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Fruit and Nut Crops - Stone Fruits

Table 1. Symptoms, source of inoculum and management of nectarine, peach, plum and other stone fruit diseases.

Disease (Pathogen)	Disease Description
Armillaria root rot (*Armillaria* (= *Clitocybe*) spp.)	**Symptoms:** Trees appear weak with small, yellowish leaves over the entire tree or confined to one or two branches. The entire tree or single branches may die by the end of the summer or the next year. White mycelial growth can be found beneath the bark of roots or base of affected trees at or about the time of death. **Source of Inoculum:** These fungi live in soil and survive for many years in old, diseased roots. **Management:** Dig up and burn old roots before planting peach trees. Remove dead trees and as many roots as possible. Fumigate before replanting.
Brown rot blossom blight and/or fruit rot (*Monilinia* spp.)	**Symptoms:** Occurs on all stone fruits. The brown rot fungus causes blossom and twig blight, fruit rot and canker. Affected blossoms turn gray or light brown and are covered with spores if wet weather prevails. The fungus may invade twigs from infected blossoms, causing twig blight or canker. Fruit infection normally occurs as the fruit near maturity. Small circular light brown spots develop on fruit, often at insect wounds or spots where scab or other diseases occur. These spots enlarge rapidly if the fruit is mature, often rotting the whole fruit. Eventually, the spots become covered with a brownish-gray spore mass. **Source of Inoculum:** The fungus overwinters in peach "mummies" on the tree or ground and in twig cankers. **Management:** Remove affected peaches from the orchard at harvest. Remove and bury any peach "mummies" remaining on the trees before spring. Do not just knock fruit to the ground. Destroy wild plum thickets, abandoned stone fruit orchards and fence row seedlings as far away as possible from producing trees. Follow the stone fruit fungicide spray program.
Bacterial spot (*Xanthomonas arbicola* pv. *pruni*)	**Symptoms:** The disease occurs on leaves, twigs and fruit of almost all stone fruits. Leaf spots progress from grayish and water-soaked to deep purple, brown or black and are angular in shape. Spots fall out to give "shot-hole" appearance. Fruit are roughened with cracked, sunken spots. Small, thick-edged depressed spots occur on twigs and larger spots or cankers occur on branches or the trunk. **Source of Inoculum:** The bacterium survives from one year to the next in twig cankers and is primarily rain-splashed. **Management:** Obtain healthy, vigorous nursery stock free from bacterial spot cankers. Maintain vigorous growing conditions by proper cultivation and fertilization. *Resistant varieties*: La. Gold (immune), Bicentennial, La. Premiere (highly resistant), La. Feliciana, Sure Crop, Majestic, Ruston Red and Ouachita Gold.
Black knot (*Apiosporina=Dibotryon*) *morbosum*)	**Symptoms:** This disease occurs on plum and cherry. Large, rough, coal black, hard swellings or knots occur along the branches, frequently several inches long. **Source of Inoculum:** The fungus survives in infected tissue of knots or swellings. **Management:** Prune and burn diseased branches during the fall or winter, making the cut at least 4 inches below the visible infection. Destroy badly infected trees. Remove wild plums in the vicinity of desirable trees.
Crown gall (*Agrobacterium tumefaciens*)	**Symptoms:** Occurs on many fruits including apple, pear, peach and plum. Affects roots and crown of host plant, causing galling of tissue and reduction in the movement of water and nutrients through the plant. **Source of Inoculum:** This bacterium lives in the soil. **Management:** Check planting stock for galls or swelling and rogue-infected plants. Treat before planting with Galltrol.
Peach leaf curl (*Taphrina deformans*)	**Symptoms:** This disease occurs only on peach trees. It has not been a problem in Louisiana, except on first-year trees. It apparently does not live over the summer here. In spring, when leaves first appear, they are thickened, and as they develop, the blades becomes puffed and folded with the edges curling inward so that the undersurface of the leaf is a series of concave chambers. Affected leaves become reddish or purplish, later becoming reddish-yellow and shedding. **Source of Inoculum:** The fungus lives from one year to the next on limbs or on the ground. **Management:** Monitor trees for symptoms. Apply fungicides if disease is confirmed.

