

1998 KENTUCKY APPLE IPM REPORT

- TITLE:** Adoption of Integrated Pest Management Practices in Widely Scattered Apple Orchards in Kentucky
- PROJECT LEADERS:** Ric Bessin, Extension Entomologist
Jerry Brown, Extension Horticulturist
John Hartman, Extension Plant Pathologist
Terry Jones, Extension Horticulturist
John Strang, Extension Horticulturist
- TECHNICIAN:** Christopher Smigell
- OBJECTIVES:** To demonstrate the effectiveness of Integrated Pest Management (IPM) technology for commercial apple growers in widely scattered locations and encourage its adoption.
- To make Apple IPM Economically feasible for smaller orchards through the use of adaptation of new IPM technology.

INTRODUCTION:

The 1998 Apple IPM Program was funded mainly by USDA/ES/IPM funds allocated to Kentucky. The purpose was to demonstrate to Kentucky apple growers the application of Integrated Pest Management practices in the management of their orchards. IPM relies on orchard management practices such as pest and tree monitoring and locally collected weather data to predict the activities of certain insects and diseases.

Using IPM, the grower applies pest management procedures as needed based on orchard monitoring and predictive models rather than according to a calendar schedule. In addition to saving money, reduced sprays result in decreased potential applicator exposure to pesticides, pest resistance development, pesticide residues on food, harm to bees, water contamination, soil compaction, and drift to other crops. Where IPM calls for more sprays, increased crop quality should occur.

Many of our apple growers also raise other horticultural crops with pumpkins being particularly because the season for pumpkin sales coincides with that of apples. To expand our IPM program, a pumpkin IPM program was initiated with the IPM apple growers in 1998.

BACKGROUND

Apple growers in Kentucky are confronted with a number of serious pest problems including apple scab, fire blight, cedar apple rust, powdery mildew, summer fruit rots (including sooty blotch, fly speck, and fruit rots), codling moth, plum curculio, aphids, and the European red mite. Without proper management, these pests can ruin an apple crop. While growers generally share the same production

and pest problems, there are some differences across the state in terms of the pest complexes.

Apple production remains one of the more pesticide intensive crops in the state. In the past, growers have relied on regular applications of pesticides throughout the growing season for protection. While these programs protect against all pests throughout the season and they will provide high quality fruit, typically this has resulted in 15 to 20 pesticide applications per season. Nearly all of these applications will contain an insecticide and a fungicide. Growers often rely on broad spectrum, non-selective organophosphate and carbamate insecticides for control of the key pests codling moth and apple maggot. Control of key insect pests with non-selective insecticides can cause additional pest problems by upsetting the natural control of other insects and mites. Supplementary applications may be needed when populations of secondary pests, such as whiteapple leafhoppers and European red mites, increase. The large number of pesticide applications associated with apple production increases the potential for human exposure and impacts to the environment.

Because of this reliance on pesticides, pesticide resistance and resistance management have increased in concern. For example, with only streptomycin available for fire blight management during infection and resistance to streptomycin appearing in some orchards, it has become critical for growers to carefully limit the use of these applications with IPM predictive models. Resistance of European red mites to most registered miticides encourages growers to use thresholds and monitor predator mite levels in order to limit the number of miticide applications. Resistance management is also a serious concern with apple scab, fire blight, codling moth, and European red mite.

Predictive apple infection models for scab, fire blight, and to a lesser extent, cedar apple rust have been worked out. These models allow growers to apply disease control chemicals only when absolutely necessary. There is a need to develop additional models for foliar diseases such as powdery mildew and frog-eye leaf spot; fruit diseases such as black rot, white rot, sooty blotch/flyspeck, blotch, and bitter rot; and stem diseases such as collar rot or nursery infections of crown gall or southern stem blight.

IPM based thresholds, predictive models, and non-pesticidal management tactics are currently available and beginning to be used by growers for management of insect and mite pests. However, there is the need to continue to develop and evaluate more biologically-intensive management such as mating disruption for insect pests, use of selective insect growth regulators and enhancing the action of natural enemies of pests.

The aim of the project is to provide growers with practical IPM systems to manage pests and reduce pesticide usage for apple production, while maintaining or increasing orchard profitability and fruit quality.

THE 1998 PROGRAM

The 1998 Apple IPM Program, funded in part by USDA/ES/IPM, involved Kentucky apple growers in the application of Integrated Pest Management practices in the management of their orchards.

There were four major components in the program in 1998:

- 1) Growers were trained to scout and evaluate their own orchards.
- 2) Foliar nutrient analysis program was initiated.
- 3) A pumpkin IPM manual was prepared and distributed to apple growers.

The first component served to better educate growers about the identification, presence, progress of various diseases and pests, and alternatives for their control, so they could make more educated management decisions. The second component of our program was conducted as a result of a survey of our growers. In a 1996 survey of our growers, only a very small percentage indicated that they used foliar analysis to assist with fertility management. Fertility management is considered a key component of an apple IPM program because it strongly effects disease and insect management. Because our growers have diversified their markets with Fall pumpkin sales, we expanded the apple IPM program to include pumpkin IPM. As part of that program, a manual was developed and distributed and a powdery mildew-resistant pumpkin variety trial was demonstrated at one of the summer field days.

Two IPM orchard meetings for growers provided an opportunity for the specialists to address current apple IPM issues as well as introduce the principals of pumpkin IPM and for the growers to discuss concerns in an informal setting. The March 20 meeting near Hopkinsville was attended by 15 apple producers and nine UK personnel. We introduced the pumpkin IPM program and distributed a draft of the pumpkin IPM manual. Guest speaker Steve Isaacs explained the Management First Program that is used to develop organization money management skills of orchard operators. We hope to present a Management First For Apple IPM meeting next year. Improved management skills should enable producers to save time and money, thus putting them in a better position to implement more IPM practices.

