Costs of Conventional Versus Low Input Peach Production in the Eastern United States

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Keywords: *Prunus perisca* 'Redhaven', 'John Boy', 'Bounty', 'Encore', *Grapholitha molesta,* Oriental Fruit Moth (OFM), organophosphorous insecticides, organophosphates

Abstract

Peaches (*Prunus perisca*) in the eastern U.S. are a high value crop encompassing 32,800 bearing ha, or 52% of the national total (fresh and processing). The 1999 eastern peach crop was valued at $191 million U.S. Eastern peach production is centered in three main areas: the upper mid-West (MI), the mid-Atlantic (NJ, PA) and the Southeast (GA, NC, SC). Peaches constitute a major component in the diets of infants and children. Implementation of the Food Quality Protection Act of 1996 has and will continue to limit reliance on organophosphate insecticides, which have been the foundation of pest management programs for the past forty years. The project evaluated the cost of pest management systems based on reduced-risk tactics that combine the use of turf ground cover to manage catfacing insects and mating disruption for oriental fruit moth. Previous research and experience indicated that these systems would be effective, sustainable, economically viable, and led to enhanced biological control.

Overall, insecticide use in RR plots was about 41% of that used in conventional plots across all varieties. When the cost of the pheromone mating disruption dispensers are added, the picture changes. The cost of materials for the reduced risk program ranged from $119.34 higher than the conventional treatment in 'Bounty' to $7.96 less than the conventional treatment in 'John Boy'. The reduced risk treatments required less labor than the conventional treatments across all varieties.

The per hectare analysis of cost of product and application of insecticides and/or mating disruption (pheromone dispensers strategies) in the conventional and reduced risk programs produce a mixed result. When the two programs are compared to the four varieties of peaches, the reduced risk program demonstrates a lower cost in the three varieties: 'Redhaven', 'John Boy' and 'Encore'.

INTRODUCTION

During one of the worst economic farm crises on record and at a time of ever-increasing global competition, U.S. farmers need to utilize all cost-effective, reliable crop risk reduction and protection strategies available. The U.S. Environmental Protection Agency (EPA) has mandated risk reduction strategies to increase protections for American families and their children from risks posed by ***organophosphates*** that remain in use as pesticides today. EPA is eliminating and significantly lowering allowable pesticide residues on a wide variety of peaches eaten by children. EPA has laid out a rigorous schedule for its review of all the "***organophosphates,***" a group of 39 older, common pesticides. In addition**,** the EPA has targeted several other older, widely used pesticides for priority review and has worked closely with the U.S. Department of Agriculture and the agricultural community to ensure that their decisions will not disrupt the growing and marketing plans of farmers. The EPA is reducing application rates and

Proc. XXVI IHC – Sustainability of Horticultural Systems
Eds. L. Bertschinger and J.D. Anderson
Acta Hort. 638, ISHS 2004
Publication supported by Can. Int. Dev. Agency (CIDA)

requiring practices that will result in significant reductions in allowable residues on peaches. This study was funded to ensure that farmers will have alternative pest management tools and substitutes.

This project determined the cost effectiveness of reduced-risk tactics for managing mating disruption of the Oriental fruit moth. Essentially, our reduced risk program combined mating disruption of the *Grapholitha molesta* (Oriental fruit moth [OFM]) with good ground cover practices for tarnished plant bug management. These practices have previously not been used together on a commercial scale, nor have they been evaluated for their economic impact. Studies in New Jersey in 1996 of the costs and returns of mature peach orchards going to the fresh market found that pesticide costs for conventional methods were 12 percent of total costs. At that time it was thought that the use of risk management systems could reduce cost of pesticides to 9 percent of total costs. (http://aesop.rutgers.edu/~farmmgmt/ne-budgets/NEbudgets.html).

MATERIALS AND METHODS

We selected 4 varieties that represented early, mid-, and late season picking dates. These were 'Redhaven' (averages July 27-August 3), 'John Boy' (August 4-10), 'Bounty' (August 11-18), and 'Encore' (September 3-10). Nine growers provided plantings such that a reduced risk (RR) block could be compared to a separate block under conventional insecticide use, or a large planting that was split between RR and conventional practices. RR block size ranged from 7.5 to 37.5 ha (avg.16.75 ha), with similar areas in conventional practices. Data were collected from 24 blocks, with RR practices on just over 200 ha. Hard fescue ground cover was established in RR blocks during the fall of 2000 on 4 farms, and had already been established on 2 other farms. The 3 other growers used K-31 tall fescue, 2 of who had fescue established in both RR and conventional blocks. Herbicides were used to maintain pure fescue stands in all established RR plantings.

