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Institute of Food and Agricultural Sciences

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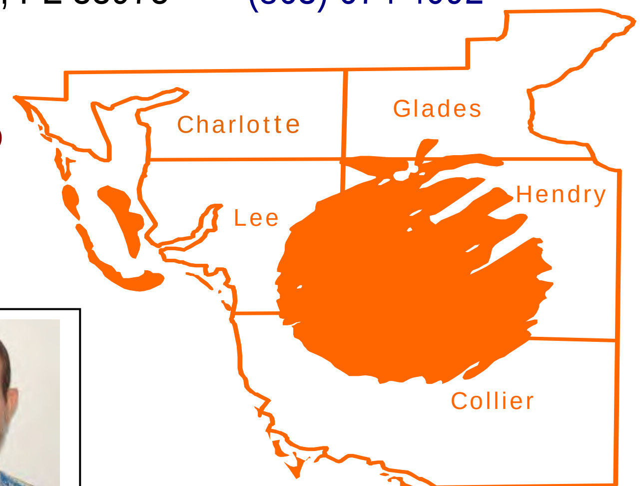
Flatwoods Citrus



Vol. 26, No. 7 **July 2023**

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

Mongi Zekri

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United States Department of Agriculture
National Agricultural Statistics Service

CITRUS JULY FORECAST FORECAST COMPONENTS

Cooperating with the Florida Department of Agriculture & Consumer Services
851 Trafalgar Ct, Suite 310E, Maitland, FL 32751-4132
(407) 648-6013 · (855) 271-9801 FAX · www.nass.usda.gov/fl

July 12, 2023

Florida All Orange Production Up 1 Percent
Florida Non-Valencia Orange Production Unchanged
Florida Valencia Orange Production Up 1 Percent
Florida All Grapefruit Production Down 1 Percent
Florida All Tangerine and Tangelo Production Down 2 Percent

The first forecast of the 2023-2024 season will be released at 12:00 p.m. ET on October 12, 2023

Citrus Production by Type – States and United States

Crop and State	Production [1]		2022-2023 Forecasted Production [1]	
	2020-2021	2021-2022	June	July
	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)	(1,000 boxes)
Non-Valencia Oranges [2]				
Florida	**22,700**	**18,250**	**6,150**	**6,150**
California	41,300	31,500	37,000	37,000
Texas	1,000	170	700	570
United States	65,000	49,920	43,850	43,720
Valencia Oranges				
Florida	**30,250**	**22,950**	**9,600**	**9,700**
California	7,700	7,600	8,100	7,000
Texas	50	30	350	560
United States	38,000	30,580	18,050	17,260
All Oranges				
Florida	**52,950**	**41,200**	**15,750**	**15,850**
California	49,000	39,100	45,100	44,000
Texas	1,050	200	1,050	1,130
United States	103,000	80,500	61,900	60,980
Grapefruit				
Florida-All	**4,100**	**3,330**	**1,820**	**1,810**
Red	**3,480**	**2,830**	**1,570**	**1,560**
White	**620**	**500**	**250**	**250**
California [3]	4,200	4,100	4,200	4,200
Texas	2,400	1,700	2,400	2,230
United States	10,700	9,130	8,420	8,240
Lemons				
Arizona	750	1,250	1,700	1,400
California	20,100	25,200	23,000	20,000
United States	20,850	26,450	24,700	21,400
Tangerines and Tangelos				
Florida	**890**	**750**	**490**	**480**
California	28,800	17,500	21,000	22,000
United States	29,690	18,250	21,490	22,480

[1] Net pounds per box: oranges in California-80, Florida-90, Texas-85; grapefruit in California and Texas-80, Florida-85; lemons-80; and tangerines and mandarins in California-80, Florida-95.
[2] Early non-Valencia (including Navel) and mid-season non-Valencia varieties in Florida; Navel and miscellaneous varieties in California; Early and mid-season varieties in Texas.
[3] Includes pummelos in California.

Citrus Forecast

The 2022-2023 Florida all orange forecast released today by the USDA Agricultural Statistics Board is 15.9 million boxes. The total is comprised of 6.15 million boxes of non-Valencia oranges (early, mid-season, and Navel varieties), unchanged from the June forecast, and 9.70 million boxes of Valencia oranges, up 100,000 boxes from the June forecast. The forecast of all Florida grapefruit production is lowered 10,000 boxes to 1.81 million boxes. Of the total grapefruit forecast, 250,000 boxes are white, and 1.56 million boxes are the red varieties. The Florida all tangerine and tangelo forecast is now 480,000 boxes.

Forecast Components of Production from Objective Surveys – Florida: 2018-2019 through 2022-2023

Fruit type and crop year	Number bearing trees	Sample survey averages		
		Fruit per tree	Percent drop [1]	Fruit per box [1]
	(1,000 trees)	(number)	(percent)	(number)
Early and Midseason non-Valencia Oranges [2]				
2018-2019	19,666	813	26	334
2019-2020	19,535	774	28	315
2020-2021	18,778	591	43	277
2021-2022	17,206	571	39	326
2022-2023	15,841	474	76	333
Navel Oranges				
2018-2019	944	213	27	146
2019-2020	920	237	26	142
2020-2021	898	185	37	132
2021-2022	756	155	28	138
2022-2023	653	106	69	137
Valencia Oranges				
2018-2019	29,097	608	25	265
2019-2020	29,690	537	30	252
2020-2021	30,069	441	41	246
2021-2022	28,679	395	51	274
2022-2023	27,465	323	70	294
Red Grapefruit				
2018-2019	2,430	375	34	137
2019-2020	2,174	422	29	116
2020-2021	1,956	371	33	115
2021-2022	1,731	393	28	127
2022-2023	1,574	381	45	140
White Grapefruit [3]				
2018-2019	478	363	22	124
2019-2020	419	461	29	108
2020-2021	329	407	32	123
2021-2022	234	470	16	104
2022-2023	180	448	34	112

[1] Averages at cut-off month—January 1 for early-midseason oranges, December 1 for Navels, April 1 for Valencia, and February 1 for grapefruit.
[2] Excludes Navels.
[3] Includes seedy grapefruit in number of bearing trees.

