



SOUTH FLORIDA VEGETABLE PEST AND DISEASE HOTLINE

March 20, 2020

Following a cold front which affected the area at the beginning of the month dipping temps into the 30's, March has been unseasonable hot with daily temps reaching the mid-upper 80's and low 90's most days. Dry conditions have prevailed with most place reporting less than a half inch since mid-February.

Hot dry weather and windy conditions have increased daily evapotranspiration and growers have responded by increasing the number irrigation cycles. Winds have also battered plants and scarred some fruit. Foggy mornings have been favorable for the development of some diseases.

FAWN Weather Summary

Date	Air Temp °F		Rainfall (Inches)	Ave Relative Humidity (Percent)	ET (Inches/Day) (Average)
	Min	Max			
Balm					
2/20 – 3/20/20	36.26	89.28	0.30	74	0.12
Belle Glade					
2/20 – 3/20/20	38.91	91.44	0.58	79	0.11
Clewiston					
2/20 – 3/20/20	39.77	92.48	0.52	76	0.12
Ft Lauderdale					
2/20 – 3/20/20	46.96	92.64	0.42	73	0.12
Homestead					
2/20 – 3/20/20	43.09	88.70	0.66	78	0.12
Immokalee					
2/20 – 3/20/20	36.92	92.19	0.15	76	0.12
Okeechobee					
2/20 – 3/20/20	30.90	90.73	0.07	77	0.11
Wellington					
2/20 – 3/20/20	43.03	92.12	0.69	76	0.12

“Remember, when in doubt - scout.”

Growers are harvesting a wide variety of vegetables with the first watermelons hitting the market around Immokalee. Prices have been favorable for a number of items.

The National Weather Service forecast indicates that an upper-level high combined with Atlantic surface high pressure will prevent any of disturbances affecting the southeast continental United States from influencing the weather pattern across South Florida. This will result in a continued benign weather pattern for South Florida.

Maximum temperatures each day will reach the low to mid 80s across most of South Florida in the extended period, while inland areas and the Gulf Coast of South Florida may experience the low 90s. A general warming trend is forecast across South Florida as the aforementioned upper-level high shifts eastward across South Florida while surface high pressure builds over the western Atlantic waters.

Radiational cooling at night will continue and allow for periods of patchy fog, mainly over inland areas.

For additional information, visit the National Weather Service in Miami website at <https://www.weather.gov/mfl/>

Insects

Whiteflies

Growers and scouts in SW Florida report that whiteflies have spiked in several locations and remain a major concern on a variety of crops especially in tomato and cucurbits where whitefly transmitted viruses are a threat. Populations have reached high to extremely levels in some locations with some tomato plantings at 50-100 adult whiteflies and numerous nymphs per plant. Some tomato fields are being abandoned because of the high incidence of irregular ripening and virus. A few growers have reported “uncontrollable” whiteflies in tomato in DeSoto and Hendry counties and in watermelon in Hardee county (Note: although whiteflies are widespread and omni-present they remain at low to moderate levels and remain manageable in a number of locations. Whiteflies have also been high in beans.

Around Central Florida, tomato growers are already experiencing whitefly and virus issues in Spring crops. Reports indicate that some farms have pulled up entire first plantings due to very high incidence of TYLCV. Respondents indicate that whiteflies are also increasing in melons and potatoes.

Respondents on the East Coast report that whiteflies are high in some eggplant and growers note that they have been hard to control. Populations are also high in cucumber and tomato.

Reports from Homestead indicate that whitefly numbers have reached high levels in all susceptible vegetable crops.

With whitefly populations beginning to build and continued warm weather, growers are advised to take precautions to protect spring crops especially those like tomato and watermelon where whitefly vectored viruses are a threat. Studies conducted by Dr Bill Turechek at USDA ARS looking at whitefly populations and virus incidence indicates that there is a high correlation between mild winters and the level of problems experienced in any particular year.

Efficacy Ratings for Insecticides and Miticides on Tomato

		Whiteflies	Other pests controlled			
MOA	Active Ingredient	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		
23	spirotetramat	E†		G		
7C	pyriproxyfen	E†				
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.

Preventative soil applications of either imidacloprid, thiamethoxam, dinotefuran, flupyradifurone or cyantraniliprole should be used preventatively in tomato and cucurbits.

Proper scouting is essential to manage silverleaf whitefly. Over the years, UF entomologists have developed usable action thresholds that have been successful for many tomato farmers. However, these thresholds are only guidelines. Farm managers may modify them to fit their particular situations and expectations. *

Silverleaf whitefly thresholds

0-3 true leaves 10 adults/plant*
3-7 true leaves 1 adult/leaflet

NOTE - *If the source of whiteflies is believed to be tomato or melons, where virus is present, the threshold will be lower!

