Pecan

Integrated Pecan Disease Management

Management of diseases and insects is essential for profitable pecan production in Louisiana. Commercial pecan producers must spray at the proper time with recommended fungicides and insecticides. Learning to identify the major insect pests and diseases of pecans is highly desirable and strongly recommended. To obtain adequate disease control and receive maximum benefit from applied fungicides, spray applications must be made on a preventive program. In addition to spraying, cultural practices and sanitation can reduce the severity of certain insects and disease problems. Commercial growers as well as homeowners should follow these practices. More information on pecan IPM can be found on the Pecan IPM-PIPE website (http://pecan.ipmpipe.org).

Plant resistant cultivars: Pecan scab is the most widespread and destructive disease of pecans. Selecting cultivars that are resistant or tolerant to pecan scab is recommended (Table 1), especially in southern Louisiana where warm and humid conditions favor disease development. It is important to note that a particular variety may be resistant to scab in one location but susceptible to scab in another location. Contact your parish agent to identify cultivars suitable for your area. For a full description of pecan cultivars go to http://cgru.usda.gov/CARYA/PECANS.

Use good sanitation practices*:* Certain leaf diseases such as scab and insects such as the hickory shuckworm overwinter on shucks and leaves. If these are raked and burned, it will help reduce the severity of these problems to some extent the following year. Prune dead and broken limbs from trees to remove potential habitats for certain insects and diseases.

Use optimal levels of fertilizer*:* Proper fertilization will increase production and boost pest control. Well-maintained pecan trees are less susceptible to attack by certain diseases and insects. Consult the LSU AgCenter's Louisiana Cooperative Extensive Service for information on leaf and soil sampling techniques, fertilization and cultural practices.

Ensure good spray coverage*:* Good spray coverage is essential for good disease control and, to a lesser extent, for insect control. A large air blast sprayer (speed sprayer) has proven very satisfactory for treating large acreages of pecan trees for control of insects and diseases.

Use registered chemicals: The potential for developing isolates of pathogens resistant to fungicides is high in pecan production. To slow the development of resistant pathogen populations:

1. Develop a spray program that uses fungicides with different modes of action.
2. Avoid consecutive sprays with fungicides with the same or similar modes of action.
3. Only use the labeled rates of recommended fungicides.

More information on fungicide resistance management can be found in the front of this guide.

Disease

Symptoms, source of inoculum and management of pecan diseases.

Disease	Symptoms	Source of Inoculum	Management
Anthracnose (*Colletotrichum* spp., *Glomerella cingulata*)	Brown-black sunken lesions on the leaves and shucks. In the spring and early summer cream- to salmon-colored spores form on shuck spots.	Spores are dispersed in the spring and early summer by rainfall.	Plant resistant varieties. Remove and destroy diseased plant material. No fungicides are available for homeowners. Commercial fungicides are listed in Table 3.
Bacterial leaf scorch (*Xylella fastidiosa*)	Symptoms of bacterial leaf scorch include chlorotic mottling of the leaves that starts from the tips and margins and progresses toward the midribs. As disease develops, leaf tips and margins become necrotic. Once a tree is infected, there is no cure.	The bacterium resides in the xylem vessels (water-conducting channels) of the tree, where it multiplies and blocks these channels and eventually obstructs the flow of water and nutrients within the plant. The bacterium is transmitted and spread by xylem-feeding insects, such as sharp shooters, leaf hoppers or spittle bugs.	There are no chemicals available to manage bacterial leaf scorch. Cultural practices that improve plant vigor, such as proper watering and fertilization, may help the infected plants to live longer. Pruning symptomatic branches will not save the plant. Detection and removal of infected plants at early stages may help reduce subsequent spread of the pathogen. Management of insects that transmit bacterial leaf scorch is critical to prevent disease spread.
Brown leaf spot (*Cercospora* spp.)	Early leaf spots are circular, reddish-brown and often develop grayish concentric zones. Spots become irregular later. Nuts are not susceptible to this disease. Usually, a problem when trees lack vigor or where rainfall is unusually high. Premature defoliation often occurs when disease is severe.	Fungus lives from year to year in infected spots on the old leaves. Spores are windborne.	Water and fertilize trees to improve vigor. Fungicides that control scab also control brown leaf spot although not all scab fungicides are labeled for brown leaf spot (see Table 3). Follow the pecan spray schedule.
Downy spot (*Mycosphaerella* spp.)	Appear in late spring or early summer as downy spots on the undersides of the leaflets. Later, greenish-white spots about 1/8 inch in diameter are visible on both sides of the leaves. As the season advances, the color of the spots changes to brown.	Fungus lives from year to year in infected leaves.	Plant resistant or tolerant varieties (i.e., Schley, Success, Mahan and Western). Remove and discard fallen leaves. Follow the pecan spray schedule.
Powdery mildew (*Microsphaera alni*)	This disease affects both foliage and nuts, forming a white superficial fungal growth early in the growing season. Nuts are affected more adversely than foliage. Nuts infected early in the season may abort or be undersized.	Infected leaf and shuck debris.	Plant cultivars that are less susceptible to disease. Include sulfur in the June, July and August sprays at the rate of 6 lb per 100 gallons or follow the pecan spray schedule. A regular scab spray program will manage powdery mildew.

