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Berry Times

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Second Anniversary Issue

Spotlight on Diagnosis - Jim Mertely and Teresa Seijo

It has been a busy month at the UF Strawberry Diagnostic Lab. Over 30 samples have been received since the beginning of November. Twenty of these have been diagnosed with various anthracnose diseases. The anthracnose fungus *Colletotrichum acutatum* was identified on 10 samples early in November. These stunted transplants were only a few weeks old and failed to establish properly due to infections in the roots, crowns, or buds. *C. acutatum* is particularly aggressive towards young plants that are infected in the nursery and stressed in the field by hot weather and transplant shock. More robust plants that had suddenly wilted or collapsed began arriving later in November. The crowns of these plants were extensively rotted or discolored internally. While several different pathogens can cause such symptoms, *Colletotrichum gloeosporioides* was isolated from the majority of these plants. Surprisingly, *C. fragariae* was also identified from a few specimens. Both are anthracnose fungi commonly associated with crown rot disease in strawberry.

Several cases of sting nematode (*Belonolaimus longicaudatus*) damage were unexpectedly diagnosed in November (sting nematode damage is more typically found in the spring). The sting nematode is a large and damaging nematode that feeds near the root tips, causing stubby root symptoms below, and stunting above. Infested plants are often clustered in fairly well defined patches in the field.

Stubby root symptoms are a sign of sting nematode damage.

Wind and Humidity as Factors in Freeze Protection with Sprinkler Irrigation - Craig Chandler

The following article was adapted from a scholarly paper written by Dr. Paul Lyrene, Professor of Horticultural Sciences at the University of Florida, and published in the 1996 Proceedings of the Florida State Horticultural Society (Vol. 109; pgs. 215-220).

Through several processes, wind greatly reduces the effectiveness of overhead irrigation in freeze protection. It reduces the uniformity of water application. It moves the warmed air out of the field and replaces it with colder, drier

For many years blueberry growers in Florida have used information provided by UF/IFAS to predict the water application rate required for cold protection under different wind and temperature conditions. This information indicates, for example, that 0.12 inch of water per hour will prevent freezing of flowers if the air is 22 ºF and there is no wind, whereas 0.5 inch per hour would be needed at the same air temperature if the wind is 5 to 8 miles per hour.

Twenty years of experience with freeze protection of blueberries in Florida under various wind and temperature conditions have proved the utility of the information provided by UF/IFAS, but have also revealed that protection on windy nights is sometimes far better or worse than expected. The principal reason for these discrepancies is believed to be variations in humidity.

Growers need accurate temperature, wind speed, and relative humidity or dew point information in order to make the best decisions as to whether water should be used on a particular night. A standard index for comparing the moisture content of the air during various freezes is needed. Moisture indexing would help growers predict the effect of using their irrigation systems during an impending freeze based on how the systems performed during previous freezes they have experienced. The dew point is probably the most useful index. Dew-point readings for stations throughout Florida are available from the Florida Automated Weather Network (FAWN) at http://fawn.ifas.ufl.edu.

FAWN Florida Automated Weather Network

FAWN provides useful weather information throughout the state including dew-point readings.

If there is little wind, the dew point will probably change little between noon and the following sunrise, except in frost pockets, where frost formation may reduce the dew point by several degrees after dew and frost begin to form during the night. If there is significant wind from a direction between west and north, drier air may be moving in, and the dew point may fall substantially during the night. This is particularly true within 48 hours after

passage of a cold front. If the dew point is above freezing and drier air is not moving in, a damaging freeze is unlikely the following night, except possibly in the worst frost pockets. If the dew point is below 10 ºF and the forecast minimum temperature is below 26 ºF, freeze protection with water will be difficult if there is significant wind.

Evidence of freeze damage.

