

Oregon Agricultural College Extension Service

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Three Insects Affecting Clover Seed Production

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This account includes a discussion of control measures recommended for the three most injurious of the clover insects in the State of Oregon. Its aim is to place in the hands of the growers information whereby they may combat these destructive pests intelligently and thus prevent serious losses in the yields of clover seed. The department of Entomology of the Oregon Experiment Station has had these pests under observation for a period of several years. Because of the importance of the problem, an intensive study of them will be continued. The present circular, therefore, is intended merely to supply growers with the best available data for the control of these particular clover enemies.

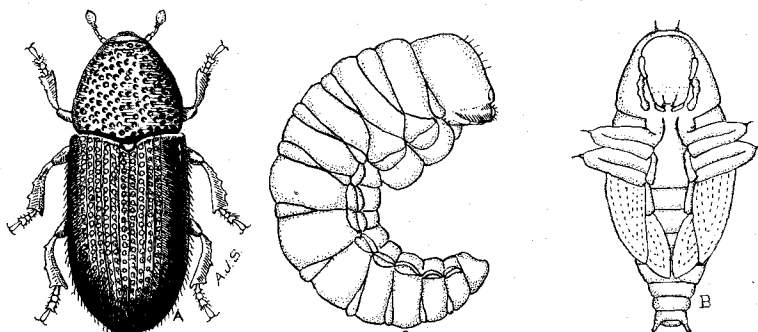


Fig. 1. The Clover-Root Borer; a, Adult Beetle; b, Quiescent Stage or Pupa; c, Mature Grub.

It is advised that growers who desire additional data in regard to these or other pests of clover communicate with the Oregon Agricultural College, Corvallis, Oregon.

The Failure of the Seed Crop. Clover in the Willamette Valley has proved to be very profitable as a seed crop. Those who grow clover seed profitably on a commercial scale, owe their success, whether they are aware of it or not, to practices which operate chiefly against the insect enemies of the seed. Under the same conditions of soil and climate, one man is able to get a good crop of seed, while his neighbor is not. This is chiefly due to the fact that there are three destructive insects that must be guarded against if one wishes to raise a good crop of clover seed; namely, the seed midge, the seed chalcid, and the root borer. When clover blooms well, and climatic conditions are favorable, the failure of the seed crop may be charged largely to the work of one or all of these three insects. Serious losses may usually be prevented by simple farm practices, the most important of these being the early clipping of the hay crop.

TWO PESTS WHICH ATTACK THE SEED DIRECTLY

There are two insects in Oregon which may seriously affect the production of red clover seed directly. These pests are known as the clover-seed midge and the clover-seed chalcid. The former attacks the unfertilized seed ovule; the latter breeds in the maturing seed.

The Clover-Seed Midge. This is a very serious pest of the red clover seed in the Willamette Valley. Where this pest is present in abundance in a field, the clover heads do not bloom normally. The heads turn brown prematurely and appear blighted; upon opening the seed capsules, small salmon-pink maggots are exposed. These are the maggots (Fig. 3) of the clover seed midge. The maggots are responsible for the damage to the florets, where the flower parts are hollowed out and emptied. Having entered the flower bud, the maggot consumes the fluid contents of the ovary before the bud has a chance to open.

The adult midge is a minute, fragile two-winged fly (Fig. 2). These midges appear in the field at about the normal period of blooming of the clover. The females deposit eggs among the opening florets. The young maggots work their way into the open end of the floret, and down to the unfertilized seed ovule (Fig. 3). They feed here until mature,

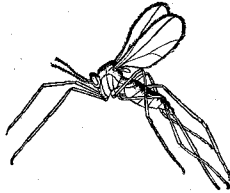


Fig. 2. The Clover-Seed Midge (Adult).

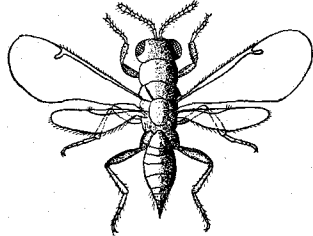


Fig. 4. The Clover-Seed Chalcid (Adult)

when they drop to the ground. Here they spin minute silken cocoons inside of which they transform to adult midges.

The second generation of midges is usually present about the time the second, or seed, crop of clover begins to bloom. The infestation of the clover heads takes place in the same way as just described. The full-grown maggots work their way a little below the ground to spin their cocoons, and it is in these cocoons in the soil that they pass the winter.

Where the clover field does not bloom normally, if the heads are reduced in size, distorted, or lose quickly their pinkish color, one should make a careful examination for the maggots in the seed ovule. The degree of infestation can be approximately estimated, in fact, by the appearance of the field in bloom.

The Clover-Seed Chalcid. This insect attacks the seed of both clover and alfalfa; and the more serious injury due to it so far, in Oregon, appears to be on alfalfa in the eastern part of the State. Its attack is on the maturing seed, and often the first evidence of the injury is observed at threshing time. The infested seeds are light in weight, dull in color, and sometimes shriveled.

The adult chalcid is a minute, black, wasp-like insect of compact form (Fig. 4). These chalcids appear at about the time the clover heads are maturing, when the females deposit eggs inside the shell of the seed, choosing the seeds where the shell is not yet completely hardened. The grubs feed on the interior of the seed. They may abandon one seed, eat into and devour another. They transform inside

the mature seed, and the adult chalcid eats its way out. As in the case of the midge, there are two generations of chalcids; one for each crop of clover heads. Those of the second generation pass the winter in the stored and fallen seed, emerging in the spring.

