

# ***Local Fruit Production***

Michael Lachance  
Virginia Cooperative Extension  
2008

## **Reasons to Promote Fruit Culture**

- Local produced food and beverages
- Family's quality of life
- Outdoor recreation
- Preserve heirloom varieties Sense of nostalgia
  - Preserve and interpret our history
  - Pride in having an antique to display
  - They are too good to lose.
- Social interaction
- Value as landscape elements
- Fruit industry sustainability

## **Major Challenges**

- Sustaining an interest in fruit growing
- Avoiding neglect and stress to the trees
- Accepting the need for pest control

## **Tree Fruit Issues**

- Where to buy nursery stock
- Selecting the right rootstock
- Pruning and training young trees
- Proper thinning
- Achieving quality fruit at harvest
- Reasons trees fail to produce fruit
- Control of insects and diseases
- Renovating older trees

## **Other issues in fruit production**

- Profitability
- Budgets and business plans
- Labor shortage
- Storage and distribution
- Changing markets, rise in organic demand
- Working with blemished fruit
- Value-added products

## **Determining if Fruit Trees are a Good Fit**

- Available light
- Well drained soils
- Fruit fit into the overall landscape design

- Willingness to control insects and diseases
- Money
- “Free time”
- They can be set farther apart but not crammed together.
- Maintain a bearing surface low enough for necessary pest control, trees should not be crowded.

### Elements of Site Selection

- Absolute & relative elevation
- Slope
- Aspect
  - (N/E > NW/SE > S/W)
- Soil Depth
- Low temperature history
- Nematodes can be a handicap
- Other site assets and liabilities

**Table 1.** Space requirement, yield, bearing age, and life expectancy of tree fruits

Fruit	Minimum Distance Between Plants (feet)	Approximate Yield Per Plant (bushels)	Bearing Age (years)	Life Expectancy (years)
Apple - standard	30	8	6-10	35-45
Apple - semidwarf	18	4	4-6	30-35
Apple - dwarf	8	2	2-3	30-35
Pear - standard	25	3	5-8	35-45
Pear - dwarf	12	1/2	3-4	15-20
Peach	20	4	3-4	15-20
Plum	20	2	4-5	15-20
Quince	15	1	5-6	30-40
Cherry - sour	18	60 qt.	4-5	15-20
Cherry - sweet	25	75 qt.	5-7	20-30

### Variety Selection

- Adapted to your soil and climatic conditions.
- Select varieties with the fewest insect and disease problems.
- Several varieties of the same kind of fruit maturing at different times may be planted to prolong the harvest season.
- The value of certain varieties for special uses, such as freezing, canning, and preserving, should be considered.
- Some varieties may be purchased in season from commercial growers more economically than you can grow them yourself.
- Varieties that are cross-fruitful and that have overlapping bloom dates should be selected.

- For adequate cross-pollination, plant at least three varieties of apples. Don't confine your selections to Summer Rambo, Winesap, and Stayman. These varieties will not cross-pollinate.
- Golden Delicious is used by many commercial growers as a pollinizer for other varieties of apples in their orchards.
- At least two of the recommended pear, plum, and sweet cherry varieties should be planted.
- Because Japanese and European plums are not generally effective as pollinizers for each other, two varieties of the same type should be planted.
- Windsor is a good pollinating sweet cherry variety.
- Sour cherries cannot be used to pollinate sweet cherries because they are different species.

