



# Berry/Vegetable Times



January 2004



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## Calendar of Events 2003-2004

**Jan 15 & 16** Florida Grape Growers Annual Conference, Mid-Florida Research & Education Center, Apopka. For more information call Stacie Lott, FGGA Secretary (863) 678-0523.

**Feb 9** Pesticide Testing, Hillsborough Co. Extension Office, Seffner. 9 am (813) 744-5519.

**Feb 23-25** NASGA 2004 North American Berry Conference. Hilton Tampa Airport Westshore. For info, [www.nasga.org](http://www.nasga.org).

**Feb 26** Blueberry/Alternative Crop Meeting (tentative date). Hillsborough Co. Extension Office, Seffner. 9 am noon. (813) 744-5519.

**Mar 23-27** ISHS Symposium for Protected Culture in a Mild-Winter Climate Kissimmee. For more information visit [www.conference.ifas.ufl.edu](http://www.conference.ifas.ufl.edu).

**June 21-24** International Symposium on Tomato Disease and 19th Annual Tomato Disease Workshop. Grosvenor Resort, Walt Disney World Orlando. For more information visit <http://plantdoctor.ifas.ufl.edu>.

## 2003-2004 Freeze Forecast

Adapted by Alicia Whidden from the Center for Ocean Atmospheric Prediction Studies

El Niño and La Niña have a major effect on our winter weather patterns in Florida. El Niño generally has 40% more rainfall than normal and cooler temperatures. The 1997-98 El Niño was one of the strongest on record and the 2002-2003 was a mild one. In contrast, La Niña brings a warm dry winter and spring and the warm winter and drought of 1999 and 2000 was due to La Niña. As well as affecting the average winter temperatures both El Niño and La Niña suppress severe arctic blasts of cold air that can cause damaging freezes in Florida. Both effect the intrusion of cold Canadian air into the south. El Niño has a strong subtropical jet that usually "blocks" the Arctic air masses from Florida. La Niña limits the movement of the Polar jet over the country which steers winter storms and cold fronts to the north away

from Florida. In Neutral years (which we are in this season) the Polar jet position is variable and wanders over the North American continent. This opens up the southern states to dramatic dips or troughs in the jet stream that pushes the frigid Arctic air masses down from Canada. These dips are what lead to freezing temperatures in our area. The last 10 out of 11 severe freezes in the state have occurred when conditions were neutral in the Pacific. Since we are considered to be neutral this year our risk of damaging freezes is increased.



## Severe Freezes of the last century

Date of Freeze	ENSO Phase
Dec 1894	Neutral
Feb 1899	Neutral
Dec 1934	Neutral
Jan 1940	Neutral
Dec 1961	Neutral
Jan 1977	El Niño
Jan 1981	Neutral
Dec 1983	Neutral
Jan 1985	Neutral
Dec 1989	Neutral
Jan 1997	Neutral

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Weather station minimum temperatures in the Southeast for the last 50 years show that freezing events are three times more likely to occur in Neutral years. This is for minimums of 20° or colder. Also the odds of extended freeze events (three or more nights at 30°) in our area is three times more likely during a Neutral year. 100 years of late-season freezes were looked at and there is no connection between type of year and the average date of the last freeze.

## News from California

Craig Chandler

A California Strawberry Commission newsletter recently reported that, based on a commission survey, California strawberry acreage for the 2004 season stands at 31,639 acres. This is 3,409 acres or 12.1% greater than the 2003 acreage. The Oxnard area had the largest gain in acreage (+1,555), giving it a total of 10,349 acres for 2004. ‘Camarosa’ remains the top cultivar in California, with 9,832 acres planted (31 % of the state’s acreage), while proprietary cultivars (from Driscolls, Cal Giant, Plant Sciences, Inc., etc.) occupy a total of 9,757 acres. Acreage in ‘Ventana’ has more than doubled from last season to this season, with this new cultivar now occupying 2,777 acres (or 9% of the state’s acreage).

Representatives from the Commission, the University of California, the USDA, and the California strawberry nursery industry met in early December to discuss priorities for nursery-based research. Areas identified as high priority by the participants include the following: 1) determine how pathogens are introduced and spread in the nursery; 2) develop methods to detect pathogens in the nursery and in transplants before they are set in the fruiting field; and 3) develop control methods to prevent the

introduction and spread of pathogens in the nursery. Meeting participants agreed that the Commission and nurseries should share the cost of conducting nursery-based research and a future meeting will be held to work out funding details.

