UNIVERSITY OF FLORIDA
EXTENSION
Institute of Food and Agricultural Sciences

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Flatwoods Citrus

Vol. 6, No. 7 **July 2003**

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

Enclosed, please find a survey on factors influencing grapefruit packouts. **Please fill it out and fax it to Dr. Mark Ritenour as soon as you can (Fax 772 468 5668). Your help will be very appreciated!**

UPCOMING EVENTS

Seminar at the ***Immokalee IFAS Center***

A joint effort between DPI, Dow AgroSciences and IFAS Extension to update everyone involved in citrus on **GF 120 Natural Fruit Fly bait to be used in the state Fly Eradication program**
Date & Time: Wednesday, August 20, 2003, 9:00 AM –12:00 Noon
2 CEUs for Pesticide License Renewal
2 CEUs for Certified Crop Advisors

Following the seminar, we are planning a free lunch (Compliments of Dow) for only who call 863 674 4092 no later than Monday, 18 August 2003.

Agenda:
9:00 Registration/Sign In
9:30 Introductions / GF 120 NF presentation, Linda / Meghan - Dow
10:10 Compliance with state Protocol for "Fly Free" Fruit, Calise Jenkins - DPI
10:40 Ground Applications for GF 120 NF, Mike Ziegler - Consultant
11:15 Lorsban 4E Tolerance Issues with Japan, Ray Brinkmeyer - Dow AgroSciences

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

CITRUS EXPO
IN FORT MYERS

Wednesday, August 27 &
Thursday, August 28, 2003

49th Annual Meeting of the InterAmerican Society for Tropical Horticulture (ISTH)

August 31- Sept 6, 2003
Fortaleza, Brazil
http://www.isth.cjb.net/

Annual Conference of Extension Professionals (FAEP)

September 8 - 11, 2003
Jacksonville Hilton, Jacksonville, Florida
http://extadmin.ifas.ufl.edu/
http://extadmin.ifas.ufl.edu/FAEP2003/Theme.htm

American Society for Horticultural Science (ASHS)

100th Annual International Conference
October 3-6, 2003
Rhode Island Convention Center, Providence, Rhode Island
http://www.ashs.org/

INTERNATIONAL SOCIETY OF CITRICULTURE

10th International Citrus Congress

February 15-20, 2004
Agadir, Morocco
http://www.lal.ufl.edu/ISC_Citrus_homepage.htm

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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Citrus Blight is a wilt and decline disease of citrus whose cause has not been determined. The first symptoms are usually a mild wilt and grayish cast to the foliage often accompanied by zinc deficiency symptoms.

Trees rapidly decline with extensive twig dieback, off-season flowering, and small fruit. Blight trees reach a stage of chronic decline, but seldom die.

The disease affects only bearing trees and usually first appears when the grove is 6-8 years old. The first affected trees in a grove are usually randomly distributed, but groups of blighted trees may eventually occur, either as clusters or down the row. The disease has been transmitted by root grafts, but not by limb grafts or with budwood. The means of spread, other than by root grafts, is not known.

Blight symptoms can be confused with other decline diseases and accurate diagnosis is important in order to follow proper practices. Citrus blight is characterized by failure to absorb water injected into the trunk. The best procedure for diagnosis of individual trees in the field is to test water uptake into the trunk using a battery-powered drill and a plastic syringe without a needle. Healthy trees or trees declining from Phytophthora root rot, nematodes, water damage, or tristeza will usually take up about 10 ml of water in 30 sec. Trees affected by citrus blight take up no water regardless of the amount of pressure applied. For confirmation, an accurate serological test is available at the University of Florida.

Trees on all rootstocks are susceptible, but significant differences between stocks exist. The rootstocks which are the most severely affected by blight are rough lemon, Volkamer lemon, Rangpur lime, trifoliate orange, and Carrizo citrange. Those most tolerant to blight are sweet orange, sour orange, Cleopatra mandarin, and Swingle citrumelo. Sweet orange and sour orange are not recommended because of problems with Phytophthora root rot and tristeza, respectively.

