

in the disease-management program. The benefits of these fungicide-use strategies (at least in theory) are to provide a wider spectrum of disease control and to reduce or delay the development of fungicide-resistant strains of the fungus. The strobilurin fungicides Abound and Cabrio will provide some suppression of Botrytis fruit rot.

Fungicide application timing is important for gray mold management. Sprays applied during bloom are much more effective than sprays applied after fruit set and during harvest. Bloom sprays also leave less residue on harvested berries.

Anthracnose Fruit Rot

Anthracnose fruit rot is not a common problem in many areas, but its occurrence is increasing across the Midwest. The disease is very important in plastic culture systems. Once anthracnose fruit rot is established in a planting, it is difficult to control and can be very severe, resulting in complete loss of the crop.

Captan and Thiram are protectant fungicides that have some activity against anthracnose. If used in a protectant program, they will provide some level of control. Abound, Cabrio, and Pristine are strobilurin fungicides and are labeled for control of anthracnose on strawberry. They have the best activity against anthracnose on strawberry of all currently registered fungicides. For purposes of fungicide-resistance management and increased efficacy, Abound, Cabrio, and Pristine should be used in alternation with or in combination with Captan or Thiram. Abound, Cabrio, and Pristine are the same class of chemistry so they should not be alternated with each other as a fungicide-resistance strategy. Switch has also been reported to have moderate to good activity against anthracnose fruit rot.

Leaf Diseases

Leaf Spot, Leaf Scorch, Leaf Blight

The emphasis for controlling leaf diseases should be placed on the use of resistant cultivars whenever possible (Table 2-1). If resistance is not available, highly susceptible cultivars should be avoided. Several fungicides are registered for control of strawberry leaf diseases (Table 2-2). Topsin-M, Captan, Thiram,

Nova, and Syllit (previously marketed as Cyprex) are registered for use on strawberries. The label states that Topsin-M cannot be applied before early bloom; thus, applications made very early in the season (as new growth starts) should use Syllit, Captan, Nova, or Thiram. The strobilurin fungicides (Cabrio, Abound, and Pristine) also have some activity against leaf diseases. If leaf diseases are a serious problem, post-harvest or post-renovation applications of these fungicides may be required.

Powdery Mildew

Topsin-M is labeled for use on strawberries and was very effective against mildew when it was first introduced; however, due to the development of fungicide resistance, Topsin-M generally does not provide adequate control in many production areas across the country. In areas where Topsin-M has not been used to control powdery mildew, it still might provide effective control.

Nova, Procure, Abound, