

CANTERBURY CHAMBER OF COMMERCE
AGRICULTURAL BULLETIN

Porina Caterpillars And Their Control
By The Use Of Poison Bait

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Bulletin

CHRISTCHURCH, APRIL, 1943.

No. 165.

Throughout the period of the year from April to August, many pastures in New Zealand are often severely damaged by Porina caterpillars, sometimes termed Subterranean Grass Caterpillars. (The term Porina which has been in general use for some time has unfortunately been replaced by the name Oxycanus). Over the past seven or eight years, for example, pastures in many parts of the South Island have suffered more from attack by Porina than from that by the notorious pasture pest — the grass grub. Since the control method which is to be discussed in this bulletin applies to Porina only and is of no avail against grass grub, it is essential that the insects themselves and the type of damage done by each be readily distinguished.

(a) Grass Grub and Grass Grub Damage:—The grass grub is the immature stage of the brown beetle which normally appears on the wing in large numbers every year during the months of November and December. This grub is easily recognised by its behaviour and appearance. It is a soft, dirty white bodied grub with a firm brown head and attains a length of about $\frac{3}{4}$ inch when full grown. It lies in the soil, frequently within an inch of the surface, doubled up in the form of a C. The grass grub generally occurs in greatest abundance in light, dry, shingly soils. It spends the whole of its larval life below the surface and feeds on the roots of

plants. Where the grub is working in pasture the surface becomes soft and spongy and covered with a layer of dead turf which readily peels off or may even be blown by strong winds. These dead patches vary greatly in size and extent, depending on the numbers of grubs present and their distribution. There is normally little real recovery of grub damaged areas, because the roots have been severed, and if the ground ultimately turns green it is due either to re-seeding or, more likely, to invasion by weeds.

(b) Porina and Porina Damage:—The Porina caterpillar is the immature stage of the fairly large greyish-brown Porina moth which commonly flies in great swarms on mild evenings during the second half of October and the early part of November. The caterpillars, which hatch from eggs scattered by the moths during their flight period, are not easily found in the soil, unless very careful search is made, until about the month of April when they will have reached a length of well over an inch. From that time they grow rapidly, and by the time they are preparing to turn to chrysalides in late August they may measure as much as $2\frac{1}{2}$ inches in length. The Porina caterpillar is a soft, lanky greyish-green creature with the upper surface much darker than the under, and the body very sparsely covered with hairs. If one of these cater-

pillars is held up between the finger and thumb, the soft, flexible body will droop like that of an earth-worm. The creature lacks the rigidity of the somewhat similar cut-worm caterpillar which has a much stouter body and usually lies in the soil coiled round clock-spring fashion. Porina caterpillars are often found to be more abundant in the fairly heavy types of soil and hence are destructive to the better pastures whereas grass grub is more a pest of the poorer pastures on the lighter soils.

The caterpillar lives in the ground in a vertical burrow which may go down 10 or 12 inches in deep loamy soil. At night it leaves its burrow to graze on top of the ground. Its food consists entirely of the above-ground portions of plants. Hence, where Porina is working the pasture becomes bare in patches; the ground remains firm because the plant roots are left intact, and there are large earth castings thrown up on the bare areas. The firmness of the ground in Porina infested soil is also due in large measure to the behaviour of the caterpillar which remains in its permanent burrow and does not move about through the soil swallowing and pulverising the earth in the manner of the grass grub. Damage occurs chiefly throughout the period April to mid-August. Unless the plants, clovers in particular, have been killed by persistent grazing hard down into the crowns, a considerable amount of recovery takes place later in the year. The important features are that the feed value of the pasture is greatly reduced in the early spring when it is urgently required; a considerable invasion of weeds takes place, and if the pasture is to be closed up for seed production it is likely to produce a much poorer crop.

Precautions Which Might Reduce Porina Infestation

Porina attack seems in the pres-

ent state of our knowledge to follow no well defined rules. For no very obvious reason one pasture may be infested while another nearby is not. There is, however, a strong probability that the time of shutting up for hay or seed may influence liability of infestation the following year. The adult moths are on the wing in greatest numbers from mid-October to the end of the first week in November. If a paddock is shut up during that period, or if stock happens to be kept off it, then there will be a little more cover for eggs when dropped, and the moths can lay their eggs without being disturbed by stock. When practicable heavy stocking of a valuable pasture during this critical period would appear to be a wise precaution.

Control by Poison Bait and Type of Bait to Use

The poison bait method of control, as universally adopted for other above-ground feeders like army-worms, cutworms and grasshoppers, has proved an efficient and in fact the only known reliable control measure for Porina. Because of its cheapness and ease of application, it is well worth adoption in order to protect a valuable pasture, particularly where abundant feed is required in early spring or where small seeds are to be saved, for the outlay will be insignificant compared with the probable return. A satisfactory poison bait mixture is as follows, and the quantities stated are sufficient to treat one acre:—
1½ pounds Paris Green, 30 pounds bran, 3 gallons water, in which is dissolved a pint of molasses.

