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Flatwoods Citrus

Vol. 7, No. 3 **March 2004**

Dr. Mongi Zekri
Multi-County Citrus Agent, SW Florida

UPCOMING EVENTS

Immokalee IFAS Center

Tuesday, March 16, 2004, 10:00 AM – 12:00 Noon

Update on citrus rootstocks and new citrus cultivars – Drs. Kim Bowman, Bill Castle, and Fred Gmitter

Climate effects on fruit quality and production, and recommendations that may improve fruit production and quality – Dr. Gene Albrigo

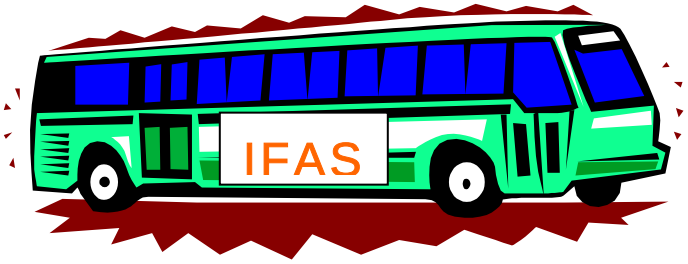
2 CEUs for Certified Crop Advisors

Sponsor: Bobby Holland & Alex Fiore, Diamond R Fertilizer Company

To reserve a free lunch, call 863 674 4092 no later than Friday, 12 March 2004.

If you want to print a color copy of the Flatwoods Citrus Newsletter, get to the Florida Citrus Resources Site at http://flcitrus.ifas.ufl.edu/ You can also find all you need and all links to the University of Florida Citrus Extension and the Florida Citrus Industry

COLLIER COUNTY EXTENSION AG TOURS

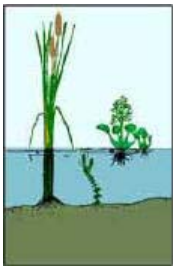


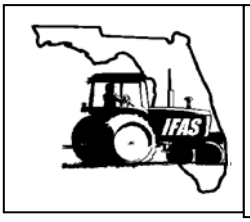
Wednesday 17 March and Friday 19 March 2004
For more information, call the Collier County Extension Office at 239 353 4244

Aquatic Weed Control Short Course

www.conference.ifas.ufl.edu/aw
Date & Location: May-3-7, 2004, Fort Lauderdale Marriott North.

To qualify for the reduced, early registration fee, payment must accompany your registration on or before March 19, 2004.





FARM SAFETY DAY

Saturday, June 5, 2004, Immokalee IFAS Center

Coordinator: Mongi Zekri

117th Annual Meeting of the Florida State Horticultural Society (FSHS)

June 6-8, 2004
Sheraton World Resort, Orlando, Florida
http://www.lal.ufl.edu/fshs/

CITRUS EXPO
IN FORT MYERS

Wednesday, August 25 &
Thursday, August 26, 2004

CITRUS EXPO

Special Thanks **to the following sponsors of the Flatwoods Citrus Newsletter for their generous contribution and support. If you would like to be among them, please contact me at 863 674 4092.**

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FACTORS AFFECTING BLOOM, FRUIT PRODUCTION AND QUALITY

In subtropical regions during the winter months, the temperature normally falls below 70 °F for several months. This causes growth to cease and trees to become dormant for about 3 months. This dormancy, among other things, induces flowering when warmer temperatures in the early spring cause resumption of vegetative growth. In a tropical climate, there is no period of cold temperature to induce dormancy. However, with periods of less than ample soil moisture, flushes of bloom and vegetative growth normally follow periods of drought.

It is well known that vegetative growth is competitive with fruit growth for available nutrients such as sugars and minerals. Flushes of heavy vegetative growth will reduce the solids available to developing fruit, while a period of dormancy will increase solids. This competition for nutrients between vegetative growth and fruit development is one of the reasons reducing solids concentration often found in oranges produced in the tropics as compared with those produced in subtropical regions.