Our objective in controlling OFM with mating disruption dispensers was to disrupt generations 2 through 4, while allowing for normal pruning activities between March and late May. This also permitted insecticide treatments to be applied for early season management of tarnished plant bugs and stink bugs, as well as coverage for first generation OFM. Pheromone dispensers were placed in RR plantings between May 12 to May 18, or just after the first flight peak, but prior to any second flight emergence. Isomate-M 100 (Shin Etsu) (243.8 mg a.i. per dispenser) were placed at the rate of 250 ties per ha in 'Redhaven' and 'John Boy' plantings. Isomate-M Rosso (264.3 mg a.i. per dispenser) were placed at the rate of 500 ties per ha in 'Bounty' and 'Encore' plantings. All 'Encore' RR plots had been under mating disruption for the previous 3 years. All other plots had not previously been under mating disruption programs.

For this program we established sod in the drive rows between the rows of peach trees and then compared pest densities with adjacent conventionally managed peach orchards. All plantings were scouted every 7 days for arthropods and disease incidence. The Oriental Fruit Moth (OFM) pheromone traps were placed to monitor male emergence (conventional) and trap shut down (RR). OFM larval populations were monitored by examining the number of flags present per tree, as well as any damage present (from all insects and disease) on developing fruit. Tarnished plant bug and stink bugs were monitored with sweep net sampling, as well as beating trays. Random at-harvest fruit samples were taken in all plantings for the presence of all insect and disease damage. At harvest, samples consisted of 3 - 100 fruit samples taken from each plot for a total of 7,200 fruit sampled. Grower pesticide and mating disruption dispenser use records were collected at the end of the season and analyzed for comparative pesticide use. Actual use was analyzed and compared to suggested retail prices for various insecticides and mating disruption dispensers. Growers were also asked to maintain records for all labor time and other production expenses associated with pesticide application and pheromone dispenser placement. Wages of ten dollars ($10US) per hour (which included benefits) were assumed based on surveys of average wages of participating growers.

RESULTS AND DISCUSSION

In the RR orchards, we found 42% fewer tarnished plant bugs and 50% fewer damaged peaches when compared with levels found in adjacent conventionally managed orchards. Fewer insecticide sprays allowed beneficial insects to build up to levels almost twice that observed in conventional orchards. Fewer sprays also reduced the risks to humans (growers, applicators, pickers, and consumers) and the environment because of reduced exposure to these toxicants. At harvest data showed that 'Bounty' and 'Redhaven' RR plots experienced higher levels of tufted apple bud moth (TABM) damage. However damage still averaged less than 1%, although some individual growers did experience higher levels. There were no significant differences in overall damage from OFM, although some farms experienced trends towards higher damage in RR plots with 'Bounty' and 'Encore' varieties. One RR 'Encore' planting did experience problematic fourth brood larval injury, possibly due to larger tree size, low placement of dispensers, and high population pressure. Across all varieties, there were no significant differences in other pest damage including damage from catfacing insects and Japanese beetle. The percent clean fruit was similar between RR and conventional plots in all varieties.

Overall, insecticide use in RR plots was about 41% of that used in conventional plots across all varieties. Some growers used fewer insecticides than others did, partially due to recommended applications for catfacing insect and OFM pressure. Savings in pesticide costs in RR plots by variety ranged from $61.12 per ha for 'Redhaven' to $171.61 per ha for 'Encore', and averaged $97.36 per ha (Figure 1). When the cost of the pheromone mating disruption dispensers are added, the picture changes. When the cost of pest controlling materials which includes pesticides and mating disruption dispensers are compared, the cost of the reduced risk treatments are higher than for conventional treatments in all varieties except 'John Boy' (Figure 2). The cost of materials for the RR program ranged from $119.34 higher than the conventional treatment in 'Bounty' to $7.96 less than the conventional treatment in 'John Boy'. The reduced risk treatments required less labor than the conventional treatments across all varieties (Figure 3).

The per hectare analysis of cost of product and application of Insecticides and/or mating disruption (pheromone dispensers strategies) in the Conventional and reduced risk programs produce a mixed result (Figure 4). When the two programs are compared to the four varieties of peaches (Table 1), the reduced risk program demonstrates a lower cost in the three varieties: 'Redhaven', 'John Boy' and 'Encore'.

