UF UNIVERSITY of FLORIDA | IFAS EXTENSION

Berry/Vegetable Times

December 2009

Calendar of Events

Jan. 12, 2010 Pesticide License Testing. Hillsborough County Extension Office, Seffner. 9 am. For more information call Dave Palmer at 813-744-5519 ext. 107.

Jan. 22-23, 2010 Agritunity, Sumter County Fairgrounds. For more information go to http://sumter.ifas.ufl.edu/Agritunity/index.htm.

Feb. 17, 2010 2010 Strawberry Field Tour and Education Program, GCREC. For updates go to http://www.strawberry.ifas.ufl.edu/.

June 6-8, 2010 Florida State Horticultural Society Annual Meeting, Plantation Inn, Crystal River, Fl. For more information visit: http://fshs.org.

July 31 and Aug. 1, 2010 Florida Small Farms and Alternative Enterprises, Osceola Heritage Park Conference Center, Kissimmee. For more information visit: http://smallfarms.ifas.ufl.edu/.

A University of Florida/IFAS and Florida Cooperative Extension Service Newsletter
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From Your Agent

Changes and Loose Ends to Tie Up for 2009

Change is inevitable even though we usually resist it for as long as we can. This goes for this newsletter too. Due to UF budget issues we can no longer send out by bulk mail a paper copy. This is our first e-mail only version. Thank you to those that were receiving the paper copy that contacted us and gave an e-mail address so that you could continue to receive the Berry/Vegetable Times and not miss an issue. If you know of someone that would like to receive the newsletter have them get in touch with me and we will get their e-mail address on our list.

This brings up another issue of getting in touch with you between newsletter issues which is another change we

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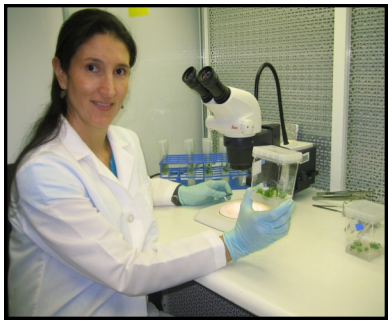
Breeding Update: Progress in Tissue Culture

Vance M. Whitaker, Assistant Professor of Horticulture
GCREC

The Florida Strawberry Growers Association is currently funding a tissue culture specialist for the UF strawberry breeding program. We are grateful for this investment, which has since allowed us to establish a productive tissue culture program.



In early 2008, Catalina Moyer became our tissue culture specialist after graduating with a Masters of Science degree in plant pathology under the direction of Dr. Natalia Peres. The main purpose of her work is to promote faster release of virus and disease-free material of

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need to make for the coming year. Occasionally we have meetings or important issues that come up in a short timeframe and I need to get the word out to everyone. I feel this is an area we have not worried about in the past but is becoming very important. For a few of you I have a fax number but for most I have no quick way to get information to you. We need to develop a quick and reliable way that I can get the word out to you when we can not wait for the next edition of the newsletter. It has been mentioned that a text message to your phone would be a fast way to get the word out. I would like to know what you think. Would you prefer to receive a fax, a text message on your phone or an e-mail? Please get in touch with me and let me know which way works for you and also give me the phone number (all ten digits) and the carrier service you use, a fax number or e-mail address.

As far as loose ends to take care of, be sure that as you hire new workers through the season that you always give them WPS training before the sixth day of work and that if you do not give them the training before they start in the field that you give them verbally some information on where and how they may contact pesticides and how to prevent that and where the decontamination site is. Also be sure that you keep current your pesticide spray records at the central posting site. Be sure all posters are easy to read and not faded. Part of WPS training is instructing workers on hand washing but that is also extremely important for food safety. It would be a good idea to regular remind workers about proper hand washing. Emphasizing this and documenting it could go into your third party audit paperwork as well as in WPS training records.

If you would like to keep track of the weather predictions, chilling hour accumulation, monthly climate summaries, the Strawberry Disease Forecasting Tool, and other interesting weather information go to www.AgroClimate.org.

I hope everyone has a great holiday season and a very profitable New Year!!!

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advanced strawberry selections. As soon as a selection shows promise in the first replicated trial, she isolates meristems and places them in tissue culture. After the plantlets have grown sufficiently, ELISA virus testing is performed to ensure cleanliness of the stock. The clean cultures are then sent to our collaborator Becky Hughes at the University of Guelph, Ontario. Becky is in a strawberry free area with a cool climate, which allows her to produce clean and vigorous plug plants. The plug plants are then available to foundation nurseries.

Only a few advanced selections are retained throughout the whole evaluation process. However, for the advanced selections that become new cultivars, performing tissue culture at an early stage hastens the cultivar release process as much as 2 years compared to previous methods. Another benefit to this approach is that we will have virus-free material of advanced selections to test in the field prior to release.

