UF IFAS Extension UNIVERSITY of FLORIDA

HS1249

Peach Scab[1]

Daniel Mancero-Castillo, Mercy Olmstead, and Phillip Harmon[2]

There are many peach diseases that can affect fruit quality and the marketability of the produce. Blemishes to the skin or within the flesh can be a reason to reject an entire fruit load or significantly reduce the purchasing price.

Peach scab is a disease caused by the fungus *Cladosporium carpophilum*. The pathogen can infect other fruits and nuts within the *Prunus* species, like almonds, apricots, nectarines, and plums. Peach scab is common during periods of humid weather because rain splashes the conidia (asexual spores) from the fungus between leaves, twigs, and fruit in the tree canopy, which spreads the disease.

Shoot/Leaf Symptoms

Since spores of peach scab overwinter in raised lesions on shoots and bark, scouting for symptoms during the winter pruning process can help to determine disease management options. Infection in young, green shoots commonly begins with small, slightly raised, reddish-grey oval or circular lesions approximately 0.08 in (2 mm) in diameter. As shoots mature, the lesions expand to 0.1–0.3 in. (3–8 mm) and develop dark brown borders (Figure 1).

Leaf infections are generally less noticeable, and lesions appear on the underside of the leaves. Angular or imperfect circular areas are pale green and approximately 0.03 in. (1 mm) in diameter. Formation of conidia and conidiophores (upright structures that hold conidia) give the lesions an olive to dark green color. Longer and narrower lesions may appear on the midrib and petiole of leaves, with many leaves turning yellow by the end of the growing season. These leaf infections are of little concern, unless the infection is so great that the tree prematurely defoliates.

Fruit Symptoms

Peach scab causes sunken lesions on the skin of fruit (Figure 2). When disease pressure is high, small lesions become noticeable on the young, green fruit. As the fruit mature, these small lesions grow and begin to produce conidia and conidiophore. Large, dark lesions can be found

Figure 1. Peach scab lesions on green current-season peach shoots. Credits: H. Scherm, University of Georgia

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2. Daniel Mancero-Castillo, graduate student, Horticultural Sciences Department; Mercy Olmstead, assistant professor and Extension specialist, Horticultural Sciences Department; and Phillip Harmon, associate professor and Extension specialist, Plant Pathology Department; UF/IFAS Extension, Gainesville, FL 32611.

on mature fruit (Figure 3). Older lesions are grey to olive in color, circular, and well-defined. At this stage, lesions are approximately 0.7–0.2 in (2–5 mm) in diameter and a yellowish halo may surround the dark lesions in fruit with significant blush. In nectarines, peach scab lesions may appear pale green with a dark center.

Peach scab lesions should not be confused with raised scabs often caused by shot-hole disease (*Wilsonomyces carpophilus*; http://www.ipm.ucdavis.edu/PMG/r602100711.html). Purple margins with light tan centers differentiate shot hole lesions from those caused by peach scab.

Figure 2. Peach scab lesions on young fruit, showing sunken, dark green, imperfect circles where spores are located.
Credits: Phil Brannen, UGA.

The corky cell layer beneath peach scab lesions does not expand as the fruit grows. This causes cracks in the skin that can extend into the peach flesh, generating an entry point for secondary pathogens such as fruit rot organisms or fruit flies. Often, peach scab is found around the stem end of the fruit because of poor spray penetration into the canopy (Figures 3 & 4). Peaches are most susceptible during the shuck split stage of growth, while nectarines are most susceptible 1–2 weeks after petal fall. While the fruit are most susceptible at early developmental stages, disease management is important from fruit set to harvest in order to prevent significant skin damage.

Figure 3. Peach scab lesions on ripening fruit. Lesions occur on the top part of the fruit where water from rain or irrigation splashes spores down on the fruit.
Credits: Phil Brannen, UGA

Figure 4. Peach scab lesions on mature 'UFSun' fruit. Notice the highest concentration of lesions is located in the stem end where spray penetration was poor.
Credits: M. Olmstead

Disease Cycle

Peach scab can overwinter as mycelia (filamentous part of the fungi) in lesions or as chlamydospores (large, thick-walled structures) on vegetative tissue or in the bark of 1-year-old shoots. Chlamydospores are the main source of inoculum in an orchard. During the spring and summer, conidia are produced when relative humidity is at least 100% for 24 hours and temperatures exceed 60°F (16°C). The conidia (spores) are spread by wind or by rain splash. They can also be spread by irrigation systems such as those used for overhead frost protection during the early spring

(Figure 3). Wind dispersal is relatively minor compared to rain/irrigation splash, the major means by which fungal spores are spread.