CONCLUSIONS

The assumption that federally mandated reduced risk programs will automatically result in higher costs to the producer is no longer valid. As updated data are analyzed, the advent of pheromone mating disruption as an effective and available control technique (RR) can be shown to be an economically viable alternative to conventional methods, i.e. the diminishing role and use of production tools such as pesticides. Accordingly, as the assumption of increased costs of implementation of RR methods is no longer valid, it can no longer serve as an impediment to a competitive alternative to conventional methods. A path to a more pesticide free methodology (hence environment) is being explored and subsequently paved. As these systems are being explored, other issues will need to be addressed, such as population increases of secondary pests that are no longer being controlled by broad spectrum organophosphate pesticides.

As Table 1 illustrates, in all four varieties fewer pesticides were applied in reduced risk plots than in conventional plots. However, when total pest management costs are considered, the cost of reduced risk plots are lower in some varieties, and higher for 'Bounty' than for the conventional plots. Some of the cost variance can be attributed to the fact that 'Redhaven' (7/27 to 8/3) is an earlier variety than 'John Boy' but, are using the same pheromone dispensers: Isomate-M 100. 'John Boy' is in the field longer, thus, the conventional plots of 'John Boy' are receiving more pesticide applications than "Redhaven' but the RR plots both receive the same number of pheromone mating disruption dispensers.

A dramatic contrast is shown in the 'Encore' variety. 'Bounty' and 'Encore' are using Isomate-M Rosso. Isomate-M Rosso costs is twice that of Isomate-M 100. The longer time that "Encore' is in the field means that more pesticide applications must be applied to the conventional plots than for any other variety. Thus, in comparison, the pheromone mating disruption dispensers are providing benefits in the field longer than for any other variety. All 'Encore' RR plots have been under mating disruption for the previous three years. All other plots have NOT previously been under mating disruption programs. This may account for why 'Encore' RR plots requires the fewest number of pesticide applications.

Based on the wage rate of $10.00US, analysis of the per hectare cost differentials between conventional and RR are mixed. However, as wages increase, and other costs remain equal, the cost differentials diminish, and reduced risk plots are more cost effective.

Also noteworthy, although there are slight variations in insect damage between RR and conventional plots, these differences have a negligible impact on the final economic analysis.

Literature Cited

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Tables

Table 1. Insecticide use and cost of materials and labor per ha compared between two treatments and four varieties.

Variety	Treatment	Number of Applications	Costs			
			Materials	Labor	Total	Difference
Redhaven	Conventional	4.17	$125.70	$104.17	$229.86	
Redhaven	Reduced Risk	2.17	$159.57	$69.17	$228.74	$1.12
John Boy	Conventional	4.67	$196.94	$116.67	$313.61	
John Boy	Reduced Risk	2.67	$204.90	$81.67	$286.56	$27.04
Bounty	Conventional	5.33	$164.12	$133.33	$297.45	
Bounty	Reduced Risk	2.67	$283.46	$89.17	$372.63	-$75.18
Encore	Conventional	6.83	$229.83	$170.83	$400.66	
Encore	Reduced Risk	1.83	$249.22	$68.33	$317.55	$83.11

