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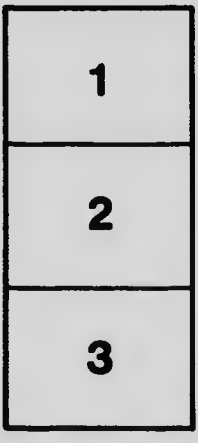

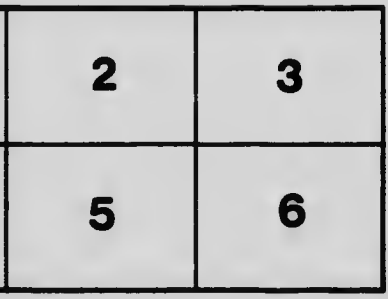

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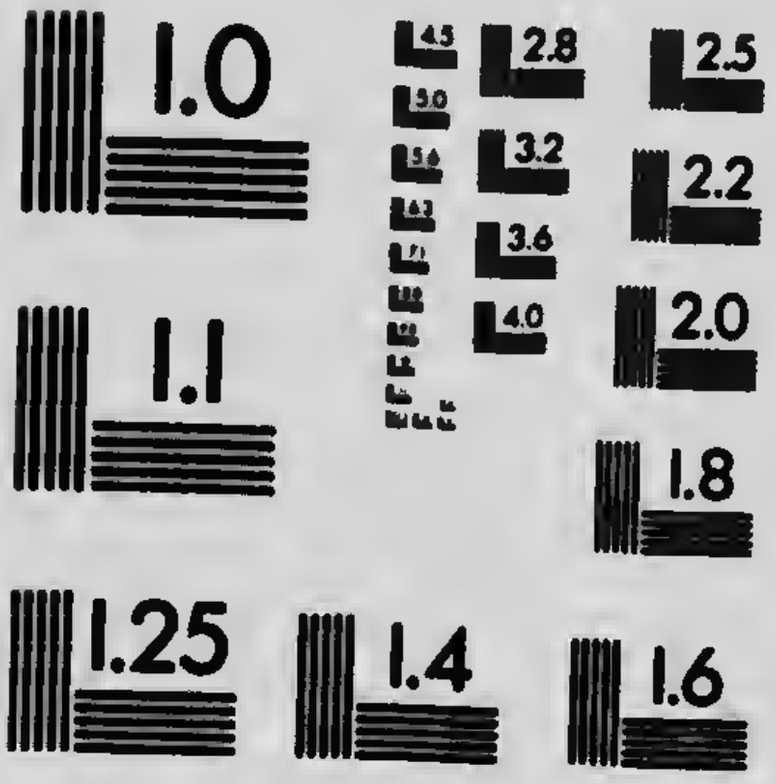

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ENTOMOLOGICAL BRANCH
C. GORDON HEWITT, DOMINION ENTOMOLOGIST.

THE CONTROL OF CUTWORMS

IN THE

PRAIRIE PROVINCES

BY

E. H. STRICKLAND, M.Sc.
Field Officer.

CIRCULAR No. 6

Published by direction of Hon. MARTIN BURRELL, Minister of Agriculture,
Ottawa, Ont.

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NOTE.

All inquiries relating to insect pests, and packages (up to 11 ounces in weight) containing specimens may be mailed "Free" if addressed to the Dominion Entomologist, Department of Agriculture, Ottawa.

In all cases where it is possible, living specimens of the insects should be sent enclosed in a strong wooden or tin box to prevent damage in transit. Living insects should be supplied with a liberal quantity of their food plant, and in all cases they should be carefully packed.

The name and address of the sender should be written on the outside of the package, and a letter giving as full details as possible should in all cases accompany the insects sent in for report.

Farmers in the prairie provinces may communicate with either of the following Field Officers: Mr. E. H. Strickland, Dominion Entomological Laboratory, Lethbridge, Alberta, or Mr. Norman Criddle, Dominion Entomological Laboratory, Treesbank, Manitoba, regarding insect injuries, particularly in cases of emergency. Letters and packages to these officers must bear postage and cannot be mailed free.

OTTAWA, December 1, 1915.