Disease	Symptoms	Source of Inoculum	Management
Scab (*Cladosporium carpophilum*, *C. caryigenum*)	Early leaf infections produce pinpoint olive-brown lesions often on veins of undersides of leaves. Spots enlarge and coalesce until large areas of leaves may become almost black. Lesions on nuts are small, black and circular, slightly raised at first but later sunken. The entire surface of nuts of highly susceptible varieties may appear black from extensive infections.	Fungus may overwinter in infested shucks, leaf stems or leaves. The fungus is spread by windborne spores and is boosted by high humidity.	Knock off old shucks and stems before spring. Prune out low limbs to improve air circulation in orchard. Fungicides that control brown leaf spot also control brown leaf spot. Follow the pecan spray schedule.
Shuck dieback and stem end blight (*Phomopsis* spp. and other fungal pathogens)	Disease is more severe in overcrowded orchards or trees that are water or nutrient stressed. The shuck turns black and begins to die near the tip of the nut. The blackened area can spread over the entire shuck, and the shuck may flare open. Stem end blight begins as a brownish black spot on the shuck near the base of the nut. The black area enlarges to cover the entire nut and the nut is easily dislodged from its stem.	Fungi overwinter is dislodged nuts.	Reduce tree stress by irrigating sufficiently to support the crop load. Thin trees to avoid overcrowding. No fungicides are effective at controlling shuck dieback and stem end blight.
Vein spot (*Gnomonia nerviseda*)	Spots (lesions) may originate on vein of leaflets or on leaf stem and are dark brown to black in final stages. On lateral veins, lesions are circular or oval and seldom attain a diameter of more than 1/4 inch. On midribs of leaflets and on leaf stems, spots are long and narrow. When the disease is severe, premature defoliation usually occurs.	Fungus lives through the winter on fallen leaves.	The pre-pollination spray and first cover sprays are essential for control.
Zonate leaf spot (*Cristulariella moricola*)	Grayish-brown spots on the upper surface of leaves. Leaf spots are light brown with dark margins on the underside of the leaf. Spots have a concentric ring formation that is more distinct on the leaf underside. Severely infected leaves dry and curl and drop from the tree. Severe defoliation of pecan trees occurs during rainy summers.	The fungus overwinters in resting bodies, called sclerotia, on plant debris. Leaf wetness in the spring initiates new infections.	No known cultivars are resistant to this disease. Remove wild hosts (i.e., hackberry, sassafras, Virginia creeper and poison oak) of the fungus from around the orchard. Prune lower branches to promote airflow and leaf drying. Follow the pecan spray schedule.

Table 1: Pecan varieties and disease resistance profiles.