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Disease (Pathogen)	Disease Description
Phony peach (*Xylella fastidiosa*)	**Symptoms:** Trees are dwarfed, foliage is abnormally green and fruit remain small. Phony trees have short terminals and profuse lateral branching. Growth starts in the spring earlier than on normal trees. **Source of Inoculum:** This bacterium lives in infected trees of many species and is spread by xylem-feeding insects and root grafting. **Management:** Rogue out and burn all infected trees. Also, destroy wild plum and peach seedlings in the neighborhood of producing trees.
Rhizopus rot (*Rhizopus* spp.)	**Symptoms:** Normally an important postharvest disease of fruit only. Fruit breaks down quickly into a soft, watery rot after harvest and is covered with "whiskers" or raised white fungal growth with little black spores. **Source of Inoculum:** Spores are present in soil on organic matter and airborne. **Management:** Avoid wounding the fruit. Practice sanitation within and around the packing shed. Spray with Botran before harvest.
Rust (*Tranzschelia discolor*)	**Symptoms:** The disease occurs on leaves, twigs and fruit of almost all stone fruits. Brown pustules occur on the lower leaf surface, marked by a yellowish spot on the upper surface. It may cause leaves to drop prematurely, lowering tree vigor. **Source of Inoculum:** The fungus overwinters as mycelium in twigs or as spores on twigs or leaves clinging to the tree. **Management:** Follow the stone fruit fungicide spray program.
Scab (*Cladosporium carpophilum*)	**Symptoms:** The disease occurs on leaves, twigs and fruit of almost all stone fruits. Spots on fruit are small, circular, dark olive-greenish and usually about 1/16 to 1/8 inch in diameter. Spots may be distinctly separate or merge, giving a velvety blotch appearance to half or more of the fruit (usually on the attachment end). Spots are superficial, but cracking or distortion of fruit may follow early or severe infection. **Source of Inoculum:** The fungus lives from year to year in infected twigs. **Management:** Prune to allow increased air circulation. Avoid low-lying planting sites. Follow the stone fruit fungicide spray schedule.

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Table 2. Seasonal fungicide spray schedule for peach, nectarine, plum and other stone fruit. Table was developed based on recommendations from the 2014 Southeastern Peach, Nectarine and Plum Pest Management and Culture Guide (http://www.ent.uga.edu/peach/PeachGuide.pdf).

Developmental Stage	Pesticide Application Timing[1]	Diseases
Dormant	After leaf fall and before bud swell	Bacterial spot Leaf curl
Delayed dormant	1-5 % bud swell	Bacterial spot Leaf curl
Early bloom	Less than 5% bloom	Bacterial spot Black knot
Bloom	Full bloom	Black knot Blossom blight
Postbloom	Petal fall to 1% shuck split	Bacterial spot Black knot Scab
	Shuck split to 10% shuck off	Bacterial spot Scab
	7-10 days after shuck split spray	Bacterial spot Scab
Summer cover sprays	7- to 21-day intervals, usually 14 days	Bacterial spot Scab
Preharvest	21 days before harvest	Brown rot (only if disease pressure is high)
	14 and 7 days (or less) before harvest	Botrytis rot Brown rot Rhizopus rot
Postharvest fruit handling		Botrytis rot Brown rot Gibertella rot Rhizopus rot

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Table 3. Efficacy of selected fungicides against peach, nectarine and plum diseases. Table was reproduced from the 2014 Southeastern Peach, Nectarine and Plum Pest Management and Culture Guide (http://www.ent.uga.edu/peach/PeachGuide.pdf).
Efficacy ratings: - = no benefit; + = suppression; ++ = poor; +++ = fair; ++++ = good activity; +++++ = excellent; and ++++++ = superior. No data are provided for products not labeled for the specific disease or if the efficacy is unknown. These ratings are benchmarks; actual performance will vary.

