



SOUTH FLORIDA VEGETABLE PEST AND DISEASE HOTLINE

October 8, 2018

The past few weeks have been quite a bit drier with a little lower humidity but temperatures remained summer-like with daytime highs in the low to mid 90's and 70's at night. Growers are watching Hurricane Storm Michael, which has formed in the Gulf.

Hot dry conditions are stressing plants causing them to kick off blooms and affect fruit set in some plantings.

FAWN Weather Summary

Date	Air Temp °F		Rainfall (Inches)	Ave Relative Humidity (Percent)	ET (Inches/Day) (Average)
	Min	Max			
Balm					
9/23 -10/8/2018	68.86	94.05	1.45	83	0.14
Belle Glade					
9/23 -10/8/2018	68.22	93.58	0.51	86	0.14
Clewiston					
9/23 -10/8/2018	69.06	93.49	0.18	80	0.15
Ft Lauderdale					
9/23 -10/8/2018	72.05	91.81	1.54	78	0.15
Homestead					
9/23 -10/8/2018	70.02	91.26	1.71	81	0.15
Immokalee					
9/23 -10/8/2018	69.82	95.65	1.50	86	0.14
Okeechobee					
9/23 -10/8/2018	66.29	95.68	2.18	87	0.13
Wellington					
9/23 -10/8/2018	69.57	95.2	1.78	82	0.14

“Remember, when in doubt - scout.”

Crops are looking good for the most part with few issues being reported. Pest and disease pressure remains low. Some isolated hail damage was reported around Immokalee. Growers should start picking in the Manatee Ruskin area in 2-3 weeks.

The National Weather Service forecast through Thursday indicates direct impacts from Hurricane Michael will remain limited across South Florida.

While Michael remains a somewhat east-sided system, its expected track will be just far enough west of the region that the heaviest rainfall will remain offshore. However, we can still expect to see periods of heavy rain as squalls go through. Given the increasing east to east-southeast wind, can't rule out training bands leading to flooding, especially along the east coast. Heavy rainfall that falls on either coast during high tide will be especially problematic as it won't be able to drain. The environment will be favorable for isolated tornadoes starting later today through at least Tuesday night.

Thursday and Friday - Michael is forecast by NHC to get picked up by an approaching trough moving into the eastern US and move quickly north northeast across the Southeastern United States and Mid Atlantic States late week. The approaching upper trough and associated surface boundary will not have enough momentum to clear the state, instead stalling somewhere across Central Florida to end the week. This keeps South Florida on the moist side of the system and weather patterns will return to a diurnal pattern, with scattered to numerous showers and storms both afternoons. The best coverage over the Lake Okeechobee and northeastern areas.

Models show the trailing trough and moisture behind Michael lingering across the peninsula into the upcoming weekend allowing for a continued pattern of scattered showers and storms, highest during the afternoons. Prevailing southwesterly flow will favor the east coast and Lake Okeechobee region for the highest rainfall coverage.

For additional information, visit the National Weather Service in Miami website at <http://www.srh.noaa.gov/mfl/newpage/index.html>

Tropical Storm Michael strengthened to become Hurricane Michael on Monday. Michael is headed for western Florida and southern Georgia. Michael is currently off the western coast of Cuba and headed directly to growing areas of Quincy, Florida, Bainbridge, Moultrie and Quitman, Georgia.

These locations are fall growing regions for tomatoes, cucumbers, bell peppers, squash, eggplant and green beans. We would expect to see production out of these regions for the months of October and November.

The National Hurricane Center is predicting that Michael might become a category 3 hurricane by the time it makes landfall sometime Wednesday. The NHC is predicting 6+" of rain in these regions.

Please visit the National Hurricane Center website for more details. <http://www.nhc.noaa.gov>

Insects

Whiteflies

Around SW Florida, whiteflies remain mostly low but are starting to pick-up on tomatoes and eggplants in several locations around Immokalee.

Growers and scouts in the Manatee/Hillsborough are reporting mostly low whitefly pressure in tomato with some increase in pressure being noted in some places. Higher numbers are present in eggplant. Growers are also reporting finding whiteflies in cukes, squash, melons and cantaloupe. Several growers note that reflective mulches appear to be doing a good job in keeping whiteflies at bay.

Respondents on the East Coast indicate that a few whiteflies are starting to show up in some eggplants. Whitefly numbers are also starting to build in squash with all stages present.

Around Homestead, whiteflies are present on various ornamental and specialty crop vegetable plants (okra, eggplants, beans, cucurbits, etc.). Growers should be aware that these whiteflies are posed to move to new vegetable plantings. Growers may want to consider reflective plastic mulches, which can significantly delay whitefly infestations on new plantings. Reflective mulch with black background is more effective than the one with white background in reducing insect pests.

Reports from Northern Florida mention increasing whitefly pressure and note that numbers are getting high enough to be concerning.

While populations remain low, they can build up quickly, so growers should scout regularly to avoid being taken unawares later in the season. Preventative soil applications of either imidacloprid, thiamethoxam, dinotefuran, flupyradifurone or cyantraniliprole should be used as normal in tomato and cucurbits.

Consider the use of metalized (UV reflective) mulch as an additional management practice for day-flying pests such as whiteflies, thrips, aphids, pepper weevil and even broad mites, which use flying insects to move around.