Recommended Practices

There is no known cure for citrus blight. Once trees begin to decline, they never recover. Severe pruning of blighted trees will result in temporary vegetative recovery, but trees decline again once they come back into production. The only procedures recommended are: (1) Remove trees promptly once yield of affected trees has declined to uneconomic levels. (2) Plant or replace trees with trees on rootstocks such as Cleopatra mandarin or Swingle citrumelo which do not develop blight at an early age. (3) Plant trees on vigorous, productive rootstocks such as Carrizo citrange or Volkamer lemon which develop blight at an early age and replace trees that decline as soon as they become unproductive. Production can be maintained at relatively high levels in spite of blight with these rootstocks.

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IMPORTANCE OF TISSUE AND SOIL SAMPLING AND ANALYSES IN ADJUSTING FERTILIZER PROGRAMS

Optimum growth and yield of high quality fruit cannot be obtained without adequate nutrition. The most successful fertilizer program should be based on tissue analysis, knowledge of soil nutrient status through soil analysis combined with university recommendations about optimum crop and fertilizer management practices. The deficiency or excess of an element will cause disturbance in plant metabolism and lead to poor performance. Appropriate steps have to be taken to diagnose nutritional problems and find solutions. Field trials, soil analysis and plant analysis have to be integrated together so that much of the guesswork is eliminated, fertilizer requirements are well assessed and fertilizer programs are adequately adjusted. Fertilizer recommendations should be based on the nutrient requirement of the crop to be grown and on the results of the tissue and soil test analyses.

Plant analysis

Nutrient concentrations in plant tissues are the most accurate indicator of the nutritional health of fruit crops. Plant analysis was demonstrated and proven to be an extremely useful tool for detecting nutritional problems and adjusting fertilizer programs of fruit trees including citrus. The concentrations of mineral nutrients in plant tissues have a controlling influence on growth and fruit yield of crops. In the case of fruit trees, research has shown that leaves are the best tissue for sampling because nutrients are gathered and redistributed throughout the plant, and the deficiency or excess of an element present in the soil is more often reflected in the leaf. Furthermore, it is easier to collect leaf samples than any other plant parts.

Used in conjunction with other data and observations, tissue analysis aids in evaluating the nutrient elements of the soil-plant system. It provides a way to evaluate the effectiveness of fertilizer programs. Tissue analysis is not only useful for determining whether or not the soil is adequately supplying the required nutrients, but also can be helpful for comparing various fertilizer treatments.

Tissue analysis has proven useful in confirming nutritional deficiencies, toxicities or imbalances, identifying "hidden" toxicities and deficiencies where visible symptoms are not manifested, evaluating the effectiveness of fertilizer programs, determining the availability of elements not tested for by other methods, and studying interactions among nutrients. Tissue analysis can be used to monitor nutrient status so that problems are avoided. The greatest limitation of relying on visual symptomology to manage fruit nutrition is that such symptoms indicate a problem already exists and reductions in growth, yield, and fruit quality may have already occurred. The goal in tissue analysis is to adjust nutritional programs to prevent nutritional problems and their costly consequences.

Adding fertilizer to the soil is no guarantee that plants will benefit from it. The form of the fertilizer may not be available to plants, or it might react with the soil to form insoluble compounds. Tissue analysis can also be used to determine whether fertilizer programs are performing according to expectations.

Leaf analysis integrates all the factors that might influence nutrient availability and uptake. It shows the balance between nutrients. For example, potassium (K) deficiency may be the result of a lack of K in the soil or from excessive Ca, Mg, and/or Na levels. Adding N, for example, when K is low may result in K deficiency because the increased growth requires more K too.

Tissue analysis is the quantitative determination of the elements in plant tissue. Tissue analysis usually refers to analysis of nitrogen (N), phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), manganese (Mn), zinc (Zn), copper (Cu), iron (Fe), and boron (B). Sulfur and chlorine are at sufficient levels under most field conditions. However, chlorine may become excessive in saline soils or irrigation water. Similarly, molybdenum deficiency or toxicity is rare. Therefore, sulfur, chlorine, and molybdenum are analyzed in special cases only.

Leaf Sampling

For reliable results and useful interpretation of lab analysis reports, citrus growers, production managers, and consultants must follow the proper procedures for leaf sampling and sample handling because improperly collected leaf samples will provide misleading information about the nutritional status of the trees and the fertilizer programs.

Considerable care is needed in taking samples. Chemical analysis values can only be useful if the samples obtained are representative of the blocks they were taken from. The proper sampling, preparation and handling would affect the reliability of the chemical analysis, data interpretation, nutritional recommendations, and adjustment of fertilizer programs.

