MANAGEMENT OF THE OBLIQUEBANDED LEAFROLLER AND ORGANOPHOSPHATE INSECTICIDE RESISTANCE WITH SOFT PESTICIDES IN NEW YORK APPLE ORCHARDS

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The 2000 growing season marks the completion of the second year of a proposed three-year research project with the following objectives: (1) To determine if populations and fruit damage from OBLR will decline in commercial orchards treated with soft pesticides for several consecutive seasons because of the effects of natural enemies (parasitoids and predators). (2) To determine if resistance levels of OBLR to organophosphates and other classes of conventional pesticides will decline during 2-3 growing seasons in plots set up in commercial apple orchards treated entirely with soft pesticides. Plots, ranging in size from 4-30 A, were set up initially in 1999 in 5 commercial orchards in Wayne and Orleans Co., and in a research orchard at Geneva. A grower's standard plot of similar apple cultivars and tree training systems, which was treated with a normal, organophosphate based insecticide program was used as a comparison for the soft insecticide plots on each farm. Colonies were collected from 4 of the 5 commercial orchards during early spring prior to the beginning of the first and second season of the project and laboratory bioassays were conducted to compare the susceptibility of each population to two organophosphates commonly used in NY orchards, Guthion and Lorsban. Treatments of soft pesticides were initiated in the research plots during the 1999 growing season and continued in the research plots during the second year of the program (2000) throughout the season. The soft insecticides and the proposed targeted pests for each material are shown in table 1.

Table 1. IPM-Compatible insecticide and acaricide treatments for management of OBLR and other arthropod pests of apples.

Pesticide	Application Strategy & Target Pest*
Apollo or Savey	Pink, European red mite (ERM)
Pyramite	Summer, applied at ERM Thresholds
Provado	Aphids, spotted tentiform leafminers, leafhoppers, applied at threshold levels after sampling
Dipel	Overwintering OBLR (petal fall), 1st Gen. codling moth according to model predictions (1-2 sprays).
Spinosad	Second Gen. CM spray according to model predictions, followed by 1-2 more sprays for control of the summer Gen. of OBLR and apple maggot as determined from trap catches.

* If necessary, border sprays of Imidan or Guthion will be applied at petal fall and as needed according to oviposition model predictions for control of the plum curculio.

The susceptibility of overwintering OBLR larvae from the soft pesticide blocks and a susceptible colony to Guthion and Lorsban were compared in laboratory bioassays in the initial year of the project (1999) and the second year of the study (2000). The resistance ratios for

Guthion were lower in both the soft pesticide blocks and in a comparison population from a standard commercial orchard during the 2000 growing season than in 1999, but the resistance ratios for Lorsban in the commercial orchard and soft pesticide blocks did not change greatly from the 1999 to the 2000 growing season. These results suggest that organophosphate resistance is fairly stable in populations of OBLR in NY apple orchards, and multiple seasons of reduced selection pressure may be necessary before resistance levels substantially decline in orchards treated with soft pesticides

The total amount of OBLR damage was considerably lower in all of the soft pesticide blocks than in the standard comparison plots during the 2000 growing season (Fig. 1). The average total damage at the end of the season was less than 2.0% in most of the "soft insecticide" blocks. The overall percentages of clean fruit in the "soft insecticide" blocks were similar at harvest to those in the comparison blocks (Fig. 2). However, plum curculio damage was observed in several of soft blocks, particularly near the borders next to woods. The general levels of curculio damage in these soft programs was higher at the end of the 2000 season than in the initial year of the trial. No damage from internal lepidoptera or apple maggot was observed in either the standard of soft plots. Populations of foliar pests such as mites, aphids, leafhoppers, and spotted tentiform leafminers were low throughout the season in the soft blocks.

Fig. 1. Comparison of total OBLR damage in standard and "soft insecticide" plots during the 2000 growing season.

