

FNE 93-12

Northeast Region SARE MINI GRANT FINAL REPORT

Bio-Control of Corn Earworm and European Corn Borer in Sweet Corn

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Restate Goals

1. Test biocontrols for Corn Earworm and European Corn Borer in Sweet Corn.
2. Establish procedures for scouting, intervention, and evaluation.
3. Share information with other growers.

Information on the farm

Since 1979 I have organically farmed a variety of vegetable and grain crops. Vegetables have included snap peas, green beans, cowpeas, lima beans, potatoes, winter squash, pumpkins and gourds, sweet corn and Indian corn, and fresh soybeans. Grains, legumes and seed have included wheat, rye grain, barley, oats, sorghum, red clover, hairy vetch, black beans, soybeans, and buckwheat. Most recently my main crops are sweet corn, fresh soybeans, winter and decorative squash and gourds, and rye grain and hairy vetch seed. All field preparation, planting and cultivation done with tractors and standard farm equipment. All harvesting is done mechanically with the exception of the peas, corn and squashes. I have a five year rotation: Beans-corn-beans-squash/potato-small grains. Soils are silty clay loams to loams. I no-till rye, vetch, and rye/vetch mixtures for my fall cover crops. Most vegetable crops are succession planted, and some are double cropped after a small grain harvest.

Cooperators

Roles

Doug Britt, Agricultural Consultant, AgLife, Inc.	Locate products, scouting
Dr. Galen Dively, Entomology Dept., U. of MD	Consultation on use of Bt
Dr. Lee Helman, Entomology Dept., U. of MD	Consultation on cover crops for beneficials, and on monitoring pest damage to sweet corn

What was done and How It was done

Interplanting Red Clover with Sweet Corn

Interplanting Red Clover-Red clover was planted two weeks before sweet corn with a grain drill and in another area two weeks after sweet corn and broadcast by hand. Rotary hoeing was done on both plots to control early weeds.

Strip cropping with Hairy Vetch and natural vegetation (weeds)

The center of a pure stand of Hairy Vetch was disked under in late May and planted to a short maturity sweet corn in early June. This configuration left 8 36" rows of sweet corn flanked by the equivalent of 8 rows of Hairy Vetch on either side. The Vetch was mowed in late June just as the leaves were beginning to brown. In addition, two 6 foot borders of weeds were allowed to develop on the outside of the Vetch patches in order to keep green vegetation as a beneficial insect habitat near the corn. Ears were checked for evidence of parasitization on pest eggs.

Spraying with Bt

Four rows of corn scheduled to mature in mid-August were sprayed with Bt at the first sign of silking and at approximately 3 day intervals until the silks started to turn color. The spraying was done on the tips and silks only with a backpack sprayer at the labeled rate for Dipel. Four rows of the same planting were not sprayed.

Harvested ears from the sprayed and unsprayed rows were compared for evidence of tip damage due to borers or earworm.

Release of *Trichogramma pretiosum*

For corn maturing in August, *T. pretiosum* was released over an eight week period culminating at the last August harvest and covering all corn from the pre-silk stage. The release rate was about 100,000 eggs per acre per week on an area of about one and one half acres.

Despite previous commitments, no *T. maidus* was made available by ~~the U of Iowa~~ *Illinois State Univ.* for this project.

Results

Interplanting Red Clover with Sweet Corn

The Red Clover treatment was not effective because the clover could not become well established before weed pressure threatened the viability of the

corn crop. A better system would probably be to fall seed the red clover or to plant in an established red clover stand that had been mowed just prior or just after corn planting. This would allow the corn to become established while the red clover was regrowing and perhaps competing with other weeds in the understory. However, the effect of the red clover on attracting the proper beneficial insects and the behavior of the beneficials to be more attracted to the corn pests in the silks than to remain in the red clover has not been established to my knowledge. Additional research and field trials in this area could establish the connection between the beneficials and the corn pests.

Strip cropping with Hairy Vetch and natural vegetation (weeds)

Some evidence of egg parasitization was found both before and after mowing the vetch. However, the corn variety used did not develop large marketable ears, and there was evidence of earworm and corn borer damage in the mature ears. Because of the difference in the corn variety and the lack of a control strip, it was difficult to tell if the presence of the vetch and weed buffer strips created a positive effect. According to the scouts and my observations, many beneficials were present in the "green" strips. However, vetch is not an ideal crop for this system since it turns brown in July before the corn has fully filled with silk. This system is not worth repeating, but a refinement of the red clover system might be worth pursuing, since the red clover will stay green through the summer..

Spraying with Bt

Spraying with Bt was somewhat effective. The sprayed rows had less damage to the tips, particularly the first maturing ears. After three pickings, damage still exceeded 20% of the ears harvested. About half of these damaged ears could be trimmed and sold. Damage was quite heavy in this year in the unsprayed rows, over 40% of the ears harvested had damage. Again, half of these damaged ears could be trimmed and sold. The amount of labor required to spray four rows of 750 feet each totaled 2 hours per spraying. The investment in specialized high clearance equipment (6 foot high spaying rig) plus the cost of the Bt and the labor for spraying is probably not justified by the results.

Release of *Trichogramma pretiosum*

The release of the *T. Pretiosum* during the season for the later maturing corn did not prevent significant amounts of tip damage, in excess of 40 %, due to earworm, borer, and fall army worm. It should be noted that much of the tip damaged corn had only slight damage and was marketable either with or without minor clipping of the tips during sorting and packing. However, in other years, we have achieved about the same percentage of damaged but marketable ears. I suspect that because the *T. pretiosum* parasitic wasp is a wide ranging predator and not specific to sweet corn pests, its effectiveness is very limited.

Procedures for scouting, intervention, and evaluation

No specific procedures were developed since none of the tested biocontrols were deemed successful enough to repeat.

Dissemination

The results of these field trials were shared with the membership of the Maryland Organic Food and Farming Association at two different field days, one of which was on this farm. No written materials were produced since none of the procedures were considered effective enough to repeat.