Procedures for proper sampling, preparation and analysis have become standardized for meaningful comparisons and interpretations. Leaf samples must also be taken at the proper time because nutrient levels within leaves are continually changing. Nitrogen (N), P and K levels normally decrease, while Ca and Mg increase as the leaf ages from the spring through the fall. However, leaf mineral concentrations of most nutrients are relatively stable within 4 to 6 months after emergence of the spring flush. Therefore, for mature tree blocks, the best time would be in July and August to collect four- to six-month-old spring flush leaves. If taken later in the season, the summer flush would probably be confused with the spring flush.

Each leaf sample should consist of about 100 leaves taken from non-fruiting twigs of 15- 20 uniform trees of the same variety and rootstock, and under the same fertilizer program. Clean brown paper bag should be used. Information sheets from the testing lab should be completed for each sample as this information helps when interpreting the results. The sample bag and the corresponding information sheet should each be carefully labeled with the same identity so that samples and sheets can be matched in the laboratory.

Sampling techniques for leaves

♦ Immature leaves should be avoided because of their rapidly changing composition.

♦ Abnormal-appearing trees, trees at the edge of the block and trees at the end of rows should not be sampled because they may be coated with soil particles and dust or have other problems.

♦ Do not include diseased, insect damaged, or dead leaves in a sample. Use good judgment.

♦ Select only one leaf from a shoot and remove it with its petiole (leaf stem).

Diagnosing growth disorders

♦ Collect samples from both affected trees as well as normal trees.

♦ Trees selected for sampling should be at similar stage of development and age.

♦ Whenever possible, confine the sampling area to trees in close proximity to each other.

Handling of leaf samples

♦ Samples should be collected in clean paper bags and clearly identified.

♦ They should be protected from heat and kept dry and cool (stored in portable ice chests), and placed in a refrigerator for overnight storage if they cannot be washed and oven dried the same day of collection.

♦ For macronutrient analysis, leaves usually do not need to be washed.

♦ Leaves should be dried in a ventilated oven at 60-70^{o}C.

Preparation for analysis

♦ Leaves that have been recently sprayed with micronutrients for fungicidal (Cu) or nutritional (Mn, Zn) purposes should not be analyzed for those micronutrients because it is unlikely to remove all surface contamination from sprayed leaves.

♦ For accurate Fe and B or other micronutrient determination, samples would require hand washing, which is best done when leaves are still in a fresh condition.

♦ For micronutrients determination, the leaves should be washed with a detergent and rinsed with tap water, then rinsed in diluted hydrochloric acid (5%) solution and finally rinsed 3 times with distilled water. It is difficult to remove all surface residue even with the acid rinse, but this procedure removes substantially most of it.

The laboratory will determine the levels of each nutrient in the plant sample, and will indicate if each nutrient level is excessive, high, adequate, low or deficient. Leaf analysis standards are shown in the Table below. The balance between nutrients should be carefully examined. For example, increasing K rate when Mg is low may cause Mg deficiency. An increase in N when K is low may result in K deficiency.

Soil analysis

Soil analysis is an important method for gaining basic information regarding the chemical status of the soil. It can also provide data on extractable and available nutrients, which are useful in formulating and improving a fertilizer program. Soil analysis is particularly useful when conducted over several years so that trends can be seen, solid information can be gathered, and proper adjustment of fertilizer programs can be achieved. However, it should be understood that soil analysis alone cannot be relied upon totally to formulate a fertilizer program or diagnose a nutritional problem in a grove.

Unlike leaf analysis, there are various methods and analytical procedures of soil analysis used by laboratories. Different procedures extract different amounts of nutrients from the soil. Therefore, to draw accurate conclusions from soil tests, consistency in adopting the same methodology and extracting solution is very important because an optimum value for a nutrient with a particular extractant may be a deficient value with another extractant.

The total quantity of a nutrient measured by soil analysis is very often not the exact measure of the quantity actually available to the trees. Even the so-called "available" portion of a nutrient determined by soil analysis is at best a tentative estimation because it is measured by empirical methods using particular solvents which cannot be taken to duplicate the action of the plant roots.

