

ORGANIC APPLE SPRAY PROGRAM

By: Mark Longstroth

District Extension Horticulture and Marketing Agent, MSU Extension

To successfully grow apples organically under Michigan conditions growers must recognize that the limited number of organically approved insect and disease control chemicals that are available leave them particularly susceptible to two major insect pests, Plum Curculio and Apple Maggot since no real good organic controls have been devised for these insects. Major diseases of apples can be controlled but require many frequent sprays particularly from silver tip to 4 weeks after petal fall.

Fertilization organically is very easy. One bushel of composted manure per tree each year up to age 5 is adequate. After age 5 dwarf trees still only need one bushel but semi dwarf and seedling apples can use up to 3 bushels per tree per year. Use only enough to insure 8 to 12 inches of new growth after year 5. On many Michigan clay and clay loam soils no fertilizer is needed to produce adequate growth for many years.

Disease control should concentrate on Apple Scab and Powdery Mildew since they can reduce crop dramatically and even cause near total leaf loss. The summer diseases of Sooty Blotch and Fly Speck are cosmetic problems that do not affect the health of the tree or the fruit quality. Other diseases such as Black Rot and Fire Blight are occasional problems and can be reduced by a strict sanitation program of pruning out infected branches each winter. Growing varieties that are not highly susceptible to fireblight is essential since antibiotics are not used in organic agriculture. Maintaining moderate rather than vigorous growth is also important since fireblight can quickly kill young tissue and easily kills wood up to 3 years old but moves slowly in older wood. For more information on fireblight see my review of the 2000 fire blight epidemic and related links.

Controlling Scab and Mildew early in the season will insure little or no problem later in the year unless your neighbor's trees are heavily infected. Better yet, plant scab resistant apples. Begin your control program as soon as you see green in the apple buds. For the rains occurring prior to when the green tissue is ½ inch long copper or lime sulfur can be used either just ahead of the rain or within 48 hours of the start of the rain. Copper should be discontinued at ½ inch green tip or russetting of the fruit will result. Sulfur is applied every 3 to 5 days or prior to every rain from ½ inch green tip until 4 weeks after petal fall. If you cannot spray prior to a rain, use lime sulfur within 48 hours of the start of the rain. For summer disease control and if you have Scab

infected leaves 4 weeks after petal fall you should continue sulfur sprays on a 2 week interval until harvest or the end of August whichever comes first. Spray until leaves are dripping. Leaves which fall from the tree should be mowed or removed and composted since the scab fungus overwinters in fallen leaves. Powdery Mildew overwinters in infected buds.

RATES			
	1 Gallon of Water	Per 10 Gallon	Per 100 Gallon
Copper Sulfate	1 Tablespoon	1. 6 oz. Dry	1 lb.
Lime Sulfur	.65 oz. liquid	6.4 oz. liquid	½ Gallon
Sprayable Sulfur	3.4 oz.	1.2 lb.	5 lb.

INSECT CONTROL		
	STAGE	PESTICIDE
Aphids Mites Scale	Dormant to ½" green tip	Dormant oil Caution: Do not mix with Lime Sulfur or Sulfur. Do not use for 4 days after or before Sulfur or Lime Sulfur
Rosy Apple Aphid Apple Aphid Apple Grain Aphid	Pink to Petal Fall	M-Pede or other Biological Soap

Lady bugs and other natural predators should be encouraged or introduced when Aphid populations are present.

Plum Curculio	Petal Fall to 4 weeks after	No effective spray
----------------------	-----------------------------	--------------------

Insect emergence varies from year to year. Warm humid weather is necessary for insects to become active. Damage (egg laying in fruit) can occur very quickly or be spread out over several weeks.

Picking up and destroying all June drop apples will reduce native populations but not prevent fly-in damage.

Tentiform Leaf Miner	Pink Bud to harvest	Sabadilla, or Pyrethrum
-----------------------------	---------------------	-------------------------

All reduce adult populations but since they are short lived the insect emerges over a 4 week period for each of 3 generations total control is unlikely and is really not needed. Apples can tolerate 3 mines/leaf prior to June drop, 4 to 5 mines/leaf in mid summer and more than 5 mines/leaf in the fall. In minimally sprayed orchards this pest may flare up from time to time but predators and parasites normally keep it under control. Rake up and bury or compost all leaves in the fall to destroy overwintering pupae in the leaves.

Codling Moth	May 30 to June, July 30 to Sept. 15 at least 2 sprays for each generations is needed to control this fruit feeder.	Bacillus thuringiensis
Leaf Rollers	Pink to June 30, July 15 to Sept. 15	Bacillus thuringiensis
Usually not severe but when large numbers are present will destroy a lot of fruit especially in late August and September.		
Apple Maggot	July 1 to Sept. 15	Pyrethrum, Rotenone
Insects emerge sporadically through a long period, Pyrethrum and Rotenone do not last long enough to do a good job in the orchard. People with small numbers of trees can prevent some damage using red ball sphere traps with apple essence dispensers hung in the trees in July and treated with Tangletrap. Six to 10 balls/tree hung on the outside is very visible locations will trap many flies before they lay their eggs. Picking up and destroying all fallen apples will reduce native populations but not prevent fly-in damage.		

MATERIALS

Use Manufactures suggested rates as active ingredients vary by brand name.

If you have suggestions I would love to hear them. longstr7@msu.edu

Superior Oil or dormant oil

are highly refined oils used in the early spring to smother the eggs of over wintering pests such as aphids and mites. Oils are incompatible with sulfur and cause damage to apple leaves and fruit. Sulfur should not be used sooner than 7 to 10 days after an oil spray nor should oils be used when sulfur residue is present.

Summer oils

are highly refined light oils used to kill or suppress insect during summer. They should not be used during high temperatures over 80 F.

Pyrethrum

Rotinone

Sabadilla

is a botanical extract from *Schonocaulon officinale*. It is a muscle poison and is especially effective on flies, Hemiptera and Homoptera which includes true bugs such as tarnished plant bug.

BT or *Bacillus thuringiensis*

is a toxin produced by bacteria that binds to the guts of insects. It needs to be ingested by the insect and is especially effective against caterpillar larva such as leaf rollers. It is not as effective against caterpillars that directly attack the fruit i.e. codling moth and oriental fruit moth

I have removed Ryania, an extract of *Ryania speciosa*. The active ingredient Ryanodine is much more toxic to mammals than to insects. Ryanodine is a muscle poison and is no longer available in the United States.

A general schedule would look like this:

Silver tip early green tip

Copper + Oil - followed by Copper or Lime Sulfur at ½ inch green tip

During rest of scab season

Before each rain use Sulfur or within 48 hours of rain use Lime Sulfur

Petal Fall

Sulfur + *Bacillus thuringiensis*

10 days later, Sulfur + *Bacillus thuringiensis*

About June 1

10 days later Sulfur + Pyrethrum

10 days later Sulfur + Pyrethrum

10 days later Pyrethrum - add Sulfur if Scab is present

About July 1

10 days later *Bacillus thuringiensis* add Sulfur if Scab is present

10 days later Sulfur + *Bacillus thuringiensis*

10 days later Sulfur + Pyrethrum

About August 1

10 days later Sulfur + Pyrethrum

10 days later Sulfur + Pyrethrum + *Bacillus thuringiensis*

10 days later Sulfur + Pyrethrum + *Bacillus thuringiensis*

Created 6-24-97

Last Modified 3-16-01