In the southeastern United States, the highest risk for infection occurs between petal fall and shuck-split. (For more information on peach phenological stages, see http://www.clemson.edu/extension/peach/commercial/files/peachgrowthstages.jpg.) Because they lack fuzz, nectarine fruit can be infected earlier than peaches , so monitoring should begin earlier in the fruit development. In some parts of the southeastern United States, late infections are not of concern because of the long incubation period between infection and the appearance of symptoms (40–70 days); however, late infection remains a concern in Florida, where many of the low-chill peach varieties grown have a fruit developmental period of 70–90 days (for more information, see http://edis.ifas.ufl.edu/mg374).

During spring seasons with frequent precipitation, spray intervals should be shortened and fungicides should be rotated to avoid development of fungicide resistance. Current and historical weather data can be found for various statewide sites using the Florida Automated Weather Network (FAWN; http://fawn.ifas.ufl.edu/). A rainy spring season (compared to the long-term average for your location) will most likely prolong the period of fungicide application for peach scab.

Management

Planning during the orchard establishment phase should include proper site selection. Avoid low-lying areas with poor air circulation and soil drainage. Implementation of a monitoring program based on the presence of lesions on the bark (Figure 1) of the previous years' growth can help to determine relative potential for infection in the current year. Lesion numbers and sizes can be monitored while pruning and fruit thinning. Furthermore, inoculum sources can be reduced by removing wild or neglected stone-fruit trees growing nearby.

To date, there are no varieties that are resistant to peach scab. Cultural controls are limited to ensuring that proper pruning practices keep the tree canopy open in order to facilitate fungicide spray penetration. Fungicide sprays must be applied just before peak infection periods to provide maximum protection on developing fruit. The first infection period occurs at petal fall, followed by additional infection periods at shuck split, shuck-off, and cover sprays as fruit are developing (Table 1). Targeted sprays work well. They will be most effective during periods of high conidial production, from shuck split to 8 weeks after petal fall (Table 2). *Fungicide sprays act as a preventive technique; they do not eliminate scab inoculum from the field.*

Table 1. Key infection periods and suggested control strategies for optimal peach scab management.

Phenological stage	**Suggested control strategies**
Petal fall	Fungicide with antisporulant activity can reduce overwintering inoculum on twigs. Petal-fall and shuck-split sprays are key management periods to reduce potential fruit infection severity.
Shuck split	Use fungicides with contact and systemic actions during this period, when numbers of conidia are high.
Early cover sprays	Shorten spray intervals during periods with frequent rain to maintain fungicide protection on susceptible fruit.
Cover sprays	6–8 weeks after petal fall, likelihood of infection decreases. Spray intervals may be lengthened depending upon weather.

Table 2. Suggested fungicide options organized by efficacy for peach scab management during key phenological stages, their Fungicide Resistance Action Committee codes (FRAC codes), application rates, effectiveness, re-entry intervals (REI) and pre-harvest intervals (PHI) *Adapted from the Southeastern Peach, Nectarine, and Plum Management Guide**. Effectiveness is gauged from (+++++) = Excellent to (+) = Poor.

Material	FRAC code (2014)	Rate/acre	Effectiveness	REI/PHI	Remarks
Petal Fall to 1% Shuck Split					
sulfur *or*	M2	9–12 lbs.	+++	24 hrs./0 days	Petal-fall scab sprays are sometimes of little value. However, if conditions are particularly favorable for scab development, no strategy can undo infections that develop because of a missed spray.
chlorothalonil	M5	3–4 pts.	+++++	12 hrs./do not apply after shuck split	Chlorothalonil provides 14–21 days of scab control. Chlorothalonil is not labeled for use after shuck split.
Bravo Weather Stik or Bravo Ultrex WDG or Equus 720 or ECHO 720 *or* *captan* Captan 50W or 80WDG Captec 4L		2.8–3.8 lbs. 3–4 pts. 4–6 lbs. 2.5–3.75 lbs. 2–3 qts.			**Chlorothalonil and captan are severe eye irritants.** Although the restricted-entry interval expires after 12 hours, **for 7 days after use, entry is permitted only when the following safety measures are provided.** 1. At least one container designed specifically for flushing eyes must be available in operating condition at the mandatory WPS-required decontamination site. 2. Workers must be informed, in a manner they can understand: • that residues in the treated area may be highly irritating to their eyes. • that they should take precautions, such as refraining from rubbing their eyes to keep the residues out of their eyes. • that if they do get residues in their eyes, they should immediately flush their eyes using the eyeflush container that is located at the decontamination site or using other readily available clean water. • how to operate the eyeflush container.
captan	M4	4–6 lbs.	++++	24 hrs./0 days	
Azoxystrobin Abound	11	9.0–15.5 fl. ozs.	++++	4 hrs./0 days	For peaches only, 9.0–15.5 fl. ozs. can be used for scab control. For scab, begin applications at petal fall and continue at 7- to 14-day intervals per label. Do not apply more than two sequential applications of FRAC code 11 fungicides before alternating with a fungicide that is not in Group 11. For optimal resistance management, use Abound only once per year and follow up with chlorothalonil at shuck split.
Shuck Split to 10% Shuck Off					
sulfur *or*	M2	9–12 lbs.	++	24 hrs./0 days	
captan	M4	4–6 lbs.	++++	24 hrs./0 days	
Captan 50W or 80WDG		2.5–3.75 lbs.			Captan 50W rates may be increased to 8 lbs. /acre for larger trees. Do not exceed 64 lbs. Captan/acre/season. **Captan is a severe eye irritant.** See above special instructions for Captan safety.
Captec 4L *or*		2–3 qts.			
Azoxystrobin Abound	11	9.0–15.5 fl. ozs.	++++	4 hrs./0 days	For peaches only, 9.0–15.5 fl. ozs. can be used for scab control. For scab, begin applications at petal fall and continue at 7- to 14-day intervals. Do not apply more than two sequential applications of FRAC code 11 fungicides before alternating with a fungicide that is not in Group 11. For optimal resistance management, use Abound only once per year and follow up with chlorothalonil at shuck split.

