New York Eco Apple Project Summary 2007
(USDA Crops At Risk Project, 2007-2008)


Abstract
In 2007, Cornell University, University of Massachusetts, Red Tomato™ (a nonprofit produce marketing corporation), and the IPM Institute of North America, Inc received a 2-year grant to develop a protocol for producing and marketing “eco apples™” in the Northeast. Red tomato’s mission is connecting farmers and consumers through marketing, trade and education and a belief in family-farms, and a locally-based, ecological, fair trade food system. The goal is to create a market niche for “eco apples™” that will resulting in premium prices and access to high quality, markets such as Whole Foods, and Trader Joe’s. Red tomato’s apple sales grew from $130,000 in 2004 to $600,000 in 06. The program grew from 6 New England growers with 441 acres in 2006 to 771 acres and 12 growers in 07. Participating growers complete a self-assessment, pay an annual certification fee and submit scouting and pesticide application records. The protocol will be adjusted annually by red tomato employees, participating growers, and university personnel. Pesticides are classified into 3 categories: green, use with justification; yellow, use when green materials are not available or effective; and red, do not use.

Background and Response
Previous studies have shown that apple growers in NY and other Northeastern states can use Integrated Pest Management (IPM) programs with reduced risk (RR) pesticides that are less toxic to humans and safer for the environment than conventional materials and obtain comparable pest control. Unfortunately, these RR programs are more expensive than those using conventional materials and may require more scouting and monitoring, which also increases growers’ costs. These increased costs are a deterrent to widespread implementation of these types of programs, but it is likely that growers would adopt this technology if they could receive higher costs for apples produced under these types of protocols. Although organic produce usually commands premium prices in selective market outlets throughout the US, it is very difficult to grow organic apples in the Northeast because of the extensive complex of insect pests and diseases within the region. Therefore, we decided to start a project with a non-profit produce marketing organization, Red Tomato, to determine if Northeast growers using an IPM protocol with RR materials could market their fruit as Eco-apples at premium prices that would offset their increased production costs for implementing this system.

In 2007, four farms in NY put a total of 62 acres in the project. Three of these growers were wholesale marketers, and one grower marketed fruit at their private fruit stand. In New England, 5 farms with approximately 500 acres participated. The NE growers included both wholesalers and direct marketers. Participating growers generally achieved comparable levels of pest control to those of conventional producers. Costs of the programs and returns to participating growers are still being calculated. Although complete information about volumes of EcoApple sales by
Red Tomato from participating growers will not be available until summer of 2008 when marketing of fruit currently in storage is completed, early sales reports in the fall of 2007 increased from previous years.

**Procedures**

The following procedures were used on all the NY Eco Apple farms to gather data on insect populations to use as a basis for making management decisions:

**Trapping.** Weekly pheromone trap catches were recorded, from May 1 to harvest. Three traps were deployed per block (edge, middle, and edge of one interior row, for the following species: codling moth (CM) – hung in the upper canopy (on bamboo pole hanger); oriental fruit moth (OFM), hung in mid-canopy; and lesser appleworm (LAW), hung in mid-canopy; obliquebanded leafroller (OBLR), hung in mid-canopy, 2 traps per block (in an interior row).

Weekly apple maggot trap catches were recorded from July 1 to harvest, using 3 volatile-baited sphere traps along the wooded or south-facing edge of each block.

**Sampling Sessions.**

From tight cluster to pink bud, 10 fruit clusters inspected on each of 10 trees for rosy apple aphid; threshold, 1.

At bloom, samples were taken for OBLR larval infestations, by examining 1000 blossom clusters; 25 on each of 40 trees; threshold, 3%

June (2nd-3rd week): Samples were taken for spotted tentiform leafminer (SLTM) 1st brood mines (10 fruit clusters on each of 10 trees); and aphids were sampled (recorded % infested terminals on 10 trees; "infested" defined as >10 aphids per terminal.

July: Foliar terminal inspections made for OBLR infestations; 2 samples taken during the 1st summer larval development period: 1st and 3rd week of July; 10 terminals on each of 10 trees of interior row; threshold, 3%

July and August: On-tree fruit inspections for internal worm damage;10 head-height fruits around the periphery and inside canopy on each of 10 trees/block; 3-4 sessions on a weekly interval

**Foliar mite samples.** Between 1-3 samples were taken in late June, mid-July, early August; 4 x 25-leaf samples per block per session; brushed & counted (through Nyrop lab).

**Harvest fruit damage inspection.** A minimum of 1000 fruits per farm (25 fruits per tree to total 100 from each edge, 600 from center) were inspected at harvest for evidence of insect and disease damage.

**Results**

Because of an unanticipated lack of a consulting agreement, insufficient trapping data was collected from the Stone Ridge farm during the growing season. Insect trapping results are given for 3 of the 4 participating NY farms (Apple Acres, Ten Eyck, and Truncali) in Fig. 1. Codling moth populations were highest at the Ten Eyck site, oriental fruit moth catches were highest at Truncali, and lesser appleworm was most numerous at the Apple Acres site. Apple maggot populations were uniformly low across all the farms monitored.

