1999 KENTUCKY APPLE IPM REPORT

TITLE: Adoption of Integrated Pest Management Practices in Widely Scattered Apple Orchards in Kentucky

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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 1999 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. However, it has also been demonstrated in Kentucky that adoption of IPM can reduce pesticide usage and at the same time increase the quality of apples as measured by the pack out of number one apples.

Many of our apple growers also raise other horticultural crops, primarily pumpkins 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 and continued in 1999. Pumpkin is a companion crop that is frequently grown and sold at apple orchards, because they are very profitable and help to drawn in customers.

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 diseases (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. In addition, the 1996 FQPA may force growers to shift from reliance on broad spectrum organophosphate and carbamate insecticides to more selective insecticides. This will dictate that growers rely on pest population monitoring and use of economic thresholds for decision making.

Because of this reliance on pesticides, pesticide resistance and resistance management have increased in concern. For example, with streptomycin being the only bactericide available for fire blight management during bloom and resistance to streptomycin appearing in some orchards, it has become critical for growers to carefully limit the use of this pesticide by using 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, codling moth, and European red mite. If usage of some pesticide classes is lost due to the implementation of the FQPA, then resistance management will become even more critical in apple orchards.

Predictive apple infection models for scab, fire blight, sooty blotch and flyspeck, 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, blotch, and bitter rot; and root 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 1999 PROGRAM

The 1999 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 1999:

1) Growers were trained to scout and evaluate their own orchards.
2) A foliar nutrient analysis program was initiated.
3) A pumpkin IPM program was delivered to apple growers field discussions on this topic were conducted.

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. Since 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-tolerant pumpkin variety trial was conducted at one of the summer field days in 1998 and a replicated study of named powdery mildew-tolerant cultivars conducted at the UK South Farm in Lexington in 1999.

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 16 meeting near Hardinsburg was attended by 29 apple producers and six UK personnel. We introduced the pumpkin IPM program and distributed the pumpkin IPM manual.

We also continued 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 18 years. During this time apple growers submitted 98 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 16 orchards this summer (in addition to the 24 collected in 1998), analyzed, and the results and

recommendations returned to the growers. Most of the orchards surveys showed some serious nutritional problems.

The field day on June 17th near Georgetown KY focused on late season scouting of the orchard, fruit quality evaluation, and cider production. The computerized ShowMe predictor for apple scab, fire blight, sooty blotch and flyspeck, San Jose scale, and codling moth was demonstrated. Billy Ray Smith, the Kentucky Commissioner of Agriculture was there to present the Kentucky horticultural society with a $95,000 grant to purchase cider pasteurization equipment. A total of 55 apple producers attended this meeting along with 10 extension specialists. A mite scouting exercise in the orchard was included that afternoon. A third Apple IPM field day was held near Monticello KY on April 21 and focused on apple and pumpkin IPM. This meeting was attended by 32 growers and six UK extension specialists. Each of these meetings included a hands-on exercise in which the growers divided into small groups and scouted orchards. A forth 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 very good. It may be noted that the composition of those attending has changed dramatically of the 8 years of the program, as many of the initial participants have graduated and our meetings are now mainly composed of a mixture of seasoned IPM practitioners and growers new to IPM. A concern in the past was that we were only reaching the same growers at these meetings, but in the last three years we have been pulling in a much larger group of orchardists.

A 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 #3 is a success story from an apple grower that has adopted and used IPM since 1991.

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 for deer	(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 2000 acres (1999 estimate).
   Total apple acreage using at least an entry level IPM program is 1300 (65% grower survey).

2. Pesticide applications (based on a 1998 survey of spray records from 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 (based on grower surveys)
      Fungicide: 11.2
      Insecticide: 10.6
      Bactericide: 1.7

3. Yield and dollar value of IPM apple crop (based on KY Ag. Statistics and 1998 grower surveys).
   A. Total yield: 7,890,000 lbs.
   B. Total value: $2,500,000

4. Agricultural producers trained during 1999 (Based attendance at the 3 meetings and specialist estimates)
   A. Apple producers trained: 80.
   B. Apple producers who have or plan to adopt IPM: 53 (45 old, 8 new).
   C. Apple producers who adopted IPM practices within 6 months of being trained: 6.

ATTACHMENT # 3

A Success Story

As a result of continuing to use the information gained in the integrated Pest Management Program for apples through the University of Kentucky Cooperative Extension Service, a Daviess county grower reduced his pesticide usage by 27% compared to previous production practices without integrated pest management, thus saving him approximately $2750 during the 1998 growing season. The program involves pheromone traps for codling moths and using insect and disease monitoring programs to determine when insecticide and fungicides were needed.

In addition, the value of his apples increased due to improved quality. After participating in the Integrated Pest Management Program, the pack out of number one apples increased from 76% to 89%, which is a 13% increase in the pack out of number one apples for fresh consumption. The current price for number one apples for this grower is $20 per bushel. The increase in the number one apples resulted in a decrease from 24% to 11% of apples which are not number one quality. These apples are used in cider and valued at only $8 per bushel for this grower. This orchard has a average yield of 400 bushels per acre. As a result of using integrated pest management, the quality of the apples improved and he is receiving $624 per acre more compared to conventional production practices without integrated pest management technology. Thirty three acres of apples are grown in the orchard.