Chemical name (Fungicide product name)	**Leaf curl**	**Bacterial spot**	**Blossom blight**	**Scab**	**Anthracnose**	**Red spot**	**Sooty peach**	**Brown spot**	**Rhizopus rot**
oxytetracycline **(Mycoshield, Fireline)**	-	+++[R]	-	-	-	-	-	-	-
azoxystrobin **(Abound)**	-	-	-	++++ [R]	++++	-	-	++++ [R]	-
trifloxystrobin **(Gem)**	-	-	-	++++ [R]	++++	-	-	++++ [R]	-
captan **(Captan, Captec, etc.)**	-	-	++	++++	+++	-	++	+++	+
chlorothalonil	++++	-	+++	++++	-	-	-	-	-
coppers **(various products)**	+++	+++[R]	-	-	-	-	-	-	-
(Botran)	-	-	+	-	-	-	-	+	++
(Ferbam)	++++	-	-	-	-	+++	-	-	-
iprodione **(Rovral)**	-	-	++++	-	-	++	++	-	-
boscalid + pyraclostrobin **(Pristine)**	-	-	+++++	++++	++++	-	-	+++++	+++
(Fontelis)	-	-	++++	++		-	-	++++ [R]	+
(Merivon)	-	-	++++++	++++	++++	-	-	++++++	+++
cyprodinil + difenoconazole **(Inspire Super)**	-	-	+++++	+++		-	-	+++++	
(Scholar)	-	-	-	-	-	-	-	+++++	++++
tebuconazole + trifloxystrobin **(Adament)**	-	-	+++	++++	+++	-	-	+++	++
azoxystrobin+	-	-	++++	++++	+++	-	-	++++	++

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Chemical name (Fungicide product name)	Leaf curl	Bacterial spot	Blossom blight	Scab	Anthracnose	Red spot	Sooty peach	Brown spot	Rhizopus rot
difenoconazole **(Quadris Top)**									
sulfur **(various)**	-	-	+	+++	-	-		+	-
tebuconazole **(Elite, Orius, Tebuzol)**	-	-	+++++	-	-	-	-	+++++ [R]	-
(Thiram)	+++	+	-	+	-	+++	+++	-	-
(Topguard)	-	-	++++	-	-	-	-	++++ [R]	-
thiophanate-methyl **(Topsin M, Thiophanate-methyl)**	-	-	++++ [R]	++++ [R]	-	-	-	++++ [R]	-
pyrimethanil **(Vangard, Scala)**	-	-	++++	-	-	-	-	-	-
fludioxonil **(Scholar)**	-	-	-	-	-	-	-	+++++	++++
(Orbit, PropiMax, Bumper)	-	-	++++	-	-	-	-	++++ [R]	-
(Rally)	-	-	+++	-	-	-	-	+ [R]	-
fenbuconazole **(Indar)**	-	-	+++++	++	-	-	-	+++++ [R]	-
metconazole **(Quash)**	-	-	+++++	-	-	-	-	+++++ [R]	-
(Ziram)	+++	+	-	+	-	+++	+++	-	-

[R]Resistance (or occasional failure of control) has been observed in some southeastern states; thus, if control failure occurs, it could indicate resistance has developed. The efficacy rating could be affected by resistance development. If resistance has occurred, use of fungicides in the same class would likewise show resistance, and a substitute fungicide should be considered for pathogen management.

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Table 4. Recommended pesticides, rates and pesticide use restrictions for pear, nectarine, plum and other stone fruit.