Figures

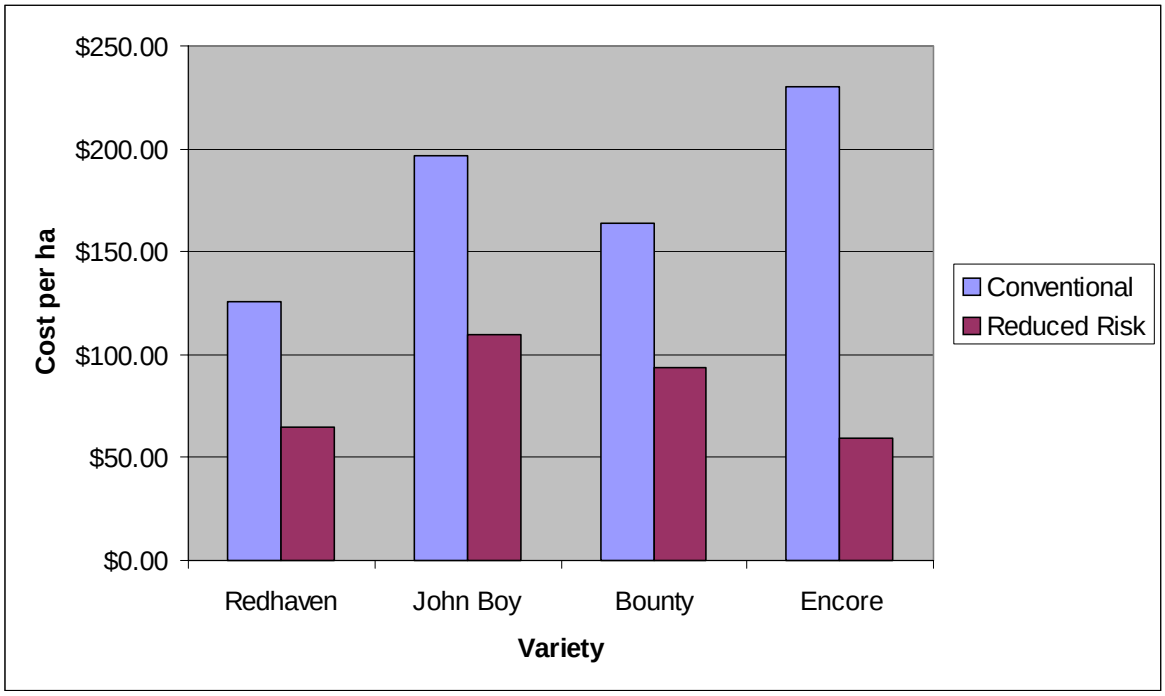

Fig. 1. Average cost of insecticides per ha for insect control of two growing systems.

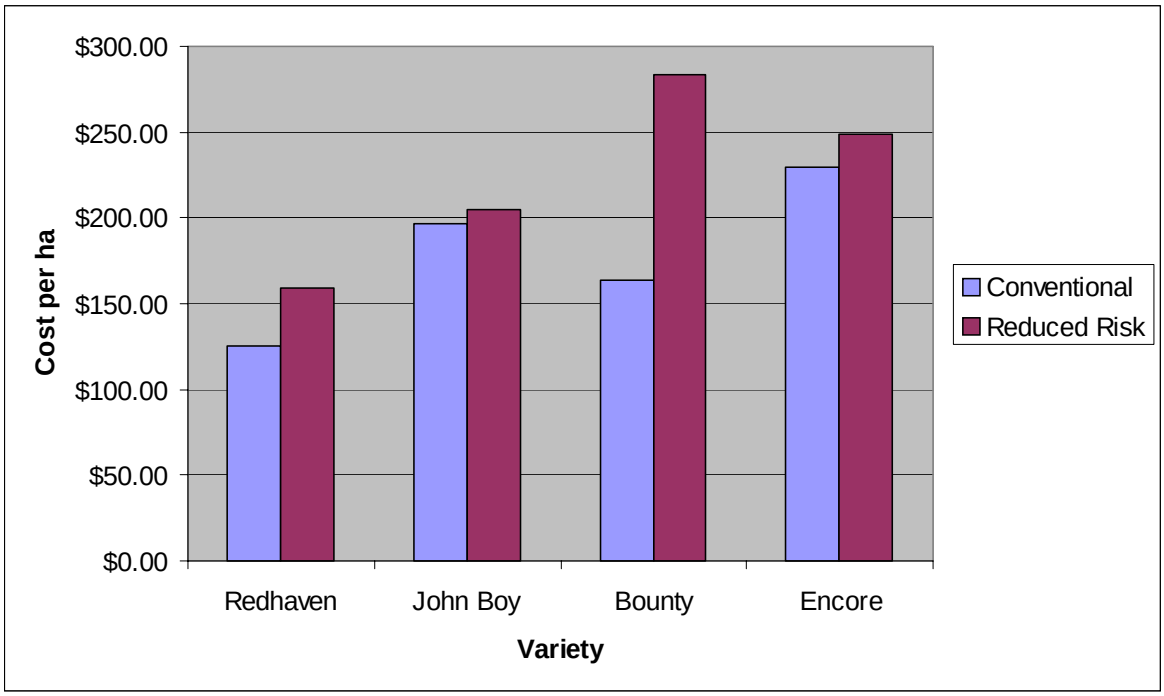

Fig. 2. Average cost of materials per ha for insect control of two growing systems.

