PP147

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2008 Florida Citrus Pest Management Guide: Alternaria Brown Spot[1]

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Alternaria brown spot, caused by *Alternaria alternata*, affects Minneola tangelos, Dancy tangerines, Murcotts, and less frequently Orlando tangelos, Novas, Lees, and Sunburst. In rare cases, it may also infect grapefruit. Where severe, the disease results in extensive fruit drop and must be controlled on processing and fresh market fruit.

Spores of *Alternaria* are airborne. Most spores are produced on recently fallen infected leaves on the grove floor or on lesions on the mature leaves on the tree. Many management practices are helpful in reducing the severity of Alternaria brown spot. When new groves of susceptible varieties are planted, they should be established with disease-free nursery stock. Trees grown in greenhouses without overhead irrigation are usually free of *Alternaria*. Even though spores are airborne, plantings of healthy trees will remain disease-free for long periods. If *Alternaria* is present from the outset, it builds to high populations during the period of vegetative growth on young trees and subsequently is difficult to control on fruit. In establishing new plantings, it is best to locate susceptible varieties in high areas where air drainage and ventilation are good and leaves dry more rapidly. Less vigorous rootstocks such as Cleopatra mandarin should be selected rather than vigorous stocks such as Carrizo citrange. Groves of Minneola tangelos in low, wet areas have conditions so favorable for disease that *Alternaria* may be virtually uncontrollable. Trees should be spaced more widely than oranges to promote rapid drying of the canopy. In existing plantings, it is important not to promote excessive vegetative growth. Overwatering and excessive nitrogen fertilization should be avoided. Light hedging should be done frequently rather than hedging severely but less often.

Copper fungicides, Abound, Gem, Ferbam, and Headline are the products registered that are effective for disease control. Situations vary considerably according to the susceptibility of the variety, the history of disease in the grove and the environmental conditions each year. Generally, the first spray should be applied when the spring flush is about 1/4-1/2 of full expansion. In severe cases, another

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spray may be needed when the flush is near full expansion, because if high levels of infection occur on the spring flush, brown spot becomes difficult to control on fruit. Another spray should be applied shortly after petal fall. Ferbam, Abound, Gem, or Headline may be the best choice for one or both of these two applications, especially if the grove has problems with both scab and Alternaria brown spot. Thereafter, all sprays should be applied solely to maintain a protective coating on the fruit. During April and May, applications may be needed as often as every 10 days or as infrequently as once per month. Spray intervals should be determined based on the frequency of rainfall and the disease history in the grove. By June, high rainfall and humid nights usually assure an abundant supply of inoculum and favorable conditions for infection. In most cases, two applications will be needed during this month. Copper fungicides may produce fruit blemishes if applied during hot weather. Thus, Abound, Gem, Ferbam, or Headline may be substituted for copper applications as needed from May to July. The fruit generally becomes resistant by early to mid-July although affected fruit may continue to drop for some time afterward. The scenario described is for difficult cases and it is sometimes possible to use many fewer sprays.

The preferred method to time fungicide sprays is the ALTER-RATER, a weather-based model. That model is available as a Fact Sheet on the EDIS website (http://www.edis.ifas.ufl.edu/ch183) or on the CREC website (http://www.crec.ifas.ufl.edu/crec_websites/fungal/Alter-Rater.htm). Table 1 indicates the points assigned in the ALTER-RATER model. Brown spot is most severe when rainfall is greater than 0.1 inch, daily leaf wetness duration exceeds 10 h and average daily temperature is between 68 and 83°F. Table 2 indicates the suggested thresholds to be applied with the ALTER-RATER. A fungicide application is made when the threshold is reached.

With such frequent sprays, low rates of copper may be used. With average quality products, usually about 2 lb of metallic copper per acre are needed for each 3 weeks or 1 lb if sprays are more frequent. Even lower rates of metallic copper can be used if high quality products are employed.

Abound, Gem, and Headline are all strobilurin fungicides and *Alternaria* has the potential to develop resistance to these products. Strobilurins should not be used for Alternaria control more than three times in a season and never more than two applications in a row. Gem is slightly less effective for control of this disease and it should be used at the high rate where disease is moderate to severe. Ferbam is less effective for Alternaria control than copper, Abound, Gem, or Headline.

DO NOT APPLY ABOUND, GEM, OR HEADLINE IN NURSERIES. Application of this fungicide in nurseries can result in selection of resistant strains which are then distributed on nursery stock to groves.

Recommended Chemical Controls

READ THE LABEL.

See Table 3.

Rates for pesticides are given as the maximum amount required to treat mature citrus trees unless otherwise noted. To treat smaller trees with commercial application equipment including handguns, mix the per acre rate for mature trees in 125 gallons of water. Calibrate and arrange nozzles to deliver thorough distribution and treat as many acres as this volume of spray allows.

Table 1. The number of points assigned to each day with ALTER-RATER according to the environmental conditions on that day. Daily point scores are added until the selected spray threshold is reached.

Rainfall > 0.1 inch	Leaf Wetness > 10 h	Avg DailyTemp (°F)	Daily Points Assigned
+	+	68-83	11
+	+	> 83	8
+	+	< 68	6
+	–	68-83	6
+	–	> 83	4
+	–	< 68	3
–	+	68-83	6
–	+	> 83	6
–	+	< 68	4
–	–	68-83	3
–	–	> 83	0
–	–	< 68	0

Table 2. Suggested threshold scores to be used in different situations with the ALTER-RATER.

Suggested Threshold Scores	Situation
50	Heavily infested Minneola, Dancy, Orlando, Sunburst; many flatwoods groves, east coast and SW Florida
100	Moderately infested Minneola or Dancy, many Murcotts; Ridge and north Florida groves
150	Light infestations, any variety, mostly Ridge and north Florida groves

Table 3. Recommended Chemical Controls for Alternaria Brown Spot

Pesticide	FRAC MOA[1]	Mature Trees Rate/Acre[2]
copper fungicide	M9	Use label rate.
Ferbam Granuflo	M2	7.5 lb/acre
Abound 2.08 F	11	12.4-15.4 fl oz/acre. Do not apply more than 92.3 fl oz/acre/season for all uses.
Gem 500 SC	11	1.9-3.8 fl oz. Do not apply more than 15.4 fl oz per acre per season.
Headline	11	12-15 fl oz/acre. Do not apply more than 49 fl oz/acre/season for all uses.

[1]Mode of action class for citrus pesticides from the Fungicide Resistance Action Committee (FRAC) 2003. Refer to ENY624, Pesticide Resistance and Resistance Management, in the 2008 Florida Citrus Pest Management Guide for more details.

[2]Lower rates can be used on smaller trees. Do not use less than minimum label rate.