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

Management of whiteflies later in the season depends on early suppression of whitefly populations, growers need to be aggressive with the best systemic materials (Venom, Sivanto Prime, Verimark) early in the season. Growers who are on seepage and not drip are at a particular disadvantage if whiteflies and virus are high early in the season.

Field hygiene should be a high priority and should be an integral part of the overall strategy for managing whitefly populations, whitefly vectored viruses, and insecticide resistance.

- **Disrupt the virus-whitefly cycle in winter by creating a break in time and/or space between fall and spring crops, especially tomato and cucurbits.** The absence of a crop-free period especially in South Florida plays a major role in some of the problems we are seeing and has been exacerbated by growers holding crops longer than usual for a 3rd or 4th pick due to high prices.
- **Destroy crops quickly and thoroughly after harvest, killing whiteflies and preventing re-growth.**
- **Promptly and efficiently destroy all vegetable crops within 5 days of final harvest to decrease whitefly numbers and sources of plant viruses.**
- **Use a contact desiccant (“burn down”) herbicide in conjunction with a heavy application of oil (not less than 3% emulsion) and a non-ionic adjuvant to destroy crop plants and to kill whiteflies quickly.**
- **Time burn down sprays to avoid crop destruction during windy periods, especially when prevailing winds are blowing whiteflies toward adjacent plantings.**

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 in the EAA indicate a mixed bag of worms including beet armyworm, fall armyworm, and southern armyworm along with corn earworm have become an issue across all plantings of leaf, celery, corn, and beans. Scouts report that corn borer pressure is high in young corn throughout the Glades region.

Around SW Florida, worm pressure has picked up. Scouts report finding beet armyworm, southern armyworms, and loopers. Growers continue to battle high melonworm pressure in squash and cukes.

On the East Coast, respondents indicate worm pressure is low to moderate depending on location.

Reports from Homestead worms are increasing in sweet corn (mostly fall armyworm and beet armyworm).

Scouting is extremely important in detecting worms early before they can do significant damage. The Florida Tomato Scouting Guide indicates a pre-bloom threshold of 1 larva/6plants and post-bloom threshold of 1 egg mass or larva/field.

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

Dr Dak Seal, entomologist at UF/IFAS TREC reports that in trials the Bt's and Spear-T provided effective control of worms. He advises growers to avoid using broad spectrum insecticides. Dak notes Rimon is an effective growth regulator in controlling beet and fall armyworm and other worm pests. Rimon also provides excellent control of cucumber beetle.

Consult the UF/IFAS Vegetable Production Handbook for labeled products.

Diamondback moth

Diamondback moth (*Plutella xylostella*) larvae have begun causing damage to cabbage crops in the EAA, Homestead, Manatee/Hillsborough, Miami Dade and Tri-County (St. Johns, Putnam and Flagler) Agricultural Area.

Diamondback moth larvae are small green caterpillars with a pair of prolegs on their posterior end that form a "V" shape. This helps distinguish them from other caterpillars commonly found attacking crucifers, including imported cabbage worm and cabbage looper.

It takes about four weeks from egg to emergence of adult from the pupa for this pest.

Diamondback moth larvae only feed on plants in the crucifer family, including cabbage, broccoli, kale, mustards, radish, turnips, watercress and Brussel sprouts.

In Florida, diamondback moth is primarily a problem in green cabbage and Napa cabbage but can occur in broccoli and other crucifers. Young diamondback moth larvae feed on the surface of the leaf, producing "windowpane" type damage. There are many weeds in Florida in the crucifer family that serve as hosts for diamondback moth, including yellow rocket, shepherdspurse, pepperweed, and wild radish.

There are at least three types of parasitic wasp in Florida that attack either the larval or pupal stage of diamondback moth. Early season reliance on *Bacillus thuringiensis* (Bt) products does not interfere with the activity of these natural enemies and can offset the severity of infestations.

Pheromone traps should be used to monitor adult populations. One or more hole per plant is often used as a threshold for control.

Since adults may carry over between crops on plant debris, cultural controls such as separation of crops in time and space and sanitation including rapid crop destruction after harvest are important.

Growers should be very careful to inspect transplants when they arrive from the nursery to make sure larvae are not present.

Diamondback moth develops resistance to insecticides easily, particularly pyrethroids. Rotation of insecticide modes of action and avoidance of pyrethroids are important for managing diamondback moth. Resistance develops when successive generations of diamondback moth are treated with the same modes of action. A way to avoid or delay the development of resistance in diamondback moth is to group insecticides by mode of action in time intervals that correspond to the 30-day life cycle of the pest.

Sampling around Florida and the Southeast has indicated varying levels of resistance to a range of active ingredients. Resistance and susceptibility to AI's can vary greatly between populations often within a relatively small geographical area. If you apply a pesticide properly at recommended rates and do not get the control expected, you may be dealing with a resistant population, try switching AI's and do not go back with the same product or similar AI.