Fruit production and quality is influenced by many factors including climatic conditions and production practices. Within fairly broad parameters of adequate soil and reasonably good cultural and crop protection practices, climate is the most important component of the climate-soil-culture complex causing differences in fruit quality among commercial citrus production areas.

CLIMATE

There is considerable diversity among citrus cultivars in their response to climate, especially as regards to market quality of the fruit. For example, 'Navel' develops its best eating and eye-appeal qualities in a Mediterranean type climate with cool, wet winters and hot, dry summer. In wet, tropical regions, it tends to be large, with poorly colored rinds, and low total soluble solids and acid in the juice. However, 'Valencia' is adapted to a broad range of climates, producing excellent to acceptable fruit quality in most of the important citrus regions. Unlike 'Navel', most grapefruit cultivars develop optimum internal quality in warm climates with little winter chilling.

Cultural practices cannot completely overcome these differences. For example, there is no known cultural practice that allows California (with Mediterranean climate) to produce low-acid, thin-peel Florida world top quality grapefruit. Nor is it possible to achieve California's 'Navel' quality in south Florida's warm to hot fall months.

Worldwide, climate has a significant effect on citrus yield, growth, fruit quality, and economic returns. In growing regions where the average temperatures remain high all year, chlorophyll levels remain high for oranges and tangerines and the fruit peel stays green, while the peel color of oranges and mandarins is more intense and of greater eye-appeal at maturity in the cold-winter subtropical climates.

In lowland tropical areas, due to the high respiration rate at warm

temperatures, the fruit mature fast, do not have sufficient time to accumulate high soluble solids levels and acidity declines so rapidly that the soluble solids/acid ratio increases sharply and the fruit quickly become insipid and dry. Total soluble solids (TSS) in the fruit accumulate most slowly in cool coastal areas. Maximum levels of TSS are usually attained in the mid-tropics and in humid subtropical regions with warm winters. Total acid (TA) levels are generally greatest in semiarid or arid subtropical and coastal regions and decline more slowly than in other regions. This decrease in TA is primarily a function of temperature (heat unit accumulation) and the rapid respiration of organic acids at those temperatures.

GROWTH REGULATORS

Application of plant growth regulators can provide significant economic advantages to citrus growers when used in appropriate situations. Depending on cultivar and timing, plant growth regulators may improve fruit set, increase fruit size by reducing cropload, extend the harvest season by delaying rind aging, and reduce preharvest fruit drop.

Gibberellic acid (GA) is recommended to be used on citrus hybrids that are weakly parthenocarpic and without sufficient cross-pollination to improve fruit set. Applied from full bloom to two-third petal fall, GA can effectively set and produce an excellent crop of seedless Robinson, Nova, Orlando, Minneola, or other self-incompatible mandarin hybrids. Application of GA to citrus fruit approaching maturity enhances peel firmness and delay peel senescence.

Application of GA in the fall often increases juice extraction from sweet oranges. It is likely that GA enhances juice extraction efficiency because increased peel firmness provides better mechanical support for fruit within extraction cups.

Applied in winter during floral induction to cultivars that routinely flower heavily but set poor crops such as Navel, Ambersweet, and Ortanique, GA reduces flowering and often results in increased fruit set. A combination of GA and 2,4-D has been used in many fresh fruit growing regions to enhance peel strength and extend the harvest seasons for grapefruit and oranges.

Naphthaline acetic acid (NAA) is used to reduce the number of fruit with excessive set. The advantage of NAA thinning in heavily cropping trees is increased fruit size. The greatest response has been shown when the average fruit diameter is around half an inch, which typically occurs 6 to 8 weeks postbloom. Thinning of Murcott and Sunburst tangerine with NAA was found to increase fruit size, mean fruit weight, and percent packout through improved fruit appearance.