## Spotlight on Strawberry Diagnosis

Teresa Seijo and Jim Mertely

During the first three months of the season (Oct. – Dec. 2003), *Colletotrichum acutatum* was the most prevalent pathogen detected at the Strawberry Diagnostic Clinic (20 of the 65 samples received). *C. acutatum* infects all parts of the strawberry plant. Early in the season, plants are often stunted and fail to establish properly. In severe cases bud rot and death can occur. As the season progresses, *C. acutatum* causes anthracnose fruit rot. However there is good news this season. To date the clinic has received 38% fewer *C. acutatum* infected samples than were received during the same period last season.

Twenty additional samples consisted of plants collapsing from severe crown rot. The majority of these plants (18 samples) were infected with *Colletotrichum gloeosporioides*. Four of these eighteen were also co-infected with *Colletotrichum fragariae*. The remaining two samples were infected with *Phytophthora* sp. Crown rot incidence in strawberry usually decreases with cooler weather. True to form, no samples of severe crown rot have been submitted since the first week of December.

Charcoal rot, caused by the fungus *Macrophomina phaseolina*, has been detected at two farms this season. *M. phaseolina* infects the roots and external margins (vascular tissue) of the crown causing

stunting, wilt and death. On one farm the disease was associated with beds that were not properly fumigated. Charcoal rot is uncommon in strawberry, but it may become a more significant problem if there is a fumigation problem.

The remaining samples had powdery mildew (4 samples), Gnomonia leaf blight (1 sample), angular leaf spot (2 samples), sting nematodes (1 samples), and a variety of abiotic problems such as iron chlorosis or poor fertilization.

## Problems with ‘Camino Real’ Fruit

Alicia Whidden, Teresa Seijo, Jim Mertely

At the end of December and early in January, problems with ‘Camino Real’ fruit were seen in several fields. Both immature and mature fruit were bronzed and cracked, primarily under the calyx. As the fruit ripen, the cracking can become severe and deep under the cap and on the shoulder of the fruit. These symptoms were seen on a large percentage of the fruit in the affected fields. Samples were taken to the Strawberry Diagnostic Clinic and no pathogen was detected. Another common element of all severely affected fields was the application of sulfur for powdery mildew control. Dr. Kirk Larson, plant breeder at the University of California - Davis, was contacted and sent this information : “Camino Real is quite sensitive to sulfur applications, under California conditions we find that just two sulfur applications within a 2-week period can cause fruit bronzing and cracking- see Figures 1 and 2. Use of sulfur-containing compounds such as Captan may also be problematic, especially if used in conjunction or in rotation with

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sulfur. With the generally warmer temperatures and higher irradiance levels in Florida compared to California, sulfur damage may be more likely in Florida, and I would urge growers to be very cautious with use of sulfur or sulfur-containing products around this variety."

In several fields that had not been sprayed with sulfur, some young fruit occasionally showed some bronzing and minute cracking. The bronzing was not restricted to just under the calyx and aphids were present on the fruit. The damage appears to be from aphid feeding. Also some growers have found thrips in their field recently and thrips feeding can also cause bronzing on fruit. There is a difference in symptoms caused by sulfur application (i.e., bronzing and severe cracking usually restricted to the stem end of the fruit) and the damage done by the insect feeding (bronzing over any part of the fruit with minor cracking, at least in immature).

Dr. John Duval has put in a demonstration plot at the center to try to reproduce the damage from sulfur on 'Camino Real'. Six rates of sulfur have been applied: control, 2.5 lbs, 5 lbs, 7.5 lbs, 10 lbs, and 12.5 lbs. It is hoped that damage will develop even though the weather conditions have changed.



Figures 1 and 2— 'Camino Real' displaying possible sulfur damage.

Thank you to everyone who worked on this problem- Kenneth Parker of Chemical Dynamics, the faculty and staff of GCREC-Dover and Dr. Kirk Larson of UC-Davis.

'Festival' in previous seasons, but they have tended to become less common as the crop moves into the main harvest period at the end of February.

## 'Festival' Shows Susceptibility to Leafy Growth on Fruit

Craig Chandler

In early January, research workers at the Dover center started seeing leafy growth (Figure 1) on a small percentage of the fruit harvested from 'Festival' plants. This type of fruit abnormality can be caused by the aster yellows phytoplasma, a bacteria-like pathogen transmitted by leafhoppers, but may also be non-infectious in nature. GCREC plant pathologist Charlie Howard, in a 1985 bulletin, stated that in Florida this disorder is associated with a change from low or moderate temperature to high temperature. Mid December of this season could be characterized as having low or moderate temperatures, and late December and early January as having relatively high temperatures. In addition to the fruit with leafy growth, we have noted that some 'Festival' fruit are more elongated or bullet shaped than is typical for this cultivar. This alteration in fruit shape could also be a result of phytoplasma infection or weather pattern. We have seen these types of fruit abnormalities on