The table below lists some of the insecticides that demonstrated efficacy against diamondback moth collected from Florida cabbage fields in the spring of 2019. The mode of action number for each group is indicated in the central column. Insecticides with the same mode of action group can be applied more than once within a 30-day treatment interval, which starts when the first application of a given mode of action is made. Distinct modes of action should be used for each thirty-day interval once insecticide applications are initiated.

Protection of crucifer crops from damage often requires application of insecticide to plant foliage, sometimes as frequently as twice per week. Complete coverage especially the undersides of leaves where larvae are most often found.

The diamide insecticides (mode of action group 28) are important for management of diamondback moth larvae. If cabbage is being planted when diamondback moth populations are known to be present, the grower should consider a transplant tray treatment of Verimark (cyantraniliprole), or an at-plant treatment of Verimark or Coragen (chlorantraniliprole). At-plant treatments in cabbage would typically be applied with a water cart. Verimark and Coragen can also be applied near the root zone via soil shank injection, however this is not optimal because these two insecticides are not highly mobile in the soil.

Application via drip tape is another option, however the use of drip tape in Florida cabbage is not common. Diamide insecticides that can be applied to the foliage are Coragen, Exirel and Harvanta 50 SL (cyclaniliprole). The active ingredient in Exirel is cyantraniliprole, the same as in Verimark, which can only be applied via transplant tray or the soil. Please consult the insecticide labels for specific rates and instructions and remember applications of diamides should be confined to a 30-day interval, after which distinct modes of action should be used.

Note: recent sampling data from one population in SW Florida showed very high levels of resistance to a range of diamide products.

Bts remain useful tools for controlling young diamondback moth larvae. It is advised that application of products with the *aizawi* strain of Bt (i.e. Agree WG, Xentari DF) be alternated with products formulated with the *kurstaki* strain of Bt (i.e. Biobit HP, Crymax WDG, Dipel DF, Javelin WG).

Other insecticides that have proven effective against diamondback moth larvae in Florida include Radiant (spinetoram, mode of action group 5), Proclaim (emamectin benzoate, mode of action group 6, a restricted use insecticide), Torac (tolfenpyrad, mode of action group 21A) and Avaunt (indoxacarb, mode of action group 22A).

Spear Lep from Vestaron has performed well in trials conducted by Dak Seal in Homestead and provides another rotation partner in the grower's toolkit. It has been designated a new IRAC Group 32.

Dak also notes that Knack in rotation with Xentari provided significant control of DBM and other worm pests in trials).

Florida diamondback moth populations tested in 2019 were not very susceptible to pyrethroids (mode of action group 3A), or Lannate (methomyl, mode of action group 1A). For a full listing of insecticides registered for management of caterpillars in brassicas, please consult the 2019-2020 Vegetable Production Handbook of Florida.

For additional information on diamondback moth, including images and links to help distinguish it from imported cabbage worm and cabbage looper, visit http://entnemdept.ufl.edu/creatures/veg/leaf/diamondback_moth.htm.

Some insecticides that have demonstrated efficacy against diamondback moth in Florida in 2019				
Insecticide	Active ingredient	Mode of Action Group	Application options	PHI
Verimark	cyantraniliprole	28	Transplant tray drench Transplant water Drip	N/A
Coragen	chlorantraniliprole	28	Transplant water Drip Foliar	3
Exirel	cyantraniliprole	28	Foliar	1
Harvanta 50SL	cyclaniliprole	28	Foliar	1
Radiant	spinetoram	5	Foliar	1
Proclaim (restricted)	Emamectin benzoate	6	Foliar	7
Agree WG, Xentari DF, others	<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>	11A	Foliar	0
Dipel DF, Javelin WG, others	<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>	11A	Foliar	0
Torac	tolfenpyrad	21A	Foliar	1
Avaunt 30 WG, Avaunt eVo	indoxacarb	22A	Foliar	3
Spear Lep	GS-omega/kappa-Hxtx-Hv1a	32	Foliar	0

Thanks to Dr Hugh Smith, Entomologist at UF/IFAS GCREC

Thrips

Around Palm Beach County, thrips numbers have reached high levels in pepper, tomato and eggplant.

Around Miami Dade County, melon thrips populations remain high around Homestead and are increasing in beans and squash. Growers are reporting difficulty in bring them under control. Reports indicate that Radiant is not working and growers are using anything and everything they can to try and get control.

Common blossom thrips are widespread in most bean fields with high numbers (4-6 thrips /flower) present. The adults cause damage by feeding and ovipositing on foliage. In addition to widespread reports of bean red node caused by tobacco streak virus, growers are also seeing some virus in beans which tested positive for tospovirus (TCSV). Common blossom thrips and western flower thrips are also present in beans as are low numbers of bean thrips *Caliothrips fasciatus*.