To date, Catalina has placed 25 advanced selections and 3 cultivars in tissue culture and has tested for major viruses. For some selections she has performed heat treatment to eliminate virus infections. Our most promising new selection, 05-107, has been tissue cultured and tested to detect viruses and will be sent to Becky Hughes this winter. Catalina will continue to tissue culture advanced selections identified in this season's

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trials. Other important functions of her job are to process permits for shipping plant material, to fingerprint cultivars using DNA techniques, and to assist with planting, harvesting, and grading fruit during the busiest weeks of production.

Our current goal is to reach new levels of efficiency. Catalina will be investigating ways to reduce contamination in the cultures. She is also manipulating hormone levels and other factors to increase the percentage of meristems that produce viable plantlets. This season Catalina will conduct a survey of strawberry necrotic shock virus (formerly tobacco streak virus) in growers' fields and at the GCREC. This research was prompted by the recent discovery of SNSV infected 'Florida Radiance' plants at a foundation nursery. The study will seek to determine the incidence of this virus among several varieties grown in Florida and whether infection is initiated in the nursery and/or fruiting fields.

The work performed by Catalina is vital to success of the Florida strawberry industry. We are fortunate to have her involved and we anticipate more good things to come!

Rimon Insecticide for Sap Beetles Expected again in 2010

James F. Price, Associate Professor of Entomology, GCREC

Rimon 0.83EC novaluron was available to strawberry farmers during 2009 production season through an EPA time-limited exemption to control sap beetles. Rimon proved to be very useful in controlling sap beetle larvae on strawberry farms during its first commercial use last spring.

That exemption expires in December 2009. However, a second petition was submitted this fall through the continued cooperation of Florida Fruit and Vegetable Association, Florida Strawberry Growers Association, Chemtura Corp., and the University of Florida. The petition has successfully passed the review of Florida Department of Agriculture and Consumer Services in Tallahassee and has been sent to the US Environmental Protection Agency for evaluation and approval.

There seem to be no red flags relative to the approval of Rimon once again. We expect the material to be permitted and available for managing the 2010 sap beetle threat. However, strawberry growers must remain in contact with county extension offices and the pesticide industry to know when the approvals have been finalized.

Spotted Wing Drosophila Update

James F. Price, Associate Professor and Curtis A. Nagle, Biological Scientist, GCREC

Florida Department of Agriculture and Consumer Services fruit fly trappers continue to discover low densities of spotted wing drosophila in northeast Hillsborough County. However no new discoveries have been made outside of that general area.

Experiences in Japan and California suggest that the cool weather we expect and the presence of sweet, ripe, thin-skinned strawberries now in fields will be factors in an expansion of this insect's range soon. Growers must remain aware of the spotted wing drosophila and be prepared to protect their crops.

On Page 4 is a list of insecticides available to Florida strawberry growers to control drosophila flies. Other management

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considerations exist and are enumerated along with important scouting, identification, ecological, etc. information, in the September 2009 issue of this newsletter http://strawberry.ifas.ufl.edu/BVT0909.pdf .
It would be wise for pest managers to review that article as the period of expected threat in strawberry crops approaches.

Table 1. Insecticides available in Florida for management of *Drosophila* spp. flies on strawberries.

Active Ingredient	Trade Name	REI[1]	PHI[2]	Mode of Action Code[3]
Diazinon	Diazinon	24 hours	5 days	1B
Malathion	Malathion	12 hours	3 days	1B
Pyrethrins	Pyganic	12 hours	0 days	3A
Pyrethrins / Piperonyl butoxide	Pyrenone	12 hours	0 days	3A / no code

[1]Re-entry interval that must elapse between application of the indicated insecticide and entry of any persons into the treated area.
[2]Pre-harvest interval that must elapse between the application of indicated insecticide and harvest of the crop.
[3]For management of spotted wing drosophila (SWD) resistance to insecticides, growers should use products from one mode of action group during the period of one SWD lifecycle then rotate to another mode of action for a similar period.

CSI: Plant City

Asha M. Brunings, Horticulture Grad Assistant and Kevin M. Folta, Associate Professor of Horticulture, GNV

It is December. The strawberry plants are now firmly in place and planning for a productive winter production season. The cultivars planted in Florida are chosen for their familiar qualities. We know from experience when they will flower, how much they will produce, and when harvest can be anticipated. Now, imagine the nightmare of looking out into a field of strawberry plants only to find that they are not flowering on time. What if they never flower at all? Situations like this have been anecdotally reported, representing cases where the cultivar planted was not the one intended. The potential for mix-ups between these very similar-looking plants is always a concern, albeit a minor one. While it is unlikely to happen, if it happens in your field or greenhouse it is no small matter.

The strawberry plants for the season are produced by vegetative propagation of daughter plants from runners. Stray runners can travel for meters, taking root in neighboring pots or field rows. Tremendous efforts ensure that such events do not occur, but it is always possible, and not easy to detect. In addition, human error can lead to mis-labeling of cultivars. Individual cultivars may also appear different depending on the climate, geography, and nutrition status. As a result it is often impossible to faithfully tell different strawberry cultivars apart, especially when the

plants are still young. ***Can we turn to the methods of modern forensic science to provide a 100% accurate means to identify strawberry cultivars?***

Fingerprints provide a tool to tell two people apart with great confidence. Recent technologies permit incontrovertible identification of individuals based on differences in DNA. These DNA "fingerprints" allow forensic researchers to identify an individual with a certainty approaching one in ten billion. UF-IFAS researchers have adopted the same technology to analyze popular Florida strawberry cultivars, providing a new set of tools to verify their authenticity.