Chemical Name (Product Mode of Action Group[1])	Product Name[2]	Rate[3]	Maximum Use	PHI[4]	Comments
aluminum tris (33)	Aliette	5 lb/100 gal	20 lb	NA	Controls collar and root rot caused by *Phytophthora* spp. Apply only to trees that will not produce fruit for 12 months.
azoxystrobin (11)	Abound Willowood Azoxy 2SC	12-15.5 fl oz 12-15.5 fl oz	92.3 fl oz 92.3 fl oz	0 0	See labels for application timings specific to each disease.
azoxystrobin + difenoconazole (11, 3)	Quadris Top	12-14 fl oz	56 fl oz	0	See label for application timings specific to each disease.
azoxystrobin + propiconazole (11, 3)	Quilt Xcel	14 fl oz	70 fl oz	0	See label for application timings specific to each disease.
boscalid + pyraclostrobin (7, 11)	Pristine	10.5-14.5 oz	72.5 oz	0	
captan (M4)	Captan 50WP Captan 80WDG Captec 4L	4-8 lb 2.5-5 lb 0.75-1 qt/100 gal	24-32 lb ai 30-40 lb 24-32 qt	0 0 0	See label for rates specific to each commodity and disease.
chlorothalonil (M5)	Bravo Ultrex[5] Chloronil 720[6] Echo 90DF Equus DF	2.8-3.8 lb 3.1-4.1 pt 2.25-3 lb 2.8-3.8	18.8 lb 20.5 pt 15.5 lb ai 16.9 lb	0 0	Do not apply Bravo Ultrex or Echo 90DF after shuck split or before harvest.
copper hydroxide (M1)	Badge SC Badge X2 Champ WG Champ Formula 2 Kentan DF Kocide 3000 Kocide 2000	5-14 pt 3.5-7 lb 8-16 lb 5.33-10.66 pt 6-16 lb 3.5-7 lb 6-12 lb	63.4 pt 18 lb 36 lb 49.6 pt 18 lb 60 lb 51.4 lb	21 21 21 21 21 6 app 21	See label for application rates specific to each disease.
copper sulfate (M1)	**Cuprofix Ultra 40 Disperss** **Cuproxat** **Top Cop with Sulfur**	5-7.5 lb 10-20 pt 0.75-1.26 qt/100 gal	45 lb 88.7 pt	 21	Do not apply Cuprofix Ultra 40 Disperss after shuck split.
copper sulfate + copper oxychloride	**C-O-C-S WDG**	12-15.6 lb (dormant) 1-2.9 lb (bloom)	35 lb		

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Chemical Name (Product Mode of Action Group[1])	Product Name[2]	Rate[3]	Maximum Use	PHI[4]	Comments
(M1)					
cyprodinil (9)	**Vangard WG**	5 oz	30 oz	2	No more than 2 applications by air.
difenoconozole + cyprodinil (3, 9)	**Inspire Super**	16-20 fl oz	80 fl oz	2	No more than 2 applications by air.
dicloran (14)	**Botran 75W**	2 lb	5.3 lb	10	
fenbuconazole (3)	**Indar 2F**	6 fl oz	48 fl oz	0	Do not graze livestock in treated areas or feed livestock cover crops grown in treated areas.
fludioxonil (12)	**Scholar**	8-16 oz/100 gal	1 app	16 oz	Use as a postharvest dip to control brown rot, gray mold, Rhizopus rot and Gilbertella rot. Dip for 30 sec and allow fruit to drain.
fenhexamid (17)	**Elevate 50WG**	1.5 lb (alone) 1-1.5 lb (tank mix)	6 lb	0	
fluxapyroxad + pyraclostrobin (7, 11)	**Merivon**	4-6.7 fl oz	20.1 fl oz	0	
iprodione (2)	Iprodione 4L AG Meteor Nevado 4F Rovral Flowable	1-2 pt 1-2 pt 1-2 pt 1-2 pt	2 app 2 app 2 app 2 app		Do not apply after petal fall.
mefenoxam (4)	Ridomil Gold SL	2 qt	3 app		**Soil application only.** Apply to the soil to cover the entire root zone. Do not apply to trees under stress. Do not graze livestock in treated areas or feed livestock cover crops grown in treated areas.