Cultural practices can be effective in reducing thrips. Use reflective plastic mulch on field margins can help repel this virus carrying thrips. Some ornamental plants are hosts to flower thrips. If possible, growers should avoid planting tomato within 1,000 feet of an ornamental nursery. Planting non-host crop as a barrier can also help reduce flower thrips infestation on vegetable crops.

Reports from the EAA indicate that thrips have exploded in some bean fields and populations are expected to continue in that direction.

Around Immokalee, thrips are on the increase, but most appear to be common flower thrips and not doing much damage.

Pepper weevils

Around SW Florida, pepper weevils are pretty well established in many older fields and growers report that pressure is building to serious levels in some younger fields as well. In a few older fields growers report that pepper weevils have become uncontrollable at this point.

Around Homestead pepper weevils remains a major problem in pepper. Serious infestations can be observed in all plantings irrespective of pepper varieties and planting location.

On the East Coast, pepper weevils are widespread in pepper and on the increase across the area. Growers are also reporting damage in some eggplant.

In addition to the pepper weevil (*Anthonomus euginii*), we are hearing scattered reports of Cuban pepper weevil showing up around South Florida. Cuban pepper weevil adults are easily distinguished from the glossy black *A. euginii*, bearing numerous rough or raised areas, and a considerable amount of brown coloration. Larva are similar in appearance to *A. euginii*.

Sanitation and a crop-free period, if accompanied by destruction of alternate hosts, can disrupt the life cycle. It is very important to eliminate wild solanaceous host plants if pepper weevil is to be managed effectively.

Adult population estimates are best obtained by visual examination and yellow sticky traps. Action thresholds are one adult per 400 terminal buds or 1% of buds infested.

Insecticides are commonly applied to the foliage at short intervals once buds begin to form. Insecticidal suppression is feasible, but insecticides vary considerably in effectiveness, and even in the presence of chemical insecticides some loss commonly occurs. Actara, Vydate, diamides and pyrethroids can be used in a program to control this pest. Consult UF/IFAS recommendations for currently labeled insecticides for pepper weevil control in Florida.

Leafminer

Around Southwest Florida, leafminer pressure remains steady.

Around Homestead, reports indicate that leafminers continue to cause problems in beans and other crops. Dak Seal entomologist at UF/IFAS TREC, reports that in some places leafminer pressure is getting worse, most probably, due to the frequent use of pyrethroids. Growers should reduce use of pyrethroids which suppress natural enemies.

Reports from the EAA, indicate that leafminer are causing some problems in celery and leafy vegetables.

On the East Coast, respondents indicate that leafminer pressure is low to moderate depending on the location.

In south Florida, leafminer populations peak between October and March while in central Florida they are a problem in both spring and fall.

The adults are small yellow and black flies about the size of a gnat. The female punctures or "stipples" the leaves with her ovipositor to lay eggs in the leaf tissue or to feed on sap.

Leafminer damage is easily recognized by the irregular serpentine mines in leaves. The tunnel is clear with a trail of black fecal material left behind as the maggot feeds.

Leafminer damage to foliage can render plants more susceptible to fungal or bacterial diseases, which can cause further harm to plants. Bacterial spot, Alternaria, target spot and other diseases often become established in leaf mines.

Aphids

On the East Coast growers and scouts report that aphid numbers are increasing. Scouts are beginning to find some aphid colonies in pepper and note virus incidence is increasing rapidly in squash.

Around SW Florida, aphids are active and are forming colonizing in some fields. Scouts note that in many places, whitefly sprays have pretty much kept them under control.

In the EEA, respondents report that aphid pressure is increasing across a range of crops and note that large colonies are beginning to show up in in beans.

If not controlled in a timely fashion, green peach aphids can attain very high densities on young plant tissue, causing water stress, wilting, and reduced growth rate of the plant. Prolonged aphid infestation can cause appreciable reduction in yield of root crops and foliage crops. Early season infestation is particularly damaging to potato, even if the aphids are subsequently controlled.

As aphid densities increase on host plants, winged forms are produced, which then disperse to alternate hosts. Winged green peach aphids attempt to colonize nearly all available host plants. They often deposit a few young and then again take flight. This highly dispersive nature contributes significantly to their effectiveness as vectors of plant viruses. Parthenogenic reproduction is favored where continuous production of crops provides suitable host plants throughout the year, or where weather allows survival on natural (noncrop) hosts.