**Table 2.** Some suggested varieties for the home fruit garden (listed in order of ripening)

APPLES	PEARS
Lodi 1c,2	Harrow Delight 1c,d
Jerseymac 1c,d,2	Moonglow 1c,d
Ginger Gold 1c,d	Harvest Queen 1c,d
Paulared 1c,d,2	Maxine 1c,d
Gala 1d,2	Seckel 1c,d
Summer Rambo 1c,d	Orient 1c
Grimes Golden 1c,d,2	Kieffer 1c
Jonathan (red strain) 1c,d,2	
Golden Delicious 1c,d	<b>PLUMS (EUROPEAN)</b>
Delicious (red strain) 1c,d,2	Earliblue 1c,d
Winesap 1c,d,2	Blue Bell 1c,d
Stayman (red strain) 1c,d,2	Stanley 1c,d
Rome Beauty (red strain) 1c,	Shropshire (Damsun) d,2,1c
Granny Smith 1c,d,2	
Fuji 1c,d,2	<b>PLUMS (JAPANESE)</b>
	Early Golden 1c,d
<b>SCAB-IMMUNE APPLES</b>	Methley 1c,d
Redfree 1d,2	Shiro 1c,d
Prima 1d,2	
Liberty 1d,2	<b>NECTARINE</b>
Priscilla 1d,2	Redgold 1d
Jonafree 1d,2	Flavortop 1d
Sir Prize 1d,2	Fantasia 1d
<b>CHERRIES (SWEET)</b>	<b>PEACHES</b>
Napoleon (Royal Anne) 1c,d	Jerseydawn 1d
Vernon 1c,d	Reithaven 1c,d,f
Lister 1c,d	Loring 1c,d,f
Hedelfingen 1c,d	Redkist 1c,d,f
Windsor 1c,d	Earnies Choice 1c,d,f
Hudson 1c,d	Cresthaven 1c,d,f
	Biscoe 1c,d,f
<b>CHERRIES (SOUR)</b>	Encore 1c,d,f
Montmorency 1c,f	White Hale 1d
	Carolina Belle 1d
	Summer Pearl 1d
	Raritan Rose 1d

1 - Principal uses: c - cooking, d - dessert, f - freezing  
 2 - In Eastern Virginia, where mildew, light brown rot, bacteriosis, fruit cracking, and poor color can be serious due to climatic conditions, these varieties are difficult to grow.

**Sour cherry, peach, and nectarine varieties** listed are sufficiently self-fruitful to set satisfactory crops with their own pollen.

**Apricots** are not recommended for planting in Virginia. The buds of currently available varieties respond to the first warm days of early spring and are usually killed by frost or low temperature common to most areas. Unless protection can be provided, a crop can be expected no more frequently than once every four or five years.

**Apple Rootstocks:** Three major considerations in rootstock selection are:

**1. Size control**

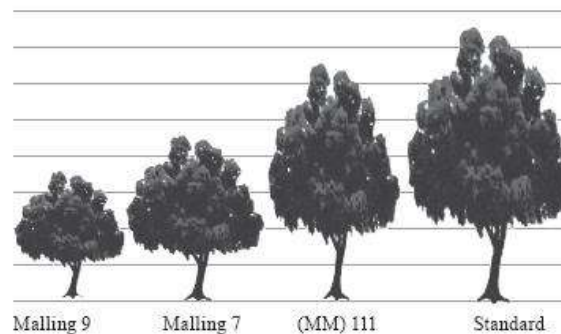
- Probably, the most widely accepted reason for the use of clonal rootstocks is tree size control.
- 16- to 18-foot tree on the rootstock Malling Merton (MM)111, down to a dwarf tree of 7 to 8 feet on a Malling (M)9 rootstock.
- Intermediate sizes can be attained by other rootstocks, such as M.26 and M.7.

**2. Precocity**

- Usually, the more dwarfing the rootstock, the earlier the tree will bear fruit.

**3. Stability**

- Trees on M.9 rootstock are very small, but because of brittle roots, must be provided some type of support.
- The semidwarfing M.7 rootstock may require support for the first few years, but some varieties can grow without support.
- The more vigorous MM.111 rootstock does not require support and is thus like seedlings.



*Figure 1. Effect of different dwarfing rootstock on the same apple variety.*

**Buying Trees**

- Obtain the best nursery stock available.
- Vigorous 4- to 7-foot, 1-year-old whips about 3/4-inch in diameter are preferred for apples.
- For peaches, nectarines, and apricots, a 4-foot tree 1/2-inch in diameter, is considered the ideal size for planting.
- Pears, quince, plums, cherries, and apples may be planted as 1- or 2-year-old trees. Either will be satisfactory as long as the trees have attained sufficient size and have.