If Paris Green (~~Chlorine Arsenate~~) cannot be obtained then lead arsenate powder as used for orchard and horticultural sprays may be substituted for it, but it requires to be used at the rate of 2½ pounds to 30 pounds bran when preparing the bait. The reason for adding molasses

is to sweeten the bait and presumably make it more attractive, and also to prevent the bran particles from drying out too quickly. Actually there is no conclusive proof that molasses does make the bait more attractive, and there is not much likelihood of the bait drying out too quickly while on the ground during the winter months. In consequence it is thought to be advisable to reduce the quantity of molasses to a minimum or leave it out of the mixture altogether because it makes the bait sticky and more difficult to broadcast evenly.

Mixing The Bait

The required quantity of bait is calculated from the total number of acres to be dressed, bearing in mind that one acre requires $1\frac{1}{2}$ pounds Paris Green, 30 pounds bran, approximately 3 gallons water, and 1 pint molasses. A very necessary precaution before mixing the substances is to tie a cloth over the mouth and nose to prevent inhaling the dust, as arsenic is very poisonous. Mix the dry Paris Green and bran thoroughly and on a clean concrete floor if possible. Then add the water gradually and mix thoroughly once more. If molasses is used it should be dissolved in a little hot water and added to the bulk water before this is poured over the dry Paris Green and bran mixture. The wet mixture is now ready for application to the pasture and can be distributed much more evenly and rapidly through a manure distributor than by hand.

When the caterpillars come up to feed at night they find the bait attractive and will readily eat the poisoned bran particles even although the ground is not bare and some grass or clover is still available to them. If possible the bait should be applied during a dry spell as it is not desirable that it should be washed into the soil by rain until a few days afterwards.

Time of Application

Damage to pastures takes place chiefly between April and mid-August. From April onwards a close watch should be kept on valuable pastures so that an application of bait can be made as soon as bare patches with earth castings begin to appear. Application of the bait after most of the damage has been done is of little avail. The caterpillars will have finished feeding about mid-August, hence the bait should be applied during the months of May, June or July, but certainly not later than the end of July.

Danger to Stock

The danger of poisoning stock is practically nil if reasonable care is taken to ensure that no lumps or small heaps of mixture are thrown down and if animals are kept off treated pastures for about a week, or even a shorter period if rain has fallen after treatment. Evidence from countries where similar baits are employed for grasshopper and cutworm control shows that the risk of poisoning small birds through eating poisoned bran particles or through devouring poisoned insects is also very remote.

Experience on the Canterbury Agricultural College Farm in 1942.

Several good pastures on the Canterbury Agricultural College farm were heavily infested with *Porina* caterpillars in the winter of 1942. Numerous bare patches began to show up in late June. Early in July it could be seen that the damaged areas were spreading at an alarming rate, and when sampling was carried out by digging up square foot blocks throughout the fields, caterpillars were abundant in both the bared and grassed areas. At this time when caterpillars are practically fullgrown there is no difficulty in estimating the numbers present provided enough random soil samples are examined. Past experi-

ence has shown that an average of two caterpillars per square foot (87,120 per acre) or more will cause heavy damage.

A total of about 120 acres was dressed with the Paris Green-bran-molasses bait. The bait was mixed and then applied broadcast by machine. Two types of machine (1) an 8 foot horse-drawn fertiliser distributor with a maximum daily acreage of 12 acres, and (2) a 14 foot motor truck top dresser with a maximum daily acreage of 80 acres on this class of work with all materials ready mixed, were used and both proved very satisfactory for the job. The total cost, including materials, mixing, and applying, worked out at approximately 7/- per acre. (Paris Green 3/- per lb., bran 1d. per lb., molasses 1½d per lb.). Highly satisfactory results were obtained from the treatment. The immediate effect seemed to be that the further eating off of grasses and clovers almost ceased and earth castings were no longer being thrown up. After a few days, rain having fallen in the meantime, large flocks of gulls and other birds were attracted to feed in those infested paddocks where water tended to lie. Whether the caterpillars were forced to the surface by flooding of their burrows alone or whether the poison had some effect in causing them to remain exposed on the surface is not definitely known. Commencing one week after application, periodic examinations of the bait-treated paddocks were carried out and a

heavy mortality among caterpillars was revealed. Dead caterpillars were rarely found on top of the ground and any which died there would be liable to be devoured by birds. Dead caterpillars were found mostly at a depth of 2 to 3 inches below the surface. The number of live, healthy caterpillars found after applying the treatment was not numerous enough to do serious damage. The treated pastures made a good recovery and those closed up at a later date for seed production very soon showed no trace of the attack.

Summary

The Porina caterpillar lives in a vertical burrow in the ground and comes to the surface at night to feed. It must not be confused with the grass grub which is small in comparison, white in colour, and lives constantly below ground level, feeding on roots. Poison bait control is applicable to surface feeders only. The bait recommended per acre is 1½lbs. Paris Green, 30lbs. bran, and 1 pint of molasses in 3 gallons of water, mixed and broadcasted in the months of May, June or July. In the winter of last year 120 acres of infested pasture of the Canterbury Agricultural College farm were treated and satisfactory results obtained. The cost of material and broadcasting averaged 7/- per acre. If best results are to be obtained, it is necessary to broadcast the mixture as soon as the first signs of damage are in evidence.

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