The offspring of these winged alates are wingless, and each produce 30 to 80 young. The rate of reproduction is positively correlated with temperature. As aphid densities increase or plant condition deteriorates, winged forms are again produced to aid dispersal. The dispersants typically produce about 20 offspring, which are always wingless. This cycle is repeated throughout the period of favorable weather. In Florida, this cycle repeats continuously, though in the northern areas of the state the aphid development rate slows greatly during the winter.

Scouting is important as development can be rapid, often 10 to 12 days for a complete generation, and over 20 annual generations per year may occur in mild climates. Large colonies can form seemingly overnight if crops are not checked regularly.

Silk fly

Around the EAA, silk flies have been common in corn close to the lake, growers and scouts report that some fields are experiencing as much 16% infestation when the corn was still 10 days from harvest.

Scouts are also seeing phorid fly damage in more areas with maggots hatching out early in fresh silks.

Silk fly are also becoming more common around Homestead as the season progresses.

Routine use of pyrethroids may suppress corn silk flies in sweet corn. Cultural practices also play an important role in suppressing corn silk fly population. Growers should avoid dumping culls and destroy rotten fruits and vegetables as these sources are preferred substrates for egg laying.

Broad Mite

Broad mites remain present a mostly low levels around South Florida.

Spider Mite

On the East Coast, spider mites are high in some eggs and crops near eggs like cucumber and pepper.

Elsewhere spider mites are beginning to build with the onset of hotter drier weather.

Stinkbug

Growers and scouts are reporting increasing problems with stinkbugs in tomato around South Florida. In the past stinkbug have primarily been a problem in organic tomato and were rarely seen in conventional tomato crops but this situation appears to be changing and some growers have reported increasing difficulty in controlling stinkbug when they show up.

Diseases

Cucurbit Downy Mildew

Respondents indicate that downy mildew has been active around South Florida in cucurbits like squash and cucumber. In some places, respondents report that cucumbers are being torn up by downy mildew.

Growers and scouts report that downy mildew has been active in watermelon and note they have been seeing new infections with recent foggy mornings.

Downy mildew caused by the fungus *Pseudoperonospora cubensis*, is found annually on squash, cucumbers, pumpkins, muskmelons, and other cucurbits in Florida.

The disease occurs on watermelons yearly in the south Florida but in northern Florida it may be present in some years but not others.

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.

Spores are easily dispersed by wind from one leaf spot to another leaf in a field or to another nearby planting. Under ideal conditions spores may be transported for many miles (sometimes hundreds of miles) from one field to another.

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 resistant varieties and/ or fungicide spray programs. Fungicide sprays are recommended for all cucurbits. Resistant varieties are currently available for some cucurbits and can help reduce fungicide applications.

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. Consult UF/IFAS recommendations for currently labeled fungicides for downy mildew control in Florida.

Lettuce downy mildew

Reports from the EAA indicated that lettuce downy mildew continues to creep around, but no major outbreaks have been reported.

These can be alternated with a preventative program of mancozeb and phosphite tank-mixtures and these should be alternated with a good translaminar or systemic fungicide more specific to downy mildew.

There is a large selection to choose from and growers should rotate among dissimilar chemistries for management of fungicide resistance.

Consult the UF/IFAS Vegetable Production Handbook for fungicides labeled for lettuce downy mildew in Florida.

Crucifer downy mildew

Reports from around South Florida indicate that crucifer downy mildew is increasing on cabbage, broccoli, collards, and mustard greens. Downy mildew of cruciferous crops is caused by the fungus *Peronospora parasitica*. All crucifers are susceptible.

Cool, wet conditions are conducive for the development of downy mildew. If temperatures are suitable, the disease will be more severe under overhead irrigation or conditions of high rainfall or heavy dews and fog,

Leaf symptoms usually appear on the underside of the leaf as black or dark specks on young leaves. These spots are often irregular in shape and may appear net-like. The upper side of the leaf will also develop dark spots similar in shape and may be accompanied by leaf yellowing.

On older leaves, these spots will often coalesce resulting in larger areas of the leaf blade having large, sunken, paper tan-colored spots. Leaf yellowing may accompany these symptoms.

On the underside of the leaf spots, a white-grey, downy growth can often be observed with or without the aid of a hand lens, especially when leaves are wet. On mature cabbage, downy mildew can appear as dark sunken spots on the head or wrapper leaves.

Cauliflower curds and broccoli heads can become infected with blackened areas on the outside of the tissue. The infection can become systemic and turn inner curd and stem tissue dark.

Downy mildew is controlled primarily by fungicides at the present time. Protectant fungicides should be applied at least weekly beginning when nighttime temperatures are conducive for sporulation and disease development and when rains, dews or irrigations are frequent or heavy.

Some of the newer fungicides are highly effective in controlling the disease but will typically have a limited number of applications and should be rotated between FRAC classes to reduce the possibility of the development of resistance and to help lengthen the effective lifespan of these fungicides.