The above table shows the production components used for the 2018-2019 through the 2022-2023 forecast seasons. Bearing trees are estimated at the beginning of each forecast season using the most updated tree inventory with an allowance for expected attrition. Revisions are made to the historic series where applicable. Fruit per tree is the weighted average obtained from the annual Limb Count survey conducted during a ten-week period from mid-July to mid-September. Survey averages for each tree age group within an area are weighted by the estimated number of bearing trees for each age group. Fruit size measurements and drop observations are obtained from monthly surveys. The average drop percentages are from the final month used in the forecast model. Average fruit sizes were also obtained from the same survey period and have been converted in the table to estimated number of fruit needed to fill a 1-3/5 bushel box. These four factors are the primary components used in the initial October forecast and in following months up to the "cut-off" for each fruit type.

$$\textbf{Direct Expansion} = \frac{\text{Bearing Trees} \times \text{Fruit per Tree} \times \text{Percent Remaining at Harvest}}{\text{Pieces of Fruit per Box}}$$

Via Zoom Citrus Workshop

July 2023 Citrus Workshop

Date and time: Wednesday, July 19, 2023, 10:00 AM – 11:00 AM

Title: "**Using optimal fertilization and frequent irrigation for managing HLB-affected trees**"

Speaker: **Dr. Davie M. Kadyampakeni**, Associate Professor in Soil, Water, and Ecosystem Sciences at the UF-IFAS Citrus Research & Education Center in Lake Alfred

Discussions will include:

-Use of elevated macronutrients such as calcium and magnesium

-Elevated micronutrients such as zinc, boron, manganese and iron

-Frequent irrigation and Using soil moisture sensors

To register and attend via Zoom, here is the Zoom link:
https://ufl.zoom.us/j/96708178098?pwd=bmgzNnRwSGN0enMyVEs5ZzJrMExXdz09
After registering, you will receive a confirmation email containing information about joining the Zoom meeting.

Coordinator: Dr. Mongi Zekri, UF-IFAS, maz@ufl.edu

1 CEU for pesticide license renewal

1 CEU for certified crop advisors

CEUs for pesticide license renewal

Earn CORE CEUs online through Southeast AgNet & Citrus Industry magazine

http://citrusindustry.net/ceu/

The following series of articles and quizzes are available with their expiration dates noted:

- 2023 #2 **What To Do When You've Been Exposed to a Pesticide (4/30/24)**
- 2023 #1: **Key Terms to Know When Using Pesticides (1/31/24)**
- 2022 #4: **Making Sense of Pesticide Formulations (10/31/23)**
- 2022 #3: **Agricultural Pesticide Licensing: Frequently Asked Questions (7/31/23)**

Each article grants one General Standards (Core) CEU when submitted and approved toward the renewal of a Florida Department of Agriculture and Consumer Services restricted-use pesticide license.

Florida Citrus Production Guide
https://crec.ifas.ufl.edu/resources/production-guide/

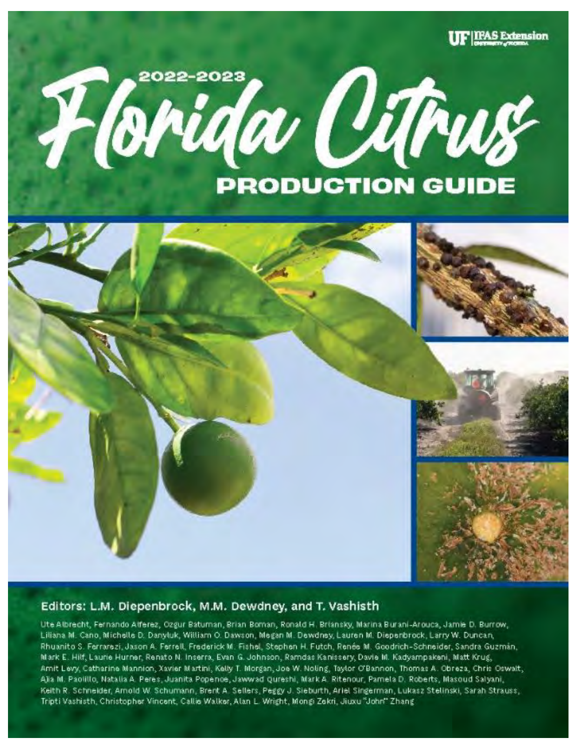
The objective of the Florida Citrus Production Guide is to assist citrus growers in the identification of pest management options and the selection of appropriate control measures. This publication should serve as a reference once it has been determined that control measures might be warranted. It is not intended to replace pesticidal product labels which contain important usage information and should be immediately accessible for reference. Violations of directions for use printed on the label are against State and Federal laws. Care should be taken to select only those treatments best suited for control of the specific pest(s) identified as requiring suppression. Products listed in all tables have been shown to be efficacious, non-phytotoxic to citrus, and relatively safe on non-target arthropods and microorganisms when used as directed. However, it is important to realize that results may not be consistent under different environmental, application, and tank mix conditions.

PRODUCTION GUIDE MENU

- General
- Horticultural Practices
- Mites, Insects & Nematodes
- Diseases
- Weeds
- Pesticides

If you did not pick up your hard copy of the newly updated Florida Citrus Production Guide at the Citrus Expo, you can find the electronic version online https://crec.ifas.ufl.edu/resources/production-guide/

If you need hard copies, you can get them free from your Citrus Extension Agent or from the Citrus Research & Education Center in Lake Alfred and the Southwest Florida Research and Education Center in Immokalee.