The IFAS Dean for Research Office has sponsored an effort to fingerprint major Florida strawberry genotypes. The work was performed by Drs. Asha Brunings and Kevin Folta (UF-Gainesville) and Dr. Natalia Peres and Catalina Moyer at the GCREC. What they devised is reminiscent of an episode of CSI on television. The scene is a familiar one. The lab technician looks at a transparent sheet with a series a cryptic black lines on it and declares: "This is from the blood sample at the scene of the crime". Then the tech places an identical looking sheet next to it and says: "This is from your prime suspect-- A perfect match." The same kind of technology can now be extended to strawberry plants.

An example is shown in the accompanying figure, which shows part of a DNA fingerprint from three familiar Florida cultivars: Earlibrite, Strawberry Festival, and Sweet Charlie. In this process discrete regions of DNA are amplified producing millions of DNA fragments. The fragments sort into 4-10 unique sizes that vary between cultivars. The different sizes can be detected and displayed graphically, as in the figure. Each cultivar produces different sizes of DNA fragments (represented as horizontal lines in the figure). The combined pattern formed by the lines constitutes the DNA fingerprint. Since commercially available

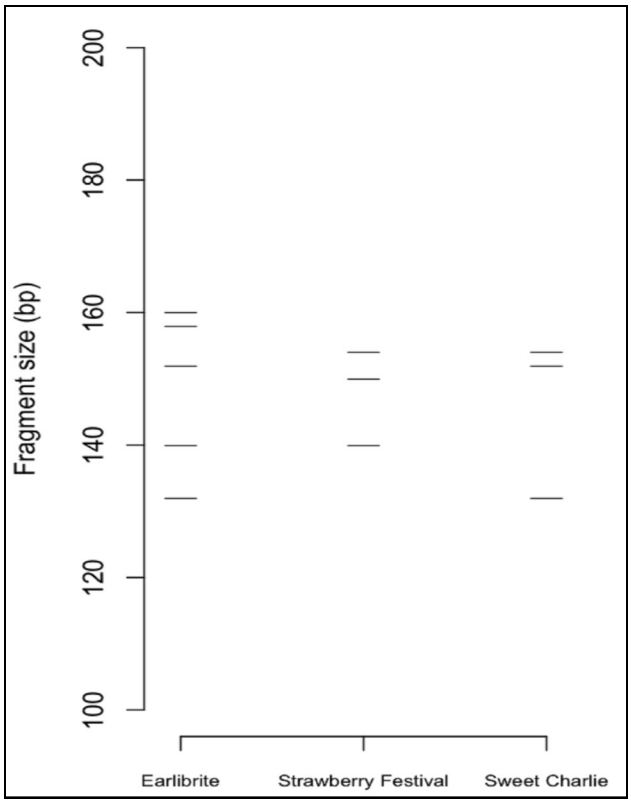

Figure 1. A simple fingerprint pattern for 3 Florida strawberry cultivars. Each horizontal line represents a different DNA fragment amplified from the cultivar shown. The different patterns for each cultivar make it easy to tell the cultivars apart.

strawberries are vegetatively propagated, the fingerprint pattern is stable for every cultivar.

What makes this technique very powerful is that there are many independent ways to generate the set of DNA fragments that make up the fingerprint. The intricate snowflake-like pattern obtained by using multiple fingerprints allows the technician to easily discern different cultivars from each other with great certainty. The commercial strawberry has a very complex genome, so there is considerable variation from one cultivar to the next. This methodology therefore makes it easy to distinguish between a parent and its offspring, or even siblings and other closely related cultivars. Although the method requires

certain equipment and expertise, it is relatively quick and inexpensive, especially when compared to the potential losses in the case of mis-represented cultivars. The pattern of any unknown or questionable strawberry plant can be compared to the known patterns of cultivars to pinpoint its identity.

In this way the same tools that can distinguish a criminal from an innocent suspect in a court of law can be used to identify one cultivar from another with great confidence. Also, the DNA fingerprint does not change with seasons or plant size, so where physical descriptors break down, DNA-based identifiers remain robust. These valuable new tools are now in use by the University of Florida strawberry team and can be used to validate the identity of cultivars relevant to the Florida strawberry industry. These DNA-based identifiers also can verify crosses in the breeding program, facilitate future breeding strategies, and even help answer questions of cultivar distribution.

2009 Florida Ag Expo Recap

This past October Gulf Coast Research and Education Center held the 4th Florida Ag Expo in Balm and welcomed over 800 participants to take part in 18 different educational sessions and field tours. More than 40 vendors were available to share updated information on new products and equipment for growers. A special premium-content sponsorship provided by DuPont will provide extended coverage of the Florida Ag Expo for the next six months in *Florida Grower* magazine. Each month the magazine will feature an in-depth article on one of the educational presentations. In addition, video presentations are of the sessions are available at FloridaGrower.net. Watch for upcoming information and the date of the 2010 Expo.

FLORIDA AG EXPO

Results of Cantaloupe Powdery Mildew Trials Spring 2009

Gary E. Vallad, Assistant Professor of Plant Pathology
Gulf Coast REC

In the spring of 2009, two cantaloupe trials were established with the goal of evaluating various products for the management of powdery mildew, caused by *Sphaerotheca fuliginea* and *Erysiphe cichoracearum,* a disease favored by the cooler, dryer conditions common during the spring. The first trial was established on March 6th to evaluate the integrated use of biopesticides with conventional fungicides for powdery mildew management. While the second trial, established March 25th, was designed to evaluate conventional fungicides alone.

Trials were conducted at the University of Florida's Gulf Coast Research and Education Center in Balm, FL, double-cropped on beds previously used for strawberry production. Plots consisted of 8 ft bed sections along 300 ft, raised beds with 4 ft center-to-center bed spacing. Beds were covered with black virtually impermeable mulch and irrigated with a drip system. Seeds of the cantaloupe cultivar Hale's Best were directly seeded at 30" spacing along beds skipping a 6 ft section between plots and every third bed as a buffer. Fungicide treatments were applied to the first trial on 9-Apr, 16-Apr, 23-Apr, 30-Apr, 7-May, 14-May, and 2-Jun; and to the second trial on 28 -Apr, 5-May, 12-May, and 1-Jun using a CO_2 back pack sprayer calibrated to deliver 40 to 100 gal/A at 40 psi. In both trials, a non-treated control was included to measure disease pressure and arranged with the other treatments in a randomized complete block design with each treatment repeated 4 times. Treatments were applied prior to the establishment of powdery mildew. Plots were monitored regularly for powdery mildew, and rated 13 May and 28 May in the first trial and 14 May and 28 May in the second trial after disease reached acceptable levels across trials. Alternating applications of the downy mildew specific products Previcur Flex (1.2 pt/A) and Curzate 60DF (3.2 oz/A) were used to minimize the impact of downy mildew, which was critical when conducive conditions occurred in the latter half of May. Marketable yield was assessed from two separate harvests of plots on 28 May and 3 June in the first trial. Whereas, conditions were so favorable for downy mildew in the latter half of May, the second trial was terminated prematurely with only a single harvest of all fruit on 9 June to avoid complications.

Environmental conditions during the beginning of trials were unusually dry. Only 1.23 and 1.34 inches of rain were recorded for the months of March and April, while 10.86 inches was recorded for the month of May. Symptoms of powdery mildew were first observed in control plots on 30-Apr (trial 1) and 5-May (trial 2). Due to the susceptible nature of the cultivar, disease developed rapidly, but a bit later than expected.

Results of Trial 1

The severity of powdery mildew on 13 May, 78 days after planting (DAP), ranged from 0 to 62.5% among plots. By 28 May, 93 DAP, disease severity values increased, ranging from 18.5 to 95.5% among plots. Significant differences were detected among treatments on both dates (Table 1).

Based on disease severity on 28 May, treatments fell into 3 groups. With weekly applications of HMO 736, Companion, Actinovate, BU EXP 1216 (both S & C formulations), and Regalia forming the first group with final disease severity values ranging from 67 to 86%. Biweekly applications of Procure (the standard fungicide) alone, weekly applications of KFD 61-04 (2.3 lb rate) alone, Actinovate alternated

with Procure, and both BU EXP 1216 formulations alternated with Procure made up the second group with final disease severity ranging from 44 to 56% on 28-May. The final group was composed of Regalia, Companion, and HMO 736 rotated with Procure, and weekly applications of the remaining KFD experimental formulations (70-01 at 2.5 and 5 lb rates & 61-04 at the 4.6 lb rate) with final disease severity ranging from 23 to 38% on 28-May. The effectiveness of all biopesticides was improved by alternating with Procure. More importantly, alternating applications of Regalia, Companion, and HMO 736 improved the activity of Procure alone based on the final disease severity rating on 28-May.

Total number of marketable fruit and total weight was collected for the trial (Table 1). Significant differences were detected for both parameters on the second harvest, 3-Jun. When data from both harvest dates were combined, only differences in the total number of marketable fruit were significant, differences in average fruit weight were not significant either (Table 2). The KFD experimental compounds exhibited the best overall disease control, but this did not always translate into improved yields; probably due to the minor-moderate levels of phytotoxicity observed in the field. However, the low rates of KFD 61-04 and KFD 70-01 gave exceptional yields and disease control. Otherwise, Companion alternated with Procure yielded the most fruit per plot among the biopesticide treatments, better statistically than Companion alone but not Procure alone. All the biopesticides typically yielded better in regards to the fresh weight and number of fruit when alternated with Procure, but this trend was usually not significant.

Results of Trial 2

The severity of powdery mildew on 14 May, 51 DAP, ranged from 0 and 18.0% across plots. By 28 May, 65 DAP, disease severity values increased, ranging from 9.0 and 98.5% across plots. Significant differences were detected among treatments on both dates (Table 2).

Based on disease severity on 28 May, all treatments significantly reduced the severity of powdery mildew relative to the non-treated control (Table 2). Treatments fell essentially into 3 groups of efficacy, with treatments1, 2, 5, and 10 conferring the best control. Treatments 3, 4 and 11 gave intermediate control, and treatments 6, 7, 8, and 9 gave the lowest levels of control. In general, spray programs that included Quintec (quinoxyfen) typically gave the best level of powdery mildew control. While all the standard treatments conferred significant protection against powdery mildew, the difference in efficacy between the two Rally-Quintec treatments (Trts 3 and 11) was surprising, and probably reflects the varying levels of disease throughout the trial than a true rate effect. The plant defense elicitor, Actigard (Trt 8), did not improve the level of disease control over Bravo Weather Stik alone (Trt 6)

Total number of marketable fruit and total weight was collected for the trial (Table 2). Significant differences were detected for both parameters. Average fruit weight was calculated from total fruit number and total weight, but differences were not significant (Table 1). All treatments, except 6, 7 & 8 statistically out yielded the untreated control based on weight. Treatments 3, 5 and 9 yielded the highest number and total weight of marketable fruit in the trial (Table 1). Treatments 9 and 10 with EXPT 1 exhibited some minor phytotoxicity (a mild chlorosis) that was more prevalent at the beginning of the trial, but did not appear to impact plant production based on yields.

(Tables 1 and 2 on Pages 8 and 9.)

Table 1. FIELD TRIAL 1: Effect of fungicides and biopesticides on cantaloupe yields and the severity of powdery mildew.

Treatment, rate/A (application)[x]	Marketable fruit yields Total no. (no./trt)	3-Jun wt. (lbs/trt)	Total wt. (lbs/trt)	Avg. size (lbs/fruit)	Disease Severity[z] 13-May	28-May
Non-treated Control	10 c[y]	11.6 e	30.1	3.1	56.3 c	93.3 g
Procure, 8 oz (2,4,6)	17 abc	25.6 a-e	49.3	3.2	1.5 a	56.3 d
Regalia, 1% (v/v) (1-7)	14 bc	18.5 b-e	40.9	2.9	3.0 a	86.3 fg
Actinovate, 3 oz (1-7)	12 bc	17.6 c-e	36.5	3.1	5.6 a	81.5 fg
HMO 736, 14 oz (1-7)	10 c	16.4 de	29.8	3.1	23.3 b	72.0 ef
Companion, 32 floz (1-7)	14 bc	20.0 b-e	40.8	3.0	16.1 b	67.3 e
Regalia, 1% (v/v) (1,3,5,7); Procure, 8 oz (2,4,6)	18 abc	32.7 ab	51.4	3.0	1.1 a	37.5 bc
Actinovate, 3 oz (1,3,5,7); Procure, 8 oz (2,4,6)	14 bc	17.8 c-e	41.4	3.3	2.3 a	50.0 cd
HMO 736, 14 oz (1,3,5,7); Procure, 8 oz (2,4,6)	17 abc	30.2 a-d	48.8	2.9	1.5 a	32.8 ab
Companion, 32 floz (1,3,5,7); Procure, 8 oz (2,4,6)	20 ab	29.2 a-d	55.8	2.8	1.1 a	37.5 bc
BU EXP 1216S, 3 lb (1-7)	13 bc	17.0 c-e	39.0	3.0	6.0 a	76.8 e-g
BU EXP 1216c, 3 lb (1-7)	15 abc	24.6 a-e	45.0	3.1	2.3 a	79.1 fg
BU EXP 1216S, 3 lb (1,3,5,7); Procure, 8 oz (2,4,6)	18 abc	25.6 a-e	48.8	2.9	0.8 a	56.3 d
BU EXP 1216c, 3 lb (1,3,5,7); Procure, 8 oz (2,4,6)	19 ab	30.9 a-c	54.9	2.7	1.1 a	43.8 b-d
KFD 61-04, 2.3 lb (1-7)	23 a	35.8 a	54.3	2.4	1.5 a	56.3 d
KFD 61-04, 4.6 lb (1-7)	17 abc	32.9 ab	47.3	2.8	1.5 a	28.0 ab
KFD 70-01, 2.5 lb (1-7)	20 ab	38.2 a	56.2	2.9	1.5 a	32.8 ab
KFD 70-01, 5.0 lb (1-7)	13 bc	25.2 a-e	38.8	2.9	1.5 a	23.3 a
P > F	*0.0435*	*0.0509*	*0.1414*	*0.6553*	*< 0.0001*	*< 0.0001*

[x] Treatments (TRT) were applied 9-Apr, 16-Apr, 23-Apr, 30-Apr, 7-May, 14-May, and 2-Jun corresponding with applications 1 to 7, using a backpack sprayer calibrated initially for 40, 60 and then 100 gallons per acre after 30-Apr. Listed treatment rates are on a per acre basis unless noted otherwise. Seeds were sown 6-Mar.