CULTIVAR/ROOTSTOCK

The most important determinant of fruit production and quality under the control of the grower is the selected cultivar. Under comparable conditions, ‘Hamlin’ orange always has poorer juice color and lower soluble solids than ‘Pineapple’ or ‘Valencia’ orange. On the other hand, ‘Hamlin’ produces higher, more consistent yields per acre than any other sweet orange cultivar. Consequently, ‘Hamlin’ has been the most extensively planted cultivar in Florida during the last two decades. ‘Valencia’ is worldwide known to produce premium quality fruit. Its internal quality is excellent. The fruit has high sugars, superior flavor, and deep orange juice color at maturity.

Beside the cultivar, many horticultural characteristics are influenced

by the rootstock including tree vigor and size, fruit yield, fruit size, maturity date, and fruit quality. Rootstock effects are usually dramatic and can be easily seen even without taking measurements. One of the best known examples is the small fruit size of 'Valencia' budded on Cleopatra mandarin rootstock.

Cleopatra mandarin is well suited for use with tangerines, Temple, and tangerine hybrids. Cleo is not widely used for grapefruit and 'Valencia'. Sweet orange and grapefruit cultivars on Cleo generally produce small fruit and are not precocious. Low yield results from poor fruit set and size and fruit splitting. Scions on Cleo are most productive on heavier soils.

Larger fruit with thicker, rougher peel, and lower concentrations of soluble solids and acids in the juice are generally associated with cultivars budded on fast-growing vigorous rootstocks such as rough lemon, Volkamer lemon, *Citrus macrophylla*, and Rangpur lime. However, these rootstocks impart high vigor to the scion and induce high yield. Tangerine fruit from trees grown on vigorous rootstocks tends to be puffy, hold poorly on the tree, and have high incidence of granulation.

Cultivars budded on slower-growing rootstocks, generally do not produce vigorous vegetative growth, but tend to produce small to medium size fruit with smooth peel texture and good quality fruit with high soluble solids and acid contents in the juice. This latter group of rootstocks includes trifoliate orange and some of its hybrids (citranges and citrumelos). Sweet oranges budded on Carrizo have been among the most profitable combinations over the long term in Florida. Planted on the right soils, trees on Swingle are very productive at high-density plantings.

IRRIGATION AND NUTRITION

Although citrus trees develop largely in response to their genetic endowment and the climate, good production practices can have favorable influences on fruit production and quality. Cultural practices that attempt to cope with climatic or weather problems include irrigation and nutrition. Irrigation is of particular importance during the spring, which coincides with the critical stages of leaf expansion, bloom, fruit set, and fruit enlargement.

Irrigation increases fruit size and weight, juice content and soluble solids-acid ratio. Soluble solids per acre may increase due to yield increase. However soluble solids per box and acid contents are reduced. Through its tendency to stimulate vegetative growth, irrigation in the dry fall and winter may reduce soluble solids in the fruit. Decline in total acid levels can also be aggravated by excessive irrigation.

Citrus trees require a properly designed, operated, and maintained water management system and a balanced nutrition program formulated to provide specific needs for maintenance and for expected yield and fruit quality performance. Adequately watered and nourished trees grow stronger, have better tolerance to pests and stresses, yield more consistently, and produce good quality fruit. On the other hand, excessive or

deficient levels of watering or fertilization will result in low fruit yield and oversize fruit with poor quality and diluted soluble solids content.

The most important nutrients influencing fruit quality are nitrogen, phosphorus, and potassium. However, when any other nutrient is deficient or in excess, fruit yield and quality are negatively altered. Nitrogen (N) increases juice content, TSS per box and per acre, and acid content. However, excessive N can induce excess vigor and promote a vegetative rather than a flowering tree and can result in lower yields with lower TSS per acre. In contrast, low N levels promote extensive flowering but fruit set and yields are poor.

Phosphorus reduces acid content, which increases soluble solids-acid ratio. Potassium (K) increases fruit production, fruit size, green fruit and peel thickness. Foliar spray of potassium nitrate or monopotassium phosphate in the spring often increases fruit size of tangerine and grapefruit, and fruit size and total pound solids of 'Valencia' orange. Foliar application (6 to 8 weeks before bloom) of low biuret urea can increase flowering and fruit set.