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EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

issued by

CLIMATE PREDICTION CENTER/NCEP/NWS
and the International Research Institute for Climate and Society

13 July 2023

ENSO Alert System Status: El Niño Advisory

Synopsis: There is a greater than 90% chance that El Niño will continue through the Northern Hemisphere winter.

In June, a weak El Niño was associated with above-average sea surface temperatures (SSTs) across the equatorial Pacific Ocean [Fig. 1]. Nearly all of the weekly Niño indices were at or in excess of +1.0°C: Niño-3.4 was +1.0°C, Niño-3 was +1.5°C, and Niño1+2 was +3.3°C [Fig. 2]. Area-averaged subsurface temperatures anomalies increased compared to May [Fig. 3], with positive anomalies below the surface of the equatorial Pacific Ocean [Fig. 4]. In contrast, the tropical atmospheric anomalies were weaker compared to the oceanic anomalies. For the June monthly average, low-level winds were near average over most of the equatorial Pacific. Upper-level wind anomalies were easterly over the western Pacific and westerly over the eastern Pacific. Convection and rainfall were enhanced around the International Date Line and were weakly suppressed in the vicinity of Indonesia [Fig. 5]. The equatorial Southern Oscillation Index (SOI) remained negative (0.5 standard deviations below average), while the traditional, station-based SOI was near zero. Collectively, the coupled ocean-atmosphere system reflected a weak El Niño.

The most recent IRI plume indicates El Niño will persist through the Northern Hemisphere winter 2023-24 [Fig. 6]. Forecasters favor continued growth of El Niño through the fall, peaking this winter with moderate-to-strong intensity (81% chance of November-January Niño-3.4 ≥ 1.0°C). An event that becomes "historically strong" (seasonally averaged Niño-3.4 ≥ 2.0°C), rivaling the winters of 1997-98 or 2015-16, has an approximately 1 in 5 chance. In summary, there is a greater than 90% chance that El Niño will continue through the Northern Hemisphere winter [Fig. 7].

This discussion is a consolidated effort of the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Weather Service, and their funded institutions. Oceanic and atmospheric conditions are updated weekly on the Climate Prediction Center web site (El Niño/La Niña Current Conditions and Expert Discussions). Additional perspectives and analysis are also available in an ENSO blog. A probabilistic strength forecast is available here. The next ENSO Diagnostics Discussion is scheduled for 10 August 2023.

Climate Prediction Center
National Centers for Environmental Prediction
NOAA/National Weather Service

WATER TABLE MEASUREMENT AND MONITORING

Most flatwoods citrus soils have a restrictive layer that can perch the water table and significantly affect tree water relations. To optimize production and tree health, the level of this water table should be monitored and maintained within an optimal zone. Simple and practical observation wells can normally produce adequate information.

Water Table Behavior. The water table under flatwoods citrus may rise rapidly in response to either rainfall or irrigation because sandy soils are highly conductive to water flow. A general rule of thumb is that 1 inch of rain will cause the water table to rise about 10 inches in fine textured soils, 6 inches in most of the flatwoods sandy soils, and 4 inches in coarse sands. It may take 4 to 6 days for the water table to return to its desired levels following rains of 1 inch or more.

Observation Wells. A water table observation well is made with a porous casing buried vertically in the ground. It permits the groundwater level to rise and fall inside it as the water level in the adjacent soils. Observation wells with a simple float indicator can provide rapid evaluation of shallow water table depths. The float and indicator level move with the water table, allowing an above-ground indication of the water level. Water table observation wells installed in flatwoods soils usually penetrate only to the depth of the restrictive (argillic or spodic) layer. Typically this layer is within 30 to 48 inches of the soil surface.

Well Construction. The basic components of the well itself include a short section of 3-inch perforated PVC pipe (3-5 ft long), 3-inch PVC cap, screening material, a float, indicator rod, and small stopper.

The indicator rod can be a dowel, ½ -inch PVC pipe (thin wall) or microsprinkler extension stake. Dowels are a poor choice since they require painting and will rot out near the float within a few years. The float is typically a 2½- inch fishing net float or a 500 ml (approximately 2½ in. diameter x 6 in. high) polyethylene bottle with a 28-mm (1.1 in.) screw cap size. The float assembly can be constructed by inserting the microsprinkler extension stake into the fishing float or ½-inch pipe into the polyethylene bottle.

The bottle neck provides a snug fit for the stake and no sealant is required. The hole in the cap should be drilled slightly larger than the indicator stake to serve as a guide for the float assembly. Fittings should not be glued so that components can be easily disassembled for cleaning or replacement.

Observation well casings are constructed from 3-in. diameter PVC pipe (Class 160). A circular saw or drill can be used to perforate the pipe prior to installation. Perforations should be staggered in rows around the pipe to allow flow into the well from the sides in addition to the bottom. Perforations totaling about 5% of the well's surface area are adequate for sandy soils encountered in the flatwoods. No perforations should be made within 12 inches of the surface in order to minimize the chances of ponded water from high intensity storms creating flow channels into perforations near the soil surface.

The pipe should be wrapped (sides and bottom) with a screening material to prevent soil particles from moving into the well. Materials such as cheesecloth, polyester drain fabric, and fiberglass screen have been used successfully as filters. The filter material should be taped in place with duct tape. A 3-inch soil auger can be used to bore holes for the wells. When possible, the observation wells should be installed when no water table is present in order to minimize chances of the well sides sloughing into the bore as it is dug.

When a water table is present, it is easiest to install the well by starting off with a larger diameter pipe. For a 3-inch observation well, a 4-inch installation pipe (Sch 40 preferred) will be needed. The installation pipe should be cut at least 6 inches longer than the intended depth of well. Holes (½-inch diameter) should be drilled in the sides of the pipe opposite each other about 1½ inches from the top of the pipe. These will be used to aid in removing the pipe from the soil after the observation well is installed. Auger a hole in the soil until it begins to slough in (when the water table is reached). The 4-inch pipe should then be forced into the hole. A 3-inch auger can then be used to remove soil from within the 4-inch casing. As soil is removed, the casing needs to be forced downward to keep the hole from sloughing. Continue to remove soil from inside the casing until the appropriate depth is achieved (typically when hardpan material begins to be excavated).