[y] Values followed by the same letter are not statistically significant ($P = 0.05$).

[z] The severity of powdery mildew was assessed as the percentage of canopy affected. The Horsfall-Barratt scale was used for all ratings, but values were converted to mid-percentages prior to statistical analyses.

Muskmelon (*Cucumis melo*) is a species of melon that has been developed into many cultivated varieties. These include different netted cultivars such as cantaloupe, persian melon and santa claus or christmas melon. The large number of cultivars in this species approaches that found in wild cabbage, though morphological variation is not as extensive. It is an accessory fruit of a type that botanists call an epigynous berry. Muskmelon is native to northwestern India, where it spread to China and Europe via the Persian Empire.

Table 2. FIELD TRIAL 2: Effect of fungicides on the severity of powdery mildew and cantaloupe yields.

TRT	Treatment, rate/acre (application)[x]	Disease Severity[z] 14-May	28-May	Marketable fruit yields No. Fruit	Weight (lbs)	Fruit size (lbs)
1	Lem17 SC, 16 floz (1-4)	1.1 a[y]	16.1 a	15 ab	37.5 ab	2.5
2	Lem17 SC, 16 floz (1,3); Quintec, 4 floz (2,4)	0 a	16.1 a	15 ab	39.7 a	2.8
3	Rally 40W, 5 oz (1,3); Lem17 SC, 16 floz (2,4)	0 a	50.0 c	18 a	44.4 a	2.5
4	Lem17 SC, 16 floz (1-4); Bravo Weather Stik, 2 pt (1-4)	0 a	43.8 c	14 ab	36.3 ab	2.7
5	Rally 40W, 5 oz (1,3); Quintec, 4 floz (2,4)	0 a	28.0 b	18 a	44.9 a	2.6
6	Bravo Weather Stik, 3 pt (1-4)	1.9 a	76.8 e	8 b	18.2 c	2.3
7	Bravo Weather Stik, 1.5 pt (1,3); Lem17 SC, 16 floz (2,4); Bravo Weather Stik, 1 pt (2,4);	1.1 a	83.9 e	11 ab	29.3 bc	2.6
8	Bravo Weather Stik, 2 pt (1-4); Actigard 50 WG, 0.33 oz (1,2), 0.50 oz (3), 0.75 oz (4)	0.8 a	72.0 de	9 ab	21.8 bc	2.3
9	EXPT 1, 3.4 floz (1,3); Procure 480SC, 6 oz (2,4); Induce, 0.25% (v/v) (1,3)	0 a	62.5 d	18 a	44.8 a	2.6
10	EXPT 1, 1.7 floz (1,3); Procure 480SC, 4 oz (1,3); Quintec, 6 floz (2,4); Induce, 0.25% (v/v) (1,3)	0 a	23.3 ab	16 a	36.6 ab	2.4
11	Rally 40W, 4 oz (1,3); Quintec, 6 floz (2,4)	0.4 a	43.8 c	17 a	36.6 ab	2.2
12	Non-treated Control	9.1 b	96.3 f	8 b	17.6 c	2.3
	P > F	*0.0002*	*< 0.0001*	*0.0016*	*0.0005*	*0.3155*

[y] Treatments (TRT) were applied 28-Apr, 5-May, 12-May, and 1-Jun corresponding with applications 1 to 4, using a backpack sprayer calibrated initially for 40, 60 and then 100 gallons per acre. Listed treatment rates are on a per acre basis unless noted otherwise. Seeds were planted 25-Mar.

[y] Values followed by the same letter are not statistically significant ($P = 0.05$).

[z] The severity of powdery mildew was assessed as the percentage of canopy affected. The Horsfall-Barratt scale was used for all ratings, but values were converted to mid-percentages prior to statistical analyses.

Powdery mildew, caused by Sphaerotheca fuliginea and Erysiphe cichoracearum, a disease favored by the cooler, dryer conditions common during the spring.

Please remember…

The use of trade names in this publication is solely for the purpose of providing specific information. It is not a guarantee or warranty of the products named and does not signify that they are approved to the exclusion of others of suitable composition. Use pesticides safely. Read and follow directions on the manufacturer's label.

Managing Yellow and Purple Nutsedge in Florida Strawberry Fields

Andrew W. MacRae, Assistant Professor
Weed Science, Gulf Coast REC

As we continue our transition to methyl bromide alternatives we will continue to see an increase in weed problems in our strawberry fields. Two of the more troublesome weeds we expect to encounter will be yellow and purple nutsedge (Figure 1). These weeds are perennial weeds that spread via underground roots called rhizomes and vegetatively produced structures called tubers. These tubers are produced in chains along the rhizomes and can remain dormant in the soil for several years. Yellow nutsedge produces fewer but larger tubers than purple nutsedge. When we fumigate we target these dormant tubers to maximize the control of nutsedge. Nutsedge is well adapted to grow in our plasticulture production systems. It is able to penetrate the majority of commercially used plastic mulches and produces large numbers of tubers by stealing the water and fertilizer intended for our strawberry plants.