The relative humidity at the time the temperature falls to 32 ºF is important because it indicates how much evaporation will occur when the irrigation system is turned on. If the humidity is predicted to be quite low at the time the temperature reaches 32 ºF, then water should be turned on (if at all) before the temperature falls to freezing. On the other hand, if the humidity is above 90%, it is probably safe to let the temperature fall to 32 ºF before turning on the water.

Normally on a radiation-freeze night, the temperature falls rapidly until it is within several degrees of the dew point. When the relative humidity reaches 96%, further temperature fall is likely to be slow, because of the heat released as water vapor condenses into dew or frost.

Another consideration makes dew point temperature important in protecting strawberry flowers from a radiation freeze. On clear nights with no wind, exposed flowers, berries, and leaves that are not hidden inside the bush or shaded by other leaves become colder than the air. If the humidity is 90% or greater, frost or dew keeps plant parts from becoming more than 3 ºF colder than the air. However, if there is no sign of wind, dew, or frost, flowers and berries can become as much as 9 ºF colder than the air. If the dew point is below 26 ºF on a calm night when a radiation freeze is expected, sprinklers should be turned on before shelter temperatures fall below 34 ºF.

Air masses, which, in Canada, had temperatures as low as -40 ºF and dew points even lower can arrive in Florida within 3 or 4 days. Although their temperatures rise rapidly as they move south, their dew points rise less rapidly, since little water is available for evaporation between Canada and Florida during the winter, transpiration from dormant plants is minimal, and the coldness of the air reduces evaporation. Thus, Canadian air is normally very dry when it arrives in Florida. Exactly how dry is a matter of great importance to growers who are trying to protect flowers and fruit on a clear or windy night.

For a discussion of 1) terms relating to atmospheric moisture content and 2) the effects of sprinkler irrigation on air temperature (also adapted from Dr. Lyrene's paper) please visit our web site http://strawberry.ifas.ufl.edu.

Reduced Risk Insecticides/Miticides - Jim Price

The Reduced Risk Initiative was created by the US Environmental Protection Agency (EPA) to enhance the development, registration and use of conventional pesticides that may be more favorable relative to human health and to the environment than existing pesticides. Two of these, Acramite® (miticide) and Spintor® (insecticide), are now available for strawberry production and an additional reduced risk miticide, Mesa®, is expected soon. Oddly, the reduced risk designation is never indicated on the product label. The designation is available only to new pesticides, leaving older but perhaps favorable conventional pesticides without the designation.

To obtain the reduced risk status, a new pesticide must possess at least one of the following characteristics:

1. Low risk to human health
2. Low toxicity to non-target organisms
3. Low potential to contaminate the environment
4. Enhance the use and reliability of integrated pest management (IPM)

Acramite® and Spintor® conformed to the requirements for designation and were treated with a high priority by the EPA during the registration process. Even though they possess this designation, each is toxic and must be handled according to the product label.

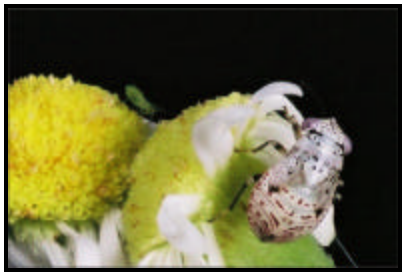
The strawberry industry benefits from the Reduced Risk Initiative in that so designated pesticides can be registered more quickly than others and because less hazardous pesticides become available.

Strawberry Culture under Protective Structures Part II. Biological Control of Pests - Dr. Daniel Cantliffe, Dr. Silvia I. Rondon, and Ashwin Paranjpe

Strawberry is an intensively cultivated high value crop that requires large inputs of pesticides. The Biological Control Laboratory of the Protected Agriculture Project has conducted a series of experiments, in cooperation with Dr. Jim Price of the Gulf Coast Research and Education Center, to determine if the commercial production of strawberries using biological control agents and minimal pesticides is possible. Through early detection of arthropod pests and the release of beneficial insects we intend to minimize the use of insecticides on strawberries. Reduction in chemical dependency will provide for safer human and environmental health and could reduce the production costs for the grower.