The well casing pipe should be cut to length and installed in the hole so that it extends 2 to 6 inches above the soil surface. Care should be taken to ensure that the casing is installed plumb to minimize binding of the float assembly. If a 4-inch installation pipe was used to excavate the hole, it needs to be removed. A ½-inch rod can be inserted through the holes that were drilled in the top of the 4-inch pipe. If the pipe cannot be removed easily by hand, a chain can be attached to the rod and attached to a high-lift jack. Usually, after jacking the installation pipe up about a foot, the pipe can be easily removed by hand. The soil should be backfilled around the observation well casing and tamped to compact the soil and get a tight fit between the soil and the sides of the pipe.

A measurement should be taken of the distance from the bottom of the well to the soil surface. The float assembly can then be lowered into the well. Make sure that the indicator rod and float do not bind against the sides of the observation well. The well is now ready for calibration.

Calibration. A mark on the indicator stake or rod should be made at the top of the well when the float is at the bottom of the well. This level is the reference mark for the well depth. The indicator stake or rod can then be marked with major divisions (feet) and minor divisions (inches) for easy reading of the water table depth. These rings can be painted at appropriate intervals using different colors for major and minor divisions. Marks painted at 2-inch increments provide enough accuracy for most users.

The mark at the upper level is dependent on the depth of the water furrow and root depth. The upper depth should be selected so that water does not pond in water furrows and it should be at least 6 inches below the bottom of the root zone to prevent root pruning. Observations over time will help to determine the water table level depth that will prevent root damage or excessive wetness in the root zone.

RESETTING IN CITRUS GROVES

For maximum efficiency of a production unit or grove, it is essential that every tree space is occupied by a healthy and productive tree. The average annual tree loss across the Florida citrus industry is currently around 6%. However, the extent of tree loss among individual groves can vary from 2 to 12% or more. Prompt replacement of unproductive trees means higher average long-term returns from the grove. If the declining trees remain in the grove, they keep getting weaker and yield less fruit each year and therefore the potential production capacity for the grove keeps declining even though production costs remain the same or even increase. It is very important to remove and replace such trees once it is clear that they are declining and they are no longer economically profitable. However, the reason for the decline should be determined and the condition should be corrected so that the replacement tree does not suffer the same fate.

Resetting should be considered if the tree is affected by an incurable disease such as blight, tristeza, or citrus greening. The resetting program should be conducted regularly rather than being delayed until serious losses in production have occurred. Resets should be planted with the same cultivar already in the block. Usually, it is more economical to keep resetting and not to push the entire block unless the cultivar and/or the tree spacing between rows is an undesirable one. Replanting in a mature grove seems justified only when a minimum of 8 ft between canopy driplines, (not from trunk-to-trunk), is available for canopy development of the new trees.

Replacement of dead, diseased, and declining trees in Florida citrus groves should always be an important part of the total production program. Today, tree replacement is more important than ever since overhead and production costs are dramatically increasing and a full stand of productive trees is essential to maximize production and profits. Freezes, blight, tristeza, Phytophthora, Diaprepes, and other pests and diseases have been particularly troublesome to Florida citrus growers for the last two decades. Citrus canker and greening have been devastating citrus groves since their introduction to Florida. Extensive tree losses coupled with the economic necessity of regular resetting have caused many growers to investigate ways to achieve new efficiencies in reset management.

NOT AN EASY TASK

Caring for young citrus trees is always troublesome because they require far more attention than larger, established trees. Florida's sandy soils, high summer temperatures, possible low winter temperatures, and scattered rainfall patterns complicate young tree care by forcing growers to protect, fertilize, and weed young trees regularly or face extensive losses. Young trees are more sensitive and more attractive to pests than mature trees due to high levels of vegetative growth. Therefore, special care is needed to insure pests are adequately controlled. Resets often present an even greater problem because trees are usually scattered throughout a block of larger trees, where they compete with large, full-grown trees for limited supplies of water, nutrients, and sometimes sunlight. Scattered resets frequently have serious weed problems since removal of the previous tree allows the area to receive more sunlight and provides more favorable conditions for weed growth. Since resets are usually scattered throughout a block of much larger trees, they are often difficult to locate and may be accidentally overlooked, resulting in inadequate care. Researchers, growers, and production managers are continually developing and improving methods of dealing with reset care.

PLANNING THE RESET PROGRAM

Grove managers should include tree removal and resetting as a routine part of the production program and assign special crews to deal specifically with young tree care. Planning ahead is very important because there is often a lag period between the time when replacement trees are ordered and when they are received. The wait time for the most desired rootstock and scion combination may be as great as 1 to 2 years, so replacement tree needs should be anticipated (when possible) and orders placed so they can be obtained when needed.

PURCHASING TREES

High quality reset trees are essential for maximum young tree growth. These young trees will be placed in an intensely competitive situation and may sometimes receive less than ideal care, so there is no room for compromising tree quality. Only healthy and properly sized trees from registered sources should be purchased since the initial cost is only a small fraction of the total cost of bringing such a tree into production.

SITE PREPARATION

The planting site should be well prepared. Weeds should be removed before planting. At a minimum, a non-residual herbicide should be applied to the reset area to get weeds under control before the young tree is planted.

Planting sites should be prepared well in advance of receipt of the trees. Ideally, trees should be planted on the same day they are received. Under no circumstances should trees be allowed to dry out. To minimize root desiccation and damage, they should be kept cool and moist until they are planted.

PLANTING THE TREES

Trees should be removed from the container and inspected for evidence of pot-binding. Make several vertical slashes about one inch deep through the root ball to encourage root branching. These slashes also allow the potting soil and roots to interface more closely with the soil in the planting site. It may be easier to cut some of the roots with pruning shears and pull them so they protrude from the ball.