Table 1; Systemic insecticides applied to soil for whitefly control

Common name	Mode of Action	Trade Names	Rates
Imidacloprid	4A	Various	Check Label
Thiamethoxam	4A	Platinum 75 SG	1.66 - 3.67
	4A	Venom 70% Scorpion 35 SL Certador 10%	5 - 7.5 oz./ac 9 - 1 0.5 fl oz./ac 32.5 - 47.5 fl oz./ac
Flurpyradifuron	4D	Sivanto 200 SL	21-28 fl oz./ac
Verimark	28	Verimark 18.7%	5-10 fl oz./ac

Efficacy Ratings for Insecticides and Miticides on Tomato

MOA	Active Ingredient	Whiteflies	Other pests controlled			
		Whiteflies	Southern Armyworm	Spider mites	Stinkbugs	Leafminer
4A	dinotefuran	E**			G	
4A	imidacloprid	E**				
4A	thiamethoxam	E**			G	
4D	flupyradifurone	E**				
23	spiromesifen	E†		E		

Efficacy Ratings for Insecticides and Miticides on Tomato						
		Whiteflies	Other pests controlled			
MOA	Active Ingredient	Whiteflies	Southern Armyworm	Spider mites	Stinkbugs	Leafminer
28	cyantraniliprole	E**	E			E
1B	malathion	G*				
3A	beta-cyfluthrin	G*	F		G	
3A	bifenthrin	G*			G	
3A	esfenvalerate	G*	G			
3A	fenpropathrin	G*	F		F	
3A	lambda cyhalothrin	G*	F			
3A	permethrin	G*	G			
3A	zeta-cypermethrin	G*	G		F	
4A	acetamiprid	G				
9	pymetrozine	G†				
16	buprofezin	G†				
21 A	fenpyroximate	G		G		
4A	clothianidin	F**				
Unk.	horticultural oil	F†		G		
Unk.	Azadiractin	F†				
Unk.	Soap, insecticidal	F†				

* OP+Pyrethroids tank mix. † Effective primarily against nymphs ** Most Effective as a drench. Check labels before using any pesticide.

For more whitefly management tips – see:

Management of Whiteflies, Whitefly-Vectored Plant Virus, and Insecticide Resistance for Vegetable Production in Southern Florida - <http://edis.ifas.ufl.edu/in695>

Worms

Growers and scouts around the Manatee Ruskin area, report that armyworms have been oddly absent this fall. Pressure from loopers and fruitworms has been persistent with a few hornworms showing up here and there.

Around Immokalee, worms remain very low with mostly loopers and melonworms with a few southern and beet armyworms.

In the EAA, beet armyworm is present on leaf lettuce. Growers and scouts report that fall armyworm activity and oviposition increased sweet corn in the last week.

Fall armyworms are showing up in some corn around Homestead.

Fortunately, growers have a wide array of excellent worm control materials at their disposal these days.

Melonworm is restricted to feeding on cucurbits and is one of the most important pests of vine crops in Florida. Summer squash and the winter squash species are favored hosts. Cucumbers and cantaloupe are attacked but not preferred. Watermelon is a rare host.

Melonworm feeds principally on foliage, especially if foliage of a favored host plant such as summer or winter squash is available. Usually the leaf veins are left intact, resulting in a lace-like appearance.

If the available foliage is exhausted, or the plant is a less preferred species such as cantaloupe, the larva may feed on the surface of the fruit, or even burrow into the fruit. Growers sometimes refer to these insects as collectively as "rindworms".

In one study of melonworm damage to summer squash conducted in south Florida, melonworm caused a 23 % yield loss due to foliage damage and a 9 to 10% yield reduction due to fruit damage.

The moths are relatively small with a wingspan of about 1 inch. The wings are white and edged with dark brown. The eggs are very small, and flattened ovals in shape. They are white or greenish initially but quickly turn yellow.

Newly hatched larvae are colorless but after molting become yellow-green. The last instar has two white stripes running the length of the body. The stripes disappear when the caterpillar pupates. The pupa is dark brown and often found in a loose cocoon in a fold of leaf.

Moths are active at night and rest under leaves during the day. They deposit their eggs in small clusters in buds, stems and leaves. The larva feeds on leaves and occasionally on the surface of fruit.

Check plants regularly for signs of feeding damage to leaves and for the presence of larvae.

Since pollinators, particularly honeybees, are very important for good fruit set in cucurbits, insecticides applied for melonworm control must be applied when bees are not actively foraging. *Bacillus thuringiensis* (Bt) can be very effective.

Many other excellent lep materials present on the market so growers have a number of options available. Consult UF/IFAS recommendations for currently labeled insecticides for melonworm control.

Leafminer

Growers and scouts in the Manatee Ruskin area report that leafminer numbers are starting to increase in some locations but remain below treatment thresholds. Growers are advised to monitor the situation as numbers will likely increase over next few of weeks

Around Southwest Florida growers are starting to see a little leafminer activity and some stippling in tomato, eggplant and watermelon but pressure is still low.

Broad Mite

Respondents on the east coast report that broad mites are showing up early in pepper plantings and movement may be aided by windy conditions.

Around Southwest Florida, low levels of broad mites are showing up in peppers and eggplants.