Table Legend

Resistance Category	Abbreviation
Very Susceptible	VS
Susceptible	S
Tolerant	T
Resistant	R
Unknown	-

Cultivar	Pecan Scab	Downy Spot	Powdery mildew	Shuck dieback	Vein spot	Zonate leaf spot
Caddo	T-S	-	S	-	-	-
Candy	R-T	-	-	-	-	S
Cape Fear	T-S	-	-	-	-	S
Creek	T	-	-	-	-	S
Desirable	S	-	-	-	-	S
Elliott	R	-	-	-	-	S
Excel	R	-	-	-	-	S
Gloria Grande	S	-	-	-	-	S
Jackson	T-S	-	-	-	-	S
Kanza	R	-	-	-	S	-
Kiowa	T-S	-	-	-	-	-
Mahan	VS	R	-	-	-	S
Melrose	T-S	-	-	T	-	-
Moreland	T	-	-	-	-	S
Schley	VS	R	-	S	-	S
Success	VS	R	-	S	-	S
Sumner	R-T	-	-	-	-	S
Western	VS	S	-	S	-	S

Table 2: Spray Schedule

Season	Fungicide Application Timing	Disease
First pre-pollination	When leaves are at least 1 inch long	Anthracnose
First pre-pollination	When leaves are at least 1 inch long	Downy spot
First pre-pollination	When leaves are at least 1 inch long	Scab
First pre-pollination	When leaves are at least 1 inch long	Vein spot
First pre-pollination	When leaves are at least 1 inch long	Zonate leaf spot
Second pre-pollination	When leaves have grown (or 10-14 days after first spray)	Anthracnose
Second pre-pollination	When leaves have grown (or 10-14 days after first spray)	Downy spot
Second pre-pollination	When leaves have grown (or 10-14 days after first spray)	Scab
Second pre-pollination	When leaves have grown (or 10-14 days after first spray)	Vein spot
Second pre-pollination	When leaves have grown (or 10-14 days after first spray)	Zonate leaf spot
First cover spray	2-3 weeks after previous spray	Downy spot
First cover spray	2-3 weeks after previous spray	Scab
First cover spray	2-3 weeks after previous spray	Vein spot
Second cover spray	2-3 weeks after previous spray	Scab
Third cover spray	2-4 weeks after previous spray	Scab
Fourth cover spray	2-3 weeks after previous spray	Scab
Fifth cover spray[1]	3-4 weeks after previous spray	Scab
Sixth cover spray	Do not apply fungicides after shuck split.	Scab

[1] Sprays may be omitted during dry weather.

Table 3: Anthracnose (*Colletotrichum* spp., *Glomerella cingulata*)

Product Choices[1]	Product Mode of Action Group (FRAC)[2]	Rate[3]	PHI[4]	Maximum Use
Abound	11	12 fl oz	45	73.8 fl oz
Aframe	11	12 fl oz	45	73.8 fl oz
Azaka[5]	11	6-12 fl oz	45	73.8 fl oz
AzoxyStar	11	6-12 fl oz	45	73.8 fl oz
Satori	11	6-12 fl oz	45	73.8 fl oz
Willowood Azoxy 2SC	11	6-18.5 fl oz	14	49 fl oz
Custodia[6]	3, 11	8.6-17.2 fl oz	45	69 fl oz
Luna Sensation	7, 11	4-7.6 fl oz	14	27.1 fl oz
Orius[5]	3	4-6 fl oz	see footnote	32 fl oz
Pristine	7, 11	10.5-14.5 oz	14	32 fl oz
Quilt	11, 3	14-27.5 fl oz	45	58 oz
Quilt Excel	11, 3	14-21 fl oz	45	122 fl oz
Regalia	P5	0.5-1 qt	0	122 fl oz
Stratego[5]	3, 11	10 fl oz	30	-
Absolute 500SC	3, 11	5-7.7 fl oz	30	30 fl oz
Adament 50WG	3, 11	4-8 oz	60	46 oz
Topguard	3, 11	7-14 fl oz	14	32 oz
Viathon[5]	3, 33	2 pt (early season only)	see footnote	56 fl oz
Willow AzoxyProp[5]	3, 11	14-21 fl oz	45	115 fl oz
Ziram 76DF	M	6-8 lb	55	48.2 lb

[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 formation 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] Do not apply to trees that will bear fruit within 12 months.