Effects of irrigation and nutrition on juice and external fruit qualities were discussed in details in the article entitled "irrigation, nutrition and fruit quality" published in the Citrus Industry magazine, October 2002.

SUNLIGHT AND PRUNING

Even though citrus trees can tolerate shade and still flower and fruit, maximum flowering occurs when leaves are fully exposed to the sun. Therefore, pruning including topping and hedging to avoid crowding is extremely important for optimum flowering. The amount of fruit that is set has a very significant effect on fruit quality. There is a positive correlation between the number of fruit per tree and fruit quality. When the number of fruit per tree is low, the peel texture, shape of fruit, and often fruit color are poor. Quality of individual fruit varies significantly, even on the same tree. Inside heavily shaded fruit have less total soluble solid than outside exposed fruit. Insufficient light contributes to reduced total soluble solid concentration of inside fruit nourished by heavily shaded leaves. Pruning is also an important factor affecting fruit production and quality. Crowded conditions result in poor light accessibility and reduction in fruit yield, size, and external quality. Therefore, good management dictates the need to prune before the occurrence of these undesirable effects.

It is well established that shoots with fruit do not flower the following year. A heavy fruit crop tends to deplete carbohydrates and results in a small crop and increased vegetative growth the following year. Pruning after a heavy crop additionally stimulates vegetative growth and reduces fruit yield the following year. Pruning after a light crop and before an expected heavy crop can increase fruit size and help reduce alternate bearing. Pruning or topping and hedging usually increase fruit size and packout of fresh-market fruit by reducing cropload, thus increasing net cash returns to growers.

Effects of pruning on fruit quality and yield were discussed in details in the article entitled "pruning citrus trees" published in the Citrus Industry magazine, January 2004.

PESTS AND DISEASES

The improvement in fruit quality that a grower can achieve through choice of rootstocks, irrigation/nutrition management, and other grove practices may easily be overwhelmed by pests, diseases, and other injuries.

PRUNING CITRUS TREES

Pruning healthy, mature citrus trees usually reduces yield in proportion to the amount of foliage removed and can delay fruiting of young, nonbearing trees. Proper control of vegetative growth is essential for the maintenance of healthy, productive citrus groves. Most groves in Florida must be pruned at some time during their development to avoid problems associated with overcrowded, excessively tall trees.

When pruning should begin will depend to a large degree on the initial tree planting density. Crowded conditions result in poor light accessibility, loss of lower foliage and bearing wood, relocation of fruiting to the upper tree canopy areas and reduction in fruit yield, size, and external quality. Therefore, good management dictates the need to prune before the occurrence of these undesirable effects.

The response to pruning depends on several factors including variety, tree age and vigor, growing conditions, and production practices. As no one system or set of rules is adequate for the numerous situations encountered in the field, growers are encouraged to gain a clear understanding of the principles involved in pruning and to take advantage of research results and knowledgeable colleague and custom operators' observations.

Too much nitrogen after severe pruning will produce vigorous vegetative growth at the expense of fruit production. Therefore, nitrogen applications should be adjusted to the severity of pruning. Reducing nitrogen applications avoids an imbalance when heavy pruning is done. Omitting a nitrogen application before heavy pruning and possibly after will reduce both costs and excessive vegetative growth. However, light maintenance pruning should not affect fertilizer requirements.

A heavy crop of fruit tends to deplete carbohydrates and results in a small crop and increased vegetative growth the following year. Pruning after a heavy crop additionally stimulates vegetative growth and reduces fruit yield the following year. Pruning after a light crop and before an expected heavy crop is recommended because it can help reduce alternate bearing.

Severe pruning stimulates vigorous new vegetative growth, especially when done before a major growth flush. This happens because an undisturbed root system is providing water and nutrients to a reduced leaf area. The larger the wood that is cut, the larger is the subsequent shoot growth. Severe pruning reduces fruiting and increases fruit size. Severe pruning of a very crowded grove typically results in a crop reduction the first year, recovery of the previous yield the second or third year, and higher yields thereafter, although this can vary with tree vigor, grove conditions, and size of the previous crop.

