been explained in an illustrated circular which is now being distributed.

Canker Worm (*Alsophila pometaria* Harris). While this is one of the oldest and best known pests of eastern orchards, it is not generally known that it occurs in Montana. Reports of injury that corresponded to canker-worm work has been coming to us for several years from Fromberg and a trip to that section confirmed our suspicions that the above named pest was doing the damage. In several orchards the foliage appeared as if scorched and no fruit was set. A simple method of control is to band the trees with Tanglefoot; this catches the wingless females as they climb up the trees to lay their eggs. The Tanglefoot should be applied early in the spring as the females emerge from the ground on the very first warm days.

Mediterranean Flour Moth (*Ephestia kuehniella* Zell.). Flour badly infested with this pest was sent to us from Bozeman.

DIPTERA

The Lip Bot Fly (*Gastrophilus haemorrhoidalis* L.). For some time horses in eastern Montana have been attacked during the summer months by what has been designated as the "nose fly". When attacked, horses became frantic, causing many accidents and serious interruptions of farm work. The fly flies near the ground, frequently between the fore legs, and then suddenly darts at the lips where the eggs are deposited instead of in the nostrils as is

commonly supposed. An assistant sent to investigate this pest learned many interesting facts concerning it and succeeded in capturing some of the flies, a very difficult feat, for they fly so rapidly that the average person never sees them. Specimens sent to the Bureau of Entomology, Washington, D. C., were identified as this species.

The Onion Maggot (*Pegomya ceparum* Bouche). In some Pozeman gardens seedling onions were completely destroyed. Onions grown from sets were also attacked but to a lesser extent. No effective control measures are known.

(*Leucopis griseola* Fall.). This tiny Agromyzid fly is of interest as it has been repeatedly observed feeding upon aphids of various kinds.

COLEOPTERA

False Wireworms (*Eleodes* sp.). Reported for the first time as injurious to grain. A grain grower in the Madison Valley reported that these worms ate the sprouts out of nearly one-third of the fall wheat that was seeded.

The Currant Fruit Weevil (*Pseudanthrenus validus* Dietz). A study of this beetle during the past season leads us to believe that it is responsible for nearly one-half of the injury which we had supposed was done by the currant fly (*Epochra canadensis* Loew).

Granary Weevil (*Calandra granaria* L.). Found in a shipment of flour at Miles City. Seventy-five sacks were infested. This is a notorious pest of stored grain and the knowledge of its presence in Montana should put grain growers on their guard.

Another Stored Grain Pest (*Cartodere ruficollis* Marsh). A number of these small beetles were found in a sample of wheat in Pozeman.

Spotted Blister Beetle (*Epicauta maculata* Say). Many reports of injury by this pest were sent in from various parts of the State. Garden crops and potatoes were the principal crops attacked.

Nuttall's Blister Beetle (*Cantharis nuttalli* Say). This striking beetle was sent in with the report that it was feeding upon alfalfa.

Colorado Potato Beetle (*Leptinotarsa decemlineata* Say). Reported as unusually destructive on the Flathead Reservation.

HYMENOPTERA

Poplar Leaf Folder (*Pontania bozemani* Cooley). Several letters were received asking how to control this shade-tree pest.

The Honey Bee (*Aphis mellifera* L.). Numerous inquiries were received relative to beekeeping. The presence of the bee moth and foul brood in some sections of the State emphasizes the necessity of apiary inspection.

THE ALFALA WEEVIL

In previous reports attention has been called to the presence of a very injurious pest of alfalfa, known as the alfalfa weevil, in Utah, Idaho and Wyoming. This insect has continued to spread toward Montana and in the territory previously occupied is as injurious as ever, excepting where effective control measures are in operation.

So far as we know the alfalfa weevil is not yet in Montana. That part of Montana which lies along the Oregon Short Line Railway from Butte to the State line appears to be most liable to get the weevil first and accordingly a careful search was made last June in this locality to determine if it was present. An assistant was sent to examine alfalfa fields and wild growing alfalfa in this territory. Eighteen days, from June 24 to July 11, were spent by this man, making careful search for all stages of the weevil and sending in the various kinds of insects that were found. He went on foot from field to field and from town to town along the tracks. No trace of the weevil was found and it is quite clear that at least there is no well established colony of the pest in the country which he searched. If this locality through which trains that have come out of the infested territory in Utah pass daily has no weevil it is probable that none yet occur in Montana.