Aphids

A few aphids are showing up on lettuce in the EAA.

Spotted cucumber beetle

Growers and scouts around Belle Glade are reporting some problems with spotted cucumber beetles in lettuce around the EAA.

The spotted cucumber beetle is yellow-green with 12 black spots on the elytra (forewings). These beetles cause agricultural damage by feeding on roots, seedlings, and foliage, and transmitting disease.

Larvae can cause severe damage to small plants, but less damage to large plants with fully developed root systems. Feeding by larvae may enhance the incidence of Fusarium wilt disease. The beetles also damage crops by causing scarring on fruits, which decreases their market value.

After eggs hatch, larvae start feeding on plant roots. Spotted cucumber beetles are more problematic in organic soils and are less troublesome in sandy soils.

Larvae feed on roots and stems under the soil where they mature for two to four weeks before pupating. Immature stages cause plant damage by boring into plant stem base and roots.

Spotted cucumber beetles can vector bacterial wilt of cucurbits as well as other diseases like Squash mosaic virus, Cucumber mosaic virus, Bean mosaic virus, and Maize chlorotic mottle virus.

Monitoring is a critical part of any cucumber beetle control program. Plants should be monitored as soon as they emerge or are transplanted, to avoid severe damage to seedlings. Control measures are recommended if numbers exceed five or more per mature plant. Control measures should also be implemented immediately if any unacceptable beetle damage occurs on young plants

When beetles are active, application of foliar insecticides may be required twice a week. It is important to rotate the chemicals with different modes of action to avoid development of pesticide resistance. Consult UF/IFAS recommendations for cucumber beetles control in Florida vegetables.

Kaolin clay, pyrethrum and spinosad are some of the organic chemicals that can be used to manage cucumber beetles to some extent.

Corn silkfly

Low numbers of corn silkfly are present on corn in the EAA.

Diseases

Bacterial Spot

Around SW Florida, bacterial spot is the main tomato problem at this point. Occurrence is sporadic with some early plantings are being hit hard, while many younger fields still look good. A few fields that have endured hard driving rains are experiencing high levels of bacterial spot.

Growers and scouts in the Manatee Ruskin area report that bacterial spot is plentiful but is mostly low on the bush.

East Coast plantings remain mostly clean.

Bacterial spot is one of the most serious diseases of tomato and pepper in Florida because it can spread rapidly during warm periods with wind driven rains, and because fruit symptoms reduce marketability.

Bacterial spot is caused by several species of *Xanthomonas* spp. Four species have been identified on tomato: *X. euvesicatoria*, *X. vesicatoria*, *X. perforans*, *X. gardneri*. In Florida, the major species encountered is *X. perforans*.

Symptoms of bacterial spot appear as small, water-soaked, greasy spots on infected leaflets. On tomatoes, distinct spots with or without yellowing occur. Individual leaf spots may coalesce with each other, resulting in the browning of entire leaflets. Fruit spots often begin as dark specks with or without a white halo. As spots enlarge, they become raised and scab-like.

Entry into the plant occurs through stomata or wounds made by wind driven soil, insects, or cultural operations. Bacterial spot can be seed transmitted, but most inocula comes from volunteer plants or infected plant debris in the soil. Temperatures of 75-87°F are ideal for bacterial spot but infections can occur at higher or lower temperatures.

***Xanthomonas perforans* is seed-borne, which allows for the movement of strains on a global scale.**

An integrated approach is needed to manage this disease.

Exclusion is the best means of managing bacterial spot on tomato. Unfortunately, even the best bactericidal treatment offers only limited protection when environmental conditions are favorable for rapid disease development, especially during periods of heavy, wind-driven rains.

Sanitation is important. Pepper and tomato volunteers and solanaceous weeds should be destroyed between crops. Transplant houses should be located away from tomato or pepper fields. Purchase only certified disease-free transplants and seed.

Since water movement spreads the bacteria from diseased to healthy plants, workers and farm equipment should be kept out of fields when fields are wet because the disease will spread readily under wet conditions.

No resistant tomato varieties are available commercially. In pepper, a number of excellent varieties with resistance to races 1 -10 are available.

It is important to apply sprays before and during rainy periods. If conditions are favorable, frequent spraying may not be sufficient to maintain bacterial spot below damaging levels.

The traditional recommendation for bacterial spot control consists of copper and maneb or mancozeb. Attention to application techniques is as important as choice of material in achieving adequate control. The effectiveness of copper is limited, because of the widespread occurrence of copper tolerance among strains of *Xanthomonas*.

In the past few years, a number of products have come on the market that have given good results in research trials when used in rotation or together with traditional controls such as copper. These include Tanos (Dupont) as well as the SAR elicitor Actigard (Syngenta), Leap (Valent), Double Nickel 55 (Certis), LifeGuard (Certis) Regalia (Maronne Bioinnovations) and Serenade and Sonata (AgraQuest).

Attention to application techniques is as important as choice of material in achieving adequate control.

Target spot

Target spot is becoming more common on tomato around Hillsborough County.

Target spot is frequently misdiagnosed as in its early stages as symptoms are difficult to recognize and can be confused with bacterial spot and early blight. Scouting is important to detect early signs of the diseases. Growers are often taken by surprise as in the beginning of the season while we are still experiencing frequent rains they are targeting bacterial spot and then as the rains subside and canopies develop target spot emerges as a larger concern.

The name derives from the bull's eye appearance that is often displayed in lesions caused by the disease. Since concentric rings are not always visible and not all lesions with concentric rings are target spot, it is recommended that a laboratory diagnosis be obtained to ensure that a correct diagnosis is made.

On tomato leaves and stems, foliar symptoms of target spot consist of brown-black lesions with subtle concentric rings giving them a target-like appearance. These can sometimes be confused with early blight. With early blight, the lesions are often associated with a general chlorosis of the leaf.

On tomato fruit, lesions are more distinct. Small, brown, slightly sunken flecks are seen initially and may resemble abiotic injury such as sandblasting. As fruits mature the lesions become larger and coalesce resulting in large pitted areas. Advanced symptoms include large deeply sunken lesions, often with visible dark gray to black fungal growth in the center. A zone of wrinkled looking tissue may surround the margins of lesions on mature fruit. Placing suspect fruit in a moist environment for 24 hours will often induce the growth of dark gray mycelia providing telltale diagnostic evidence of target spot infection.

Optimum conditions for disease development include temperatures from 68° - 82°F and long periods of free moisture.

In trials, wounding was essential for reproduction of the fruit symptoms. Wind-blown sand is probably important in outbreaks of target spot on tomato fruit in the field.

Strategies for the management of this disease require an integrated approach for best results.

Growers should rotate fields to avoid carryover on crop residue and avoid rotations among solanaceous crops. Eliminate any volunteers and weed species that can act as a host.

Start with clean, healthy transplants and maintain proper fertility as nitrogen deficiencies favor the development of early blight.

Currently, target spot is controlled primarily by applications of protectant fungicides. It should be noted that tank-mix sprays of copper fungicides and maneb do not provide acceptable levels of target spot control.

Widespread resistance has been documented to QoI fungicides including both strobilurins and non-strobilurin fungicides in FRAC Group 11 and their use is not recommended for target spot control.

In addition, moderate resistance has been documented in the SDHI fungicides FRAC Group 7 which includes boscalid, penthiopyrad, fluopyram and fluxapyroxad. These should be used with caution and attention paid to rotating with alternative modes of action.

In recent efficacy trials, at the University of Florida – Approvia Top, Inspire Super, Luna Tranquility, Revus Top, Rhyme, and Scala are top performers. Contact protectant fungicides like mancozeb and Bravo

are effective and should be used early in the crop cycle switching to more efficacious materials once disease is present.

Consult UF/IFAS recommendations for currently labeled fungicides for target spot control in Florida vegetables.

Pythium

Pythium continues to cause some problems on tomato, eggplant, pepper, and watermelon around Southwest Florida.

Growers and scouts report some problems with aerial pythium on green beans as well as pythium damping off on lettuce and green beans in the EAA.

Pythium is one of the Oomycetes or “water molds.” It thrives in moist soils and multiplies and spreads rapidly under wet conditions. Although Pythium is capable of producing several spore types, zoospores and oospores are most important.

Zoospores are mobile. They are produced rapidly and in great numbers and contribute to the organism’s ability to cause disease almost “over-night.” Zoospores may be detected within half an hour after a site is flooded and can “swim” for up to 30 hours and move three or more inches through soil.

Oospores are extremely durable and can survive in soil and infected crop debris for more than 10 years. A number of broadleaf and grassy weeds may host Pythium spp. and serve as important sources of inocula.

Gummy stem blight

Low levels of gummy stem blight continue to be reported on watermelons in a few places around South Florida.

Infection and symptoms may occur on all plant parts and at any stage of development from seedlings to maturity.

Symptoms appear as light to dark brown circular spots on leaves or as brown to black, lesions on stems. Wilting followed by death of young plants may occur. Stem lesions enlarge and slowly girdle the main stem resulting in a red-brown-black canker that cracks and may exude a red to amber gummy substance. Vine wilting is usually a late symptom.

Use of a hand lens will reveal small, clear white (when young) to black (when older), pycnidia embedded in older diseased tissue.

Because other plant disorders can cause exudation of a gummy substance, “gummy-ness” should not be relied upon for diagnosis of gummy stem blight. Anthracnose and inadequate liming can both cause stem lesions and gumming.

Gummy stem blight typically progresses from the central stem of the plant to growing tips. Leaf spots are variable in shape, red-brown in color and initial infections are generally seen on leaf margins and veinal areas.

The fungus (*Didymella bryoniae*) produces two spore stages, a sexually produced spore (ascospore) and an asexually produced spore (pycnidiospore). The ascospore is windborne and serves as a primary source of inoculum. The pycnidiospore functions in secondary spread of the disease. Pycnidiospores are released in a gummy substance that makes them adaptable for spread by splashing water.

Growers often comment on this disease occurring “overnight.” What they are actually seeing are the results of secondary spread, which is more difficult to control than primary spread simply because of increased spore numbers with increased diseased tissue.

Gummy stem blight is most severe in wet years since moisture is necessary for spore germination. After a spore germinates on a susceptible host, the fungus penetrates the plant tissue and symptoms can appear in 7 to 12 days.

Gummy stem blight can be successfully managed using a combination of control strategies. Control of primary sources of inoculum is important. Growers should purchase clean seed and avoid transplants that have gummy stem blight or other diseases.

Multiple applications of fungicides are necessary to control gummy stem blight. It is important to begin a fungicide program prior to the first sign of gummy stem blight. In south Florida, the spray program should be initiated soon after emergence. In other areas of the state, fungicide spray programs can be initiated when the vines begin to “run.” When vines are small, band applications of fungicide over the crown area are effective and help reduce application costs. Fungicides like mancozeb or Bravo in rotation will provide good protection before disease is established in the field

In recent years, strains resistant to the strobilurin fungicides have been detected throughout the Southeast, so it is important that growers practice resistance management and avoid repeated applications of these and all fungicides. Materials such as Folicur (Tebuconazole), Pristine (boscalid and pyraclostrobin), Fontelis (penthiopyrad), Inspire Super (cyprodinil and difenoconazole), Luna Experience (fluopyram and tebuconazole), Luna Privilege (fluopyram), Merivon (fluxapyroxad and pyraclostrobin) and Topsin (thiophanate methyl) have shown good efficacy against resistant strains of the disease.

Be sure to read the label as the number of applications per season are typically limited and other restrictions may apply.

Downy Mildew

Growers around SW Florida and West Central Florida are starting to report finding low levels of downy mildew in cucumbers and watermelon.

Leaf symptoms can be used to diagnose downy mildew in the field in some cases. On cucurbits other than watermelon, small yellowish spots occur on the upper leaf surface initially away from the leaf margin. Later, a more brilliant yellow coloration occurs with the internal part of the lesion turning brown. Lesions are usually angular as leaf veins restrict their expansion. When the leaves are moist, a downy grayish fungal growth may be seen on the underside of lesions.

On watermelons, yellow leaf spots may or may not be angular and later turn brown to black in color. On watermelons an exaggerated upward leaf curling occurs that growers sometimes liken to a dead man’s hand.

Since nighttime temperatures between 55° and 75°F and relative humidity above 90%, provide ideal conditions for infection, cucurbits planted in South Florida are always at risk from downy mildew. Control of downy mildew on cucurbits is achieved primarily by the use of fungicide spray programs. Fungicide sprays are recommended for all cucurbits.

Squash, pumpkin, cantaloupe, and non-resistant cucumber varieties are very susceptible and should be sprayed every five to seven days. If cucurbits are planted close to established fields infected with downy mildew, a spray program should be initiated as soon as the first true leaves are present.

Spray programs for downy mildew are most effective when initiated prior to the first sign of disease since once a planting becomes infected; it becomes more and more difficult for fungicides to control downy mildew.

A range of fungicides is available for the control of downy mildew depending on the crop. Use of Bravo should be avoided on watermelon after fruit set as it may increase the risk of sunburn. Consult UF/IFAS recommendations for currently labeled fungicides for downy mildew control in Florida.

Tomato Yellow Leaf Curl Virus

Low levels of TYLCV – mostly a few plants here and there in a scattered locations - are being reported on tomato around South Florida – both Manatee Ruskin and SW Florida.

Southern Corn Leaf blight

Low levels of southern corn leaf blight are present on sweet corn in the Glades.

Bacterial Blight

Bacterial blight is present on some young corn in the EAA.

Bacterial blight of celery, caused by *Pseudomonas cichorii*, is present in low levels on celery in the EAA.

Southern Blight

Scattered occurrence of southern blight are being reported in some older tomato and sweet corn around South Florida.

Phytophthora

Growers and scouts in SW Florida are reporting some problems with *Phytophthora capsici* on squash in wet fields.

Fusarium crown rot

Around the Manatee Ruskin area, Fusarium crown rot is starting to show up in some blocks with a history of the disease.

Fusarium crown rot is caused by the fungus *Fusarium oxysporum f. sp. radidis-lycopersici*, a close relative of the Fusarium wilt pathogen.

FCR is becoming more common and widespread in Florida. The disease causes significant yield losses and yield reductions of 15 to 65% have been reported.

Symptoms typically begin to show when plants are nearing the mature-green fruit stage. On more mature plants, the initial symptoms include a yellowing of the oldest leaves. The yellowing gradually progresses up the plant to the younger leaves as the disease develops, and symptoms may be restricted to a single branch of the

plant. Affected leaves may wilt during the heat of the day but recover overnight, and in some cases, flowers may wilt and die. These symptoms are similar to those associated with Fusarium wilt.

Prominent lesions develop on the hypocotyl (lower stem) and on the tap- and lateral-roots. These lesions are typically round in shape and chocolate brown in color. A brown discoloration in the cortex can extend beyond the externally visible lesions, up to 10 inches above the soil-line, but the discoloration will not move up into the upper parts of the plant as is seen with Fusarium wilt.

Adventitious roots may proliferate above the affected stem tissues, and sometimes-white mats of fungal growth with pink spore masses will develop on dead tissues. Plants can be killed when the disease is severe.

The pathogen survives in the soil as spores and on the roots of alternate hosts including eggplant, peppers, some legumes and cucurbits, beets, spinach, carrot, cabbage, and several weed species. The pathogen can spread by infected transplants and through the movement of infested soil and equipment.