## Setting the Orchard

### Time of Planting

- Planting about a month after the first killing frost in the fall or about a month before bloom in the spring is generally recommended.
- Trees should be dormant and the soil should have proper moisture content.

### Handling Nursery Stock

- Containerized plants from local nurseries and garden centers or as bare root trees from mail-order companies.
- Mail-order companies usually offer a larger selection of varieties.
- If trees cannot be planted immediately, they can be stored in the original packaging for a week or two in an unheated basement or garage.
- Check the roots frequently and moisten if necessary.
- In the absence of a cool storage place, trees can be heeled in
- It is a good idea to soak the roots in a bucket of water for a few hours before planting.

### Planting the Trees

- Remove the turf and spade the soil deeply over an area of several square feet where each tree is to stand.
- Dig the hole only as deep but wider than necessary to accommodate the root ball.
- Prune the roots of young trees only where necessary to remove broken and damaged ones
- Set the tree at approximately the same depth it grew in the nursery.
- Never set it so deep that the union of the scion and rootstock is below ground level
- Then begin filling the hole with pulverized topsoil, shaking the tree gently to filter the soil among the roots.
- Tamp the soil firmly and thoroughly with your foot or a well-padded stick.
- Add water when the hole is about 3/4 full to aid in settling the soil around the roots
- After the water has completely soaked in, finish filling the hole, leaving the soil loose on top
- Don't allow bare roots to dry out
- Avoid sunlight and wind as well
- Soak roots for 1-2 hours prior to planting
- Construct a large dish-shaped hole
- Note location of graft union, place well above soil level
- Soak thoroughly after planting to settle tree in
- Prune up to 20% off top

## Orchard Management

### Cultural Practices

- Young fruit trees should be mulched or cultivated until they begin to bear.
- Weeds must be eliminated so they will not compete for available moisture and fertilizer.
- Cultivation must be shallow to avoid injury to roots near the surface. The cultivated or mulched area should extend a little beyond the spread of the branches.
- Both organic and inorganic mulch (i.e., black plastic) provide habitats for voles.
- Organic forms of mulch also release nitrogen throughout the season, which affects the grower's ability to control when and how much nitrogen is available. If trees are mulched, the mulch should be removed in the fall.
- Fertilize young trees three times.
- Two weeks after planting
- Again six and 10 weeks after planting.
- Apply 0.03 pounds of actual nitrogen each time (i.e., 1/3 pound 10-10-10, 0.2 pound nitrate of soda, or 0.1 pound ammonium nitrate).
- Temporary nitrogen deficiency may occur when mulch material low in nitrogen begins to decay. This can be overcome by the addition of nitrogen fertilizer. Usually about 1/4 pound of ammonium nitrate, 1/2 lb. of nitrate of soda or 2 pounds of 10-10-10 to each 100 square feet of mulched area will be enough.

### Fertilization

- Soil pH.
- Adjust the pH to a level between 6.0 and 6.5.
- No fertilizer is recommended or needed at planting time.
- After the young tree becomes established and growth begins, apply nitrate fertilizer in a circle around the tree, about 8 to 10 inches from the trunk.
- Usually fruit trees show no increased growth or fruitfulness from the use of any nutrient element except nitrogen.
- Other elements are used by the tree; however, only in special cases are they deficient in the soil.
- Deficiencies are more likely to occur in light, sandy soils.
- A rule of thumb practiced in many commercial apple orchards is to apply about 1/4 pound of a 16% nitrogen fertilizer, or its equivalent, for each year of the tree's age from planting.
- For peach orchards, the amount of fertilizer should be doubled.
- Over fertilization with either organic or inorganic materials should be avoided. Excessive vegetative growth will result, usually accompanied by delayed fruiting and possible winter injury. Fertilizer may be applied either after the leaves have fallen or in early spring about three or four weeks before active growth begins.
- On light, sandy soils, it is best to delay application until early spring.
- When trees are grown in a lawn area, delay fertilizing the lawn until after trees are dormant to avoid late-summer growth on the trees.