THE QUARANTINE LAW

The last session of the legislature enacted the following law:

CHAPTER 61

"An Act to provide for the prevention of the introduction and spread of insect pests and diseases of horticultural and agricultural plants; and providing the penalties for violations of the provisions of this Act."

Be it enacted by the Legislative Assembly of the State of Montana:

Section 1. Whenever the Governor of the State has good reason to believe that any pest, gypsy moth, brown tail moth, Mediterranean fruit fly, potato wart, potato canker, black scab, potato ellworm, pea weevil, alfalfa weevil, alfalfa blight, flax canker, or flax wilt or other fruit or plant disease or insect pest dangerous or inimical to the horticultural or the agricultural industry exists in certain localities in another State, territory or country, or that conditions exist that render domestic horticultural stock or agricultural crops or plants likely to become diseased, he must by proclamation designate such localities and prohibit the importation therefrom of any tubers, plants, nursery stock, fruit or seeds or agricultural crops, plants or seeds likely to introduce or spread infection, contagion or insect pests into the State, except under such restrictions as he, after consulting with the State Board of Horticulture, the Commissioner of Agriculture or the State Entomologist may deem proper.

Section 2. Whenever the Governor of this State has good reason to believe that any pest, gypsy moth, brown tail moth, potato wart, potato canker, black scab, potato ellworm, pea weevil, alfalfa weevil, alfalfa blight, flax canker or flax wilt or other plant disease or insect pest, dangerous or inimical to the agricultural industry, exists within any county or locality within the State, it shall be his duty to prescribe and enforce such rules and regulations as may be necessary to circumscribe, eradicate or control such pests or disease.

Section 3. Any person, firm or corporation who after publication of such proclamation knowingly receives in charge any tubers, plants, nursery stock, fruit, seeds, or agricultural crops, plants or seeds from any of the prohibited districts and transports, conveys, sells or uses the same, within the limits of this State, is guilty of a misdemeanor and punishable by a fine of not less than ten (\$10.00) dollars or more than five hundred (\$500.00) dollars, and is further liable for any and all damages and loss that may be sustained by any person by reason of the importation of such prohibited and diseased tubers, plants, nursery stock, fruits, seeds, or agricultural crops, plants, or seeds.

Section 4. All Acts and parts of Acts in conflict herewith are hereby repealed.

Section 5. This Act shall be in full force and effect from and after its passage and approval by the Governor.

Approved March 8, 1913.

The State horticulturist, M. L. Dean, and the State entomologist were instructed by the Governor to make a careful inquiry into the alfalfa weevil situation and to prepare recommendations. Accordingly on April 16, 1913, we went to Utah and secured much valuable information. Following this, the Governor placed a quarantine on the following articles out of Utah and the counties of Bear Lake, Oneida, and Bannock in the State of Idaho and the counties of Unita and Lincoln in the State of Wyoming.

1. Alfalfa hay.
2. Forage crops of all kinds, whether loose or baled.
3. Alfalfa seed, unless accompanied by a certificate of fumigation.
4. All nursery stock, unless accompanied by a certificate of fumigation.
5. Fresh fruit and vegetables of all kinds during the months from April to October, inclusive.

This quarantine became effective on July 1, and the officials of the State of Utah raised the objection that sufficient time had not been allowed for their people to adjust their markets, resulting in a congestion of produce in Utah cities. By an amended proclamation the quarantine did not become effective until August 1. When it was decided that the quarantine should not go into effect until August 1, it was thought to be desirable to station a man at Butte to examine all freight and express shipments to see if weevils could be found. Accordingly an assistant, Mr. Seamans, was stationed at Butte and, while paid from funds from this office, he was appointed as an inspector under the board of horticulture by the secretary, Mr. M. L. Dean, who also assisted in the direction of his work.

Upon arriving in Butte, Mr. Seamans found that the branch office of the Bureau of Entomology at Salt Lake had also detailed a man to make the same kind of examinations. The two men therefore worked together. Shipments were gone over very carefully on their arrival and the walls, floors, and litter in the freight and express cars were searched.

Living weevils were found in four carloads of potatoes, the four cars containing respectively 8, 10, 12, and 20 insects.

Any one of these four lots might easily under the right surroundings start a colony of this dreaded pest in Montana and we think that the experience shows that our quarantine is needed.

Early in September, following a conference with Mr. Dean in Helena, the State entomologist again went to Utah to study the field and packing conditions and get any information possible bearing on the probability of shipments to Montana becoming infested with weevils.