In Florida, soil tests for the relatively mobile and readily leached elements such as N and K are of no value. Soil tests are mainly important for pH, P, Mg, Ca, and Cu. For Florida sandy soils, using the Mehlich-1 or double acid (hydrochloric acid + sulfuric acid) extraction procedure adopted by the University of Florida analytical lab, 40-60 lbs/acre (20-30 ppm) of P, 70-120 lbs/acre (35-60 ppm) of Mg, 500-800 lbs/acre (250-400 ppm) of Ca, and 5-10 lbs/acre (2.5-5 ppm) of Cu are considered adequate for citrus. A Ca:Mg ratio of 7:1 seems desirable and ratios of higher than 10 may induce Mg deficiency problems. Copper levels higher than 50 lbs/acre may be toxic to citrus trees if the soil pH is below 6.

Soil tests are most useful in monitoring soil pH in established citrus groves. Soil pH greatly influences nutrient availability, and many nutrient deficiency can be avoided by maintaining soil pH between 6 and 7. Nutrient deficiencies or excesses (toxicities) are more likely when the pH is outside of this range.

In some cases, soil tests are needed to determine the best method of correcting a deficiency identified through leaf analysis. For example, Mg deficiencies may result from low soil pH or excessively high soil Ca. Dolomitic lime applications are advised if the pH is too low, but magnesium sulfate is preferred if soil Ca levels are very high and the soil pH is adequate. If the soil Ca levels are excessive and the soil pH is relatively high, then foliar application of magnesium nitrate is recommended.

A poor relationship may exist between soil and plant nutrient levels in perennial crops including citrus. Often fruit trees contain sufficient levels of a nutrient even though soil test values are low. On the other hand, high soil nutrient levels do not assure an adequate supply to the trees. Adequate nutrient uptake by trees can be hindered by other problems such as drought stress, flooding stress, root damage, and cool weather. Tissue analysis along with soil tests can help pinpoint the problem.

Furthermore, several other factors such as plant species, cultivars, rootstocks, microbiological activity, climatic conditions, and plant needs at different growth stages have to be considered for more reliable interpretation and application of the soil analytical data and formulation of a fertilizer program.

Soil sampling

The accuracy of a fertilizer recommendation depends or how well the soil sample on which the recommendation was based represents the area of the grove. In Florida, if soil samples were to be collected once a year, the best time would be at the end of the summer rainy season and prior to fall fertilization, usually during September and October. However, soil sampling may be conducted at the same time as leaf sampling to save time and reduce cost.

Standard procedures for proper sampling, preparation and analysis have to be followed for meaningful interpretations of the test results and accurate recommendations. Each soil sample should consist of 15-20 soil cores taken at the dripline of 15-20 trees within the area wetted by the irrigation system to a depth of 6 inches. The area sampled should be uniform in terms of soil and tree characteristics and correspond to the area from which the leaf sample was taken. Individual cores should be mixed thoroughly in a plastic bucket to form a composite sample. Subsample of appropriate size should be taken from the composite mixture and put into labeled paper bags supplied by the lab. Soil samples should be air-dried but not oven-dried before shipping to the testing laboratory for analysis.

Traditional sampling vs. other sampling strategies

Tissue and soil sampling and testing to determine fertilizer recommendations for the whole grove followed by uniformly applying a fertilizer over the entire area is still the most practiced and accepted nutrient management strategy. However, there is a problem with this method because some trees may be over fertilized and others may be under fertilized. It is well known that variability exists within groves. Understanding this variability and taking it into consideration allows the grove to be efficiently managed.

The basic principle of the "traditional way" is continued sampling at the same location from year to year. This technique assumes that the selected area is less variable but representative of the entire grove or major portion of the block. Representative sites are selected based on several things including close observation of the trees, past grower experience, crop load, soil surveys, and remote sensed images. This technique has the advantage of minimizing sampling errors and the number of samples, and is less expensive and less time-consuming than the grid sampling method, but does not provide a full indication of field variability.

With the new advances in technology, "grid sampling" for precision agriculture has been gaining ground. The first step in grid sampling is to divide the field into small areas. The second step is to identify a representative location within the grid from which the sample will be collected. Grid sampling has the advantage in being integrated into commercial Global Positioning System (GPS) based soil sampling and nutrient-mapping Geographic Information System (GIS) to use Variable Rate Technology (VRT) management. However, dense grid sampling can be quite expensive and non-profitable for some growers.