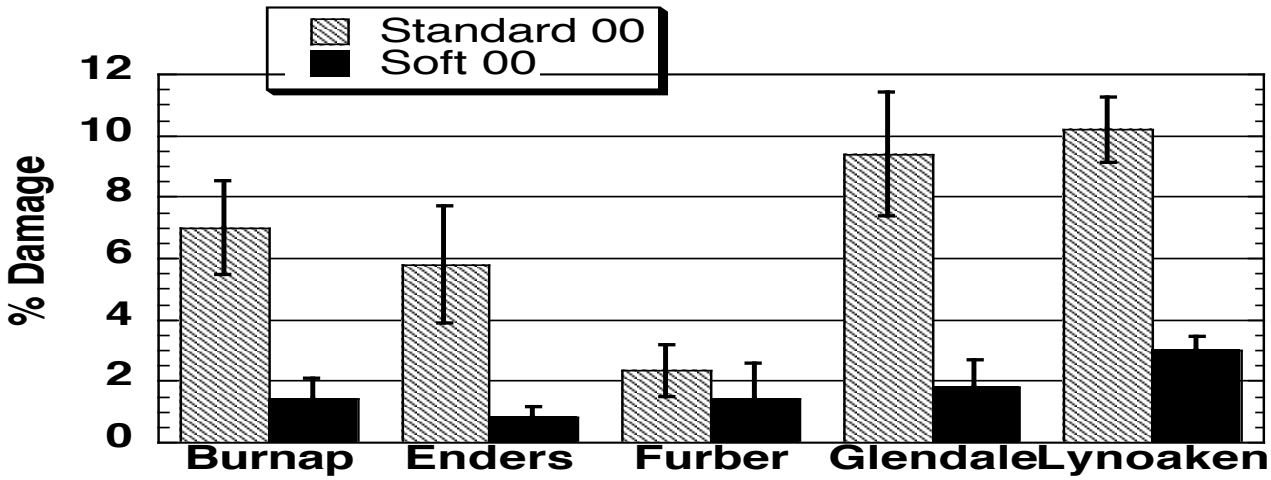
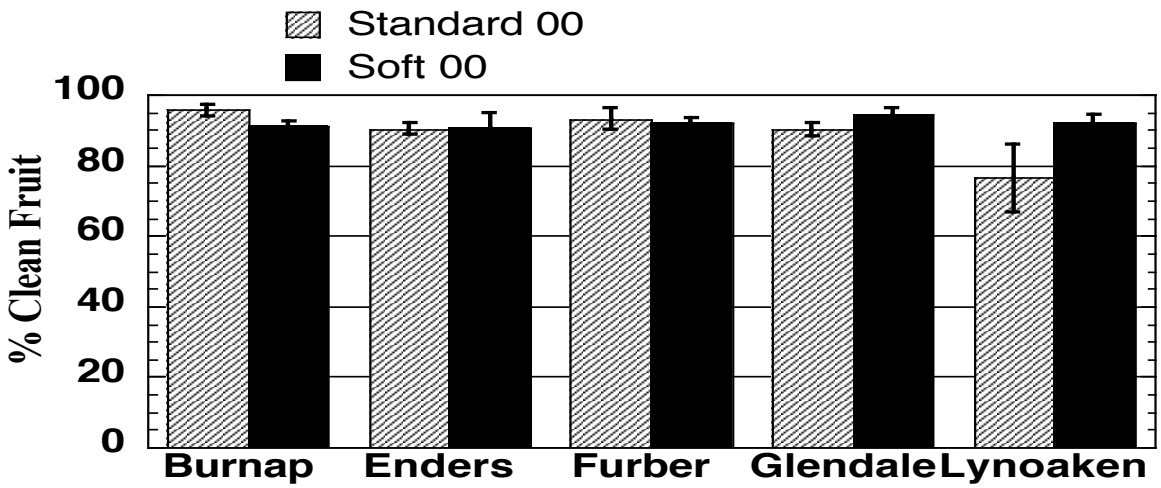


Fig. 2. Comparison of percentages of clean fruit in standard and "soft insecticide" plots during the 2000 growing season.



Although the results on the second year of this study appear very promising , this work should be continued at least one more season to determine if the reductions in OBLR populations and damage and acceptable levels of fruit damage from other major pests in the soft blocks can be sustained for multiple seasons. Also, it will be essential to continue to test the susceptibility of the populations of OBLR in these blocks to monitor the stability of resistance to organophosphate resistance under this soft pesticide regime. Ultimately, this study should be expanded to include substantial numbers of representative orchards in areas throughout NY state that have chronically experienced severe damage from OBLR.