RECOMMENDATIONS

Severe pruning and training of young, nonbearing trees tends to delay fruit production and should be avoided. Most trees usually need no pruning for the first few years in the grove except for removal of sprouts on the trunk or vigorous suckers on weak trees. When the tree is 3 or 4 years old, depending on its growth, branches that are too closely spaced or are crossed and entangled may be removed. This pruning should be light, just sufficient to establish a desirable framework without stimulating excessive vegetative growth. Mature Trees require pruning when they approach containment size because crowding results in inadequate light conditions, loss of foliage and loss of fruit production in the lower portion of the tree.

Hedging, which consists of cutting back the sides of trees to prevent or alleviate crowding, has become a common practice. Hedging causes numerous cut wood surfaces along the side of the tree canopy from which new sprouts arise eventually developing into a wall of new foliage. Middles between tree rows should be sufficiently wide to accommodate grove equipment and provide adequate light access to the sides of the trees. Middles are usually hedged to a width of 7 to 8 ft.

Hedging should be started before crowding becomes a problem so that only cutting of small branches is necessary and minimal crop reduction results. The closer the spacing and the more vigorous the trees, the sooner hedging is required and the more frequently it needs to be done. Removal of a large portion of the tree will result in excessive vegetative growth and a drastic reduction in subsequent yield. Hedging of severely crowded groves aids in the eventual restoration of the tree skirts and opens them up for passage of grove equipment. However, heavy cutting is expensive, reduces the crop, and increases problems and cost of brush disposal.

Hedging is usually done at an angle, with the boom tilted toward the treetops so that the middles are wider at the top than at the bottom, allowing more light to reach the skirts of the tree. Hedging angles being used vary from 0 to 25 degrees from vertical, with 10 to 15 degrees being more commonly used and more satisfactory. With wide angles, topping can sometimes be done with one pass of the boom instead of two or can be eliminated entirely if the trees come to a peak at a suitable height. Another advantage of hedging at wider angles may be better spray coverage, particularly aerial.

Topping should be done before trees have become excessively tall and should be an integral part of a maintenance program. Long intervals between topping will increase costs of the operation due to heavy cutting and more brush disposal. Excessively tall trees are more difficult and expensive to harvest and spray. Topping trees will increase light penetration into the tree canopy thereby stimulating intense vegetative growth. Topping will also reduce harvesting costs and enhance pest and disease control due to better spray coverage, and increase fruit quality and size. Yield reduction due to light topping is usually not great if trees still have their lower skirt areas. However, if the trees have lost their lower canopy

bearing wood, a large reduction in yield will occur in the first year since much of the fruit-producing wood and foliage would be removed. Topping these trees would still be beneficial in the long run since it may help them regain their skirt areas and bring them to a more manageable height. Since topping usually increases fruit size (by reducing crop load), fresh-market fruit from topped trees may have a higher packout.

Some trees are flat-topped, especially if they are small or narrow or have been hedged at a wide angle. Closely-spaced rows and those with a sufficient hedging angle can be flat-topped with a single pass of the boom. However, trees can be topped at angles ranging from 15 to 30 degrees from horizontal, resulting in a peak, which is 2 or more ft higher than the shoulders. Angles between these extremes are commonly used. The slope aids machines in sweeping brush from the tops.

Optimum tree height depends on the distance between trees, the hedging angle and tree width. Topping height may vary from about 10 to 20 ft, but is usually about halfway between. Some common topping heights are 12 to 14 ft at the shoulder and 15 to 16 ft at the peak. Lower heights are mostly used for training trees, increasing fruit size or rejuvenating declining trees. Topping should be started before heavy cutting is required. If heavy cutting is required in older groves, the initial cuts should be low enough to avoid cutting heavy wood in subsequent topping operations. Retopping is generally done just above the old cut.

Skirting, which is pruning to raise tree skirts has become a more widely accepted practice. With low tree skirts the movement of herbicide booms and other equipment is impeded, and the inspection of irrigation systems is more difficult. Fruit and limbs near the ground are often damaged by the passage of such equipment and by herbicide spray and fertilizer contact. Low tree skirts may also increase the incidence of Phytophthora foot rot, because of poor air circulation under the tree canopy. Lower canopy fruit is also more susceptible to Phytophthora brown rot. Skirting has the advantage in reducing problems with vines and facilitating mechanical harvesting.

PRUNING PROGRAMS

Hedging programs can vary considerably with variety, tree vigor, and spacing. The grower can hedge every middle every year; hedge alternate middles every year; or hedge every middle every other year. Groves on a 2-year program are hedged in one middle one year and the other middle the next. A 3-year program might consist of hedging one middle the first year, the other the second and topping in the third year. The possibilities for hedging and topping schedules are numerous and should be decided on an individual basis.

The best time of year to hedge depends on variety, location, severity of pruning, and availability of equipment. Since hedging is usually done after removal of the crop, early maturing varieties are generally hedged before those, which mature later in the season. Many prefer to hedge early before bloom, but they may also get more regrowth, which may or may not be desirable. Hedging could begin as early as November in warmer

areas. Moderate hedging can be done until July with little or no crop loss and perhaps less regrowth. Light maintenance pruning can be done throughout the summer and until early fall with little or no loss in fruit production. Hedging should not continue into the fall in freeze-prone areas, as trees with tender regrowth are more susceptible to cold injury.

Hedging `Valencia' orange or late harvested grapefruit presents a special problem because of overlapping crops. Hedging has usually been done in late spring after the old crop is harvested and the new crop is set. Fruit harvest should be scheduled early in the season for `Valencia' groves that are to be hedged. Good results have been obtained when annual hedging has been done in late winter with the old crop still on the tree and before bloom. The first cut is usually done after harvest and then the grove is rehedged annually in January or February. When this is done annually at the same width, the wood and foliage removed contains few fruit and there is little or no reduction in yield. The key to this program is consistency.

Summary. A pruning program should begin before any heavy cutting is necessary and should be conducted every year so that desired tree size and shape can be maintained at low cost and with minimum loss of canopy and maximum consistency in fruit production.

- Severe pruning and training of young, nonbearing trees, tends to delay fruit production and should be avoided.
- Mature trees should be pruned when approaching containment size and before crowding becomes a problem so that only small branches are cut and yield reduction is minimized.
- Crowding results in inadequate light conditions, dieback of small branches in the interior and base of the canopy, loss of foliage and fruit production particularly in the lower portion of the tree.
- Middles between tree rows should have a width of 7 to 8 feet to accommodate grove equipment and provide adequate light to the trees.
- **Hedging** consists of cutting back the sides of trees to prevent crowding.
- Hedging should be done at 10 to 15 degrees from vertical. Hedging at wider angle is better for spray coverage, but may result in severe yield reduction.
- **Topping** should be done before trees have become excessively tall.
- Yield reduction due to light topping is usually not significant if trees still have their lower skirt areas.
- Topping increases light penetration into the trees, stimulates vegetative growth and results in thicker canopies.
- Topping can increase fruit size and packout.
- Retopping should be done just above the old cut.
- Moderate, consistently timed hedging and topping does not reduce yield, but may improve fruit quality.
- The best time to top and hedge early maturing cultivars is after removal of the crop. For Valencia, it is recommended that the first cut is done after harvest and then annually during the winter.
- **Skirting**, which is the pruning to raise tree skirts, has become a more widely accepted practice.
- Skirting facilitates the movement of herbicide booms and other equipment, improves weed control, fertilizer distribution and air circulation under the tree canopy, reduces brown rot and Phytophthora problems, and makes less difficult the inspection of irrigation systems.