[6] Do not apply after shuck split

Table 4: Brown leaf spot (*Cercospora* spp.)

Product Choices[1]	Product Mode of Action Group (FRAC)[2]	Rate[3]	PHI[4]	Maximum Use
Elast[5, 6]	M	3 pt	See footnote	18 pt
Eminent VP[6]	3	6-16 fl oz	30	64 fl oz
Banner MAXX[5,6]	3	12 fl oz	See footnote	24 fl oz
Bumper ES[5,6]	3	4-8 fl oz	See footnote	32 fl oz
Procon-Z[5,6]	3	12 fl oz	See footnote	32 fl oz
Topaz[5,6]	3	4-8 fl oz	See footnote	32 fl oz
Orbit[5,6]	3	4-8 fl oz	See footnote	32 fl oz
Protocol[6]	1, 3	1.3-2.5 pt	See footnote	7.5 pt
Monsoon[6,8]	3	4-8 fl oz	See footnote	32 fl oz
Onset 3.6L[6,8]	3	4-8 fl oz	See footnote	32 fl oz
Orius 3.6F[6,8]	3	4-8 fl oz	See footnote	32 fl oz
Thiophanate-methly 85WDG	1	0.4-0.8 lb	1	2.5 lb
Topsin M 70WP[6]	1	1 lb	See footnote	3 lb
Topsin XTRA 2[6,9]	1, 3	25 fl oz	See footnote	See footnote
Agri Tin	30	5-7.5 oz	30	45 fl oz
Super Tin 80WP	30	5-7.5 oz	30	45 fl oz
Viathon[6,7]	3, 33	2-2.5 pt	See footnote	16.5 pt

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2 Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).

3 Rates are the amount of formation 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 Do not apply to trees that will bear fruit within 12 months.

6 Do not apply after shuck split.

7 Use 2 pt per acre early in the season and 2-2.5 pt per acre post pollination.

8 Also registered are: Tebu-Crop 3.6F, Tebuzol and Topaz.

9 Do not exceed a total application of 2.1 lb a.i. thiophanate-methyl and 0.9 lb a.i. tebuconazole per year.

Table 5: Downy spot (*Mycosphaerella* spp.)

Product Choices[1]	Product Mode of Action Group (FRAC)[2]	Rate[3]	PHI[4]	Maximum Use
Custodia	3, 11	8.6-17.2 fl oz	45	69 fl oz
Elast[5,6]	M	3 pt	See footnote	18 pt
Enable 2F[6]	3	8 fl oz	28	1.5 qt
Eminent VP[6]	3	6-16 fl oz	30	64 fl oz
Bumper ES[6]	3	4-8 fl oz	See footnote	32 fl oz
Procon-Z[6]	3	12 fl oz	See footnote	32 fl oz
Topaz[66]	3	4-8 fl oz	See footnote	32 fl oz
Orbit[6]	3	4-8 fl oz	See footnote	32 fl oz
Protocol[6]	1, 3	1.3-2.5 pt	See footnote	7.5 pt
Quadris Top	11, 3	8-14 fl oz	45	56 fl oz
Quilt[6]	11, 3	14-27.5 fl oz	45	122 fl oz
Quilt Excel[6]	11, 3	14-21 fl oz	45	122 fl oz
Monsoon[6]	3	4-8 fl oz	See footnote	32 fl oz
Onset 3.6[6]	3	4-8 fl oz	See footnote	32 fl oz
Orius 3.6F[6]	3	4-8 fl oz	See footnote	32 fl oz
Thiophanate-Methyl 85WDG	1	0.4-0.8 lb	1	2.5 lb
Topsin M 70WP[6]	1	1 lb	See footnote	3 lb
Topsin XTRA 2[6,8]	1, 3	25 fl oz	See footnote	See footnote
Topguard	3	7-14 fl oz	14	56 fl oz
Agri Tin	30	5-7.5 oz	30	45 oz
Super Tin 80WP	30	5-7.5 oz	30	45 oz
Viathon[6,7]	33, 3	2-2.5 pt	See footnote	16.5 pt
Willow AzoxyProp[6]	3, 11	14-21 fl oz	30	115 fl oz

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[2] Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).

