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Insects and Sweetclover Seed Production

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"How can I produce more sweetclover seed?" This is a question of interest to many Minnesota seed growers today. Recent research sponsored by the University of Minnesota, in cooperation with the Iron Range Resources and Rehabilitation Commission, has resulted in some helpful answers. There is much yet to be learned about insects and sweetclover seed production, but here is a progress report on results obtained so far.

WHAT ABOUT POLLINATION OF SWEETCLOVER?

Use Honeybees -- Seed yields have been increased in test fields where honeybees were placed in or near the seed fields.

Sweetclover must be cross-pollinated if profitable yields of seed are to be obtained. This transfer of pollen from the flowers on one plant to the flowers on another is almost entirely by insects. Comparison of seed yields from an area where insect pollinators were kept off the sweetclover by cages, with an area of the same field supplied with honeybees, clearly demonstrated the value of honeybees in increasing seed yields (table 1).

At Alvarado, where a large field completely isolated from honeybees was compared to a field supplied with honeybees (40 miles away, near Crookston), the seed yields also showed the importance of the honeybees (table 2).

Fig. 1. Colonies of honeybees placed in the fields increase yields of sweetclover seed.

TABLE 1. SWEETCLOVER SEED YIELDS PER ACRE, N. W. MINNESOTA, 1955

Fertilizer (lbs. per acre)	All insect pollinators excluded	Pollination by honeybees: Not sprayed to control injurious insects	Pollination by honeybees: Sprayed to control injurious insects
Check	6 lbs.	1,078 lbs.	1,378 lbs.
0-20-0..... (500 lbs.)	20	1,286	1,438

Wild bees, such as bumble bees, pollinate sweetclover and are commonly present in sweetclover seed fields. These wild bees help to increase seed yields -- but usually are so few in number for the acreage concerned that they can not be depended on for adequate pollination. For example, it was estimated that there was approximately one bumble bee per 25 square yards in Field A at Alvarado (table 2).

Sweetclover seems to be one of the most attractive crops to honeybees, and it is known to be valuable bee pasture for the production of high-quality honey.

In some kinds of legume seed fields, it is difficult to increase honeybee populations and pollination. But honeybees will work sweetclover readily. Usually it is not difficult to increase honeybee populations in a field by placing colonies in or near the seed field (figure 1).

TABLE 2. SWEETCLOVER SEED YIELDS WITH AND WITHOUT HONEYBEES, N. W. MINNESOTA, 1956

	Honeybees per sq. yd. (average)	Seed yields per acre
Field A--Isolated from honeybees.....	none	63 lbs.
Field B--Colonies of honeybees placed in the field.....	4.6	455 lbs. *

* Yields substantially reduced by early frost.

Pollination of sweetclover is not difficult for the honeybee in routine visits to the flowers.

Fig. 2. Healthy sweetclover blossom (left), and weevil-damaged blossom (right).

How Many Bees Are Needed? -- Just how many bees are needed for maximum seed yields or honey production on sweetclover hasn't yet been determined. The number of colonies needed per acre depends on many conditions -- such as the strength of the colonies used, acres of other flowers within flight range of the bees, and attractiveness of the clover.

On the basis of observations made in recent tests, one colony of bees per acre of sweetclover within flight range of the bees seems to be a bare minimum for a profitable seed set. Two colonies per acre and more seem to be desirable. In experimental fields, 6 to 10 colonies per acre have resulted in progressively greater bee populations in the fields and correspondingly larger seed yields.

Distribution of Bees in the Field -- This is important. Present evidence indicates that in fields of 5 to 10 acres, the bees were distributed fairly evenly when colonies were placed in one location in or near the fields.

But in larger fields (especially the long narrow ones), when bees were placed at one end of the field only, seed set was considerably higher at that end than at the other. High and low seed yields corresponded closely with high and low bee populations. These results suggest that colonies of bees used in pollinating sweetclover should be located at several points in the larger fields.

Fig. 3. "Chewing" damage to plant leaves is typical of the sweetclover weevil (arrow).

WHAT ABOUT THE CONTROL OF INJURIOUS INSECTS?

Sweetclover seed yields have been increased where injurious insects have been controlled by use of insecticides (table 1). These results are based on tests where second-year stands were sprayed once early in the spring and again just before the clover blossomed -- each time with 1/2 pound of actual dieldrin per acre.

Adult sweetclover weevils have recently been observed feeding on all floral parts and green seed pods of sweetclover (figure 2). These insects were not previously considered pests of sweetclover seed.

Protect New Seedings -- In recent years, sweetclover weevils have been a principal cause of stand failures of new seedings in Minnesota. They must be controlled if stands are to be established. Extension Folder 180, "Sweetclover Weevil," describes their life cycle and seasonal history, and suggests methods of control. You can get the folder from your county agent.

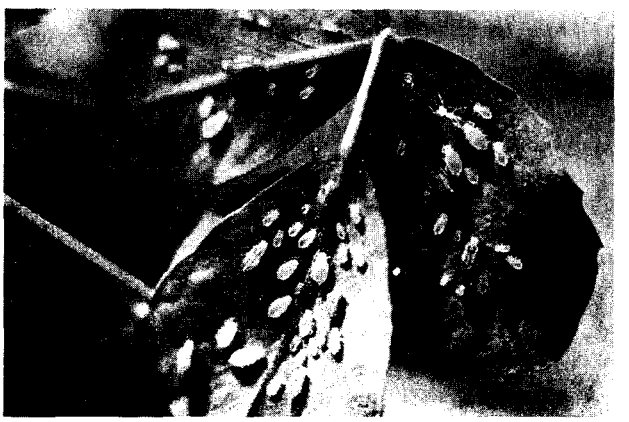

Fig. 4. Sweetclover aphids feeding. The aphid sucks the plant juices from the leaf.

The destructiveness of a new insect, the sweetclover aphid, on new seedings has been recognized since 1954. Studies of the aphid are just beginning. Preliminary studies in 1956 indicated that dieldrin applied early in spring to control the weevils on a new seeding also effectively reduced sweetclover aphid populations.

The sweetclover weevil destroys the new seedlings by chewing the leaves and eating the various parts of the plant (figure 3). In contrast, the aphid has a beak and feeds by sucking plant juices (figure 4). Feeding by the aphid results in yellowing leaves and leaf drop.

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