Fungicide effectiveness (By Dr. Timmer)

	Greasy Spot	Alternaria	Scab	Melanose	PFD
Copper	Excellent	Good	Moderate	Excellent	Poor
Benlate	Excellent	None	Excellent	Weak	Good
Topsin	?	None	?	?	Good
Ferbam	Weak	Moderate	Good	Weak	Moderate
Enable	Excellent	Poor	Good	Weak	?
Abound	Good	Very good	Excellent	Moderate	Moderate
Gem	Good	Moderate	Excellent	Moderate	Moderate
Headline	Good	Very good	Excellent	Moderate	Moderate
Trilogy	Weak	Moderate	None	None	None

For Alternaria Brown Spot, Use the Alter-Rater Model and Evaluations at http://www.lal.ufl.edu/timmer/Alterater.htm

The Alter-Rater suggested threshold scores

Score	Situation
50	Heavily infested Minneola, Dancy, Orlando, Sunburst; Many Flatwood groves, east coast, and SW Florida.
100	Moderately infested Minneola or Dancy, many Murcotts, Ridge and north Florida groves.
150	Light infestations, any variety, mostly Ridge and north Florida groves.

ALTERNARIA BROWN SPOT

Alternaria fungal disease can cause severe leaf and fruit drop particularly in Minneola (Honeybell) and Orlando tangelos, Dancy tangerine, and Murcott (Honey tangerine). Alternaria must be controlled on these cultivars to obtain high yields of good quality fruit. The spores of this disease are air borne, but require moisture for germination and infection. Leaf tissue is susceptible until it is fully expanded and fruit is susceptible for about 3 months after bloom. When new groves of the above cultivars are planted, only disease-free nursery stock should be used. Trees should be spaced more widely than oranges to promote rapid drying of the canopy. It is best to locate susceptible varieties in high areas where air drainage and ventilation are good so that leaves dry more rapidly. Irrigation, fertilization, hedging, topping, and skirting should be carefully monitored so that excessive vegetative growth is minimized. Copper fungicides, Abound, Gem, Ferbam, Headline, and Trilogy are the materials registered for the control of this disease. The first spray should be applied when the spring flush leaves are ¼-1/2 expanded. In severe cases, another spray should be applied when the leaves are near full expansion to reduce the infection on the fruit. Another spray should be scheduled shortly after petal fall. Abound, Ferbam, Gem or Headline may be the best choice for one or two applications especially if the grove has problems with both scab and Alternaria. From April though June, spray applications may be needed as often as every 10 days or as infrequently as once a month depending on the frequency and amount of rainfall and the rate of infection in the grove. Copper fungicides can be used from April through May, but can produce fruit blemishes if applied during hot weather. Therefore, Abound, Gem, Ferbam, Headline, and Trilogy may be substituted for copper in June or July applications. Abound, Gem, and Headline are strobilurin fungicides and Alternaria has the potential to develop resistance to these products. Strobilurin should not be used for Alternaria control more than 3 times in a season and never more than 2 applications in a row. Gem is not highly effective for control of Alternaria. Trilogy and Ferbam are less effective for Alternaria control than copper, Abound or Headline.

DO NOT APPLY BENLATE, ABOUND, GEM, or HEADLINE IN NURSERIES.

For more information, get your copy of the 2004 Florida Citrus Pest Management Guide.

Postbloom Fruit Drop (PFD)
(By Dr. Timmer)

PFD – FAD
(Postbloom Fruit Drop – Fungicide Application Decision)

Get to this website:
http://infotech.ifas.ufl.edu/disc/pfd

Fungicides for PFD

Benlate 50 WP	2.0 lb
Topsin M	2.0 lb
Abound 2.08F + 5lb Ferbam	12.4 fl. oz + 5 lb
Gem + Ferbam	4.0 oz + 5 lb

Dr. L.W. "Pete" Timmer, Extension Plant Pathologist at the University of Florida/IFAS Citrus Research and Education Center, will provide current information on recent outbreaks, the status of the bloom and other relevant news.