Consult the UF/IFAS Vegetable Production Handbook for fungicides labeled for downy mildew of crucifers in Florida.

Powdery mildew

Powdery mildew is widely present and increasing in squash and beans in several locations around South Florida from Ruskin down to Homestead.

Growers and scouts report that powdery mildew has recently started to show up on watermelon around Immokalee.

Powdery mildew can develop rapidly under favorable conditions. Symptoms of powdery mildew of watermelon appear as yellow blotches on the oldest leaves first. If untreated the fungus quickly spreads to completely affect the entire leaf. As the disease progresses these blotches become bronzed and turn dark brown or purplish. Eventually the leaf dies and has a crisp texture.

White masses of sporulation that are frequently seen with other powdery mildews are not commonly seen with the powdery mildew of watermelon. In some cases, affected leaves may display the typical yellowing, bronzing, and a fair amount of white powdery fungal growth. Often little or no white powdery mycelia are present and, in these cases,, microscopy may be necessary to find a limited amount of the powdery mildew fungus in the yellowed areas. In some instances, powdery mycelia may be absent on the leaves but present on the fruit

Powdery mildew can cause fruit to be smaller in size, fewer in number, less able to be successfully stored, sun scalded, incompletely ripe, and have a poor flavor.

Growers who wish to minimize the risk of yield loss to powdery mildew should make preventative fungicide applications and scout fields regularly.

Tolerance or resistance to powdery mildew is available in some vegetable crops. Most commercial cucumber varieties grown in Florida have acceptable levels of resistance.

In addition to resistance, economic control can be achieved with chemicals. Under low disease pressure, some materials applied preventatively for downy mildew may provide satisfactory control of powdery mildew.

Consult UF/IFAS recommendations for currently labeled insecticides for powdery mildew control on cucurbits in Florida.

Target spot

Target spot continues to creep around in tomato around South Florida.

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.

Bacterial Blight

Common bacterial blight has been active in green beans around Belle Glade.

Stem lesions appear as long, reddish colored spots. When the plant begins to set fruit, lesions are formed at the nodes, which girdle the stem.

The disease can cause spots on the pods, which start as water-soaked (greasy) areas and later become surrounded by a brick-red border. Such spots cause severe quality loss in both fresh market beans and may result in rejection of an entire field.

It is especially important to avoid spreading the disease by keeping pickers and cultivators out of the field when the foliage is wet to reduce the amount of spread in the field.

Spraying with fixed copper is of some benefit if applied at first signs of the disease.

Gummy Stem Blight

Around SW Florida, gummy stem blight is mostly low but has flared up in some watermelons in recent week.

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.” 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 (BASF) a mixture of boscalid and pyraclostrobin, and Topsin (thiophanate methyl) have shown good efficacy against resistant strains of the disease.

Consult UF/IFAS recommendations for currently labeled fungicides for gummy stem blight control in Florida.

Northern corn leaf blight

In the EAA, northern corn leaf blight seems to have slowed somewhat due to warmer temperatures although some growers continue to battle it in a few places.

Southern Corn Leaf Blight

Respondents in the EAA and around Homestead indicate continued unseasonably warm weather has kept Southern corn leaf blight active on sweet corn around South Florida. In the EAA, it is most prevalent in corn planted behind fall/winter corn.

Lesions caused by southern corn leaf blight are much smaller (up to ½ inch wide and 1 inch long) than those caused by northern corn leaf blight. Southern blight lesions are also lighter in color (light tan to brown) and have parallel sides rather than the tapering sides of lesions caused by *E. turcicum*. A greenish growth near the center of the lesion may be evident if spores are present.

When severe, lesions may become so numerous that they coalesce and turn the entire leaf necrotic. Southern blight, like northern blight, moves from the lower canopy to the upper canopy.

Typically, lower leaves are infected first progressing upward to higher leaves over time. Occasionally, infections of the ear husk, silks, kernels, cob, and floral bracts in tassels occur.

Fungicides should be applied early, particularly if the forecast is for warm, humid weather. As with northern corn leaf blight, the sterol inhibitors and strobilurin fungicides are most efficacious. These products should be used together with a broad-spectrum protectant to minimize development of fungal resistance.

Consult UF/IFAS recommendations for currently labeled fungicides for northern and southern corn leaf blight control in Florida.

Phytophthora

Phytophthora has slowed down in most places with the onset of hot dry weather.

Fusarium

Around SW Florida, low levels of fusarium are being seen in tomato and watermelon.

Sclerotinia

Growers and scouts report that sclerotinia appears to be declining with warmer temperatures and dry weather.

Bean red node/Tobacco Streak Virus

Bean growers in Homestead are reporting severe issues with red node - caused by the thrips vectored tobacco streak virus. Bean red node is caused by a member of the genus Ilarvirus and is also known as Tobacco Streak Virus.