We also initiated the foliar analysis nutrient project. Foliar analysis is a tool for determining tree nutritional status. Studies indicate that trees are better able to resist adverse conditions and pest pressure when leaf tissues contain optimum amounts of essential nutrients. The UK Cooperative Extension Service has provided the foliar analysis service for 17 years. During this time apple growers submitted 74 samples that they assumed were from orchards with nutrient levels at acceptable ranges. However, only four of these samples did not show any nutrient excesses and/or deficiencies in the plant tissue analyses. Furthermore, a 1996 producer survey showed that few Kentucky apple growers have used foliar analyses, which we consider an IPM practice. Thus, foliar and soil samples were collected from 24 orchards this summer, analyzed, and the results and recommendations returned to the growers. Most of the orchards surveys showed some serious nutritional problems..

The field day on September 24 in Lietchfield focused on late season scouting of the orchard, fruit quality evaluation, and an assessment of a powdery-mildew-resistant pumpkin variety trial on his farm. A total of 26 apple producers attended this meeting along with 10 extension educators. Each of these meetings included a hands-on exercise in which the growers divided into small groups and scouted orchards. A third apple IPM meeting was help during the annual winter Horticultural conference in Lexington. At the field meetings, growers practiced orchard monitoring while having UK specialists available for questions. Kentucky Apple IPM Manuals were distributed to growers for use in scouting and implementing IPM in their orchards. Attendance at the apple IPM field days was good. It may be

noted that the composition of those attending has changed dramatically of the 7 years of the program, as many of the initial participants has graduated and our meetings are now mainly composed of growers new to IPM. This had been a concern in the past that we were reaching the same growers at these meetings, but in the last two years we have been pulling in a much larger group of orchardists.

A new set of criteria have now been developed to identify which orchards are using conventional practices, entry level IPM, intermediate level IPM, or advanced IPM practices. The survey instrument is included as Attachment 1. The performance goal indicators for the KY apple IPM program are included in Attachment 2.

Overall, IPM use Continues to generated notable savings among the participating orchards.

ATTACHMENT # 1
Kentucky IPM Program Components

	(Points)
Orchard Nutrition	
Soil testing	(1) _____
Foliar analysis	(1) _____
Necessary nutrient application	(1) _____
Use of foliar sprays	
Boron	(1) _____
Calcium	(1) _____
Orchard irrigation	(1) _____
Annual pruning	
For open canopy	(1) _____
For sanitation	(1) _____
For fireblight	(1) _____
Vegetation/Rodent/Deer Control	
Use of herbicides and/or mowing beneath trees	(1) _____
Reduction of vegetation beneath trees in the fall for rodent control	(1) _____
Clearing fence rows	(1) _____
Use of tree guards/trunk painting/thiram	(1) _____
Monitoring for voles in fall	(1) _____
Monitoring for voles in mid winter	(1) _____
Use of bait for vole control	(1) _____
Use of repellants, electric fences, or hunting	(1) _____
Insect Control	
Regular monitoring for spraying decisions (Add an extra point for computerized monitoring of each)	
Scale (pheromone traps)	(1-2) _____
Codling Moth (pheromone traps)	(1-2) _____
Leaf roller (pheromone traps)	(1-2) _____
Plum curculio (traps)	(1-2) _____
Mite counting/integrated mite program	(1) _____
Aphid counting	(1) _____
Mating disruption for codling moth control	(1) _____
Disease Control	
Monitoring for Spray Decisions Regular monitoring (Add an extra point for computerized monitoring of each)	
Scab (temperature and leaf wetness duration)	(1-2) _____

Fireblight (Maryblyt/maximum minimum thermometer calculation)	(1-2)	_____
Sooty blotch and flyspeck (leaf wetness hours total)	(1-2)	_____
Fall destruction of leaves	(1)	_____
Fall destruction of mummies	(1)	_____
Use of some scab immune varieties	(1)	_____
Spraying		
Annual sprayer calibration and maintenance	(1)	_____
4-spray program	(1)	_____
Dormant/delayed dormant oil spray	(1)	_____
Dormant fixed copper	(1)	_____
Use of spot treatments for pests	(1)	_____
Use of reduced pesticide rates	(1)	_____
Use of alternate middle spraying	(1)	_____
Pesticide usage restricted to bio-rational alternatives	(1)	_____
IPM record management that includes orchard and pest history, scouting and pesticide use records	(1)	_____
	Total	_____

Level of IPM

Points	
0-10	Conventional orchard management
11-20	Entry level IPM
21-30	Intermediate level IPM
31+	High level biologically intensive IPM system

ATTACHMENT # 2
Performance Goal Indicators

1. Apple Acreage in Kentucky
 - Total apple acreage is 1865 acres (1998 estimate).
 - Total apple acreage using at least an entry level IPM program is 1082 (58% 1998 survey).

2. Pesticide applications (based on a survey of spray records for 13 IPM growers)
 - A. Total pounds of formulated pesticide applied to IPM acreage:
 - Fungicides: 53,381
 - Insecticides: 32,711
 - Bactericides: 2202
 - B. Average number of pesticide applications
 - Fungicide: 11.2
 - Insecticide: 10.6
 - Bactericide: 1.7

3. Yield and dollar value of IPM apple crop (Based on KY Ag. Statistics and grower surveys).
 - A. Total yield: 789,000 lbs.
 - B. Total value: \$2,500,000

4. Agricultural producers trained during 1998 (Based attendance at the 3 meetings and specialist estimates)
 - A. Apple producers trained: 36
 - B. Apple producers who have or plan to adopt IPM: 27 (21 old, 6 new)
 - C. Apple producers who adopted IPM practices within 6 months of being trained: 3