Progress/Termination Report

PROJECT: 3096

TITLE: Monitoring leafrollers in areawide sites

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JUSTIFICATION:
Control of codling moth (CM) with pheromone rather than broad-spectrum insecticides is the foundation of the Codling Moth Areawide Pilot Project (CAMP). As a pest control tactic, mating disruption (MD) is highly specific. Thus, implementing this tactic for codling moth control will have a significant impact on nontarget arthropods, both pests and their natural enemies. The potential for some species to increase as a pest problem in the absence of CM cover sprays appears to be one of the greatest challenges to the adoption of MD for many growers. Two species of leafroller, *Pandemis pyrusana* (pandemis leafroller or PLR) and *Choristoneura rosaceana* (obliquebanded leafroller or OBLR), have increased in abundance in all CAMP sites and caused substantial levels of fruit injury in a number of orchards (1, 2).

The ability to monitor and prevent the establishment of leafroller populations is crucial to the success of pheromone based pest management programs throughout the western region. Detecting larval infestations before they reach damaging levels is very difficult. An alternative approach is to monitor leafroller populations with pheromone traps. Pheromone trapping systems are commercially available for PLR and OBLR, but their use has been limited primarily to tracking the seasonal phenology of leafrollers. PLR and OBLR pheromone traps are highly attractive, often capturing several hundred moths per week. Trap maintenance is difficult and costly. In addition, the consensus in the fruit industry is that the number of moths captured does not correlate well with larval densities and fruit injury. High moth catches occur in orchards without a detectable resident population. We suspect that moths from adjacent orchards are locating the highly attractive pheromone lures. In addition, low moth catches do not always indicate low levels of larval activity.

The standard lures used for monitoring PLR or OBLR are red septa loaded with at least 1 mg of either PLR or OBLR pheromone. Preliminary studies conducted in 1995 indicated that the standard dose may be too high to effectively monitor these species. Results of our 1996 CAMP research project confirmed that a red septum loaded with 0.1 of the standard dose of PLR pheromone or 0.05 of the dose of OBLR pheromone was still attractive to males of these species, but significantly fewer moths were captured in a trap baited with the low-load lure than in a trap baited with the standard lure (2). Moth catches in low-load traps were consistently higher in orchards with substantial levels of leafroller larval activity as indicated by feeding on fruit or foliage. Furthermore, there was good correlation between moth catches in low-load traps during the OW flight and fruit injury at harvest. PLR and OBLR moth catches in standard load traps during the OW flight also provided a good measure of subsequent larval activity. However, the low-load trap was easier and less expensive to use than the standard trap because the reduced moth catch in this trap resulted in fewer replacements of the trap bottom. Additional studies indicated that field longevity of the low dose and standard lures is equivalent, about six weeks (Gut and Brunner, unpublished data).

We plan to repeat our direct comparisons of the field performance of standard and low load PLR and OBLR lures in 1997. Hopefully, this will confirm the promising results obtained in 1996. It will also allow us to evaluate the relationship between moth catches during the late summer (1996) and larval activity in the spring of the following year (1997).

OBJECTIVE:
To develop an effective pheromone trapping system for pandemic leafroller and obliquebanded leafroller.

PROCEDURES: Standard load PLR and OBLR red septa, and septa loaded with 0.1 of PLR pheromone and 0.05 of OBLR pheromone will be obtained from Trece, Inc. The effectiveness of pheromone traps baited with standard or low load lures will be directly compared in orchards at all five CAMP sites, as well as in a number of orchards at other locations (primarily those associated with the SARE project). Comparisons will be repeated in the 27 orchards monitored for PLR and the 20 orchards monitored for OBLR in 1996. In addition, OBLR will be monitored in six orchards in Randall Island. For each species, Pherocon 1C traps (Trece, Inc.) baited with red septa containing lures with either the standard or low pheromone dose will be uniformly distributed in orchards at a density of approximately one trap per 1.25 acres. The number of male moths captured will be recorded weekly and trap bottoms will be replaced after a cumulative catch of 50 moths, more often if dirty. Lures will be replaced every four weeks.

Larval densities of the overwintering will be estimated in each of the orchards where traps are placed. Larval sampling will be conducted toward the end of each generation. The overwintering generation will be sampled after petal fall when the population is comprised of late instar larvae feeding in spur shoot leaves. Densities of the summer generation will be estimated in late July or early August when most individuals are late instar larvae feeding in shoot tips. A total of 20 growing points per 20 trees will be examined around each trap during each generation. A sample of 25 fruits on each of 20 trees in proximity to each trap will be inspected for leafroller injury at harvest. The relationship between moth capture and larval density or fruit injury will be inspected for leafroller injury at harvest. The relationships between moth capture and larval density or fruit injury will be evaluated by regression analysis.

Pheromone emission rates of field exposed, standard and low load lures will be determined by residual analysis using GLC. Twenty standard and 20 low load lures for PLR and OBLR will be placed in traps in the field at the start of the OW and SU flights Five lures of each type will be collected at 10-day intervals during each first flight.

PROGRESS: A final report will be provided at the Entomology review in January 1998.

FIT INTO AREAWIDE PROJECTS:
This project will be conducted in all five CAMP sites. A build-up of leafroller populations in 1996 was reported for each site. Monitoring of leafrollers has been identified by growers, fieldmen and researchers as an area needing improved techniques if MD is to be adopted on a large scale. CAMP offers an excellent opportunity to conduct research in a large number of orchards receiving very few broad-spectrum insecticide sprays.

RELATIONSHIP TO OTHER FUNDING AND PROJECTS: Two active projects support research on monitoring leafrollers with pheromone traps. Evaluating new IPM technologies is one component of a three-year project funded jointly by the Sustainable Agriculture Research and Education (SARE) special grants program and the Washington Tree Fruit Research Commission (WTFRC). A graduate student affiliated with this project, Glenn Thayer, has identified leafroller monitoring as a major focus of his thesis. He will primarily investigate questions relating to the response of leafrollers to various lures. Large-scale field studies like those proposed here are difficult to conduct in SARE sites because there are only six reduced insecticide blocks in which to work. A proposal to continue testing new traps and lures for monitoring various orchard pests, including leafrollers, will be submitted to the Washington Tree Fruit Research Commission.

BUDGET:

Amount allocated by the Commission in 1997-98:	$13,340
Request for FY 1998-99:	$0

REFERENCES:

(1) WRCC-43 areawide project reports, 1995, Yakima. (2) WCC-43 areawide project reports, 1996, Summerland.