Canterbury Chamber of Commerce
Agricultural Bulletin

CATERPILLARS AND THEIR CONTROL

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BULLETIN CHRISTCHURCH, NOVEMBER, 1933 No. 53

Army worms, cutworms, and surface caterpillars are terms applied to the caterpillars of a number of different species of moth which frequently cause a great deal of damage to cultivated plants both in New Zealand, and in almost every other country in the world. The sudden outbreak of caterpillars and the resultant damage to wheat and grass in the Ashburton county in October, 1933, was due to the abnormal increase of one of these moths, namely, Persectania ewingi (P. composita or Melanchra composita). This is the commonest species in New Zealand, where it is usually called simply "caterpillar." The species of moth referred to all belong to the family Noctuidae, which means "night-fliers," a family of moth which is well represented in all parts of the world. In New Zealand there are 120 different species, while approximately 3500 are known from North America.

General Description.

All the adult moths are dull-coloured at least with regard to the front wings, greys and browns predominating. All the adult moths are heavily built and have a wing span of about an inch and a-half. They frequently escape observation during the day which they spend with folded wings on tree-trunks, etc., where the sombre colourings of the fore-wings blend with the surroundings and help to conceal them to a large extent from their enemies. They nearly always fly at night or at dusk, hence the name Owlets or Noctuids, and they are readily attracted to lights. On a mild summer night these moths may often be seen, their huge eyes flashing like rubies, as they flutter in vast numbers round a street lamp or come into the living rooms of our houses.

The caterpillars are smooth, and as a rule not hairy. They are often difficult to identify owing to the great similarity which exists between the species. They are up to an inch and a-half in length and usually are dirty grey in colour, sometimes tinged with chestnut brown, and have rows of blackish dots along their sides, with faint traces of stripes passing down the body from head to tail. They vary in colour at different seasons. While the common New Zealand species is usually light grey in colour, those at Ashburton were nearly black, but they are nevertheless the same species.

The Three Groups.

The cutworms fall into three groups, according to habit:—1. Climbing cutworms, which actually climb up the plant and eat the foliage rather than the stem. The best known example of this type in New Zealand is the closely related caterpillar which cuts V-shaped incisions in the leaves of native flax (Phormium tenax), and thus shortens the length of the fibre obtainable. This cutworm may often be found in large numbers during the daytime sheltering in the rolled-up dead leaves of flax.

2. Surface cutworms, which feed at or just above the surface of the ground and cut off the stems of plants. The great majority belong to this group.

3. Sub-surface cutworms, which feed entirely below the soil surface and cut the plants from one or two inches below the ground. This is a comparatively uncommon habit, but is shown in particular by the pale western cutworm, a notorious pest of the north-western states of North America.

Life History.

When the caterpillar is full fed it goes down into the surface soil and changes to a beautiful reddish brown chrysallis from which the adult moth emerges in due course. This resting stage probably lasts from one to two months, according to the season of the year.

The number of generations a year seems to vary with the species and the climate. Our common New Zealand caterpillar has two broods. The first brood may be found during the winter, but is particularly active in the spring. The second brood is well grown by harvest time, when binder canvases and threshing machines often become clogged with their bodies. Considerable damage is frequently done by this second brood of caterpillars. They eat off the branchlets of oats; they have been known to cut off heads of standing barley at the rate of one every six minutes; and they will work even in the stook.

The adult moths live for a comparatively short period, during which they may frequent flowers at dusk in order to feed on nectar. The females lay their eggs on the leaves or stems of many common weeds and cultivated plants. From these eggs, which are spherical and generally ribbed, young caterpillars hatch as a rule in from ten to fourteen days.

Destructiveness.

Caterpillars are the enemies of agricultural crops, devouring wheat, oats, barley, grasses, turnips, potatoes, tomatoes, etc. Cabbage and other seed beds may suffer, and the pests are also harmful to young forest trees in the nursery, biting through or barking the stems below ground. Numerous species are known as "cutworms" from their habit of coming out to feed at night and cutting through the stems of plants, so that the plants look as if they had been cut across with shears. Since the majority feed on the surface of the ground they have frequently been termed "surface caterpillars" and the popular term "Army-worm" has been applied to those species, which, when they have exhausted the food near their breeding place, mass together and march in hordes in search of new fields. It is usually in this stage that they are first discovered.

Noted Outbreaks.

Cutworms in Britain are particularly destructive to grass, cereals, turnips, potatoes, and tomatoes. The species most commonly met with there are the turnip moth (not the Diamond Back moth, but Agrotis Segetum), the Heart-and-Dart Moth, the Yellow Underwing, and the Antler Moth. In Canada frequent outbreaks of the Variegated Cutworm occur, while in the United States of America, the Cotton Worm, the Boll Worm, the Black Cutworm, the Fall Army Worm, the Pale Western Cutworm and the American Army Worm, are amongst the worst insect pests of that country.

Although cutworms are always fairly numerous in our fields it is seldom nowadays that they appear in such enormous numbers as to become a real menace to the farmer either in New Zealand or in Britain. There are well authenticated stories told in New Zealand of their having held up railway trains in the early days owing to the rails being made slippery with their crushed bodies. Old settlers still point out ditches which they have seen filled with caterpillars, and there is a record of an army of them being stopped by a water-race in South Canterbury, where sea-birds took full advantage of the blockage, eating their fill, vomiting it up, and eating their fill again.