If continued studies show that OBLR populations can be reduced to low, sustainable levels under this type of selective pesticide regime, it is likely that NY growers in areas that are severely infested with this pest will implement this program within a very short period of time. Unfortunately, insecticide costs for this type of selective management program may be somewhat higher than a standard schedule relying on conventional broad spectrum materials. However, long-term studies in orchards treated with conventional control programs, have shown that OBLR populations persist at damaging levels from year to year in chronically infested areas in spite of the continued heavy use of insecticides specifically for control of this pest. In contrast, the adoption and implementation of this type of program could result in a long-term solution to the management of OBLR and the rest of the orchard arthropod pest complex. Ultimately, in the future if FQPA regulations result in the elimination of organophosphate insecticides from use in apple orchards, growers may have to adopt this type of selective insecticide program on their entire apple acreage throughout NY state.

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NON-TECHNICAL ABSTRACT

The 2000 growing season marks the completion of the second year of a proposed three-year research project with the following objectives: (1) To determine if populations and fruit damage from OBLR will decline in commercial orchards treated with soft pesticides for several consecutive seasons because of the effects of natural enemies (parasitoids and predators). (2) To determine if resistance levels of OBLR to organophosphates and other classes of conventional pesticides will decline during 2-3 growing seasons in plots set up in commercial apple orchards treated entirely with soft pesticides. Plots, ranging in size from 4-30A, were set up initially in 1999 in 5 commercial orchards in Wayne and Orleans Co., and in a research orchard at Geneva. A growerís standard plot of similar apple cultivars and tree training systems, which was treated with a normal, organophosphate based insecticide program was used as a comparison for the ìsoftî insecticide plots on each farm. Colonies were collected from 4 of the 5 commercial orchards during early spring prior to the beginning of the first and second season of the project and laboratory bioassays were conducted to compare the susceptibility of each population to two organophosphates commonly used in NY orchards, Guthion and Lorsban. Treatments of soft pesticides were continued in the research plots during the second year of the program (2000) throughout the season.

The results of monitoring the susceptibility of ovewintering OBLR during the start of the 200 grwoing season in the blocks that had been treated with soft pesticides the previous year showed that organophosphate resistance is fairly stable in populations of OBLR in NY apple orchards. Therefore, multiple seasons of reduced selection pressure may be necessary before resistance levels substantially decline.

The total amount of OBLR damage was considerably lower in all of the soft pesticide blocks than in the standard comparison plots during the 2000 growing season The average total damage at the end of the season was less than 2.0% in most of the soft insecticide blocks. The overall percentages of clean fruit in the soft blocks were similar at harvest to those in the comparison blocks. However, plum curculio damage was observed in several of soft blocks, particularly near the borders next to woods. The general levels of curculio damage in these soft programs was higher at the end of the 2000 season than in the initial year of the trial. No damage from internal lepidoptera or apple maggot was observed in either the standard or soft plots. Populations of foliar pests such as mites, aphids, leafhoppers, and spotted tentiform leafminers were low throughout the season in the soft blocks.

Although the results on the second year of this study appear very promising , this work should be continued at least one more season to determine if the reductions in OBLR populations and damage and acceptable levels of fruit damage from other major pests in the soft blocks can be sustained for multiple seasons. Also, it will be essential to continue to monitor the susceptibility of the populations of OBLR in these blocks to determine the stability of resistance to organophosphate resistance under this soft pesticide regime. Ultimately, this study may have to be expanded to include substantial numbers of representative orchards in areas throughout NY state that have chronically experienced severe damage from OBLR.

If continued studies show that OBLR populations can be reduced to low, sustainable levels under this type of selective pesticide regime, it is likely that NY growers in areas that are severely infested with this pest will implement this program within a very short period of time. Unfortunately, insecticide costs for this type of selective management program may be somewhat higher than a standard schedule relying on conventional broad spectrum materials. However, long-term studies in orchards treated with conventional control programs, have shown that OBLR populations persist at damaging levels from year to year in chronically infested areas in spite of the continued heavy use of insecticides specifically for control of this pest. In contrast, the adoption and implementation of this type of program could result in a long-term solution to the management of OBLR and the rest of the orchard arthropod pest complex. Ultimately, in the future if FQPA regulations result in the elimination of organophosphate insecticides from use in apple orchards, growers may have to adopt this type of selective insecticide program on their entire apple acreage throughout NY state.