Three predators, the lady beetle, *Coleomegilla maculata fuscilabris* DeGeer, the big-eyed bug, *Geocoris punctipes* Say, and the minute pirate bug, *Orius insidiosus* L. are being evaluated as potential biological control agents against pests such as the melon aphid, *Aphis gossypii* Glover, the two spotted spider

mite, *Tetranychus urticae* Koch, thrips, white flies, and sap beetles. All beneficials are being provided by a commercial beneficial supplier, Entomos LLC (Gainesville, FL).



Geocoris punctipes, the "big -eyed bug" (Picture courtesy P. Blanchart).

Feeding behavior, effectiveness, choice, and functional response studies are being conducted to obtain basic information regarding the use of predators in order to determine the application rate of beneficial insects needed for greenhouse and field situations. Ongoing and future research will determine the effectiveness of these predators to control pests on strawberries grown commercially in greenhouses as well as open fields. Farmers will benefit from the adoption of this integrated approach because of potential reduction in cost of production and increase in returns, especially if the fruit can be sold under a 'reduced pesticide' or 'pesticide free' label. With the information which we have obtained so far from our laboratory and greenhouse experiments, we will be able to establish trials on growers' fields in the 2003-04 season and test our findings. For more information contact: Dr. Cantliffe djc@mail.ifas.ufl.edu; Dr. Rondon srondon@mail.ifas.ufl.edu; or Ashwin Paranjpe ash22@mail.ifas.ufl.edu.

2002-2003 Field Research Projects

Plant Pathology Program - Jim Mertely, Steve MacKenzie, and Teresa Seijo

The Plant Pathology Program conducts standard fungicide trials and specific research experiments. Each of the three major diseases of strawberry in Florida (anthracnose, Botrytis fruit rot, and powdery mildew) is targeted by a separate fungicide trial. The object of these trials is to evaluate standard and experimental fungicides for efficacy, and to develop spray programs that maximize disease control and minimize chemical use. The following research experiments are programmed for 2002-03:

- **Pre-plant dip.** Strawberry runner plants from an anthracnose-infected nursery field were treated with fungicides and other products before transplanting to evaluate their ability to protect plants from poor establishment caused by *Colletotrichum acutatum.*
- **Anthracnose ontogeny**. 'Camarosa' flowers and fruit will be inoculated with *Colletotrichum acutatum* in February to determine which stage(s) of fruit development are most susceptible to anthracnose fruit rot.
- **Plant colonization.** *Colletotrichum* spp. colonizing the petioles of 'Camarosa' will be monitored at regular intervals over the season in plants sprayed with Captan or Thiram at weekly intervals, and in untreated plants.
- **Cultivar-Isolate**. In early November, selected strawberry cultivars were inoculated with isolates of *Colletotrichum gloeosporioides* to investigate cultivar-isolate interactions in Colletotrichum (anthracnose) crown rot disease.
- **Cultivar trials.** Florida cultivars and advanced breeding lines are being evaluated for resistance to anthracnose fruit rot and Botrytis fruit rot in two separate trials.
- **Botrytis post-harvest.** The effect of late season fungicide applications on the post harvest incidence of Botrytis fruit rot will be investigated.

Breeding & Genetics Trials - Craig Chandler and Jim Sumler

This season we are continuing an active breeding program aimed at identifying strawberry genotypes that produce high yields of firm, attractive, and flavorful fruit. Here are the specifics:

- 4,000 seedlings (stage 1) are being screened for desirable fruit quality traits.
- 300 selections (stage 2) are being evaluated for consistency of fruit quality.
- 12 advanced selections (stage 3) are being evaluated for ease of harvest, production pattern, fruit size, post-harvest fruit quality, and resistance to powdery mildew and fruit rots.
- A planting-date trial includes Carmine, Earlibrite, Strawberry Festival, Sweet Charlie, and FL 97-39 planted on Oct. 2, 9, 17, and 25.
- Trials to evaluate Aromas, Camarosa, Carmine, Earlibrite, Strawberry Festival, Gaviota, Sweet Charlie, Treasure, FL 97-39, and FL 99-56 for resistance to Botrytis fruit rot and anthracnose fruit rot.