A number of important points were developed by observations and by conference with the State and Federal men. The weevils go into hibernation about the first of August and in doing so disappear into the soil. I was informed that the season's work had shown that the weevils are much less inclined to leave the fields and get into miscellaneous articles which might be shipped out of the State than had been previously believed. Having confidence in the Utah horticultural officials, it seemed feasible to depend upon them for an effective inspection system which would so govern the packing conditions in Utah as to reduce to a minimum the chances of carrying weevils in shipments out of that State.

On returning to Montana and conferring with Mr. Dean, it was decided to recommend a modification of the quarantine, and a few days later a new proclamation was issued by the Governor which permitted the shipping of fruits and vegetables after August 1, provided the horticultural inspector of Utah would certify that each shipment had been repacked under his supervision; that all wagons and conveyances used in hauling to the packing houses had been kept free of alfalfa hay, straw, and other litter; and that packing houses at all times be kept free from alfalfa hay and other means of contamination. This modified quarantine is now in force.

During the year the State entomologist has prepared and the Experiment Station has published an illustrated, 15-page circular dealing with the life history of the alfalfa weevil and containing a copy of the law and the quarantine proclamation. This is intended for general distribution in Montana and also in the states on which a quarantine has been placed.

We have also prepared and distributed about forty exhibits of the weevil. These exhibits contain actual specimens of the weevil in the various stages and parts of alfalfa plants that have been injured by the insects. It is hoped that by means of the circular and the exhibits, growers of alfalfa in various parts of the State may learn to recognize the insect when it first appears in Montana. These exhibits were placed in public buildings and attention was called to them in local papers.

There can be little doubt that the alfalfa weevil will reach Montana eventually, for year by year it is getting closer and closer by cross-country spreading, but our present danger is from shipments direct from infested localities. However, every year that it can be delayed is distinctly worth while, for when it gets here it will cost Montana annually large sums of money.

THE SPOTTED FEVER TICK

The situation regarding the spotted fever tick in Montana has been materially changed during the past year. In December, 1912, following a conference with the newly elected Governor, the State entomologist went to Washington, D. C., in the hope of arousing interest in an appropriation for work on tick eradication.

We also conferred with representatives of the Bureau of Entomology of the Department of Agriculture. Our senior senator later introduced an amendment to the agricultural appropriation bill, which had already passed the House, and was successful in getting passed an appropriation of fifteen thousand dollars to be expended through the Bureau of Entomology. The United States Public Health Service has also allotted ten thousand dollars per year for work on spotted fever and tick eradication, thus making a total of \$25,000 per year from Federal sources. This is the first time that any considerable sum has been secured from the Federal government and a distinctly new chapter in the tick work has thus been opened.

The last legislature passed a bill to provide for the study and control of insects which transmit human and animal diseases. By the terms of this law the secretary of the State board of health, the State veterinary surgeon, and the State entomologist are constituted *ex officio* a State board of entomology with authority to prescribe rules and regulations. The act carries an appropriation of \$5,000

per annum for the ensuing two years. The law follows:

CHAPTER 120

"An Act to Create the State Board of Entomology. To define its powers and duties and appropriate money therefor."

Be it enacted by the Legislative Assembly of the State of Montana.

Section 1. There is hereby created the Montana State Board of Entomology, which shall be composed of the State Entomologist the Secretary of the State Board of Health and the State Veterinarian.

Sec. 2. The Secretary of the State Board of Health shall be Chairman of said Board and the State Entomologist shall be Secretary.

Sec. 3. None of the members of said board shall receive any compensation other than that already allowed by law, except that the actual expenses of members while engaged in the duties incident to the work of said board shall be paid out of the appropriation made to carry on the work of said board.

Sec. 4. It shall be the duty of said board to investigate and study the dissemination by insects of diseases among persons and animals, said investigation having for its purpose the eradication and prevention of such diseases.

Sec. 5. Said board shall take steps to eradicate and prevent the spread of Rocky Mountain tick fever, Infantile Paralysis and all other infections or communicable diseases that may be transmitted or carried by insects.

Sec. 6. Said board shall have authority to make and prescribe rules and regulations including the right of quarantine over persons and animals in any district of infection and shall have the right to designate and prescribe the treatment for domestic animals to prevent the spread of such diseases; but said board shall not have the right to prescribe or regulate the treatment given to any person suffering from any infections or communicable disease.

Sec. 7. All rules and regulations of the State Board of Entomology shall be subject to approval by the State Board of Health.

Sec. 8. The board shall publish in printed form all rules and regulations which shall be adopted by said board for the eradication and control of diseases of any kind and such rules and regulations

shall be circulated among the residents of every district affected thereby.

Sec. 9. Any person who shall violate any of the rules or regulations of the State Board of Entomology shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined in any sum not in excess of one hundred (\$100.00) dollars, or by imprisonment in the County Jail for any period not exceeding thirty (30) days or by both such fine and imprisonment.

Sec. 10. There is hereby appropriated out of any moneys in the State Treasury not otherwise appropriated the sum of five thousand (\$5,000.00) dollars, or so much thereof as may be necessary to carry on the work of the State Board of Entomology for the year 1913, and the sum of five thousand (\$5,000.00) dollars or so much thereof as may be necessary to carry on the work of said board for the year 1914. Said money to be expended under the direction and approval of the State Board of Examiners.

Sec. 11. All Acts and parts of Acts in conflict with this Act are hereby repealed.

Sec. 12. This Act shall take effect from and after its passage and approval.

Approved March 18, 1913.

While this law was undoubtedly intended to provide immediately for the necessary legal machinery for control or eradication of the spotted fever tick, its framer, Hon. Fred Whiteside, wisely made it of much wider application and any insect which transmits a disease of human beings or domestic animals may be investigated and if the board possesses sufficient information it may proceed to eradicate or control any such insect. This board, backed up by a small appropriation, can be of much service to the State. There are already several problems other than the tick which need attention.

Work on the seasonal history of the spotted fever tick is being continued. A series of longevity tubes has been established in Owl Canyon, four miles northeast of Bozeman, and observations are being made from time to time. The results of these tests are intended for comparison with those that have been secured in the tubes at Florence. These observations should add materially to our knowledge of the time required for the completion of the full life-cycle

and should throw light on other important points.

It now appears that we have another reason for being interested in this tick, which a few years ago was regarded as scarcely more than a source of annoyance to persons who had occasion to go into brush and pastures in the spring.

Dr. I. U. Temple of Pendleton, Oregon, Dr. Seymour Hadwen, pathologist to the Dominion Department of Agriculture, Agassiz, B. C., Canada, and others have called attention to what is apparently a well marked new disease, known as "acute ascending paralysis" or "tick paralysis."

This disease follows the bite of the tick and the location of the bite on the body seems to have much to do with the occurrence of the disease, as in these cases the bites are generally at the base of the skull or along the spine. Recovery of the patient is surprisingly rapid after the removal of the tick, and an early removal of the tick seems to prevent death. Most of the cases are in children.

The cases that have been reported so far have been mainly in northeastern Oregon and in southern British Columbia. It would be interesting to determine if cases have occurred in the territory between, in the State of Washington. Tick paralysis is of rare occurrence in Montana, but a few cases have been reported. None have occurred in the Bitter Root Valley so far as we know.

Doctor Hadwen has called attention to what is probably the same disease occurring in sheep in British Columbia. In a band of 900 sheep at Keremeos many died and many more were affected.

FEATURES OF THE YEAR'S WORK

Some of the main features of the season's activities in the entomologist's office were the work on the alfalfa weevil and on the spotted fever tick, the latter being done through the State board of entomology. These two lines alone absorbed much time.

In addition to these, work was done on the insects which were mentioned in the last annual report as requiring immediate attention, and many conferences have been held with the State horticulturist, with whom this office is always in close cooperation.

An assistant was sent to the extreme east end of the State to look into grasshopper conditions and to advise with farmers regarding control.

Further attention was given to the little known grain aphid which continues to cause injury in the Judith Basin and an assistant made one trip to the region where it is present and secured some notes.

Two new insect pests of currant and gooseberries which have been previously mentioned in our reports were further studied and we now possess fairly complete knowledge of the life-histories of both. The insects referred to are the currant fruit weevil and the currant thrips. It has been found that both of these insects are very injurious and it is desirable that means be devised for controlling them. Experiments in spraying for the currant thrips were conducted and a feasible remedy has been indicated.

Incidentally material additions from all parts of the State have been made to the insect collections. One new cabinet was purchased and immediately filled with systematically arranged insects. All the spare time that can be secured is being devoted to the insect collections, and an abundance of material, the accumulation of years of collecting in Montana, still awaits study. This collection is indispensable in our work for we are constantly called upon to give the names and important facts regarding a wide variety of insects from all parts of the State. Such work as this is of a miscellaneous nature and does not receive much attention in our reports, yet it consumes much time and is quite necessary.

The above lines of work and many others of a miscellaneous nature have been conducted during the year and are in addition to the main lines of research conducted by the Station entomologist under research funds furnished by the Federal government.