- Scatter fertilizer evenly under the tree, starting about 2 feet from the trunk and extending to just beyond the tips of the branches.
- Terminal growth and general vigor of the individual tree should be observed closely.
- Both pear and quince are highly susceptible to fire blight, and excessive growth will make this disease more prevalent.
- Mature, bearing trees of peach, nectarine, and sweet cherry should produce an average of 10 to 15 inches of new growth annually.
- 8 to 10 inches of terminal growth is considered adequate for mature, bearing apple, pear, quince, plum, and sour cherry trees.
- When trees are planted in rows, the area between the rows may be allowed to grow in sod or used for interplanting with low-growing vegetables or strawberries. There is no objection to this practice in the home orchard, provided ample plant nutrients and moisture are available for proper development of the fruit trees.
- Under sod culture, frequent, close mowing during the growing season is desirable. This reduces competition for necessary moisture and plant nutrients and also aids in disease and insect control.

### **Organic Fertility Management**

- 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 clay and clay loam soils no fertilizer is needed to produce adequate growth for many years.

## **Fruit Tree Pruning**

### **Training Systems**

- Central Leader for Pome Fruit
- Open Center for Peaches and Nectarines

### **Pruner types:**

Anvil vs. Bypass  
 Loopers LT 1" diameter wood  
 Pruning saws  
 Spreaders

### **Pruning Cuts**

Thinning: taking growth back to point of origin  
 Heading: induces laterals to break, head back to a lateral or a fruit bud

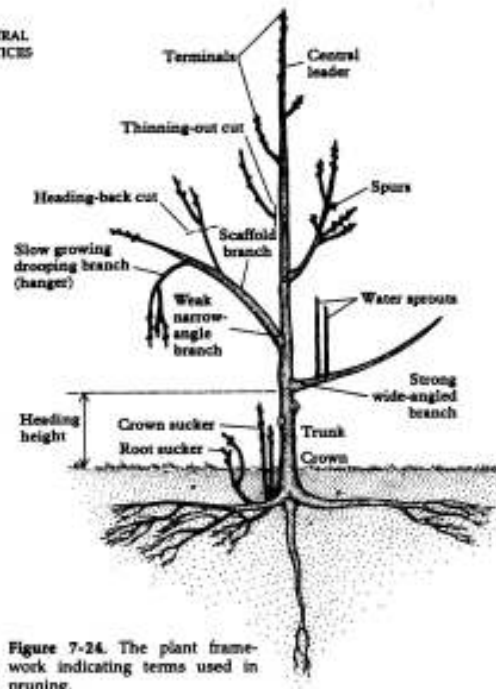


Figure 7-24. The plant framework indicating terms used in pruning.

### Central Leader Scaffold Arrangement

- Tier #1      Limb angle 45 degrees
- Tier #2      Limb angle 60 degrees
- Tier #3      Limb angle 90 degrees

- Four limbs per tier, head leader 15" above last lateral branch
- In later years, take out stronger laterals in upper regions on the tree and head back the leader

### Central Leader Maintenance

- Remove temporary laterals to allow ladder bays
- Work down the scaffolds with thinning cuts
- Tie up branches to invigorate

### Pruning

- All pruning has a dwarfing effect
- For maximum yield of high-quality fruit, prune only as necessary to establish a tree with a strong framework capable of supporting heavy crops annually without damage
- Maintain the tree sufficiently open to allow penetration of sunlight, air, and spray material for good fruit development and pest control.
- Most pruning is done during the dormant season, preferably just before active growth begins in the spring.

- Summer pruning may be done to help train young trees to the desired shape, remove water sprouts and other undesirable growth, and maintain smaller tree size.
- All newly planted fruit trees should be pruned in the spring before growth starts to stimulate lateral bud development.