[3] Rates are the amount of formation 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] Do not apply to trees that will bear fruit within 12 months.

[6] Do not apply after shuck split.

[7] Use 2 pt per acre early in the season and 2-2.5 pt per acre post pollination.

[8] Do not exceed a total application of 2.1 lb a.i. thiophanate-methyl and 0.9 lb a.i. tebuconazole per year.

Table 6: Powdery mildew (*Microsphaera alni*)

Product Choices[1]	Product Mode of Action Group (FRAC)[2]	Rate[3]	PHI[4]	Maximum Use
Actinovate[OG]		3-12 oz		
Adament 50WG[6]	3, 11	4-8 oz	60	32 oz
Enable 2F[6]	3	8 fl oz	28	1.5 qt
Eminent VP[6]	3	6-16 fl oz	28	64 fl oz
Luna sensation	7, 11	4-7.6 fl oz	14	27.1 fl oz
Fosphite	33	1-3 qt		
K-Phite 7LP AG	33	1-3 qt		
Rampart	33	1-3 qt		
Procon-Z[5,6,8]	3	12 fl oz	See footnote	32 fl oz
Topaz[5,6,8]	3	4-8 fl oz	See footnote	32 fl oz
Orbit[5,6,8]	3	1.3-2.5 pt	See footnote	7.5 pt
Protocol[6]	1, 3	4-8 fl oz	See footnote	32 fl oz
Quadris Top	11, 3	8-14 fl oz	45	56 fl oz
Quilt[6]	11, 3	14-27.5 fl oz	45	122 fl oz
Quilt Excel[6]	11, 3	14-21 fl oz	45	122 fl oz
Microthiol Disperss	M	5-10 lb		
Monsoon[6]	3	4-8 fl oz	See footnote	32 fl oz
Onset 3.6L[6]	3	4-8 fl oz	See footnote	32 fl oz
85WDG	1	0.4-0.8 lb	1	2.5 lb
Topsin M 70WP[6]	1	1 lb	See footnote	3 lb
Topsin XTRA 2[6, 7]	1, 3	25 fl oz	See footnote	See footnote
Trilogy[OG]		0.01		
Agri Tin	30	5-7.5 oz	30	45 oz
Super Tin 80WP	30	5-7.5 oz	30	45 oz
Willow AzoxyProp	3, 11	14-21 fl oz	306	115 fl oz

[OG] Indicates a pesticide that has been listed by the Organic Materials Review Institute (OMRI) as approved for use in organic production.

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[2] Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).

[3] Rates are the amount of formation 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] Do not apply to trees that will bear fruit within 12 months.

[6] Do not apply after shuck split.

[7] Do not exceed a total application of 2.1 lb a.i. thiophanate-methyl and 0.9 lb a.i. tebuconazole per year.

[8] Also registered are: Propensity 1.3ME, Propicure 3.6F, Strider and Willowood Propican 3.6EC.

Table 7: Scab (*Cladosporium carpophilum*, *C. caryigenum*)