## Late Season Epidemics Often Begin in January

Jim Mertely

A critical time for the management of Florida strawberry diseases lies just ahead. There are two main reasons for this. Our strawberry crop is already three months old, and disease inoculum can increase over time. In addition, pathogens such as *Botrytis cinerea* (Botrytis fruit rot, Figure 1) and *Colletotrichum acutatum* (anthracnose fruit rot, Figure 2) will soon have an abundance of susceptible flowers to infect. Management of these two pathogens depends on individual circumstances and is not well suited to a "one size fits all" recommendation. The following comments may provide some guidance for developing a good disease management program.

*Botrytis cinerea* is usually more predictable and easy to control. According to research done at NC State, nursery plants from Canada often arrive with leaves already infected by the fungus. These leaves begin dying (of natural causes) shortly after planting. As they die, Botrytis colonizes the tissue and produces spores which are splashed or wind-blown to new emerging leaves. The new leaves may appear healthy, but as they die in January and early February, a new crop of spores is produced just in time to infect second bloom flowers. The appearance of Botrytis fruit rot on ripening fruit is usually the result of flower infections which occurred two to three weeks earlier.

The key to Botrytis control is to protect the flowers. A normal



Figure 1—Symptoms of phytoplasma infection of a 'Festival' berry.

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maintenance program of protectant fungicides such as captan or thiram helps to suppress this disease, and is often sufficient when moderately resistant varieties such as Camarosa, Carmine, or Gaviota are grown.

However, more susceptible varieties such as Festival and Sweet Charlie would benefit from applications of Elevate, Pristine, or Switch during the second peak bloom period. One of these products should be tank mixed with the normal protectant fungicide beginning at 10% bloom. Three to four applications at weekly intervals should adequately protect most second bloom flowers.

Captivate can also be used during this period as it is a pre-mix of captan and Elevate. Additional applications are usually not needed since Botrytis fruit rot is naturally suppressed as temperatures rise in March.



Figure 1—Botrytis fruit rot.

The understanding and management of anthracnose fruit rot has been more difficult to achieve. In Florida, *C. acutatum* is not believed to persist on alternative hosts or crop debris over the summer. However, the pathogen has been found on northern nursery plants during each of the past three seasons. Plant dip treatments with Abound (Quadris), or hydrogen peroxide (Oxidate) may reduce the pathogen, but probably do not eliminate it. Fortunately, not all nursery material is contaminated, and some fields escape the disease. If the planting material was disease free, measures should be taken to protect anthracnose-free fields. These include starting normal field

operations in these fields to avoid spreading the pathogen by contaminated equipment or pickers, and regular applications of protectant fungicides to reduce the possibility of chance infection.



Figure 2—Anthracnose fruit rot.

Controlling anthracnose fruit rot is much more difficult than Botrytis fruit rot, especially if diseased nursery stock was initially planted in the field. The degree of success is highly dependent on variety and weather. Control is rarely a problem if highly resistant varieties (Carmine and Sweet Charlie) are grown under normal disease management. However, it can be more difficult on moderately resistant varieties (e.g., Festival or Gaviota), and especially challenging on susceptible varieties such as Aromas, Camarosa or Treasure. *C. acutatum* is efficiently spread by rainstorms (splashing water) when the weather is mild to warm. This frequently occurs in late February or early March when epidemics are common. However, control measures must be started early to successfully avoid or delay an epidemic. The most important of these is maintaining regular applications of protectant fungicides such as captan or thiram. During the vulnerable February to March period (or as soon as diseased fruit are noted in the field), additional fungicides such as Abound, Cabrio, Pristine, or Switch may be added to the tank mix. Research here at GCREC-Dover has shown that flowers are more susceptible to infection than leaves, petioles, or green fruit.

Diseased flowers become blighted or develop into small black fruit which *C. acutatum* uses to produce large quantities of spores. To protect vulnerable flowers, susceptible varieties may benefit from applications started before diseased fruit appear in the field. These applications should be made during the second bloom when temperatures begin to moderate and/or rain events occur. In theory, such a program would delay the increase in spore numbers which eventually results in epidemics on ripening fruit.