The FCR pathogen infects tomato root systems through wounds created by emerging lateral roots. The disease develops best in areas with low soil pH levels, high chlorine salt levels, applications of ammonia forms of nitrogen, and waterlogged soils. The pathogen can spread from plant to plant during the season through root contact. The pathogen can also spread through wind-blown spores to re-infest fumigated soils.

Management strategies focus on preventing infection and limiting the spread of the pathogen. Growers should plant only pathogen-free seed and transplants.

In the field, maintain soil pH levels in the 6 to 7 range, and avoid the use of ammonia-based fertilizers. Minimize plant stress throughout the growing season. Incorporate crop debris promptly after harvest to promote rapid decomposition. Long-term rotation to non-host crops, such as corn and other monocots, can help prevent the buildup of inoculum in the soil. Soil fumigation is usually not effective for controlling FCRR because the fungus can quickly recolonize fumigated soil.

A single dominant gene for resistance to FCR (Fr1) has been identified, and it is used in some tomato varieties. However, most commercial tomato varieties are susceptible to this disease.

News You Can Use

Corn that acquires its own nitrogen identified, reducing need for fertilizer

By Eric Hamilton
University of Wisconsin
August 7, 2018

A public-private collaboration of researchers at the University of Wisconsin–Madison, the University of California, Davis, and Mars Inc., have identified varieties of tropical corn from Oaxaca, Mexico, that can acquire a significant amount of the nitrogen they need from the air by cooperating with bacteria.

To do so, the corn secretes copious globs of mucus-like gel out of arrays of aerial roots along its stalk. This gel harbors bacteria that convert atmospheric nitrogen into a form usable by the plant, a process called nitrogen fixation. The corn can acquire 30 to 80 percent of its nitrogen in this way, but the effectiveness depends on environmental factors like humidity and rain.

Scientists have long sought corn that could fix nitrogen, with the goal of reducing the crop's high demand for artificial fertilizers, which are energy intensive, expensive and polluting. Further research is required to determine if the trait can be bred into commercial cultivars of corn, the world's most productive cereal crop.

The findings are reported Aug. 7 in the journal PLOS Biology.

- Nitrogen-fixing corn varieties secreting large amounts of sugar-rich gel as they grow in Madison, Wisconsin.
- The gel harbors bacteria that convert atmospheric nitrogen into a form usable by the plant, a process called nitrogen fixation.
- The corn can acquire 30 to 80 percent of its nitrogen in this way, but the effectiveness depends on environmental factors like humidity and rain.
- Further research is required to determine if the trait can be bred into commercial cultivars of corn, the world's most productive cereal crop.

"It has been a long-term dream to transfer the ability to associate with nitrogen-fixing bacteria from legumes to cereals," says Jean-Michel Ané, a professor of bacteriology and agronomy at UW–Madison and a co-author of the new study.

Legumes, such as beans, are the only group of crop plants previously known to acquire a significant amount of nitrogen through fixation, which they perform in specialized tissues called root nodules.

Howard-Yana Shapiro, the chief agricultural officer at Mars, a senior fellow in the Department of Plant Sciences at UC Davis and a co-author of the report, identified the indigenous varieties of corn in a search for cultivars that might be able to host nitrogen-fixing bacteria.

The corn is grown in the Sierra Mixe region of Oaxaca in southern Mexico, part of the region where corn was first domesticated by Native Americans thousands of years ago. Farmers in the area grow the corn in nitrogen-depleted soils using traditional practices with little or no fertilizer, conditions that have selected for a novel ability to acquire nitrogen. The biological materials for this investigation were accessed and utilized under an Access and Benefit Sharing Agreement with the Sierra Mixe community and with the permission of the Mexican government.

The corn is striking. Most corn varieties grow to about 12 feet and have just one or two groups of aerial roots that support the plant near its base. But the nitrogen-fixing varieties stand over 16 feet tall and develop up to eight or 10 sets of thick aerial roots that never reach the ground. Under the right conditions, these roots secrete large amounts of sugar-rich gel, providing the energy and oxygen-free conditions needed for nitrogen-fixing bacteria to thrive.

Establishing that plants are incorporating nitrogen from the air is technically challenging.

"It took us eight years of work to convince ourselves that this was not an artifact," says Ané, whose lab specializes in studying and quantifying nitrogen fixation. "Technique after technique, they're all giving the same result showing high levels of nitrogen fixation in this corn."

The group used five different techniques across experiments in Mexico and Madison to confirm that the Sierra Mixe corn's gel was indeed fixing nitrogen from the air and that the plant could incorporate this nitrogen into its tissues.

"What I think is cool about this project is it completely turns upside down the way we think about engineering nitrogen fixation," says Ané.

The gel secreted by the corn's aerial roots appears to work primarily by excluding oxygen and providing sugars to the right bacteria, sidestepping complex biological interactions. The research team was even able to simulate the natural gel's effects with a similar gel created in the lab and seeded with bacteria. The simplicity of the system provides inspiration to researchers looking to identify or create more crop plants with this trait.