The last serious outbreak in Britain, an outbreak similar to the one that occurred in Ashburton County in October, 1933, occurred in the Peak District of Derbyshire in 1917, when the Antler moth multiplied and caterpillars commenced marching in armies.

In Canada and the United States caterpillars are a far more formidable enemy, and destructive outbreaks much more frequent than in New Zealand. An extensive invasion of the Black Cutworm occurred in Arkansas State (U.S.A.) in 1927-28, when huge hordes of caterpillars attacked thousands of acres of corn land.

Reasons for Outbreaks.

It is difficult to establish definite reasons for these sudden outbreaks. Insects are normally held in check by birds, adverse climatic conditions, and parasitic insects, etc. As regards the Canterbury outbreak there does not seem to have been any recent violent fluctuation in the bird population of mid-Canterbury, and there is no reason to suppose that the parasitic insects have suddenly diminished in numbers or become less effective. The popular belief that mild winter temperatures previous to the outbreak under consideration are the main cause of the survival of abnormal numbers of caterpillars is most probably quite erroneous. Insects, particularly those which live in cold climates, are surprisingly resistant to low temperatures. Ground beetles have been found frozen firmly inside a lump of earth which was so hard that it could not be broken with the fingers; when subsequently thawed the beetles became quite active and behaved normally. Caterpillars which normally spend the winter in that state are not likely to be affected by the severity of the winters of mid-Canterbury. It is well known that severe fluctuations in temperature cause far greater mortalities than continued low temperatures, and that is the reason why insects are readily killed by late frosts in spring when they have survived much lower temperatures during winter. The more probable explanation of the outbreak is found in the droughts experienced at various periods during the past few years. The exceptionally dry conditions of the last two winters undoubtedly favoured the multiplication and development of generations of Army-worms. A series of dry seasons would tend to check the development of those fungoid and protozoan diseases which cause heavy mortality amongst insect larvae, and hence dry seasons are favourable to an increase of the pest.

Various Control Methods.

In countries where caterpillars are among the most serious insect pests much labour and money has been spent in evolving means of control. Running fire through old grass where an army is marching is a most effective means of destroying the caterpillars. Ploughing a deep furrow will alter the line of march and may even confine the caterpillars for a time to a restricted area. Such methods as driving mobs of sheep and the use of heavy rollers may have some limited use when the caterpillars are marching on hard, bare ground or on a roadway, but cannot be recommended when loose soil or crops are affected. At Ashburton twenty-one living caterpillars were found in a square foot of a wheat field, just after it had been rolled about twenty times with a Cambridge roller.

By far the most effective method of dealing with caterpillars and one which has received world-wide recognition, is the use of poisoned bait. This is usually prepared by thoroughly mixing 30lb of bran with either 1lb of Paris Green, or ½ to ¾lb White Arsenic or 4lb of Lead Arsenate paste.

To this is added from 1 to 2 quarts of molasses dissolved in about 3 gallons of water. This should make the mixture just damp all through but not sloppy. A few drops of Amyl acetate or Nitron-benzine (which may be purchased cheaply at any chemist) makes the bait more attractive to the caterpillars. This bait may be scattered along furrows if these have been ploughed to break the line of march, or simply scattered evenly over the ground. When sown broadcast on the land it may be used at the rate of 6 to 10lb per acre, when the cost would be 1s 6d per acre. On occasion it has been applied in much greater quantities. Where this bait has been extensively used there is no evidence to prove that birds have been poisoned through eating either the bait or the poisoned caterpillars. There is no danger of poisoning if stock are kept off the area until rain has fallen when any trace of arsenic left will be washed into the ground.

Referring to the Variegated Cutworm the Ontario Department of Agriculture Bulletin 359, April, 1931, states: "Usually any outbreak can be controlled completely by the combination of the furrow and of the poison bait, but it is seldom that the furrow will be needed."

The same bait may be used in gardens, but one which is less poisonous to human beings and domestic animals is desirable. The following is fairly effective against both caterpillars and earwigs: Mix 12lb of bran with 12oz of Sodium fluoride, then moisten with 1 quart of molasses and dissolve in 6 quarts of water. The mixture should be scattered thinly between the rows of plants as soon as injury is noticed. It is advisable to place the bait after sunset so that it will be in the best condition to attract the pests when they come out to feed at night. It should be placed near the plants but not touching them.

It may be well to add a note of warning in relation to poison baits. Paris Green, White Arsenic, and Lead Arsenate are very poisonous, and must be used with care. To prevent the dust from poisonous powders being inhaled it is advisable to tie a handkerchief over the mouth and nose, while the mixture is being made up.

Summary:

The caterpillars belong to a common New Zealand species and are always present in smaller or greater numbers. There are two broods per year, one in early spring and another at harvest time.

A sudden outbreak may be due to dry periods checking the diseases which commonly attack caterpillars. Control on old grass fields may be obtained by fires or ploughed furrows, but the means of control most generally applicable is poison bait.

This bait is made of bran and arsenic, can be used under all conditions, and costs about 1s 6d per acre. It is used in all other parts of the world where invasions of caterpillars are experienced.

Copies of this Bulletin may be obtained from the secretary, Canterbury Chamber of Commerce, P.O. Box 187, Christchurch.

Christchurch Press Co. Ltd., Printers