Between the traditional way of sampling and the grid sampling strategy there is interest in the "management zone" method. Prior knowledge by growers and production managers can help delineate management zones based on several characteristics such as soil type, high and low yielding areas, soil water and nutrient holding capacities, and depth to the water table. This method involves less sampling than the grid method but is based on more targeted sampling than the traditional way. With this technique, different fertilizer rates can be applied to a smaller number of zones even without the need of VRT equipment.

Growers should stay flexible and prepared to adjust their sampling and management strategies because emerging technology will keep refining sampling systems and integrating useful information from database including yield maps, tree age, size, and performance, soil characteristics, satellite images, and aerial photographs.

Soil pH

The optimum soil pH range for citrus trees is between 6 and 7. Trifoliate hybrid rootstocks such as citrumelos and citranges do better at the low end of this pH range. For sandy soils, one ton of liming material such as dolomite will generally raise the soil pH by about one unit. Liming is economically sound and essential for profitable crop production. Soil pH must be monitored every year through soil testing because development of soil acidity is a continuous process that requires repeated applications of liming materials.

It should not be assumed that lime is always needed. Soil test must be conducted before liming. Certain soils may already contain excess lime. Such soils will typically have pHs between 7 and 8. When soil pH is high because of naturally occurring lime such as limestone, marl, and seashells, there is no practical, economical way of lowering the soil pH. Under these conditions, tolerant rootstocks to high pH soils should be selected to reduce nutritional disorders and deficiency problems. Sulfur added to soil can reduce the soil pH through the help of bacteria which transform elemental sulfur to sulfuric acid. However, the soil pH can return to its original value as soon as sulfuric acid is used up.

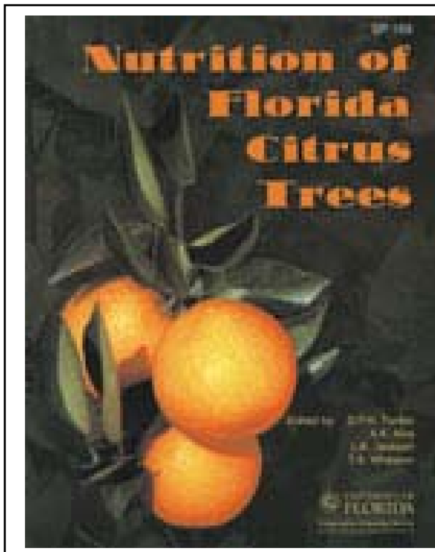
Benefits of liming to correct soil acidity

- Increased nutrient availability
- Improved fertilizer use efficiency
- Increased soil microbial activity
- Higher nitrogen fixation by legumes
- Reduced toxicity of copper, manganese and aluminum
- Provision of additional amounts of calcium and magnesium
- Improved availability of molybdenum
- Improved soil physical conditions
- Increased cation exchange capacity (CEC)
- Improved herbicide activity
- Increased growth and crop yield

Conclusion

Tissue and soil analyses are a powerful tool for confirming nutrient deficiencies, toxicities and imbalances, identifying "hidden hunger," evaluating fertilizer programs, studying nutrient interactions. However, if initial plant and soil sampling, handling, and analysis of the sample were faulty, the results would be misleading. Experience with interpreting the overall tissue analysis reports is essential because of the many interacting factors, which influence the concentrations of elements in plant tissue. Thus, tree size, cropping history, sampling techniques, soil test data, and knowledge of nutrient concentrations and leaf analysis standards all need to be considered in the final diagnosis. If properly done, tissue and soil analyses can point the way toward more economical and efficient use of fertilizer materials, avoiding excessive or inadequate application rates.

For more information check "Nutrition of Florida citrus trees", UF-IFAS publication SP 169.



Standard Table for Assessing Nutritional Status and Adjusting Fertilizer Programs for Citrus

Leaf analysis standard for assessing current nutrient status of citrus trees based on concentration of mineral elements in 4- to 6-month-old-spring-cycle leaves from non-fruiting terminals.