Breeding the trait into commercial cultivars of corn could reduce the need for artificial nitrogen fertilizers, which have a host of disadvantages. More than 1 percent of the world's total energy production goes toward producing nitrogen fertilizer. Developed countries contend with waterways polluted by leaching nitrogen, while adequate fertilizer is often inaccessible or too expensive for farmers in developing countries. Corn that fixes some of its own nitrogen could mitigate these issues, but more research will be required.

"Engineering corn to fix nitrogen and form root nodules like legumes has been a dream and struggle of scientists for decades," says Ané. "It turns out that this corn developed a totally different way to solve this nitrogen fixation problem. The scientific community probably underestimated nitrogen fixation in other crops because of its obsession with root nodules."

"This corn showed us that nature can find solutions to some problems far beyond what scientists could ever imagine," Ané says.

Tomato imports from Mexico create unfair market

By Jack Payne, Senior vice president for agriculture and natural resources / University of Florida

If you want to pick a home-grown tomato from the produce bin, you'd better reach carefully — past the five Mexican imports for each one grown in the U.S.A.

It wasn't always like this. Less than a generation ago, U.S. farms supplied the majority of tomatoes in U.S. markets. It's the same story with strawberries, peppers and blueberries.

Why the change? Until recently, we explained it away as imports beating out local produce on price in a free market.

To University of Florida economist Zhengfei Guan, the question was "How free?" To find out, he and his team of economists dug through government data. Mexican government data.

It revealed that before you make a choice in the supermarket aisle, the Mexican government made choices to increase the likelihood that you would buy cheap instead of American. It paid much of your cost by spending billions of pesos to help Mexican growers purchase sprinkler systems, shade houses, genetic research and other tools. In other words, subsidies.

International trade has winners and losers. U.S. growers sell a lot of corn and soybeans to Mexico, for example. Mexico's government has essentially conceded those commodities to American farmers.

Government subsidies for other crops make it possible for Mexican growers to sell strawberries, blueberries, peppers and tomatoes for essentially less than it costs to produce them — or at least to produce them in Florida. That does not seem like free trade. It's certainly not fair trade.

UF's Institute of Food and Agricultural Sciences provides the science behind how to grow food in Southwest Florida. It also provides the science behind the choices that consumers and governments make.

That science is called economics. UF/IFAS has a large Department of Food and Resource Economics that crunches numbers on Plant City strawberries, LaBelle peppers and Collier County tomatoes. They're the local agricultural economists for Southwest Florida and for every other Florida community where people make their living off the land.

Guan, who works at the Gulf Coast Research and Education Center in Balm (near Tampa), is the go-to economist for Florida agricultural leaders tracking the North American Free Trade Agreement negotiations. These leaders have repeatedly turned to Guan to produce data on the food fight on Florida grocery store shelves. As recently as this month, the leaders were texting Guan for more as they visited federal offices to educate policy-makers on the effects of Mexican government subsidies.

Guan got them the data within an hour, while they were still on Capitol Hill. They also shared copies of Guan's new published research that reveals the startling extent of how the price of a Mexican strawberry can be influenced as much by government ministers in Mexico City as by farmers in Michoacan.

Guan's previous work on agricultural trade with Mexico already had been shared with some of the highest-ranking U.S. trade officials.

The stakes are high. The agriculture, food and natural resource industry is Florida's second-largest, accounting for about one in every five jobs.

An unfair playing field — whether strawberries or peppers grow on it — threatens Floridians' livelihoods. It exacts environmental costs in the extra carbon miles our food travels from abroad. If we go too far down the road of outsourcing our food supply, we could ultimately be handing over to others the choice of what we eat — or even whether we eat.

Do your part by looking for food that carries the Fresh from Florida logo.

UF/IFAS agricultural economists will continue to support Florida by providing the science behind your choices while they're still yours to make.

Jack Payne is the University of Florida's senior vice president for agriculture and natural resources and leader of the Institute of Food and Agricultural Sciences. Contact: jackpayne@ufl.edu @JackPayneIFAS.

“Fall Weather” is Still a Little Ways Off!

Average Date of Fall Arrival is South Florida (based on the first average date of temperatures below 60°F)	
LaBelle	October 21
Belle Glade	October 23
Immokalee	October 23
Moore Haven	October 25
Naples	October 29
Homestead/Redlands	October 30
West Palm Beach	November 2
Fort Lauderdale	November 4
Miami	November 8
Miami Beach	November 17
Courtesy of the National Weather Service in Miami Florida	

Up Coming Meetings

October 10, 2018 **Sweet Corn Growers Meeting** **12:00 – 2:30PM**

UF/IFAS Everglades Research & Education Center
3200 E Palm Beach Road
Belle Glade, FL 33430

Please [RVSP](#) so we can be sure to have enough lunches for everyone: <https://www.eventbrite.com/e/sweet-corn-grower-meeting-tickets-50413350689>. *Sponsored by Corteva Agriscience – Ag Division of Dow DuPont*

October 16, 2018 **WPS – Train the Trainer Workshop** **8:30AM – 3:30PM**

Clayton Hutcheson Ag Center – Exhibit Hall A
559 N Military Trail
West Palm Beach, FL 33415

Please RVSP by contacting Ethel Scott at 561-233-1975 or eescott@pbcgov.org Cost = \$25

Produce Food Safety Workshops: Fall 2018

Produce Safety Alliance Grower Training

This is the one-day course for fruit and vegetable growers and packers who fall under FSMA's Produce Safety Rule. FDA and PSA are very sensitive about how this course is advertised and promoted as the standardized curriculum. Even though there are currently no other recognized alternative courses to satisfy the training requirements of the Produce Safety Rule, they do not want us to say the course is required or mandated or anything like that...even though, by default, it kind of is. This is the “approved” advertising language from PSA:

WHO SHOULD ATTEND

Fruit and vegetable growers and others interested in learning about produce safety, the Food Safety Modernization Act (FSMA) Produce Safety Rule, Good Agricultural Practices (GAPs), and co-management of natural resources and food safety are encouraged to attend. The PSA Grower Training Course is one way to satisfy the FSMA Produce Safety Rule requirement.