Information on PFD and other foliar fungal diseases is available on Timmer's citrus pathology website http://www.crec.ifas.ufl.edu/timmer/

Call the Citrus Disease Hotline **866-365-3017**

CITRUS SCAB

This fungal disease affects grapefruit, Temple orange, Murcott, tangelos, and some other tangerine hybrids. If leaves from the previous season are heavily infected by citrus scab, 3 applications should be scheduled to control this disease. The first spray should be applied at about ¼ expansion of the spring flush leaves, the second at petal fall and the third about 3 weeks later. Fruit becomes resistant to scab about 2 months after petal fall. Benlate, Ferbam, and Abound, Gem, or Headline are good choices for the first application because they are able to kill the fungus in old lesions and thus reduce the inoculum and protect the foliage. Whichever of these products was not used in the first spray may then be used in the petal fall spray. Copper fungicides, Abound, Gem, or Headline are good choices for the third spray since they will protect fruit from early melanose as well as from scab. On tangelos and Murcott, Alternaria brown spot and scab occur together. Under this circumstance, either copper fungicides, Ferbam, Abound, Gem, or Headline should be selected for the 3 sprays. Benlate is ineffective against Alternaria. If used more than once a year, resistance of the scab fungus to Benlate, Abound, Gem, or Headline may develop.

DO NOT APPLY BENLATE, ABOUND, GEM, or HEADLINE IN NURSERIES.

•<u>Spring flush</u>
Abound, Gem, Headline, Benlate, Ferbam

•<u>Petal fall</u>
Abound, Gem, Headline, Benlate, Enable, Ferbam

•<u>3 weeks later</u>
Cu fungicides, Abound, Gem, Headline

•Do not use Abound, Gem, Headline or Benlate more than once.

IRRIGATION

Despite our large yearly rainfall of 50-60 inches, which exceeds the citrus water requirement or evapotranspiration (ET), Florida citrus growers and production managers should keep in their mind that they can't grow citrus successfully and competitively without supplemental irrigation. Through research and field experience, we know that irrigation is necessary because of the non-uniform distribution of the rainfall and the very limited water holding capacity of Florida sandy soils.

Irrigation is of particular importance during the dry period (February-May), which coincides with the critical stages of leaf expansion, bloom, fruit set, and fruit enlargement.

Proper irrigation scheduling is defined as the application of water when needed and in the amounts needed. Citrus production managers should accurately determine when and for how long to irrigate. With proper irrigation scheduling, tree growth and fruit yield will not be limited by water stress or water excess. Over-watering will waste water and pumping energy, will leach nutrients and other chemicals below the rootzone, and will contribute to contamination of the groundwater.

Because of the high water table in southwest Florida, citrus trees have over 90% of their feeder roots within the top foot of soil. For this situation, irrigating for long duration can lead to loss of water below the rootzone. Therefore, it is recommended to increase the frequency and reduce the length or duration of irrigation. Irrigating every other day is better than irrigating once or twice a week. Research work in Florida has shown the importance of the area wetted by irrigation systems. When managed properly, greater area coverage by irrigation emitters provides higher yield than very limited coverage.

Because of the relatively high annual rainfall in Florida, roots of mature trees are spread throughout the grove and are not restricted to the wetted area by the irrigation system emitters. Roots are commonly found in the middles between tree rows and outside the wetted zone by microirrigation systems. Therefore, it is important to have the irrigation system cover most of the area under the tree canopy and even slightly outside the canopy dripline.

Drip systems may not provide enough water to mature citrus trees in Florida because of the limited horizontal distribution of water on poor fine sands. Irrigating with drip systems for too long will neither provide more coverage nor reduce water stress and wilting, but will drive most of the water below the shallow rootzone. Increasing irrigation frequency rather than duration with microirrigation systems is one of the most important factors improving water use efficiency. Raising the water table in the ditches or water furrows will certainly help the trees recover from water stress.

Good water management practices should include precise irrigation scheduling and well-designed, uniform irrigation systems to minimize waste. Non-uniform irrigation will cause excess water to be applied in some areas while other areas will not get enough. Production managers should not only be aware of the losses resulting from irrigation systems that apply water and chemicals non-uniformly, but should adopt the recommended ways to minimize these losses.