

Organic apple production in eastern US - Pennsylvania perspective

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In 2004, an organic apple orchard was established at the Pennsylvania State University Fruit Research and Extension Center in Biglerville, PA to provide researchers and growers with the opportunity to explore and observe the best research based organic practices for local commercial organic apple production. The first certified organic fruit was produced and sold in 2006. The organic apple project was named PA Regional Organic Fruit Industry Transition (PROFIT). Two apple scab disease resistant cultivars "GoldRush" and "Enterprise" were selected for the demonstration orchard due to their resistance to diseases and for their potential as processing or fresh market varieties.

Organic pest and disease control programs consisting only of approved organic materials were utilized. During a normal growing season, copper, sulfur, lime sulfur and paraffinic/mineral oils were applied throughout the season to protect the trees from diseases. There were no major events of diseases except sporadic occurrence of powdery mildew and cedar apple rust.

Sex pheromone mating disruption materials, neem products, *Bacillus thuringiensis*, codling moth granulosis virus, natural pyrethrum and kaolin clay were utilized to provide insect pests control through the season. Intensive insect pest monitoring program utilized standard insect sex pheromones and attractants. While the management of direct fruit pests such as codling moth *Cydia pomonella*, Oriental fruit moth *Grapholita molesta*, or tufted apple bud moth *Platynota idaeusalis* resulted in excellent insect pests control, the occurrence of secondary pests such as plum curculio *Conotrachelus nenuphar*, European apple sawfly *Haplocampa testidunea* and Japanese beetle *Popillia japonica* challenged the quality of fruit at harvest. Increasing populations of beneficial insects such as lady beetles, lacewings and predatory mites, provided excellent control of numerous indirect pests.

Weed management alternatives: hand hoeing, weed mowing and "mechanical hoeing", (i.e., Weed BadgerTM) and propane weed burner were also evaluated and demonstrated in the organic orchard. The use of herbicides containing vinegar/acetic acid was evaluated but did not prove effective. The crop load management practices included organically-acceptable fruit thinners such as paraffinic and fish oils and lime sulfur. Set and yield data revealed promising effect of applied treatments. The primary causes of grade-out at harvest evaluations were sunburn, cracking and incidences of cedar apple rust caused by *Gymnosporangium juniperi-virginianae*. The applications of kaolin clay made no difference in the tree response to the crop management treatments.

Overall, this commercial organic apple project demonstrated that high quality organic apples can be grown on commercial scale in the eastern United States with existing and alternative materials currently approved and available to organic fruit growers.

The example of seasonal insect pest control program (with various experimental treatments) utilized during the 2008 season is presented in Table 1. Established organic and transitional organic orchards were used for evaluations of organically approved products for insect pest control. The control block with a standard insecticide program was located about 500 yards away from the organic orchards (Pink Lady and GoldRush cultivars).

Table 1. Seasonal insect control treatments in organic orchard during the 2008 season. All applications conducted using 100 gal of water per acre as complete applications. PSU FREC 2008.

<u>Date</u>	<u>Insecticide</u>	<u>Rate/acre</u>	<u>Comments</u>
May 02	Surround	50 lb	All treatments
<i>plus</i>	Neemix/AzaDirect	7.0 oz/32 oz	Treatments comparison
May 05	Surround	50 lb	All treatments
May 06	Isomate CM/OFM TT		All treatments
May 09	Surround	50 lb	All treatments
<i>plus</i>	Neemix/AzaDirect	7.0 oz/32 oz	Treatments comparison
May 19	Dipel	1.0 lb	All treatments
May 23	Surround	50 lb	All treatments
<i>plus</i>	Neemix/Entrust	7.0 oz/2 oz	Treatments comparison
<i>or</i>	AzaDirect/Dipel	32 oz/1 lb	Treatments comparison
June 12	Deliver/Dipel	1.0 lb/1lb	Treatments comparison
June 20	Deliver/Dipel	1.0 lb/1lb	Treatments comparison
July 24	Cyd-X	1.0 oz	All treatments (CM)
Aug 06	Cyd-X	1.0 oz	All treatments (CM)
Aug 15	Cyd-X	1.0 oz	All treatments
<i>plus</i>	Neemix/Deliver	12 oz/1 lb	Treatments comparison
<i>or</i>	AzaDirect/Dipel	42 oz/1 lb	Treatments comparison
Aug 27	Cyd-X	4.0 oz	All treatments (CM)
Sep 05	Cyd-X	4.0 oz	All treatments (CM)