While fungicides are an effective tool for the control of anthracnose and Botrytis fruit rots, good cultural practices should not be ignored. The fertilization program, for example, influences the development of both diseases. Excessive fertility produces large plants whose rank foliage covers flowers and fruit, delays drying, and promotes infection by *B. cinerea*. In addition, spray coverage is less complete when the canopy becomes overly dense. Excessive fertilization also promotes the development of young tender tissues (e.g., petioles) which are more susceptible to infection by *C. acutatum*. Plant sanitation is also an important cultural control method. Harvesters should be encouraged to pick and throw down diseased and other cull fruit. In addition, harvest intervals should be short enough to avoid the appearance of over-ripe fruit in the field. Wise management practices such as these will reduce dependence on fungicides and some of the control failures that inevitably occur.

## IR-4 Trials at the GCREC-Dover

John R. Duval

Currently two herbicides, sulfentrazone and terbacil, are being tested on an IR-4 residue study for strawberry. Sulfentrazone is an

under mulch pre-emergence, currently without a label, and terbacil is currently labeled but has a 110-day PHI postharvest interval. The purpose of these trials is to get PHI's down to below 50 days. Since field preparation may take place several weeks before planting and it is unusual to produce berries 40 days after transplanting, a PHI of 50 days should be sufficient to avoid interference with the first harvest of the season. Thanks to the efforts of Dr. Bill Stall and Berry Tanner from Gainesville, we should have new tools to manage weed pests in strawberry in the coming years.

## Experiments on Two Spider Mite Predators

Jim Price

In the recent November issue of Berry/Vegetable Times, Liburd, Seferina and Dinkins discussed that *Neoseiulus californicus* predatory mite performed well in controlling twospotted spider mites in North Florida where they had observed poor results with *Phytoseiulus persimilis* predatory mite. Since that report, several scientists within the University of Florida and Clemson University have begun cooperative work to determine if there is an advantage of *N. californicus* over *P. persimilis* in areas of the southeastern US.

Accordingly, field experiments have been established in Charleston, South Carolina (1), north Florida (1) and west-central Florida (3) strawberry production areas. Three treatments in each experiment include large areas where spider mites are managed using *N. californicus*, *P. persimilis* and a chemical control check. Data will be collected through the spring 2004 crop and will be examined collectively and by locality.

It is understood that the two species of predators posses different

optimal environmental humidity and temperature for foraging, responses to insecticides used in strawberry culture, and food host ranges and consumption rates. For instance, *N. californicus* tolerates Brigade® bifenazate insecticide well and can survive on pollen or some mite prey other than spider mites if the preferred spider mite prey is unavailable. *P. persimilis* tends to consume more spider mites each day than can *N. californicus*. Neither predator species can damage strawberry crops.

The results of these experiments can be useful to determine the better predator for the prevailing strawberry environmental conditions in the southeastern US. Outcomes at the various sites will be reported in this newsletter.

Valent Co. announced that Zeal® (etoxazole) ovicidal miticide is now approved for Florida strawberry. Restricted to one application per season. Trials on this product performed very well at GCREC.

## Pesticide Registrations and Actions

Chemically Speaking, 12/03

- The Florida Department of Agriculture and Consumer Service (FDACS) issued the Special Local Needs [24(c)] registration number FL-030013 to Nichino America for use of Courier® (buprofezin) insecticide to control whiteflies on tomato with a one-day pre-harvest interval. EPA registration number 71711-15. (FDACS letter of 10/28/03).
- On October 3, FDACS registered the fungicide Endura® (boscalid) for control of diseases on lettuce, potato, cucurbits, fruiting vegetables, and other crops. EPA registration number 7969-197. (FDACS PREC November Agenda).
- On October 3, FDACS registered the fungicide Tanos® (famoxadome) for control of diseases on cucurbits, potato, tomato, and other crops. EPA registration number 352-604. (FDACS PREC November Agenda).
- On October 3, FDACS registered the fungicide Pristine® (boscalid) for control of diseases on carrot, strawberry, bulb vegetables, and other crops. EPA registration number 7969-199. (FDACS PREC November Agenda).
- On November 6, the FDACS registered the herbicide Envoke® (trifloxysulfuron-sodium) for selective control of certain broadleaf, sedge, and grass weeds in cotton, sugarcane, and transplanted tomato. EPA registration number 100-1132. (FDACS PREC December Agenda).
- Bayer CropScience announced in Nov. that due to incidences of injury to blueberries after applying Rovral® (iprodione) fungicide in Georgia in 2003, the company is prohibiting the use of all Rovral® products on all varieties of blueberries in the United States. The Rovral® product manager can be reached at 888-992-2937. (Bayer CropScience letter of 11/10/03).
- The pesticide community now has a tool to locate product collection and disposal opportunities. Earth 911, www.earth911.org/master.asp, offers information on approximately 375,000 communities, which users can access by entering a zip code. (*Pesticide & Toxic Chemical News*).