### Young, Nonbearing Apple Trees

- Future pruning of an apple tree is greatly affected by early training.
- Much of the pruning of young, bearing trees is the result of errors made in training in the early life of the tree.
- A delay for the first 3 to 4 years will result in a poorly-developed, weak tree.

### At Planting (Fig. 4)

- Head trees to a height of 30 to 35 inches. If feathered (branched) trees are planted, they should be headed to a strong bud to stimulate growth of the central leader.
- Feathers desirably located can be retained as scaffolds and should be headed by a third.
- Undesirable feathers should be removed.

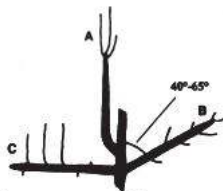


Figure 2. Limb orientation affects vigor: (A) dominate vertical growth, (B) healthy growth with optimum branch angle, and (C) water sprouts where branch angle is too great.



Figure 3. Use limb spreaders to insure proper limb orientation.

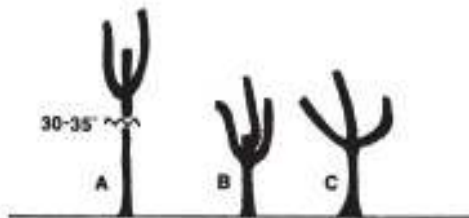


Figure 4. Pruning the first growing season: (A) pruning at planting (B) resulting regrowth, and (C) branch angles after spreading.

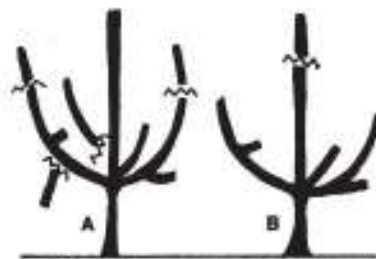


Figure 5. Pruning done during the first winter after planting: (A) tree before pruning with cuts marked and (B) after pruning.

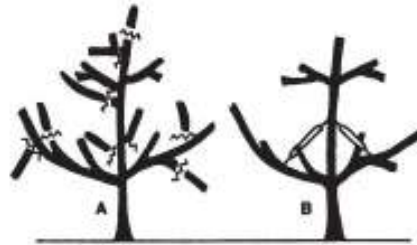


Figure 6. Pruning the two year old tree: (A) before pruning and (B) after spreading and pruning.

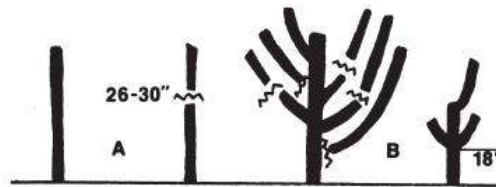
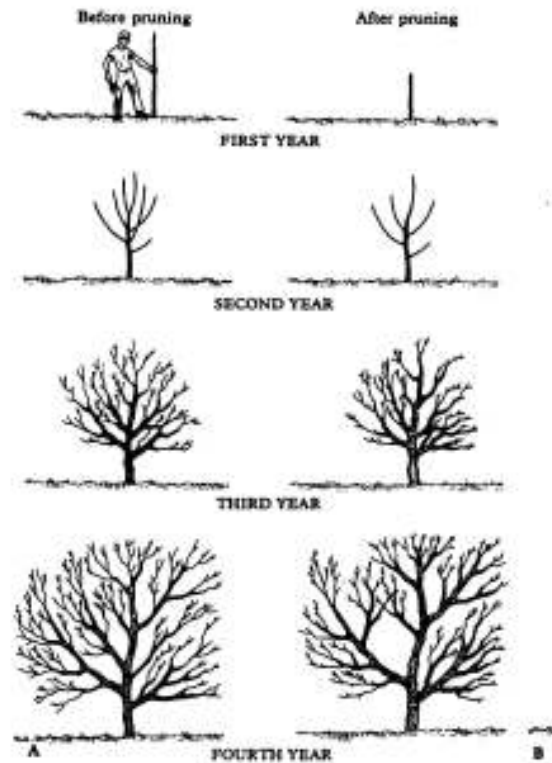


Figure 7. Pruning peach trees after planting: (A) cut unbranched tree 26-30 inches above soil line, (B) cut branched tree to 30 inches, cut three to four sided braches in half and remove all others, leaving nothing below 18 inches.