Element	Deficient less than	Low	Satisfactory	High	Excess more than
Nitrogen (N) (%)	2.2	2.2-2.4	2.5-2.8	2.9-3.2	3.3
Phosphorus (P) (%)	0.09	0.09-0.11	0.12-0.17	0.18-0.29	0.30
Potassium (K) (%)	0.7	0.7-1.1	1.2-1.7	1.8-2.3	2.4
Calcium (Ca) (%)	1.5	1.5-2.9	3.0-5.0	5.1-6.9	7.0
Magnesium (Mg) (%)	0.20	0.20-0.29	0.30-0.50	0.51-0.70	0.80
Sulfur (S) (%)	0.14	0.14-0.19	0.20-0.40	0.41-0.60	0.60
Chlorine (Cl) (%)	------	------	less than 0.5	0.5-0.7	0.7
Sodium (Na) (%)	------	------	less than 0.2	0.2-0.5	0.5
Iron (Fe) (ppm)	35	35-59	60-120	121-200	250
Boron (B) (ppm)	20	20-35	36-100	101-200	250
Manganese (Mn) (ppm)	18	18-24	25-100	101-300	500
Zinc (Zn) (ppm)	18	18-24	25-100	101-300	300
Copper (Cu) (ppm)	4	4-5	6-16	17-20	20
Molybdenum (Mo) (ppm)	0.06	0.06-0.09	0.1-1.0	2-50	50

THE ORANGE JUICE TARIFF

The orange juice citrus tariff imposing 70 cents per gallon on imported citrus juice was initiated in 1930. It was reduced to 35 cents in 1947 at the General Agreement Tariffs and Trade (GATT) talks held in Switzerland. Two attempts by the US government were tried in 1963 and 1970 to reduce citrus import tariffs, but failed through the hard work of Florida Citrus Mutual. American citrus growers had operational costs that were 4 times higher than their foreign counterparts. Therefore, a reduction in tariffs would render them helpless in the international market.

Trade negotiations continued in the 1990s with the initiation of the North America Free Trade Agreement (NAFTA), which established free trade between Mexico, Canada, and the US. It was decided to phase-out the import tariffs in 15 years.

Once again, Florida citrus growers are threatened to lose the tariff. The current 29-cents/gallon tariff is at stake in the upcoming negotiations for the Free Trade Area of the Americas. The agreement would create a 34-nation free trade zone throughout the Americas and the Caribbean, except for Cuba. Not only citrus growers have to defend the citrus tariff that protects their livelihood, but also every Florida resident has to do so because the Florida citrus industry employs 100,000 people and provides $9 billion to the Florida economy. Eliminating or reducing the tariff would severely cripple the Florida citrus industry. Without the citrus industry, the state would lose a healthy product, a rural lifestyle, jobs, tax dollars, green space, and a healthy environment.

The 29-cent tariff primarily affects Brazil, which accounts for 90% of US orange juice imports. Brazil exports over 95% of its juice, while 90% of Florida's production is consumed domestically. Without the tariff, Florida citrus growers will be out of business, Florida citrus groves will lose value, thousands of people will lose their jobs, Florida economy will crumble, and taxes will skyrocket. Compared with Florida, Brazil is at advantage of lower production cost due mainly to cheap labor and less environmental regulations, worker protection standards, and food safety regulations.

2000-2001 Season	Florida	**Brazil**
Avg. Production Costs	$0.70/lb solid	$0.30/lb solid
Avg. Pick & Haul Costs	$2.00/box	$0.50/box
Orange citrus Acreage	660, 000 acres	1,440,000 acres

The Florida Citrus Commission, which is the governing body of the Florida Department of Citrus (FDOC), passed this year a proposal approved by a tariff oversight committee concerning the funding to fight for the tariff preservation. It was decided to impose 1.5 cents/box decrease on processed juice oranges during the 2003-04 season from 16.5 to 15 cents and use that money on a voluntary basis to help finance a $7 million political campaign to preserve the federal tariff on orange juice imports. The voluntary contribution of 1.5 cents on each box of juice oranges will generate around $3 million during the upcoming growing season.

All Florida residents should learn the facts about the tariffs and should unite and fight for its preservation.

The Thirteenth Annual Farm Safety Day held on Saturday 7 June 2003 was a big success.

Over the past few years, The Farm Safety Day has been proven to be a very effective way in providing an educational opportunity for farm equipment operators and workers.

Certificates of appreciation were sent to the
2003 Farm Safety Day Committee Members

Pam Roberts, Julie Carson, Buddy Walker, Cesar Asuaje, Steve Taylor, Ralph Mitchell, Barbara Hyman, Mickey Pena, Lorenzo Daetz, Juan Nieto, Rudy Aragus, Michael Obern, Debbie Spencer, Katrina Van Tonder, Rose Edwards, Teresa Salame, Nita Morris, Jim Conner.