To the Honourable
The Minister of Agriculture,
Ottawa.

SIR,—I have the honour to submit for your approval Entomological Circular No. 6, entitled "The Control of Cutworms in the Prairie Provinces," which has been written by Mr. E. H. Strickland, Field Officer in charge of the Entomological Laboratory at Lethbridge, Alberta.

Owing to the serious outbreak of Cutworms in southern Alberta in 1912, when upwards of 35,000 acres of grain were destroyed in one district, it was decided to investigate the species of Cutworms responsible for the damage and the most satisfactory methods of control under western conditions. Mr. Strickland has been stationed at our Entomological Laboratory at Lethbridge, Alta., since 1913 and during the past three seasons he has made a careful study of all the commoner species of Cutworms and has carried out extensive experiments on their control. Our thanks are due to Mr. W. H. Fairfield, Superintendent of the Dominion Experimental Station at Lethbridge, where our Laboratory is situated, for his co-operation and assistance at all times.

In order to make the results of Mr. Strickland's work immediately and conveniently accessible to the farmers of the prairie provinces it is considered preferable to publish a brief circular setting forth the habits and the main results of the investigations on control measures. It has been found that under the drier conditions met with in certain of the prairie districts, particularly in southern Alberta, modifications in the usual poisoned baits are necessary.

It is most important that farmers and market gardeners should keep their crops under closer supervision than is usually the custom, with a view to detecting the presence of Cutworms or other insect injury in the early stages. Such constant vigilance would frequently result in the prevention of serious financial losses by rendering possible the adoption of control measures before the damage had assumed extensive proportions.

I have the honour to be,
Sir,
Your obedient servant,

C. GORDON HEWITT,
Dominion Entomologist.

THE CONTROL OF CUTWORMS IN THE PRAIRIE PROVINCES.

By E. H. STRICKLAND, Field Officer for Alberta, Lethbridge, Alberta.

Cutworms constitute the most destructive insects with which the farmers in the Prairie Provinces have to contend. Two species are specially important, namely, The Red-backed Cutworm (*Euxoa ochrogaster*) and the Pale Western Cutworm (*Porosagrotis orthogonia*). A third species known as the Army Cutworm (*Chorizagrostis auxiliaris*) occurs less frequently, though in greater numbers locally. On account of its specialised habits it calls for different treatment from that employed for other cutworms and it is not included in this circular.

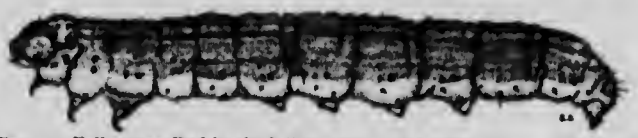

FIG. 1.—Full grown Red-backed Cutworm; twice natural size. (Original).

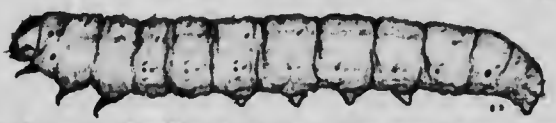

FIG. 2.—Full grown Pale Western Cutworm; twice natural size. (Original).

GENERAL LIFE-HISTORY OF CUTWORMS.

The eggs from which cutworms hatch are laid by a moth, or, as it is commonly called, a "miller," in August and September. Those of the prairie inhabiting species have been found in or on the soil. Most of them remain unhatched through the winter though a few hatch before the ground freezes up, and the young caterpillars begin to feed in the fall. These remain inactive underground through the winter and resume feeding as soon as the frost is out of the soil in the spring. The majority of eggs, however, do not hatch until the middle of April, by which date much of the spring sown crop is above ground. From

FIG. 3.—Cutworm moths: *a*, Red-backed; *b*, Pale Western; natural size. (After Gibson).

then on to the middle of June the cutworms feed extensively upon all classes of crops, and many weeds. By the latter date, in normal seasons, all are mature and have formed small oval cells in the earth within which they remain for a period ranging from a few days to about a month before turning to a brown pupa from which, at the end of another month the moth hatches. These moths fly almost exclusively at night time and must not be confused with the small moths which occasionally swarm on the prairie by day.