A common problem with nursery trees is that the potting mixture is often highly organic. Such materials form areas, which are difficult to permeate with water after the young tree is planted in sandy soils and irrigated. The outer third of the organic ball should be removed so that the outer roots are exposed and can extend into the soil in which the tree is planted. Otherwise, the tree may not grow off quickly and satisfactorily.

WEED CONTROL

Keeping weeds under control during the establishment period of the reset is very important. Weeds compete with young citrus trees for water, nutrients, soil applied pesticides, and sunlight and they must be properly controlled. Weed control around a reset site should be considered at pre-plant, early post-plant, and after the tree is established. Control of weeds prior to planting should be provided. If residual herbicides are used, they should be used at proper rates and at least 30 days in advance of planting so that residues do not impact reset growth. Prior to planting, contact or growth regulating herbicides may be preferred since they do not leave residual effects in the soil.

Weed control during the establishment period or approximately the first year is frequently quite difficult. Hand labor is scarce and expensive. Trunk damage by hoes or other cultivation equipment further compounds the problem. Chemical weed control provides at least a partial solution to the problem during this establishment period. There is now a fairly wide selection of residual herbicides available, which can be used around young trees. These materials should be applied at reduced rates. Be sure to read labels carefully for restrictions on the use of herbicidal materials around young trees.

After the reset has been planted for a year or more, modifications of the weed control program can be considered. Labels of materials under consideration should be checked carefully for restrictions prior to use. Some herbicides require reduced rates around young trees to minimize potential damage to resets planted among older trees. Specially modified herbicide applicators are available which enable the equipment operator to deliver reduced rates or a different herbicide mix around young trees.

To minimize herbicide contact to young trees, many growers apply a wrap or guard around the lower 12 to 16 inches of the tree trunk. When using these wraps be sure to monitor the protective structure for ants or other pests that may damage the tree trunk.

SPROUTING

Resets require periodic sprout removal. The use of tree wraps usually reduces the need for sprout control. Wraps often stay in place for up to 3 years. They should, however, be checked periodically for the presence of ants or fungal diseases. Reduced sprouting may be enough to justify their use. There are no simple answers to the use of wraps. Each situation is different and requires careful horticultural and economic consideration to arrive at the best procedure of maintenance, inspection, and management.

IRRIGATION & DRAINAGE

Young citrus trees require frequent but moderate water application for survival and proper growth. Competition for water is accentuated by nearby older trees or if weeds are allowed to grow close to the young trees. Anything that can be done to discourage competition for available water should be beneficial to the young tree. Irrigation systems should be in place before planting trees. Special modifications to the irrigation pattern by inverting the micro-sprinkler so that the surface wetting area is reduced or by increasing irrigation frequency can be good strategies to supply water for resets. However, the irrigation frequency necessary to sustain a mature grove is rarely adequate for good growth of newly-set trees, and young trees should be checked frequently to be certain they are receiving sufficient water. Drainage is as important as irrigation. Excess water must be removed from the rootzone. 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. In Florida, both surface and subsoil drainage is necessary to obtain adequate root systems for the trees.

FERTILIZATION

Reset fertilization requires an extra effort beyond the needs of the bearing grove. Frequent application of water-soluble fertilizers with irrigation water (fertigation) can increase overall fertilizer use efficiency. If the grove is under a fertigation program, there is no need for special care in terms of nutrition for resets. Great care must be taken to ensure that proper rates of fertilizer materials are dispensed to prevent nutritional deficiencies or toxicities. Frequent light applications usually produce best results and lessen the danger of leaching but these practices need to be evaluated for cost effectiveness. The use of controlled-release fertilizers for resets is a better option than making multiple trips throughout the year to scattered resets throughout large blocks.

PEST CONTROL

Because young trees have more frequent flushing cycles than mature trees, they are more attractive and sensitive to pests. Therefore, special care is needed to keep the citrus psyllid and leafminer under control to reduce their damage to new leaves and to reduce the severity of citrus canker and the spread of citrus greening. Relying solely on foliar contact insecticides for resets is not a good strategy. Soil-applied systemic insecticides (neonicotinoids) which provide 6-8 weeks of control are the most effective tool for managing psyllids and leafminers on resets. Currently, three neonicotinoid products are registered for use in citrus: imidacloprid (Admire, Alias, Couraze, Nuprid), thiamethoxam (Platinum), and clothianidin (Belay). Various generic formulations are also available. Resets should also benefit from foliar contact pesticides and from foliar nutrition used on mature trees.

GROVE PLAT

Since resets are usually scattered throughout a block of much larger trees, they are often difficult to locate and may be accidentally overlooked, resulting in inadequate care. An annually updated grove plat is probably the best method for assessing general grove condition and productivity. Plats can be prepared by hand or with the assistance of a computer. This can help determine the number of trees which will be needed and where they should be placed. Reset plats can be prepared to later help equipment operators locate newly-planted trees for periodic care.

Scattered resets in a citrus grove.

Danger of Heat Stress

Be alert to early warnings of heat stress, both in yourself and in your co-workers.

Heat stress needs to be taken seriously.

Working in a hot environment puts stress on the body's cooling system. When heat is combined with other stresses like hard physical work, loss of fluids, or fatigue it may lead to heat-related illness. Individuals over 40 years of age need to take extra care when the weather is hot because their ability to sweat declines as they age. However, heat stress can also affect individuals who are young and fit.

POINTS TO EMPHASIZE:

- Drink plenty of water to keep body fluid levels up
- Get out of the heat occasionally

Water is crucial to help the body adjust to high temperatures. The rate of water intake must be equal to the rate of water loss by perspiration to keep body temperature normal. **When it's hot, drink plenty of water!**

Your body must work even harder to get rid of excess heat when conditions are both hot and humid. Unfortunately, water can't evaporate as readily under muggy conditions. The process is easier if the surrounding air is moving. That's why we welcome a cool breeze, or turn on a fan when the air is "sticky".