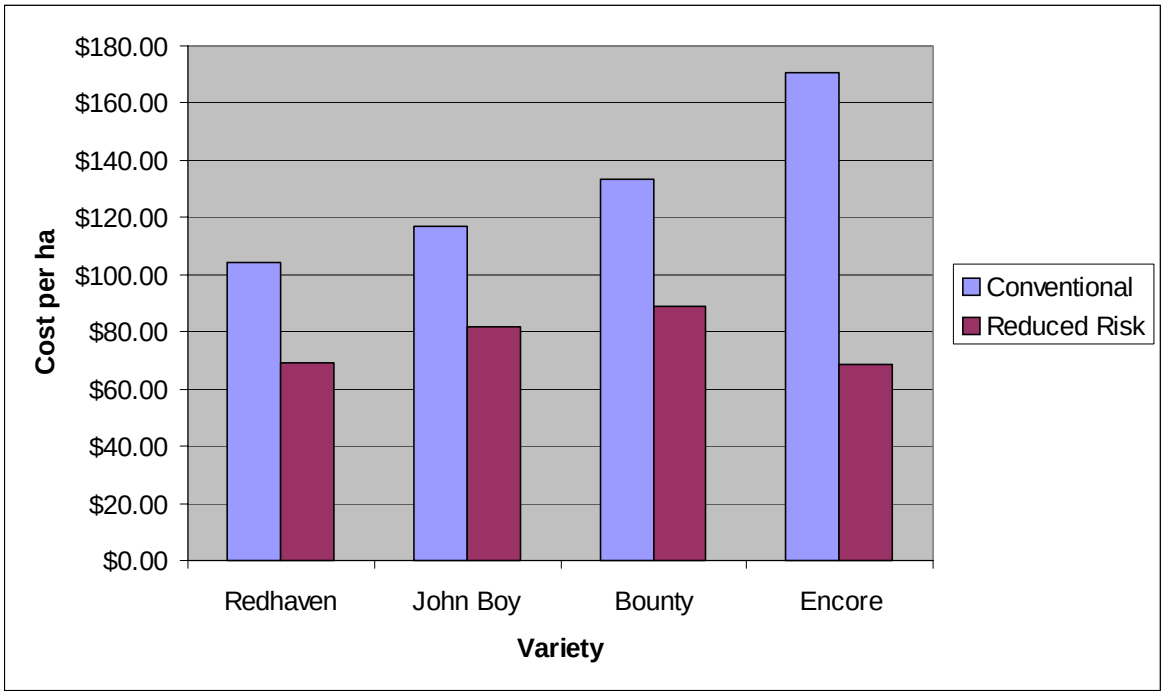

Fig. 3. Average cost of labor per ha for insect control of two growing systems.

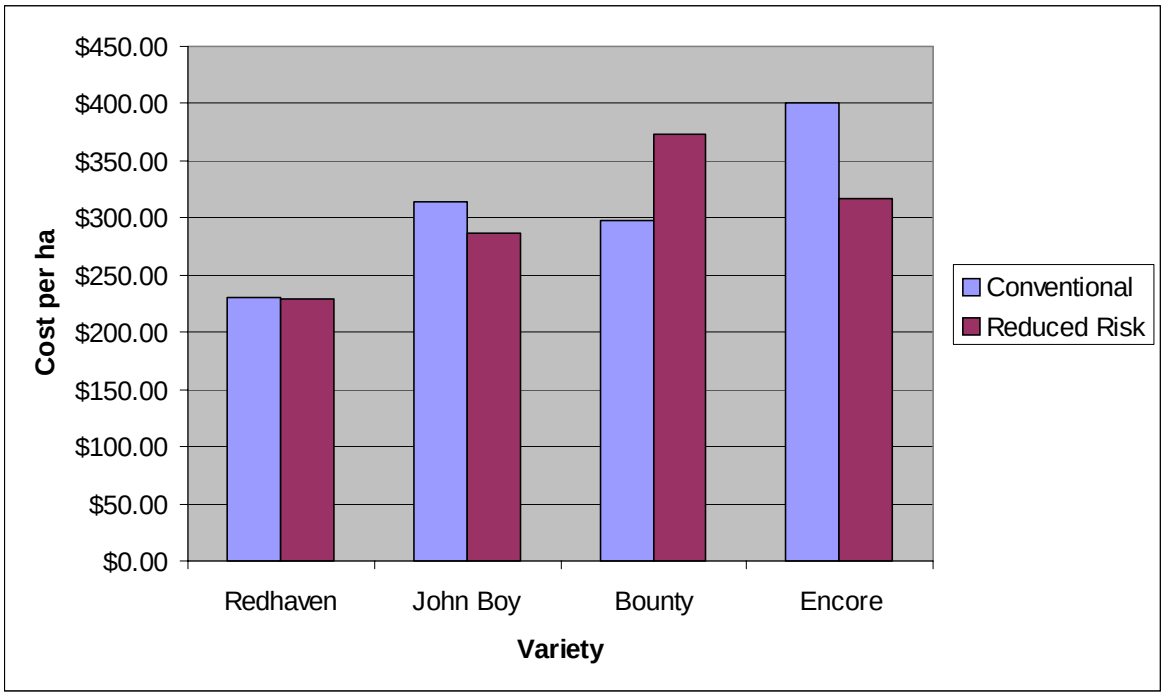

Fig. 4. Average total cost per ha for insect control of two growing systems.