HABITS OF CUTWORMS.

Both of the injurious true Cutworms of the Prairie Provinces remain below ground during the day, coming near or to the surface at night in order to search for food. They rarely feed while on the surface, but burrow into the soil near a plant to bite through the stem below ground. Sometimes they continue to feed on the plant and draw it down for a considerable distance into the soil. When the soil is very dry, however, they more frequently simply bite through the stem below ground and pass on to the next plant, which is similarly destroyed. This habit accounts largely for the fact that cutworms do more damage in dry than in wet years. In wet soil the cutworms are able to move less freely below ground and come to the surface more extensively. At such times they feed more freely above ground. Since, however, the prairie is very dry as a rule during the cutworm period, they feed upon the surface to a very much less extent than they do in regions where the rainfall is greater. For this reason

FIG. 4.—Fall wheat, after summer fallow, destroyed by Pale Western Cutworm, showing characteristic damage to a slightly elevated spot. (Original).

control measures practical elsewhere are largely a failure when applied to prairie conditions, and the modifications given below are necessary for successful control with poisoned baits.

Cutworms avoid moist or hard soil when possible and are found in the largest numbers in the driest and most dusty or sandy parts of a field, where they can move freely just below the surface. For this reason they are usually most numerous early in the season upon the higher parts of a field where the soil dries out more rapidly in the spring. Later, they become much more scattered and may be present in small numbers throughout the entire field.

None of the usual prairie crops is immune from cutworm attack, for they feed freely upon grain, flax, roots and alfalfa, as well as upon all kinds of vegetable crops. The presence of cutworms in a field is not due to the crop that is being grown, but to the treatment of the field during the previous year.

HABITS OF THE MOTHS.

The moths fly from the middle of July to the middle of September. Throughout August and till about the 20th of September they are laying the eggs from which will hatch the next season's cutworms. The locations selected for egg-laying are almost exclusively *weedy summer fallows*, particularly those with a rough surface. The moths hide under the clods by day, but usually will not lay their eggs in, or on, the soil at a distance from green growth; so that even a rough fallow field on which there is no green growth whatever during August and September is fairly safe from cutworm attacks in the following year. Clean stubble land is rarely chosen by the moths for egg-laying and when cutworms appear in such fields the following year they have usually migrated in from a neighbouring field where weeds were allowed to grow. A field of which the surface is not broken and therefore does not offer shelter for moths, even

FIG. 5.—Flax following summer fallow destroyed by Red-backed Cutworm, showing subsequent growth of weeds which attract moths for egg-laying. (Original).

though it be very weedy, is in less danger than is a rough summer fallow upon which a small growth of weeds and volunteer grain has been allowed to remain during the egg-laying period.

CONTROL MEASURES.

Attention to fallow land.—Crops following summer fallow are always most liable to cutworm attacks. The reasons for this are given above, and a consideration of them will at once suggest measures which will render fallow land less attractive to cutworm moths for egg-laying.

Summer fallow must be kept *absolutely free from all green growth* between August 1st and September 20th and should be worked as finely as is consistent with good cultural practices.

Date of sowing fall wheat.—Since fall wheat is attractive to the moths for egg-laying it should not be sown earlier than the second week in September in order that it will not be above ground before the moths disappear.

Fall ploughing.—Land which has been allowed to grow up to weeds, and weedy stubble land, should be ploughed as deeply as possible in the fall, for on such land numerous eggs are deposited, and if well ploughed these eggs are buried so deeply that many of the cutworms hatching from them die from starvation before they reach the surface. This method of destruction is not, however, very certain, though if the field be harrowed or packed after ploughing its efficacy is increased.

POISONING WITH BAITS.—For field control under prairie conditions, it is seldom practical to spread poisoned bait over large areas on account of the expense of such an operation. Poisoning is, however, always a valuable and profitable method of controlling cutworms in market gardens and when properly employed can be used successfully in grain fields.