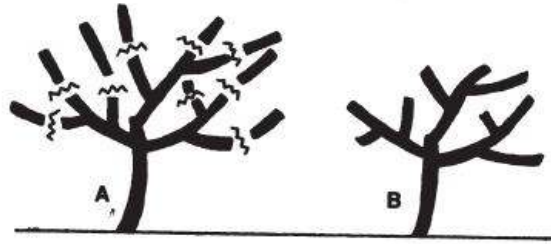


Figure 8. Pruning peach trees the winter after planting: (A) before pruning and (B) after pruning.



Figure 9. Pruning peach trees the second winter after planting: (A) before pruning and (B) after pruning.

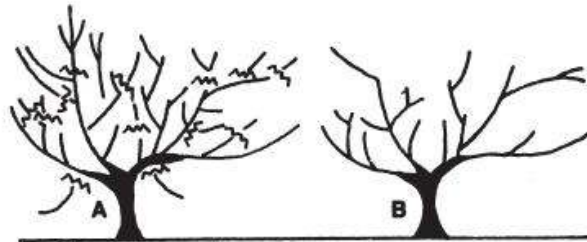


Figure 10. Pruning the third winter consist of thinning and heading back: (A) before pruning and (B) after pruning.

## **Fruit Tree Development**

### Open-center tree

- Once the scaffold system of the young peach tree is established, fairly heavy pruning is required to develop a low spreading tree (Fig. 9).
- Remove all strong, upright shoots growing in the center of the tree, and lightly head back terminal growth on the scaffold limbs to outward growing laterals.
- It is necessary that the peach be pruned annually to stimulate new growth and maintain production near the main body of the tree (Fig. 10).
- Moderate thinning and heading back to outward-growing laterals to keep the tree low and spreading.
- A height of 8 or 9 feet is usually preferred.

### **Pruning Summary**

- Pruning invigorates and results in strong growth close to the pruning cut.
- Pruning reduces the number of shoots, so remaining shoots are stimulated. However, total shoot growth and size of the limb is reduced.
- Pruning always reduces yield.

## **Sanitation**

- The destruction of places that harbor insects and diseases plays a large part in the control program.
- Collect and burn debris.
- Remove and destroy all dropped fruit.
- Rake and burn apple and cherry leaves.
- Scrape loose bark from trunks, crotches, and main limbs of apple trees.
- Prune out and destroy all dead or diseased
- Conditions that encourage mice should also be eliminated.

## SPRAY CALENDAR FOR APPLE TREES

	MARCH	APRIL	MAY	JUNE	JULY	AUGUST
1-3						
4-6		1/2" Green	First Cover			Eight Cover
7-9					Sixth Cover	
10-12				Fourth Cover		
13-15		Pink				
16-18			Second Cover			
19-21		Bloom				
22-24				Fifth Cover	Seventh Cover	
25-28		Petal Fall	Third Cover			
29-31	Green Tip					

### Find the Right Sized Sprayer



### Diagnosing Tree Fruit Diseases

Factors which may be confused with diseases:

- Insect damage
- Rodent damage
- Bird damage
- Hail damage
- Mechanical damage

Points to consider when making a diagnosis:

- Symptoms may vary from season to season and time of appearance , often depending on environmental conditions.
- Look at fresh disease samples to rule out saprophytic organisms.