Figure 1. Purple nutsedge in strawberry field.

It is important keep any nutsedge population as small as possible, even to the point of having a zero tolerance policy on any infestation. The grower should focus on year round control to prevent a wide scale establishment of this weed. This will involve selecting and applying correctly a good fumigant system, spot spraying of nutsedge, post harvest herbicide and/or fumigant applications, and fallow period tillage/herbicide/cover crop programs.

Fumigation

For any areas of your field that have had nutsedge problems in the past it is important that you use a full fumigant system. Fumigant systems consisting of only 1,3-dichloropropene and/or chloropicrin will not provide satisfactory control of nutsedge. In long term testing conducted in Georgia the use of these systems actually increased the amount of nutsedge present in the field after four years of use. These systems may include a combination of Telone II and 100% chloropicrin or may come as pre-mix such as products like Telone C35 and PicClor 60. Methyl Bromide 50:50 will provide good control of nutsedge while Midas 50:50 will provide good to excellent control and the soon to be registered product Paladin Pic will provide excellent control. The use of the 3-WAY system consisting of Telone II plus chloropicrin plus KPam or Vapam will also provide good to excellent control. When using KPam or Vapam a minicoulter rig will give the best control of nutsedge; however if using drip applications good control can be achieved provided the grower uses two drip tapes to maximize coverage of the bed.

Yellow and purple nutsedge will be a major factor in future fumigation decisions. Preventing this weed from getting a foothold may allow a strawberry grower to use a reduced fumigant system provided they are willing to spend the time to remove any nutsedge escapes from their production fields.

In Crop

If you have nutsedge emerging through your plastic mulch it is important to spot spray a glyphosate product (Roundup, Touchdown, Glyfos Xtra, etc.) to not only kill the top growth but to also kill the tubers the plant is producing. Hand pulling will only result in removing the top growth and repeat pulling may take all season before exhausting the root reserves of an established plant.

Post Harvest

At the end of the growing season either an application of a fumigant in the drip tape or a post emergence application of a glyphosate product will be needed reduce the population of nutsedge tubers present in the soil. The use of a fumigant can also help in reducing disease and nematode populations.

Fallow Period

Maintaining control of nutsedge will require an active management plan. The key is to break the chain of nuts to maximize nutsedge emergence at a time that you can apply control measures. An example would be to use tillage to break the chain and then following that with an application of glyphosate after the nutsedge shoots have emerged. After you have knocked down the population of nutsedge, then seed a cover crop that will form a crop canopy quickly, preventing further emergence of the nutsedge. Broadleaf cover crops tend to develop thicker crop canopies and are more suitable to limited light from penetrating to the soil surface.

Figure 2. Purple nutsedge infestation starting from the edge of the field.

Initial infestation of nutsedge will be noticed coming from the edges of the field (Figure 2) and may get a foothold at the end of the rows where the fumigant has not been properly applied. It will be important to maintain good weed management practices around the edges of the field for not only nutsedges but all weeds. A little bit of time spent from now on can help reduce the possibility of a nutsedge population increasing to the point where a full fumigant system will be required to keep the nutsedge population below damaging levels.

Pesticide Registrations and Actions

- Based on a request by IR-4 and Syngenta, the EPA has approved tolerances for the insecticide thiamethoxam (Actara®). Tolerances of importance to Florida include bushberry (blueberry), canistel, small climbing fruit (except fuzzy kiwi fruit), mango papaya, rice, sapodilla, black sapote, mamey sapote, star apple, and root vegetables (subgroup 1A). (Federal Register, 9/30/09).
- On October 5, the Florida Department of Agriculture and Consumer Services accepted EUP submitted by Pasteuria Bioscience, Inc., which allows the use of the nematicidal active ingredient *Pasteuria usgae* on strawberry and turf to evaluate control of sting nematode. (FDACS letter, 10/5/09).

New, web-based tool to aid disease control available for strawberry growers

Natalia Peres, Assistant Professor Plant Pathology GCREC; Clyde Fraisse, Assistant Professor Biological Engineering GNV; and Willingthon Pavan, Assistant Research Scientist Biological Engineering GNV

A new, web-based tool to help growers to time their fungicide applications is now available. The web decision support system can be accessed at http://agroclimate.org/tools/strawberry/. The system gives information on the current risk level for the two most important fruit rot diseases in Florida, Botrytis (or gray mold) and anthracnose, and makes recommendations on the timing of fungicide applications for control of those diseases.

The disease models that were used to develop the web-based system have been tested in field research trials for the past four seasons. In most cases, the number of fungicide applications was reduced to about half compared to the currently preventive spray program without any significant loss of disease control or yield. Thus, the use of the system can significantly help growers to reduce the number of sprays and the cost of production, especially in years when the conditions for disease are not favorable.