Sickness and accident rates increase when heavy work is done at temperatures above 86 F.

Don't push yourself beyond your limits. It could be harmful to your health, and could put you at increased risk of having an accident.

Heat stress hazards

1. **Heat cramps:** Heavy sweating drains the body of salt, which cannot be replaced by simply drinking water. Painful cramps occur in the arms, legs, or stomach while on the job, or later at home. Move to a cool area at once if cramping is experienced. Loosen clothing and drink cool, commercial fluid replacement beverage. Seek medical aid if the cramps are severe, or don't go away.

2. Heat exhaustion: Inadequate water and salt intake causes the body's cooling system to break down. Symptoms include heavy sweating, cool, moist skin, body temperature over 100 F, weak pulse, and normal or low blood pressure. The victim is likely to be tired, weak, clumsy, upset, or confused. He will be very thirsty, and will breathe rapidly. His vision may be blurred. **Get medical help immediately!** Heat exhaustion can lead to heat stroke, which can kill. Move the person to a cool, shaded area. Loosen or remove excess clothing. Provide cool, lightly-salted water. Fan and spray the victim with cool water.

3. Heat stroke can kill a person quickly! Once the body uses up all its water and salt, sweating ceases. Temperature can rise quickly. You can assume a person is suffering from heat stroke if their body temperature is over 105 F, and any of the following symptoms are present:

- weakness, confusion, distress, strange behavior
- hot, dry, red skin
- rapid pulse
- headache or dizziness
- In later stages of a heat stroke, a victim may pass out and have convulsions

Call an ambulance immediately if heat stroke is suspected. The victim's life may be on the line! Until help arrives, move the victim to a cool area and remove excess clothing. Fan and spray them with cool water. Offer sips of water if the victim is conscious.

Heatwave guidelines

The following measures should help prevent the development of heat-related illnesses.

- Slow down in hot weather. Your body's temperature regulating system faces a much greater workload when temperature and humidity are high.
- Heed early warnings of heat stress, such as headache, heavy perspiration, high pulse rate, and shallow breathing. Take a break immediately and get to a cooler location. **Watch for heat stress signs among your co-workers.**
- Dress for hot weather. Lightweight, light-colored clothing reflects heat.
- **Drink plenty of water.** Don't let yourself "dry out".
- Try to get used to warm weather gradually. Take it easy for those first three hot days. Your body will have a better chance to adjust if you take it slow.
- Get out of the heat occasionally. Physical stress increases with time in hot weather. Take breaks in a cool, shady location.
- Wear a hat and long-sleeved shirt to prevent burning (which can increase the risk of skin cancer.)

"Do's" and "Don'ts" of preventing heat-related illnesses

DO:	**DON'T:**
Drink plenty of water Take breaks in a cool, shady area Watch for symptoms of a heat stress, both in yourself and co-workers	Ignore symptoms of heat stress Try to "keep up" with the rest of the crew, even though you feel ill

MANAGING HEAT STRESS

Heat stress is caused by working in hot conditions and when the body builds up more heat than it can cope with. Several factors work together to cause heat stress. Before beginning a task, think about whether any of these factors are likely to be a problem. Consider making adjustments in the task itself or in the workplace conditions, including: heat factors--temperature, humidity, air movement, and sunlight; workload--the amount of effort a task takes; drinking water intake; and scheduling.

High temperatures, high humidity, and sunlight increase the likelihood of heat stress. Air movement, from wind or from fans, may provide cooling. Because hard work causes the body to produce heat, a person is more likely to develop heat stress when working on foot than when driving a vehicle. Lifting or carrying heavy containers or equipment also increases the likelihood of overheating. Use fans, ventilation systems (indoors), and shade whenever possible. A work area or vehicle sometime can be shaded by a tarp or canopy or provided with fans or air conditioners. Consider wearing cooling clothes that help keep the body cool.

People who have become used to working in the heat are less likely to be affected by heat stress. To become adjusted to hot work environments, do about two hours of light work per day in the heat for several days in a row; then gradually increase the work period and the workload for the next several days. An adjustment period of at least seven days is recommended. If the warm weather occurs gradually, workers may adjust naturally to working in hot conditions.

Whenever it is practical, choose coveralls that allow air to pass through. Woven fabrics (cotton, or cotton-polyester blends) allow air to pass through fairly easily. Rubberized or plastic fabrics and fabrics coated with chemical-resistant barrier layers allow almost no air to pass through.

Perspiration or evaporation of sweat cools the body. Under the conditions that lead to heat stress, the body produces a large amount of sweat. Unless the water lost in sweat is replaced, body temperature will rise. Drink plenty of water before, during, and after work during heat stress conditions. Do not rely on thirst alone to guide you. A person can lose a dangerous amount of water before feeling thirsty, and the feeling of thirst may stop long before fluids are replaced. Be sure to keep body weight fairly constant. All weight lost because of sweating should be regained every day.

When the combination of temperature, sunlight, humidity, and workload is likely to lead to overheating, use scheduling to avoid heat stress. Schedule tasks requiring the heaviest workload during the coolest part of the day. When heat stress risk is high, schedule frequent breaks to allow the body to cool. Anyone who gets dangerously hot should stop work immediately and cool down. If necessary, shorten the time between breaks.

The above steps will prevent most heat stress problems. But under extremely hot conditions when cooling devices cannot be used, it may be necessary to stop work until conditions improve.