Insect sampling results can be summarized as follows:

**Rosy Apple Aphid:** Above-threshold counts were obtained at Ten Eyck in 2 of the 3 sites sampled; none were found at Apple Acres.
OBLR: Ten Eyck – 0.1% infestation at petal fall (below threshold); Apple Acres – 0.4-2.3% infestation at petal fall (treatment recommended).

STLM: Truncali – no mines detected in mid-June; Ten Eyck – above-threshold levels detected in all sites sampled in mid-June (treatment recommended); Stone Ridge – moderate numbers of mines detected at 3 of the 4 sites sampled in mid-June (treatment suggested but not imperative); Apple Acres - moderate numbers of mines detected at 2 of the 3 sites sampled in mid-June (treatment suggested but not imperative).

Internal Lep fruit damage inspections: Ten Eyck – none found in 3 sites sampled through the summer; Apple Acres – none found in 2 sites sampled over 5 weeks.

Foliar Mite Samples:
Apple Acres – sampled 3 times during the summer, numbers ranged from 0.0-0.46 ERM per leaf (below threshold). Predator mites: 0.03-0.42 per leaf.
Stone Ridge – sampled 1 time, numbers ranged from 0.1-0.35 ERM per leaf (below threshold). Predator mites: 0.0-0.6 per leaf.
Ten Eyck – sampled 2 times, numbers ranged from 0.0-0.45 ERM per leaf (below threshold). Predator mites: 0.0-1.05 per leaf.

Fruit Damage at harvest. Average total damage to fruit at harvest ranged from 73.5-89.8% in the four NY farms (Table 1). While this appears to be somewhat lower than may have been desired, these values are skewed because of the impact of higher than anticipated disease damage in selected sites in at least two of the farms. For example, at Stone Ridge, scab damage ranged from 12-60% in half of the sites sampled, but was zero or nominal in the remaining sites. Similarly, at Ten Eyck, scab was 17% and 82% in two of the sites, but essentially zero in the remaining sites sampled. The overall marketability of the fruit at these farms was therefore higher than the total average figures represent, and the growers have indicated that they felt their returns on the fruit sold generally compensated for the losses incurred by disease and other damage, although naturally improvements will be sought in subsequent seasons.

Impact
This program should result in participating growers marketing apples for premium prices to high quality, selective markets, such as Trader Joe’s and Whole Foods. The ultimate goal is to create a marketing niche for apples grow under an IPM protocol, such as EcoApples, that be sold in high quality market outlets for prices comparable to those of organic apples. Although economic data is not yet available for the 2007-2008 season, Red Tomato sales of EcoApples have steadily increased during the last several years. For example, in 2004, the company sold $130,000 of apples. In 2006, 24,000 cases of apples were sold for $600,000. From January-June of 2007, 5,354 cases of apples were marketed for $112,858, and in September of 2007, 24,000 cases of apples were sold.
Fig. 1. Trap catches of major economic pest species in three NY Eco Apple orchards, 2007.
Table 1. Average percent damaged fruit at harvest in four participating New York Eco Apple farms, 2007

<table>
<thead>
<tr>
<th>Farm</th>
<th>n (number of sites sampled)</th>
<th>total # fruits sampled</th>
<th>PC</th>
<th>TPB</th>
<th>SJS</th>
<th>EAS</th>
<th>Int Lep</th>
<th>Sting</th>
<th>OBLR</th>
<th>RAA</th>
<th>AM</th>
<th>Scab</th>
<th>SB/FS</th>
<th>Clean</th>
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<tbody>
<tr>
<td>Apple Acres</td>
<td>12</td>
<td>1200</td>
<td>1.1</td>
<td>5.1</td>
<td>0.0</td>
<td>2.2</td>
<td>0.0</td>
<td>1.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>89.8</td>
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<tr>
<td>Stone Ridge</td>
<td>9</td>
<td>1050</td>
<td>1.6</td>
<td>3.5</td>
<td>0.9</td>
<td>1.4</td>
<td>0.1</td>
<td>3.8</td>
<td>0.0</td>
<td>0.0</td>
<td>16.5</td>
<td>1.1</td>
<td>73.5</td>
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<tr>
<td>Ten Eyck</td>
<td>6</td>
<td>1100</td>
<td>2.6</td>
<td>3.8</td>
<td>4.3</td>
<td>0.5</td>
<td>0.2</td>
<td>2.0</td>
<td>0.1</td>
<td>1.8</td>
<td>9.6</td>
<td>0.4</td>
<td>83.0</td>
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<td>Truncali</td>
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<td>1105</td>
<td>4.5</td>
<td>7.1</td>
<td>0.0</td>
<td>0.1</td>
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<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>87.4</td>
<td></td>
</tr>
</tbody>
</table>

Key: PC, plum curculio; TPB, tarnished plant bug; SJS, San Jose scale; EAS, European apple sawfly; Int Lep, internal Lepidoptera (codling moth, oriental fruit moth, lesser appleworm); Sting, minor surface damage; OBLR, obliquebanded leafroller; RAA, rosy apple aphid; AM, apple maggot; Scab, apple scab; SB/FS, sooty blotch and flyspeck summer diseases.