WHAT TO EXPECT

The trainers will spend approximately seven hours of instruction time covering content contained in these seven modules:

- Introduction to Produce Safety
- Worker Health, Hygiene, and Training
- Soil Amendments
- Wildlife, Domesticated Animals, and Land Use
- Agricultural Water (Part I: Production Water; Part II: Postharvest Water)
- Postharvest Handling and Sanitation
- How to Develop a Farm Food Safety Plan

In addition to learning about produce safety best practices, key parts of the FSMA Produce Safety Rule requirements are outlined within each module. There will be time for questions and discussion, so participants should come prepared to share their experiences and produce safety questions.

BENEFITS OF ATTENDING

The course will provide a foundation of Good Agricultural Practices (GAPs) and co-management information, FSMA Produce Safety Rule requirements, and details on how to develop a farm food safety plan.

After attending the entire course, participants will be eligible to receive a certificate from the Association of Food and Drug Officials (AFDO) that verifies they have completed the training course.

Here's the list of upcoming PSA courses.

- 10/9/18 – Palmetto - <https://psa100918.eventbrite.com>
- 10/23/18 – Sebring - <https://psa102318.eventbrite.com>
- 11/7/18 – Tavares - <https://psa110718.eventbrite.com>
- 11/27/18 – Homestead - <https://psa112718.eventbrite.com>
- 12/13/18 – Immokalee - <https://psa121318.eventbrite.com>
- 12/17/18 – St Augustine - <https://psa121718.eventbrite.com>

Fall 2018 - Farm Labor Supervisor Training Schedule

October 23 - 24, 2018 - Wimauma, FL 33598

UF/IFAS Gulf Coast Research and Education Center
14625 CR 672

Register: <https://fls2018wimauma.eventbrite.com>

November 27 – 28, 2018 – Immokalee, FL 34142

UF/IFAS Southwest Florida Research and Education Center
2685 SR 29 North

Register: <https://fls2018immokalee.eventbrite.com>

For more information, contact: Barbara Hyman 239-658-3461 or hymanb@ufl.edu

November 4–6, 2018 The 24th International Pepper Conference

Sanibel Harbour Marriott
Fort Myers, Florida, USA

Learn more at <http://conference.ifas.ufl.edu/pepper2018/>

November 7, 2018 2018 Florida Ag Expo

UF/IFAS Gulf Coast Research and Education Center
14625 CR 672
Wimauma, FL 33598

Register online at <http://www.floridaagexpo.com/>

Websites

PERC is the **Pesticide Educational Resources Collaborative** – the website provides a wealth of resources to help you understand and comply with the 2015 Revised WPS including training materials, the “new” WPS poster, handouts and WPS respiratory guide. <http://pesticideresources.org//index.html>

PERC - WPS Compliance Suite — Training Materials

Under the newly revised Worker Protection Standard (WPS), training materials must be EPA-approved when officially training workers, handlers, and trainers. At present, the only EPA approved materials available can be found at the PERC website

- Expanded training concepts will be required starting January 2, 2018.
- Training must be delivered in a manner that can be understood, in a location relatively free from distractions.
- When training workers or handlers, the trainer must remain present at all times to be available to answer questions, even when showing a video.
- Trainers must be qualified, most often by holding a pesticide applicator's license or by completing an EPA-approved Train-the-Trainer course.

Training Materials for Workers and Handlers - <http://pesticideresources.org/wps/temp/training/index.html>

Need CORE CEU's? – here is an easy way to obtain CORE CEU's on-line by reading an article and answering questions regarding the online. A passing score obtains one Core CEU.

CEU Series: Mix and Load Pesticides Safely

CEU Series: Protect Crops and the Environment

CEU Series: Make Sure to Stow Your Pesticides before You Go

CEU Series: Avoid Mishaps When Handling Pesticides

CEU Series: Be Aware of Bees When Applying Pesticides

CEU Series: Place Priority on Preventing Pesticide Poisoning

CEU Series: Learning about Pesticide Resistance Is Anything but Futile

Go to <http://www.growingproduce.com/?s=CORE+CEUs>

Check out Southwest Florida Vegetable Grower on Facebook

<https://www.facebook.com/pages/South-Florida-Vegetable-Grower/149291468443385> or follow me on Twitter @SWFLVegMan - <https://twitter.com/SWFLVegMan>

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The **South Florida Pest and Disease Hotline** is compiled by **Gene McAvoy** and is issued on a biweekly basis by the **Hendry County Cooperative Extension Office** as a service to the vegetable industry.

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