Certificates of appreciation were sent to

Mark Henderson with Evergades Farm Equipment for providing 2 John Deere tractors for the rodeo and to **Keith Blasingim** with Lee County Parks and Recreation for donating 4 sets of bleachers.

Certificates of appreciation were also sent to the
2003 Farm Safety Day Speakers and their assistants

Carlos Balerdi, Cesar Asuaje, Gene McAvoy, Paul Midney, Paul Monaghan

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Congratulations to the winners of the 2003 equipment operators contest and to their respective companies!

First Place: Miguel Rodriguez, Deseret Farms
Second Place: Jorge Rosas, Immokalee Tomato Growers
Third Place: Isrrael Rodriguez, Everglades Harvesting

Trophies were given to the winners.
Engraved plaques were given to their respective companies.
The big trophy will stay for one year at the company that has the 1st place winner.

DRAINAGE AND FLOODING INJURY

Almost all citrus trees grown in southwest Florida are located on high water table, poorly drained soils. Water management on poorly drained soils is difficult and expensive because during heavy rains in the summer, excess water must be removed from the rootzone and in periods of limited rainfall, irrigation is needed. On these soils, drainage is as important as irrigation. The concept of total water management must be practiced. If either system—irrigation or drainage—is not designed, operated, and maintained properly, then the maximum profit potential of a grove cannot be achieved. Both surface and subsoil drainage is necessary to obtain adequate root systems for the trees.

Roots, like the rest of the tree, require oxygen for respiration and growth. Soils in Florida typically contain 20-21 % oxygen. When flooding occurs, the soil oxygen is replaced by water causing hypoxia (low oxygen) or anaerobiosis (no oxygen) These conditions cause tremendous changes in the types of organisms present in the soil and in the soil chemistry.

Flooding injury would be expected if the root zone were saturated for 3 days or more during extended summer rains at relatively high soil temperatures (86-95° F). Flooding during the cooler December-March period can be tolerated for several weeks at low soil temperatures (< 60° F). The rate of oxygen loss from the soil is much greater at high vs. low temperatures. The potential for damage to roots is less obvious but equally serious when the water table is just below the surface. Flooding stress is usually less when water is moving than when water is stagnant. The use of observation wells is a very reliable method for evaluating water-saturated zones in sites subject to chronic flooding injury.

Short-term estimates of flooding stress can be obtained by digging into the soil and smelling soil and root samples. Sour odors indicate an oxygen deficient environment. The presence of hydrogen sulfide (a disagreeable rotten egg odor) and sloughing roots indicate that feeder roots are dying. Under flooded conditions, root death is not exclusively associated with oxygen deficiency. Anaerobic bacteria (the kind that can grow only in the absence of oxygen) develop rapidly in flooded soils and contribute to the destruction of citrus roots. Toxic sulfides and nitrites formed by anaerobic sulfate- and nitrate-reducing bacteria are found in poorly drained groves. Sulfate-reducing bacteria require both energy and sulfates in order to change sulfates to sulfides. The best sources of energy have been found to be certain organic acids contained in citrus roots, grass roots, and buried pieces of palmetto. Thus, citrus roots can contribute to their own destruction by being an energy source for these bacteria.

Symptoms of flooding injury may occur within a few days or weeks, but usually show up after the water table has dropped and the roots become stranded in dry soils. Leaf wilting, drop, dieback, and chlorosis patterns may develop and tree death may occur. Trees subjected to chronic flooding damage are stunted with sparse canopies, dull colored, small leaves and produce low yields of small fruit. New flushes of growth will have small, pale leaves due to poor nitrogen uptake by restricted root systems. Usually, the entire grove is not affected, but most likely smaller more defined areas will exhibit the symptoms. Striking differences in tree condition can appear within short distances associated with only slight changes in rooting depths. Water damage may also be recognized by a marked absence of feeder roots and root bark, which is soft and easily sloughed.

With acute water damage, foliage wilts suddenly followed by heavy leaf drop. Trees may totally defoliate and actually die, but more frequently partial defoliation is followed by some recovery. However, such trees remain in a state of decline and are very susceptible to drought when the dry season arrives because of the shallow, restricted, root systems. Moreover, waterlogged soil conditions, besides debilitating the tree, are conducive to the proliferation of soil-borne fungi such as Phytophthora root and foot rot. These organisms cause extensive tree death especially in poorly drained soils.