Experimentation of the Plant Physiology Program - John Duval and Elizabeth Golden

This is an exciting time for the plant physiology program. The legislative appropriation for improvements at GCREC-Dover greatly increased our research capabilities. The addition of three growth chambers is allowing us to investigate the effect of temperature on water consumption, nitrate and micro-nutrient uptake, and plant growth and yield under very controlled conditions. This information should help us to develop fertilization and irrigation recommendations that are based on seasonal weather forecasts (e.g. specific recommendations for El Niño and La Niña seasons, may be possible). In addition, fieldwork is being conducted to determine the differences in fertilization and irrigation requirements between

varieties. This should help us to better optimize varietal performance. Calcium and sulfur nutrition is being examined to detect any yield or post-harvest quality response of strawberry. Studies aimed at reducing the amount of water needed for establishment and increasing early season yields are continuing. These studies, which include the evaluation of transplants that have been mowed or treated with a promising new chemical growth regulator in the nursery, are in their third and final year. The impact of mowing appears to be cultivar-specific, and the timing of both mowing and growth regulator applications is critical to success, but these cultural practices appear to have the potential to provide substantial reductions in establishment time without significantly increasing costs or compromising yields. A study to determine the effect of planting date on growth and yielding patterns of advanced selections has been initiated in conjunction with Dr. Craig Chandler's strawberry breeding program. The long-term goal of this study is to develop planting date recommendations that can be communicated to growers at the time a selection is named and released. Finally, the on-farm demonstration of gravimetric soil water sensors is continuing this year. Soil water monitoring can help growers use water more efficiently, thus potentially increasing their fruit yields while reducing their water usage. If you wish to participate in this study, please contact Dr. John Duval at (813) 744-6630 Ext. 75 or drop by our research center.

Entomology Program – James Price and Curtis Nagle

The Entomology Program is continuing to do research at GCREC-Dover for the 2002-2003 strawberry season and the following trials have been initiated:

- Biological control of spider mites. Observations will be made on a miticides/predator hybrid plan for spider mite control where miticides are used early-season and predators are used in time for the spring build-up of spider mites.
- Chemical control of spider mites. Evaluations of new miticide chemistries will be completed.
- Sap beetle control. Innovative methods of introducing chemicals for sap beetle control will be tested.

Other Center News – Christine Manley

GCREC-Dover's Drip Irrigation School held November 13th proved to be very successful with nearly 40 participants attending. We would like to thank the following individuals who made this event a great success: Mitch Flinchum, Univ. of Florida; Eric Simonne, Univ. of Florida; David Studstill, Univ. of Florida; Ron Cohen, SWFWMD; Kenneth Parker, Chemical Dynamics; Jerry Nance, Dow Chemical Corp.; and Eric Waldo, Helena Chemicals.

Dr. Craig Chandler was recently awarded the Classic Award by the Florida Strawberry Grower's Association at their annual awards banquet, "Florida Strawberry Jam 20". With the presentation of this award, which is one of the top honors presented by FGSA, the industry recognized Dr. Chandler's many accomplishments. During his acceptance speech, Dr. Chandler made a point of thanking Jim Sumler, a biological scientist at GCREC-Dover, for all the time and effort he has contributed to the breeding program, as well as his wife, Lynda. *Congratulations, Dr. Chandler!*

California Dreaming…Faculty and staff gave a fond farewell to Dr. Dan Legard of the GCREC-Dover Plant Pathology Program. Dr. Legard will be moving to California and starting a new position with the California Strawberry Commission as their Director of Research and Education. If you wish to contact Dr. Legard, please call Christine at GCREC-Dover. *Good luck and best wishes, Dan!*

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