<table>
<tr><th colspan="2">Signs and Symptoms of Heat Stress</th></tr>
<tr><td rowspan="3">
Heat stress, even mild heat stress, makes people feel ill and impairs their ability to do a good job. They may get tired quickly, feel weak, be less alert, and less able to use good judgment.</td><td>Learn the signs and symptoms of heat stress and take immediate action to cool down if you observe:</td></tr>
<tr><td>fatigue (exhaustion, muscle weakness),</td></tr>
<tr><td>headache, nausea, and chills,</td></tr>
<tr><td rowspan="4">Severe heat stress (heat stroke) is a serious illness. Unless victims are cooled quickly, they can die. Severe heat stress is fatal to more than 10 percent of its victims--even young, healthy adults. Victims may remain sensitive to heat for months and be unable to return to the same work.</td><td>dizziness and fainting,</td></tr>
<tr><td>loss of coordination,</td></tr>
<tr><td>severe thirst and dry mouth,</td></tr>
<tr><td>altered behavior (confusion, slurred speech, quarrelsome or irrational attitude).</td></tr>
<tr><td colspan="2">Heat cramps can be painful. These are muscle spasms in the legs, arms, or stomach caused by loss of body salts through heavy sweating. To relieve cramps, drink cool water or "sports drinks." Stretching or kneading the muscles may temporarily relieve the cramps.</td></tr>
</table>

<table>
<tr><th colspan="2">First Aid for Heat Stress</th></tr>
<tr><td rowspan="6">It is not always easy to tell the difference between heat stress illness and pesticide poisoning. The signs and symptoms are similar. Don't waste time trying to decide what is causing the illness. Get medical help right away.</td><td>Get the victim into a shaded or cool area.</td></tr>
<tr><td>Cool victim as rapidly as possible by sponging or splashing skin, especially face, neck, hands, and forearms, with cool water or, when possible, immersing in cool water.</td></tr>
<tr><td>Carefully remove clothing that may be making the victim hot,</td></tr>
<tr><td>Have the victim, if conscious, drink as much cool water as possible.</td></tr>
<tr><td>Keep the victim quiet until help arrives.</td></tr>
<tr><td>Severe heat stress (heat stroke) is a medical emergency! Cool victim immediately. Brain damage and death may result if treatment is delayed.</td></tr>
</table>

https://extension.missouri.edu/news/plants-respond-to-heat-differently-than-humans-5715

Plants respond to heat differently than humans

Writer: Linda Geist

COLUMBIA, Mo. – Extreme heat affects plants differently than humans.

First, human concepts such as "heat index" or "feels like" do not apply to plants, Wiebold says. People and plants feel and react differently to heat.

Leaf temperature matters more to plants than air temperature. Leaves absorb light to build sugars and other things needed for life and yield, he says. Plants use little of the available light energy. Extra energy causes leaf temperature to rise.

Changing water from liquid to vapor (evaporation) uses a sizable amount of energy and causes a cooling effect. Conduction occurs when the warm leaf surface returns energy to the air that touches it if the air temperature is lower than the leaf temperature. In convection, cooler air moves closer to the surface of the leaf and displaces warmer air.

Temperature directly affects yield potential, Wiebold says. Enzymes (proteins) control the chemical reactions needed for plants to live. The rates of these reactions increase with temperature. For example, plant growth and weight gain are greater at 80 F than at 50 F. The three-dimensional shapes of plant enzymes can warp or change at high temperatures.

Agronomists consider 86 F the optimum temperature for corn and soybean growth. Temperatures above 86 F slow important reactions, including those involved in photosynthesis, reducing yield potential.

During the day, leaf temperatures are often higher than air temperatures, especially on bright, sunny days with little wind, says Wiebold. With good moisture supplies, evaporation happens quickly enough to keep leaf temperatures near air temperature. However, with limited moisture, water may not evaporate fast enough to cool the leaf. This causes leaf temperature to rise. Conduction and convection are not effective at driving heat away from the leaf when air temperatures are high.

Plants respond to the stress of high leaf temperatures in several ways. Leaves of grass plants such as corn roll into a cylinder to reduce the amount of leaf surface exposed to light. Leaves also tilt upward. Broad-leaved plants such as soybean do not roll. Instead, they turn their flat leaves to be parallel with incoming sunlight.

If heat stress continues, soybean and other broadleaf plants flip their leaves so that lighter-colored bottom surfaces face upward to reflect light. This reduces leaf temperature and limits exposure to sunlight. Reducing leaf temperature also reduces water evaporation.

The direct effect of high temperature on crop yields is small in most years, Wiebold says. But when temperatures top 95 F, as they often have this summer, corn and soybean yields may drop even in the few areas of Missouri where there was adequate precipitation.

One less obvious effect of high temperatures occurs in photosynthesis and respiration, he says. In the plant world, photosynthesis is “income” and respiration an “expense.” The difference, net photosynthesis, is “net income.” Within reason, high net photosynthesis high yield.

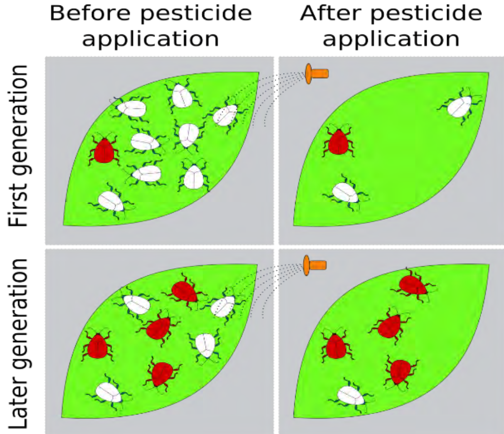
Plants need some respiration to burn sugars to make energy for many life processes. However, some respiration is wasted as it burns or oxidizes sugars that could be stored in seeds as yield. High temperatures fuel respiration more than photosynthesis and reduce the plant’s “net income.” This is especially true at night, when no photosynthesis occurs. Warm nights can lower yield without any visible effects on the plants.

The term “feels like” also has no meaning for plants. High daytime humidity can benefit plants because lower evaporation reduces water stress. High nighttime humidity slows the rate at which air temperatures fall. It is not uncommon for temperatures to remain above 80 F on summer nights if humidity is high (dew point above 70 F). So, although plants do not “feel” a high heat index, the slow rate of temperature decline during high-humidity nights shows through increased respiration.