It has been stated that cutworms are most destructive to crops following summer fallow, and that it is from spots, which for some reason, such as their being higher than the ground-level of the field, are drier than the rest that a general infection spreads. Such places should be watched from time to time in the spring. If during the latter part of April or in May any signs of cutworm damage are seen on them they should be treated immediately with the bait described below, in order that the young caterpillar may be killed before they have become scattered throughout the whole field. In this way the damage to many acres may be considerably lessened by treating a comparatively small area. Farmers who delay treatment until these centres of infestation are nearly or quite stripped may find that the infestation has become too general to warrant the expense of poisoning.

The poisoned bait.—As a result of numerous experiments that we have carried out it has been found that the most reliable poisoned bait mixture for prairie conditions is the following:—

Shorts	50 lbs.
Paris green	1 lb.
Molasses	1 gallon.
Water	1½ gallons.

Shorts are preferable to bran for dry farming conditions, because no bait can be kept moist when applied to the soil, and cutworms will eat dry shorts when they refuse dry bran. In damp localities and seasons when the soil is moist the shorts can be replaced with an equal weight of bran in which case three gallons of water should be used instead of 1½ gallons. In all cases, however, shorts give somewhat better results than bran. Crude beet molasses* give the best results. It is suggested that arrangements be made with a storekeeper at each town in infested districts to keep a barrel of this extremely cheap and valuable material on hand.

Preparation.—Thoroughly mix the shorts and Paris green while dry. Care must be taken not to allow more of the Paris green dust to be breathed than is absolutely unavoidable, when making this mixture, for it is a violent poison. A handkerchief tied over the mouth will lessen any danger from this source.

Stir the molasses into the water and add the solution slowly to the shorts and Paris green, thoroughly mixing with the hands all the time to prevent lumps forming.

Application.—Apply to infested areas and for a few feet beyond at the rate of 50 pounds of shorts per acre, preferably in the late afternoon.

*This material can be obtained from beet sugar mills such as the Raymond Sugar Mills, Raymond, Alberta.

When the soil is very dry it is essential that the ground be lightly harrowed after the bait has been applied, for, as pointed out earlier, the cutworms feed almost exclusively below ground under these conditions, and a surface application of poisoned bait is nearly all wasted.

Harrowing is not necessary when the soil is moist.

Resowing fields after cutworm devastation.—No definite date can be given as to when it is safe to re-sow a field which has been destroyed by cutworms on account of the annual variations in season. During the past three years the date has varied from June 18th to June 28th, but farmers who desire to re-sow fields and wish for advice upon the subject are advised to send specimens of the average sized cutworms to either of the Dominion Entomological Laboratories at Treesbank, Manitoba, or at Lethbridge, Alberta, in order that they may receive information as to the approximate date when re-sowing will be safe in their district.

CONTROL MEASURES NOT SUITABLE TO OUR PRAIRIE CONDITIONS.

Farmers are sometimes confused by the variety of methods recommended for the control of cutworms. While a ceertain measure may be effectual in one region it may fail completely in another. In the course of our investigations we experimented with all kinds of methods of control, including baits, and in order that farmers may avoid unnecessary expense and disappointment we will indicate a number of control measures which are sometimes advocated but which we cannot recommend.

Light traps in the field.—A method of control, which has been occasionally recommended for cutworms consists of placing light traps in the field in order to catch the moths. Experiments with various light traps carried out by Mr. Norman Criddle in Manitoba and by the writer in Alberta have shown that such lanterns attract the moths of destructive cutworms in extremely small numbers and are absolutely valueless under prairie conditions as a means of control.

Lime and Salt.—The applications of these substances to fields for the destruction of cutworms has not been found to have any beneficial results.

Fruit juice added to baits.—Though this is apparently a valuable material when added to grasshopper baits, it has not proved to be of appreciable value when utilized for the control of prairie inhabiting cutworms.

Sugar and Salt added to baits.—Both of these substances are inferior to molasses as attractive agents and their use cannot be recommended in poisoned bait for application to dry soil when molasses are available.

Stubble burning in the Fall.—Cutworm eggs are rarely found in clean stubble land, whereas when a cropped field is so weedy that cutworm moths are attracted for egg-laying it is difficult to obtain a good burn. It is not advisable to burn over clean stubble land in the fall if the stubble will be of value for catching snow during the winter.