When growers go to the website, the first page displays a map showing the currently available weather stations in the system. Those are part of the Florida Automated Weather Network (FAWN) and are located at Dover, Balm, Lake Alfred and Arcadia. The stations are displayed with different colors to quickly show the current disease risk level (green: no risk, yellow: moderate risk or red: high risk). By passing the mouse over the stations, the user can check which specific diseases are affecting that area.

When conditions for disease are moderate or high, users can click on the station symbol and then on the link to check for a more specific spray recommendation. A few questions about previous fungicide applications and the stage of crop development will then need to be answered. Once the responses are entered, the system applies the rules and gives a spray recommendation for each disease, including a list of possible products to use.

A 'Disease simulation' tab presents the outputs for disease risk levels throughout the season as well as the forecast for the next 3 days in graphic and table formats. A display of weather data observed during the last 48 hours and forecast for the next 24-hours (provided by the National Weather Service) can also be found under the 'Weather' tab.

E-mail and cell phone text messages (SMS) are also available during the season for growers who register for those options. This service is automatically activated to send alerts when disease risk reaches moderate or high levels.

We would like to encourage growers to test this system to manage diseases on a small acreage of your farm so that you can gain experience and confidence in this new tool. The system is simple to operate and very user friendly. On a small trial in a commercial strawberry farm last season, the grower saved about 50% on fungicide related costs by using this tool. Overall, the use of the tool will offer growers the same level of disease control with less applications of fungicide but the potential savings will vary according to the weather conditions. Thus, it is possible that fungicide sprays won't be reduced as much in a wetter season under influence of El Niño conditions such as the current one.

Project funds to develop this system were granted by the USDA-RMA (Risk Management Agency). Future grants for enhancing the system that would allow the addition of more weather stations for greater accuracy are being sought.

Finally, if you haven't yet, check it out the tool at http://agroclimate.org/tools/strawberry. If you are interested in receiving E-mail and/or text messages when the anthracnose or Botrytis risk level exceeds the threshold, please contact Dr. Natalia Peres (nperes@ufl.edu), Dr. Clyde Fraisse (cfraisse@ufl.edu) or Dr. Willingthon Pavan (wpavan@ufl.edu).

GCREC FACT SHEET
Crown Rot (Charcoal Rot) of Strawberries
Caused by *Macrophomina phaseolina*

Natalia A. Peres and J.C. Mertely

Introduction

Crown rot of strawberries, also known as charcoal rot, caused by *Macrophomina phaseolina*, is a relatively new disease in Florida. This disease was first observed in December 2001, when collapsed and dying strawberry plants from a commercial field were submitted to our Diagnostic Clinic. During the 2003–2004 season, *M. phaseolina* was isolated from dying strawberry plants taken from the original field and two additional farms. Since then, a few additional samples are received in our Diagnostic Clinic every season. Affected plants are often found along field margins or other areas inadequately fumigated with methyl bromide. Charcoal rot has also been reported on strawberry in France, India, and Illinois.

Causal Agent and Symptoms

Symptoms caused by *Macrophomina phaseolina* are similar to those caused by other crown-rot pathogens such as *Colletotrichum* and *Phytophthora* species. Plants initially show signs of water stress during warmer periods of the year and subsequently collapse (Fig.1). The cut crowns of affected plants reveal reddish-brown necrotic areas on the margins and along the woody vascular ring (Fig.2). The fungus produces tiny black knots of mycelium (sclerotia) that allow it to persist in the soil even when host plants are unavailable, making it an adaptable and persistent soil pathogen. To confirm a diagnosis, a sample must be submitted to a Diagnostic Clinic and the pathogen must be isolated from the diseased crowns and identified.

Disease Development and Spread

Very little is known regarding this disease on strawberries. *M. phaseolina* is a common soilborne pathogen in many warm areas of the world and has a very broad host range. Many vegetable crops planted as second-crops after strawberry such as squash, cantaloupe, and peppers, among others, are susceptible. In addition, legumes planted as summer crops are also susceptible. Those infections may increase inoculum levels of *M. phaseolina* in the soil. In general, high temperatures and low soil moisture favor infection and disease development.

Control

No fungicides are labeled for control of charcoal rot on strawberries. Topsin M® is labeled for application through the drip lines for charcoal rot control on cucurbits. Although Topsin is labeled for foliar application to strawberry, it is not labeled for drip application. Our preliminary results with Topsin M® have shown that injection of this product early in the season when warm weather and transplant stress favor disease may help delay onset of symptoms. Studies are currently being conducted to test this and other chemical and biological products for control and also to determine if cultivars differ in susceptibility to charcoal rot. This disease may be an emerging threat as the Florida strawberry industry transitions from methyl bromide to other fumigants.

Fig.1. (right) Plant wilting symptom of charcoal rot.

Fig.2. (left) Internal crown symptoms of charcoal rot.