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Chemical Name (Product Mode of Action Group[1])	Product Name[2]	Rate[3]	Maximum Use	PHI[4]	Comments
metconazole (3)	Quash	2.5-4 oz	12 oz	14	See label for application rates specific to each disease. Do not make more than two applications AFTER petal fall.
myclobutanil (3)	Eagle 20EW Rally 40WSP	2-3 fl oz/100 gal 2.5-6 oz	84-100 fl oz 2.75-3.25 lb	0 0	See label for maximum application rates specific to each commodity.
oxytetracycline (41)	Mycoshield	12 oz/100 gal	12 lb	21	Bacterial spot management only.
phosphite (33)	Confine Extra Fosphite Fungi-phite Helena Prophyt Rampart	1-3 qt (foliar) 1-3 qt 1-2 qt 2 pt 1-3 qt	NA NA NA 4 apps NA	0 0 0 0 0	See label for root dip and trunk injection rates.
propiconazole (3)	Propiconazole Banner MAXX Bumper 41.8EC Bumper ES Fitness Procon-Z Strider Tilt Topaz Willowood Propicon 3.6EC	 4 fl oz 2-4 fl oz/100 gal 4 fl oz 4 fl oz 4 fl oz 2-4 fl oz/100 gal 2-4 fl oz/100 gal 4 fl oz 4 fl oz 4 fl oz	 20 fl oz see label 20 fl oz 20 fl oz 20 fl oz see label see label 20 fl oz 20 fl oz 20 fl oz	 0 0 0 0 0 0 0	Do not apply Banner MAXX, Strider or Procon-Z to trees that will bear harvestable fruit within 12 months.
propiconazole + thiophanate-methyl (3, 1)	Protocol	1.3-3.75	6.6 pt	1	See label for application rates specific to each disease.
pyrimethanil (9)	Scala SC	9-18 fl oz	54 fl oz	2	Do not use on cherries.
sulfur (M2)	Liquid Sulfur Six Microfine Sulfur Microthiol Disperss Yellow Jacket Wettable Sulfur	0.66-2.75/100 gal 40-50 lb 10-20 lb 40-50 lb	NA NA NA NA		
tebuconazole (3)	Elite 45WP Orius 20AQ Tebuzol 45DF	4-8 oz 8.6-17.2 oz 4-8 oz	3 lb 103 oz 3 lb	0 0 0	The amount of Orius 20AQ depends on tree size and the amount of foliage present.

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Chemical Name (Product Mode of Action Group[1])	Product Name[2]	Rate[3]	Maximum Use	PHI[4]	Comments
tebuconazole + trifloxystrobin (3, 11)	Adament 50WG	4-8 oz	32 oz	1	
thiophanate-methyl (1)	Cercobin Incognito 4.5F T-Methyl 4.5F T-Methyl 70WSB Thiophanate methyl 85WDG Topsin 4.5FL Topsin M 70WP Topsin M WSB	21.8-32.7 fl oz 20-30 fl oz 20-30 fl oz 1-1.5 lb 0.8-1.2 lb 20-30 fl oz 1-1.5 lb 1-1.5 lb	82.7 fl oz 80 fl oz 80 fl oz 4 lb 3.3 lb 80 fl oz 4 lb 4 lb	1 1 1 1 1 1 1 1	T-methyl 4.5F can only be applied to peaches and cherries during nonbearing years of new plantings and nursery stock.
trifloxystrobin (11)	Gem	1.9-3.8 fl oz	15.2 fl oz	1	
ziram (M3)	Ziram	3.75-10 lb	40-72 lb	14	See label for rates specific to each commodity and disease.

[1]Reference to commercial or trade names is made with the understanding that no discrimination or endorsement of a particular product is implied by LSU or the LSU AgCenter.
[2]Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).
[3]Rates are the amount of formulation per acre unless otherwise indicated. Usually 100 gallons of water are required to give good coverage with boom sprayers.
[4]Postharvest interval (PHI) is the minimum number of days allowed between the last application and harvest.
[5]Other generic products include Daconil Ultrex and Ensign 82.5.
[6]Other generic products include Bravo Weather Stik, Chlorothaloil 720SC, Docket WS, Echo 720 or Ensign 720 (do not apply after shuck split), Initiate 720, Equus 720SST and Daconil Weather Stik.

Information in the stone fruit section was last updated December 2019 by Dr. R. Singh.