In beans, red node infection causes a reddish discoloration of nodes at the point of attachment of leaf petioles to stems. In severe cases, infected plants will flex or break at a discolored node. The veins and veinlets of infected leaves exhibit a red to reddish-brown streaking. Red to reddish-brown concentric rings form on pods which become shriveled or puffy and do not produce seeds. Plants can be severely stunted and killed by the virus.

In tomato, downward curling of leaf blades of tomato infected with tobacco streak is common. Leaf veins become necrotic which can lead to necrotic blotches, especially on young leaves. Fruit may develop necrotic ringspots. Necrotic streaks on young stems extend to flowers and leads to flower drop.

In escarole, tobacco streak virus causes escarole necrosis.

Tobacco streak virus has wide host range infecting more than 200 plant species. In addition to beans, other known hosts of the virus include cowpea, cucurbits, sweet clover, tomato and a number of weeds such as wild mustard and thistle.

Tobacco streak virus (TSV) or red node is efficiently transmitted vectored in the field by several species of thrips including western flower thrips, *Frankliniella occidentalis*, and onion thrips, *Thrips tabaci*.

Control of TSV is difficult. Chemical controls have not been developed for red node. Thrips control is ineffective but maintaining insect control programs is advised even though controlling insect vectors alone will probably not provide sufficient control of TSV.

The primary controls for this disease are mostly cultural. *It is always wise to use virus-free seed and to control weed hosts. No biological control strategies have been developed for the management of red node.*

Good ditch bank weed management and growing beans in large tracts to minimize border to field area ratio are the most effective means of controlling this disease. Typically, this requires advanced planning. Once beans are in the ground, there is little that can be done, so keep this in mind for next season.

Consult UF/IFAS recommendations for currently labeled insecticides for thrips control in Florida vegetables.

Stemphylium leaf spot

Leafy green producers in the EAA are experiencing problems with Stemphylium leaf spot in spinach.

Initial symptoms of Stemphylium leaf spot caused by the fungus *Stemphylium botryosum f. sp. spinacia*, on leaves consist of small (0.13 to 0.25 inch diameter), circular to oval, gray-green leaf spots. As the disease progresses, leaf spots enlarge, remain circular to oval in shape, and turn tan in color. Older spots coalesce, dry up, and become papery in texture. Visual signs of fungal growth are generally absent from the spots; hence this problem is readily differentiated from foliar diseases in which purple growth (downy mildew), green spores (Cladosporium leaf spot), or acervuli (anthracnose) develop within circular lesions.

Overall, symptoms resemble the tan, circular spots caused by pesticide or fertilizer damage. Weeds or other reservoir hosts have not been identified. This pathogen is seedborne.

Chemical control with fungicides is effective in reducing disease development. Miravis Prime and various azoxystrobin fungicides are recommended for control.

Tomato Yellow Leaf Curl Virus

Around SW Florida TYLCV is increasing dramatically with the recent spike in whiteflies. Incidence has reached 30-50% in some hard-hit fields. Some of these fields will not be harvested.

Growers are advised to plant resistant tomato varieties for the spring crop.

Respondents in Homestead indicate TYLCV incidence is increasing in a number of fields.

Tomato Chlorotic Spot Virus

Reports from Homestead report TCSV remains low in most tomato fields. TCSV is also showing up in some beans.

Growers and scouts in Palm Beach County report that TCSV is showing up couple pepper farms where incidence remains mostly low.

TCSV-infected tomatoes develop necrotic lesions of variable size, easily recognized necrotic and chlorotic spots, and ringspots on leaves, stems, petioles, flowers, and fruit. Symptoms are like those of GRSV and, to a lesser extent, some isolates of TSWV. Although apparently less common, chlorotic spots and ringspots may form prior to or at the same time as necrotic lesions. Following the onset of these symptoms, wilting and bronzing of the infected plant may occur. TCSV infections in young tomato plants may result in severe stunting and eventually death. Fruit from infected plants may show necrotic ringspots, necrotic spots, and distortion, rendering them unmarketable.

Symptoms in pepper plants include severe stunting, necrotic spots, necrotic ringspots, and severe leaf deformation. Fruit from infected pepper plants can be deformed and present ringspots and irregular coloring.

TCSV, like other members of the Tospovirus genus, is vectored by certain thrips species. As with other tospoviruses, TCSV is only acquired by the larval (1st and 2nd instar) stages of the thrips vector as they feed on infected plants.

TCSV is known to be transmitted by three species of thrips: common blossom thrips (*Frankliniella schultzei*), western flower thrips (*F. occidentalis*), and flower thrips (*F. intonsa*)

Surveys by Dr Scott Adkins et al have found TCSV on weeds such as purslane in production fields.