Material	FRAC code (2014)	Rate/acre	Effectiveness	REI/PHI	Remarks
			7 to 10 Days after Shuck Split Spray		
sulfur	M2	9–12 lbs.	++	24 hrs./0 days	The addition of thiophanate-methyl (Topsin-M) at 1.25 lbs./acre can enhance scab control. If thiophanate-methyl is used here, it should be used only once and not in other earlier or later sprays because of potential for resistance.
or					
captan	M4	4–6 lbs.	++++	24 hrs./0 days	**Captan is a severe eye irritant.** See above special instructions for Captan safety.
Captan 50W or 80WDG		2.5–3.75 lbs.			
Captec 4L		2–3 qts.			
			Early Cover Sprays Before Harvest		
sulfur	M2	9–12 lbs	++	24 hrs/0 days	
or					
captan	M4	4–6 lbs	++++	24 hrs/0 days	Captan products provide enhanced scab and green fruit rot control.
Captan 50W or 80WDG		2.5–3.75 lbs			**Captan is a severe eye irritant.** See above special Instructions for Captan safety.
Captec 4L		2–3 qts			
or					
Azoxystrobin Abound	11	9.0–15.5 fl. ozs.	++++	4 hrs./0 days	For peaches only, 9.0–15.5 fl. ozs. can be used for scab control. For scab, begin applications at petal fall and continue at 7- to 14-day intervals. Do not apply more than two sequential applications of FRAC code 11 fungicides before alternating with a fungicide that is not in Group 11. For optimal resistance management, use Abound only once per year and follow up with chlorothalonil at shuck split.
tebuconazole Elite 45DF Orius 45DF Tebuzol 45DF	3	4 oz.	+++++	12 hrs./0 days	On larger trees, the per-acre rate may be increased to 8 oz. of Elite, Orius or Tebuzol.
fenbuconazole Indar 75 WSP	3	2 oz.	++	12 hrs/0 days	
difenoconazole plus anilinopyrimidine cyprodinil Inspire Super	3 + 9	16–20 fl. oz.	+++	12 hrs/0 days	
Qol/SDHI mix pyraclostrobin plus boscalid Pristine 38W	11 + 7	10.5–14.5 oz	++++	12 hrs/0 days	

Material	FRAC code (2014)	Rate/acre	Effectiveness	REI/PHI	Remarks
QoI/SDHI mix *pyraclostrobin* *plus* *fluxapyroxad* Merivon	11 + 7	4–6.7 fl oz	++++	12 hrs/0 days	Under certain conditions, mixtures of Merivon with adjuvants, additives and/or other products may cause crop injury, particularly to fruit within two weeks of harvest. *Do not* use Merivon with: • Emulsifiable concentrate (EC) or solvent-based formulation products. • Crop oil concentrate (COC), methylated seed oil (MSO) adjuvants.
or					
pyrazole-4-carboxamides Fontelis	7	14–20 fl oz	++	12 hrs/0 days	
Cover Sprays After Harvest					
sulfur	M2	9–12 lbs	++	24 hrs/0 days	The addition of thiophanate-methyl (Topsin-M) at 1.25 lbs/acre can enhance scab control. If thiophanate-methyl is used here, it should be used only once and not in other earlier or later sprays because of potential for resistance.
or					
captan Captan 50W or 80WDG Captec 4L	M4	4–6 lbs 2.5–3.75 lbs 2–3 qts	++++	24 hrs/0 days	**Captan is a severe eye irritant.** See above special instructions for Captan safety.