Product Choices[1]	Product Mode of Action Group (FRAC)[2]	Rate[3]	PHI[4]	Maximum Use
Abound	11	6-12 fl oz	45	73.8 fl oz
Aframe	11	6-12 fl oz	45	73.8 fl oz
Azaka	11	6-12 fl oz	45	73.8 fl oz
AzoxyStar	11	6-12 fl oz	45	73.8 fl oz
Satori	11	6-12 fl oz	45	73.8 fl oz
Willowood Azoxy 2SC	11	6-18.5 fl oz	14	49 fl oz
Custodia	3, 11	8.6-17.2 fl oz	45	69 fl oz
Double Nickel 55[OG]		see label	0	see label
Elast[5, 6]	M	3 pt	See footnote	18 pt
Eminent VP[6]	3	6-16 fl oz	30	64 fl oz
Enable 2F[6]	3	8 fl oz	28	1.5 qt
Helena ProPhyt	33	2-3 pt		
Luna Sensation	7, 11	4-7.6 fl oz	14	27.1 fl oz
Pristine	7, 11	10.5-14.5 oz	14	58 oz
Bumper ES[5,6,10]	3	4-8 fl oz	See footnote	32 fl oz
Procon-Z[5,6,10]	3	12 fl oz	See footnote	32 fl oz
Topaz[5,6,10]	3	4-8 fl oz	See footnote	32 fl oz
Orbit[5,6,10]	3	4-8 fl oz	See footnote	32 fl oz
Protocol	1, 3	1.3-2.5 pt	See footnote	7.5 pt
Quash	3	2.5-3.5 oz	25	14 oz
Quadris Top	11, 3	8-14 fl oz	45	56 fl oz
Quilt[6]	11, 3	14-27.5 fl oz	45	122 fl oz
Quilt Excel[6]	11, 3	14-21 fl oz	45	122 fl oz
Regalia	P5	0.5-1 qt	0	-
Sovran		2.4-4.8 oz[8]	45	14.4 oz
Stratego[6]	3, 11	10 fl oz	30	30 fl oz
Monsoon[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Onset 3.6L[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Orius 3.6F[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Absolute 500SC	3, 11	5-7.7 fl oz	30	46 fl oz
Adament 50WG	3, 11	4-8 oz	60	32 fl oz
85WDG	1	0.4-0.8 lb	1	2.5 lb
Topsin M 70WP[6]	1	1 lb	See footnote	3 lb
Topsin XTRA 2[6.9]	1, 3	25 fl oz	See footnote	See footnote
Topguard	3	7-14 fl oz	14	56 fl oz
Trilogy[OG]		0.01		
Agri Tin	30	5-7.5 oz	30	45 fl oz
Super Tin 80WP	30	5-7.5 oz	30	45 fl oz
Viathon[6, 7]	3, 33	2-2.5 pt	See footnote	16.5 pt
Willow AzoxyProp[6]	3, 11	14-21 fl oz	30	115 fl oz
Ziram 76DF	M	6-8 lb	55	48.2 lb

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[2] Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).

[3] Rates are the amount of formation 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] Do not apply to trees that will bear fruit within 12 months.

[6] Do not apply after shuck split.

[7] Use 2 pt per acre early in the season and 2-2.5 pt per acre post pollination.

[8] Use 2.4-3.2 oz per acre pre-pollination and 3.2-4.8 oz post-pollination.

[9] Do not exceed a total application of 2.1 lb a.i. thiophanate-methyl and 0.9 lb a.i. tebuconazole per year.

[10] Also registered are: Propensity 1.3ME, Propicure 3.6F, Strider and Willowood Propican 3.6EC.

[11] Also registered are: Tebu-Crop 3.6F, Tebuzol and Topaz.

Table 8: Vein spot (*Gnomonia nerviseda*)

Product Choices[1]	Product Mode of Action Group (FRAC)[2]	Rate[3]	PHI[4]	Maximum Use
Custodia	3, 11	8.6-17.2 fl oz	45	69 fl oz
Eminent VP[6]	3	6-16 fl oz	30	64 fl oz
Enable 2F[6]	3	8 fl oz	28	1.5 qt
Bumper ES[5,6,10]	3	4-8 fl oz	See footnote	32 fl oz
Procon-Z[5,6,10]	3	12 fl oz	See footnote	32 fl oz
Topaz[5,6,10]	3	4-8 fl oz	See footnote	32 fl oz
Orbit[5,6,10]	3	4-8 fl oz	See footnote	32 fl oz
Pristine	7, 11	10.5-14.5 oz	14	58 oz
Protocol[6]	1, 3	1.3-2.5 pt	See footnote	7.5 pt
Quadris Top	11, 3	8-14 fl oz	45	56 fl oz
Quilt[6]	11, 3	14-27.5 fl oz	45	122 fl oz
Quilt Xcel[6]	11, 3	14-21 fl oz	45	122 fl oz
Monsoon[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Onset 3.6L[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Orius 3.6F[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Topsin XTRA 2[6,9]	1, 3	25 fl oz	See footnote	See footnote
Viathan[7]	3, 33	2-2.5 pt	See footnote	16.5 pt
Willow AzoxyProp[6]	3, 11	14-21 fl oz	30	115 fl oz

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[3] Rates are the amount of formation 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] Do not apply to trees that will bear fruit within 12 months.