Water damage may usually be distinguished from other types of decline by a study of the history of soil water conditions in the affected areas. Areas showing water damage are usually localized and do not increase in size progressively as do areas of spreading decline. Foot or root rot symptoms include a pronounced chlorosis of the leaf veins caused by root damage and girdling of the trunk. Lesions also appear on the trunk usually near the soil level (foot rot) or roots die and slough-off (root rot). Flood damage does not produce lesions. Trees with blight or CTV are usually randomly distributed within the grove and diagnostic tests are available to distinguish them from water-damaged trees.

Citrus trees respond physiologically to flooding long before morphological symptoms or yield reductions appear. Photosynthesis and transpiration decrease within 24 hours of flooding and remain low as flooding persists. Water uptake is also reduced which eventually translates to decreased shoot growth and yields.

It is both difficult and costly to improve drainage in existing groves, so drainage problems should be eliminated when the grove area is prepared for planting by including a system of ditches, beds and/or tiling. Growers should not depend on the slight and often unpredictable differences in rootstock tolerance to waterlogging to enable trees to perform satisfactorily under such conditions. Trees, irrespective of scion and rootstock cultivars, should be planted under the best drainage conditions possible. Drainage ditches should be kept free of obstruction through a good maintenance program including chemical weed control. Tree recovery from temporary flooding is more likely to occur under good drainage structure maintenance conditions.

Do not disk a grove if trees were injured by flooding. Irrigation amounts should be reduced, but frequencies should be increased to adequately provide water to the depleted, shallow root systems. Soil and root conditions should be evaluated after the flooding has subsided. Potential for fungal invasion should be determined through soil sampling and propagule counts. If there is a Phytophthora problem, the use of certain fungicides can improve the situation. The nature of the soil, the rootstock, root condition, duration of flooding, soil and air temperature, soil pH, and the presence of sulfur and organic matter in the soil are all factors that need to be considered when trying to evaluate flooding injury and manage tree recovery.

Survey of Factors Influencing Grapefruit Packouts:

All Information Kept Strictly Confidential

1. Name of operation (for tracking purposes only): ________________________________

2. Contact person for further information, if needed: _______________________ Phone #: _____________

3. During the past 7 year, and for the below list of grade lowering defects, please estimate: 1) how many years each was the #1 cause of eliminations, and 2) how many years each was one of the top 5 causes of eliminations. E.g., Poor shape may have been the primary cause for eliminations 1 year out of the past 7 years, but one of the top five causes of eliminations every year.

	Number of years defect was	
	Number 1 cause of eliminations	Among the top five causes
Windscar:	_____	_____
Green color:	_____	_____
Poor shape:	_____	_____
Off-size:	_____	_____
Insect injury:	_____	_____
Melanose:	_____	_____
Greasy spot (pink pitting):	_____	_____
Hail damage:	_____	_____
Chemical Burn:	_____	_____
Soft/spongy:	_____	_____
Plug/Puncture:	_____	_____
Oleocellosis (oil spotting):	_____	_____
Decay:	_____	_____
Other:	_____	_____

List:____

4. If packouts have declined over time, please rank the relative importance of the following factors as an explanation **(1=most important; 10=least important; x=don't believe involved)**:

____Shift to sales in more demanding markets.
____General increase in market demands with greater supply.
____More sales late in season.
____Change in practices resulting in more blemish problems.
____Change in practices resulting in more shape problems.
____Change in weather resulting in more blemish problems.
____Change in weather resulting in more shape problems.
____Greater age of trees.
____Reduced resources invested into the grove.
____Other:____
____

Do you have packout records (possibly detailing the type of elimination) over several years for a block of the following grapefruit types that you would be willing to share with us?

White grapefruit .... Yes___ No___
Light red grapefruit (Red Marsh, Ruby etc.) .... Yes___ No___
Deep red grapefruit (Flame, Star, Rio, Ray etc.) .... Yes___ No___

Additional useful information for each block includes harvest date and where shipped (e.g., domestic, Europe, Japan).

Other suggestions/comments concerning the decline of packouts in Florida?

Please fax to Dr. Mark Ritenour by July 28, 2003 (fax 772 468 5668). Thanks for your help!