- Record the varieties and rootstocks involved. Often a valuable clue!
- Look at the distribution of the disease within the orchard.
- Look about nearby areas for alternate hosts, abandoned orchards, and other potential disease reservoirs.
- Obtain spray records of pesticides, growth regulators, and fertilizers.
- Look at last year's weather pattern for excessive rain, drought, and extremes in heat and cold. Couple with growth cultural practices.
- Develop a history of orchard performance.

#### Scab and Mildew Control

- Consider growing scab resistant apple varieties
- Remove winter wood showing signs of powdery mildew
- Copper and lime sulfur are the backbone of organic disease management
- Begin your control program as soon as you see green in the apple buds
- Control apple scab and mildew early in the season to insure little or no problem later in the year.

#### Summer Diseases

- Black Rot and Fire Blight are occasional problems.
- They can be reduced by a strict sanitation program of pruning out infected branches each winter.
- Grow varieties and rootstocks that are not highly susceptible to fireblight.
- Maintain moderate rather than vigorous growth is also important. Fireblight can quickly kill young tissue and easily kills wood up to 3 years old but moves slowly in older wood.

#### Early Season Plant Protection

- 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.

#### Calculating Degree Days

- Determine when a biofix has occurred
- Average temperature for the day
- Subtract the developmental threshold
- Run a cumulative degree day total throughout the year
- Spray according to expected 50% emergence dates

#### Organic Approach

- Fragmented, pest-by-pest set of tactics should
- gradually be integrated into an overall management
- plan. Obstacles to a holistic or integrated approach
- include the following:

- Cultural guidelines for controlling one pest may create conditions that favor another (=secondary pest outbreak).
- Many ecological pest control tactics tend to give highly variable results from location to location and year to year.
- Traditional local support services are often unable to provide much information or guidance.
- Available ecological practices may be labor- and/or capital-intensive.
- Serious insect pests are the Plum Curculio and Apple Maggot
- Apple Scab, Powdery Mildew and Fireblight are potentially devastating
- Summer diseases will diminish cosmetic appeal
- Effective disease control require many frequent sprays particularly from silver tip to 4 weeks after petal fall.

### **Organic Orchard Fertility Management**

- 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 clay and clay loam soils no fertilizer is needed to produce adequate growth for many years.

## **Organic Apple Disease Management**

### **Scab and Mildew Control**

- Controlling Scab and Mildew early in the season will insure little or no problem later in the year.
- Consider growing *scab resistant apples*.
- Begin your control program as soon as you see green in the apple buds.
- Copper and lime sulfur are the backbone of organic disease management

### **Summer Disease Control**

- The summer diseases Sooty Blotch and Fly Speck are cosmetic problems and do not affect the health of the tree or the fruit quality.
- Continue sulfur sprays on a 2 week interval until harvest or the end of August whichever comes first, especially if you have Scab infected leaves 4 weeks after petal fall
- 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.

### **Organic Materials**

- 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.

**BT or *Bacillus thuringiensis***

- Active component is an endotoxin produced by bacteria that binds to the guts of specific types of insects. It needs to be ingested by the insect.
- Has shown greatest utility with indirect pests such as and is especially effective against leaf roller caterpillars larva
- It is not as effective against caterpillars that directly attack the fruit i.e. codling moth and oriental fruit moth

**Provisional Organic Spray Schedule**

**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*

**Organic Spray Schedule**

- **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

**Action Item: Organize an Organic Home Fruit Network to provide:**

- Better connections with consumers
- Designs and finances for successful markets
- Emerging community-based orchards and farms (CSAs)
- Field days- learning first hand how to be successful
- Conferences- tailoring existing conferences to meet local needs
- Research projects for organic solutions
- Website & list-serv – to keep people informed and motivated
- Continuing education in the community

**Reference**

**Tree Fruit in the Home Garden**

Author: Rongcai Yuan, Extension Specialist, Tree Fruit  
Publication Number 426-841, posted August, 2007

**Contact for more information:**

Michael Lachance  
Virginia Cooperative Extension, Nelson County  
(434) 263-4035  
lachance@vt.edu  
www.ext.vt.edu