[6] Do not apply after shuck split.

[7] Use 2 pt per acre early in the season and 2-2.5 pt per acre post pollination.

[8] Use 2.4-3.2 oz per acre pre-pollination and 3.2-4.8 oz post-pollination.

[9] Do not exceed a total application of 2.1 lb a.i. thiophanate-methyl and 0.9 lb a.i. tebuconazole per year.

[10] Also registered are: Propensity 1.3ME, Propicure 3.6F, Strider and Willowood Propican 3.6EC.

[11] Also registered are: Tebu-Crop 3.6F, Tebuzol and Topaz.

Table 9: Zonate leaf spot (*Cristulariella moricola*)

Product Choices[1]	Product Mode of Action Group (FRAC)[2]	Rate[3]	PHI[4]	Maximum Use
Badge X2[OG,6]	M	0.75-1.75 lb	See footnote	1.6 lb
Champ Formula 2FL[6]	M	1.33-2.66 pt	See footnote	23.2 pt
Kocide 3000[6]	M	0.75-1.75 lb	See footnote	28 lb
Cuprofix Ultra 40[6]	M	1.25-2.5 lb	See footnote	21 lb
Custodia[6]	11, 3	8.6-17.2 fl oz	45	69 fl oz
Eminent VP[6]	3	6-16 fl oz	30	64 fl oz
Amtide 41.8EC[6]	3	4-8 fl oz	See footnote	32 fl oz
Banner MAXX[6]	3	12 fl oz	See footnote	24 fl oz
Bumper 41.8EC[6]	3	4 fl oz	See footnote	32 fl oz
Bumper ES[6]	3	4 fl oz	See footnote	32 fl oz
Topaz[6]	3	4-8 fl oz	See footnote	32 fl oz
Protocol[6]	3, 1	1.3-2.5 pt	See footnote	7.5 pt
Quadris Top	11, 3	8-14 fl oz	45	56 fl oz
Quilt XCEL[6]	11, 3	14-27.5 fl oz	45	122 fl oz
Quilt[6]	11, 3	14-21 fl oz	45	122 fl oz
Monsoon[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Onset 3.6L[6,11]	3	4-8 fl oz	See footnote	32 fl oz
Orius 3.6F[6,11]	3	4-8 fl oz	See footnote	32 fl oz
85WDG	1	0.4-0.8 lb	1	2.5 lb
Topsin M 70WP[6]	1	1 lb	See footnote	3 lb
Topguard	3	7-14 fl oz	14	56 fl oz
Topsin XTRA 2[6]	1, 3	25 fl oz	See footnote	See label
Viathan[6]	3, 33	2-2.5 pt[7]	See footnote	16.5 pt
Willow AzoxyProp[6]	3, 11	14-21 fl oz	30	115 fl oz

[OG] Indicates a pesticide that has been listed by the Organic Materials Review Institute (OMRI) as approved for use in organic production.

[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 formation 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] Do not apply to trees that will bear fruit within 12 months.

[6] Do not apply after shuck split.

[7] Use 2 pt per acre early in the season and 2-2.5 pt per acre post pollination.

[8] Use 2.4-3.2 oz per acre pre-pollination and 3.2-4.8 oz post-pollination.

[9] Do not exceed a total application of 2.1 lb a.i. thiophanate-methyl and 0.9 lb a.i. tebuconazole per year.

[10] Also registered are: Propensity 1.3ME, Propicure 3.6F, Strider and Willowood Propican 3.6EC.

[11] Also registered are: Tebu-Crop 3.6F, Tebuzol and Topaz.

The pecan section was revised October 2023 by R. Singh.