“It is difficult to separate the effects of high heat from the effects of water stress,” says Wiebold. “Often these two stresses occur together and magnify the effects from each other. But high temperatures can reduce yield even if plants show no signs of water stress.”

Pesticide Resistance and Resistance Management

Lauren Diepenbrock, Megan Dewdney, and Ramdas Kanissery



Populations of animals, fungi, bacteria, and plants possess the ability to respond to sustained changes or stresses in their environment in ways that enable the continued survival of the species. Such environmental stresses include physical factors (e.g., temperature or humidity), biological factors (e.g., predators, parasites, or pathogens) and environmental contaminants. In any population, a small percentage of individuals will be better able to respond to new stresses because of unique traits or characteristics that they possess. Consequently, those individuals will survive, reproduce, and become more common in a population. This phenomenon is commonly referred to as "survival of the fittest."

Many pest species, such as the citrus rust mite, are exceptionally well-equipped to respond to environmental stresses because of their short generation time and large reproductive potential. The use of chemical sprays to control insect, mite, and fungal diseases of citrus creates a potent environmental stress. There are now many examples of pests and pathogens that have responded by developing resistance to one or more pesticides. Pesticide-resistant individuals are those that have developed the ability to tolerate doses of a toxicant that would be lethal to the majority of individuals. The resistance mechanisms can vary according to pest species and/or the class of chemical to which the pest is exposed. Resistance mechanisms include an increased capacity to detoxify the pesticide once it has entered the pest's body, a decreased sensitivity of the target site that the pesticide acts upon, a decreased penetration of the pesticide through the cuticle, or sequestration of the pesticide within the organism. The main resistance mechanism for pathogens is a change in the target site so that the pathogen is less susceptible or fully resistant. A single resistance mechanism can sometimes provide defense against different classes of chemicals and this is known as *cross-resistance*. When more than one resistance mechanism is expressed in the same individual, this individual is said to show *multiple resistance*.

Because the traits for resistance are passed from one generation to the next, continued stress from a pesticide may, over time, create resistance in the majority of individuals in a population. From an operational perspective, this process would be expressed as a gradual decrease and eventual loss of effectiveness of a chemical. Resistance to a particular chemical may be stable or unstable. When resistance is stable, the pest population does not revert to a susceptible state even if the use of that chemical is discontinued. When resistance is unstable and use of the chemical is temporarily discontinued, the population will eventually return to a susceptible state, at which time the chemical in question could again be used to manage that pest. However, in this situation, previously resistant populations may eventually show resistance again.

Of the factors that affect the development of resistance—which include the pest's or pathogen's biology, ecology and genetics—only the operational factors can be manipulated by the grower. The key operational factor that will delay the onset of pesticidal resistance and prolong the effective life of a compound is to assure the survival of some susceptible individuals to dilute the population of resistant individuals. The following operational procedures should be on a grower's checklist to steward sound pesticidal resistance management for acaricides, insecticides, fungicides, and herbicides:

Never rely on a single pesticide class.

Integrate chemical control with effective, complementary cultural and biological control practices.

Always use pesticides at recommended rates and strive for thorough coverage.

When there is more than one generation of pest, alternate different pesticide classes.

Do not use tank mixtures of products that have the same mode of action. If control with a pesticide fails, do not re-treat with a chemical that has the same mode of action.

Reports of resistance have been documented for certain acaricides used to control citrus rust mite and fungicides used to combat diseases in Florida. Resistance to Benlate developed in the greasy spot fungus shortly after the product was introduced about 30 years ago and is still widespread. Benlate resistance also occurs in the scab fungus in isolated situations and is stable. Resistance has been detected in tangerine groves with Alternaria brown spot to strobilurin fungicides (Abound, Gem, and Headline and contained in the mixtures Pristine and Quadris Top) but no resistance has developed to ferbam. Dicofol resistance in citrus rust mite was detected throughout the citrus industry about 10 years ago, but resistance proved to be unstable and usage of dicofol has continued. Agri-mek tolerance in citrus rust mite is of concern and growers should follow sound resistant management practices when using this product.

The following tables are provided to aid in the rotation of pesticides with different modes of action within a season or from year to year. There is a separate table for insecticides/acaricides, fungicides, and herbicides. The information in these tables was derived from information produced by the Insecticide Resistance Action Committee (IRAC) (http://www.irac-online.org/), Fungicide Resistance Action Committee (FRAC) (http://www.frac.info/), and the Herbicide Resistance Action Committee (HRAC) (http://hracglobal.com/pages/classificationofherbicidesiteofaction.aspx). Each table lists the number (or letter in the case of herbicides) of the group code for each pesticide class, the group name or general description of that group of pesticides, the common name of pesticides used in citrus production that belong to each group, and examples of trade names of pesticides for each common name listed. When using the table to rotate between using products with different modes of action, choose products with a different group code than previously used in the grove during the current growing season. In the case of insecticides/acaricides, many of these pesticides are broken into subgroups. It is unclear whether cross resistance will occur between these subgroups. When possible, it is recommended to rotate with an entirely different group. (Note: The IRAC and FRAC mode of action systems both use a similar numbering system. There is no cross-resistance potential between the insecticides and fungicides.) Products with broad-based activity such as sulfur, copper, and oil are not included in this list because the development of resistance to them is not likely.

For more details, go to: https://edis.ifas.ufl.edu/pdf/CG/CG026/CG026-Dfryt7p45d.pdf

Flatwoods Citrus newsletter

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Please send: Dr. Mongi Zekri
Multi-County Citrus Agent
Hendry County Extension Office
P.O. Box 68
LaBelle, FL 33975
or E-mail: maz@ufl.edu

Subscriber's Name:____

Company:____

Phone:__________________________

E-mail:____

Racial-Ethnic Background

__American Indian or native Alaskan
__Asian American
__Hispanic
__White, non-Hispanic
__Black, non-Hispanic

Gender

__Female __Male