CONTROL MEASURES

So far as is known, the same control measures will apply to each of these pests. In a normal season, these pests are present in their greatest abundance at the time the clover normally blooms. To change slightly by some practice the time of blooming of the clover seed crop affords our most feasible method for lessening their injury. If it is desired to obtain both a hay crop and a seed crop, the hay crop should

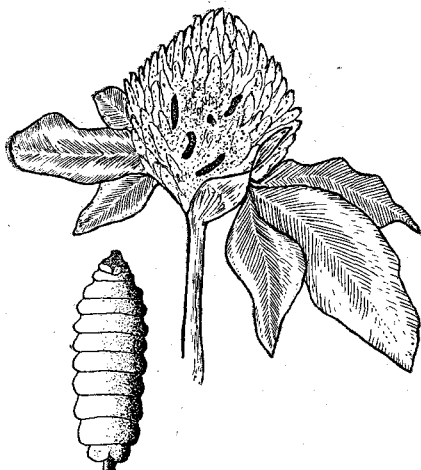


Fig. 3. The Clover-Seed Midge; a, Maggot; b, Clover head with maggots.

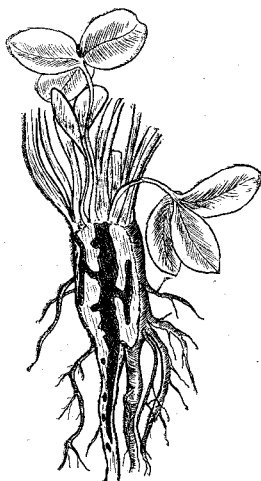


Fig. 5. The Clover-Root Borer, showing tunnels in clover root.

be mowed ten days to two weeks earlier than the usual time. We cannot set a specific date or time when this should be performed, as the climatic conditions influence the emergence and further activities of the seed midge and seed chalcid. The object of this early cutting of the clover is to cut short the development of the maggots before they mature, by drying up their food plant. This practice also hastens the development of the second crop of clover heads, so that the midges of the second generation usually have but few green heads in which to lay their eggs. Cutting need not be done until the field is fairly fresh with bloom, but should not be delayed until the flowers commence to wither. A very common practice in the Willamette Valley is to pasture clover with sheep from April first to June first and then remove the sheep and get a seed crop. The clover should be clipped after the sheep are removed to insure an even stand and to destroy any clover heads present. It is also suggested as probably advisable to remove the sheep somewhat earlier than is commonly done, and clip, in order to hurry up slightly the blooming period of the seed crop.

THE CLOVER-ROOT BORER

This pest is without question the most serious to clover in the Pacific Northwest. That many failures of the clover seed crop supposedly due to the activities of the seed midge are actually due to the

injury by this borer is undoubtedly true. The rapid deterioration of the older fields and the indifferent growth of the younger fields following short periods of drouth are common effects following the work of the pest.

The insect passes the winter for the most part as an adult beetle (Fig. 1-a), resting in the tunnels in the clover roots made by the previous season's grubs. The adult beetle is dark brown in color, cylindrical, body hard and less than one-eighth inch in length.

These beetles become active in the spring, leave the tunnels, and fly out over the field. Many of them fly to new fields of young clover and start an infestation there. The female beetles eat out shallow grooves or troughs on the sides of the tap root and crown of the clover plant, and deposit eggs along the sides of this trough. These eggs are very small and white. They hatch in a few days, and the young grubs eat their way inside and proceed to tunnel up and down and through the root system, (Fig. 5). When they are present in numbers, the tap root and crown are simply riddled; by September the plant wilts down and upon examination is found to be practically severed from the root, so that it can be easily kicked out of the ground. The mature grub (Fig. 1-c) is a little more than one-eighth inch long, white, wrinkled, somewhat curled, with a small brown head. The first grubs, which are mature in early July, transform to small white pupae (Fig. 1-b) inside these tunnels, and later change to adult beetles. The first adult beetles occur about August 1. The grubs continue to mature and transform to beetles during August, September, and October.

Red Clover is apparently the only crop seriously injured by the root borer. Alsike, alfalfa, vetch, field beans, and peas are sometimes attacked, but the injury is seldom serious. Any of these crops may, however, serve as a breeding place for the pest.

This pest is so serious in Oregon that it is seldom that clover can be depended on to produce a profitable yield the second crop year, particularly a seed crop. The plants are seriously injured as early as the fall following the harvest of the first seed crop, the majority of the plants dying or making so little growth as to prove of no value.

CONTROL MEASURES

There is no material at present known which may be added to the soil for the control of the clover-root borer. No spray will reach the insects in their tunnels in the root. We must rely, then, on cultural methods. Taking into account the fact that but few of the grubs are mature in midsummer, the following recommendation is made. Immediately following the harvest of the clover seed crop from the first crop year clover, plow the field. This plowing will turn up the infested roots and allow them to dry out, thus starving the grubs inside. To be effective this plowing cannot be delayed; for early in July the larvae begin to pass into the quiescent or pupa stage in which they take no food. They would then doubtless transform and emerge as beetles in some numbers in spite of plowing. Use a dry-land or disc plow and do a thorough job. If entire communities where this borer is bad would follow this practice for a few years, the pest would unquestionably be reduced to near extinction. Certainly the injury from its attack would be comparatively slight for a period of years. In any case, red clover should not be permitted to struggle along after the second year, to furnish a nursery for this pest and others. Destroy all volunteer clover, which furnishes a good nursery for all kinds of clover insects.