Cucurbit Crumple Leaf Virus and Cucurbit Yellow Stunting Disorder Virus

Growers and scouts report that cucurbit crumple leaf virus and cucurbit yellow stunting disorder virus is becoming more common in watermelon around SW Florida.

Bean Golden Mosaic Virus

Respondents from Homestead report that bean golden mosaic virus (BGMV) is present in snap beans.

News You Can Use

Operation Clean Sweep

The Florida Department of Environmental Protection and the Florida Department of Agriculture and Consumer Services announces the 2019-2020 Operation Clean Sweep program, a mobile pesticide collection effort that provides a safe way to dispose of cancelled, suspended, and unusable pesticides. The free service is available to farms/groves, greenhouses, nurseries, golf courses, and pest control entities.

For more information, including how to sign up, click here:

<https://floridadep.gov/waste/permitting-compliance-assistance/content/operation-cleansweep-pesticides>.

2019 - 2020 UF/IFAS Vegetable Production Handbooks

Copies are available at the Hendry County Extension Office in LaBelle, the Miami Dade County Extension Office, the Palm Beach County Extension office in West Palm Beach, the UF/IFAS Everglades Research and Education Center in Belle Glade and the UF/IFAS SW Florida Research and Education Center in Immokalee.

Up Coming Meetings

Due to the evolving corona virus situation, UF/IFAS Administration has mandated that ALL in-person group research and extension meetings through the end of April have been postponed (no exceptions).

March 24 Vegetable Growers Meeting – **online only**

Time: Mar 24, 2020 10:00 AM Eastern Time (US and Canada)

To participate remotely, click here: <https://ufl.zoom.us/j/109265507>

Vegetable Growers Meeting – Focus on Soil Fertility

10:00 AM - Welcome

10:00 AM - General soil fertility topics for vegetables – Dr Phillip Williams, Vegetable Horticulturist, UF/IFAS SWFREC.

10:30 AM - Scouting for Nutrient Deficiencies - Gene McAvoy, Regional Vegetable Extension Agent Emeritus

11:00 AM – Update on the FL Ag BMP Program - Vanessa Bessey, Office of Agricultural Water Policy, Florida Department of Agriculture and Consumer Services

11:20 AM – Florida Soil Testing Lab - Dr Rao Mylavarapu - Director of IFAS Analytical Services Laboratories, UF IFAS Soil & Water Sciences Department – video conference

11:40 - Estimating Nitrogen Release from Polymer Coated Fertilizer Materials Using Degree Days - Update on – Dr. Nael El-Hout, Wedgeworths Big W Brand Fertilizers

RUP CEU and CCA credit will be provided.

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 CEU's?

Here are a couple of ways to earn CEU's

UF/IFAS does offer a number of excellent videos and online modules, that will allow you to earn CEUS.

Go to <https://ifas-pest.catalog.instructure.com> where you will find a number of training modules for a variety of license categories which will allow you to earn CEU's online. Note: there is a charge for these.

Be sure to read the class description to make sure it offers CEU's in the category that you need.

Other options to earn CEU's include.

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.

Go to: CEU Series-Growing Produce

<https://www.growingproduce.com/crop-protection/ceu-series/>

- 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

Need more CORE CEUs –Earn CEU Credits NOW online through Southeast AgNet & Citrus Industry Magazine

The following series of articles and quizzes are available:

- 2019 #4: The fate of pesticides (10/31/2020)
- 2019 #3: Protecting soil and water while using pesticides (7/31/20)
- 2019 #2: At-a-glance safety information (4/30/20)
- 2019 #1: What is a pesticide, really? (1/31/2020)

Go to <http://citrusindustry.net/ceu/>

Worker Protection Standard Train the Trainer Classes Now On-Line

Exam Administrators - Cesar Asuaje, UF/IFAS Palm Beach County has developed and made available a new EPA-approved WPS Train the Trainer online option. See the following:

The Environmental Protection Agency (EPA) approved this online Worker Protection Standard Train the Trainer (WPS TTT) course, and upon successful completion, the Florida Department of Agriculture and Consumer Service (FDACS) will issue a WPS TTT certificate.

This certificate provides the qualification to train agricultural workers and pesticide handlers under the Worker Protection Standard requirements. The course was developed in collaboration with Ricardo Davalos, Florida WPS coordinator from FDACS.

Cost is \$35

The course is available in the IFAS Catalog at the following link: Certificate version: <https://ifas-farmlabor.catalog.instructure.com/courses/wps-ttt>

EPA-approved Fumigant training program for certified applicators using methyl bromide, chloropicrin, chloropicrin and 1,3-dichloropropene, dazomet and metam sodium and potassium. Applicators must retrain every 3 years. - <http://www.fumiganttraining.com/>

Check out Southwest Florida Vegetable Grower on Facebook

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

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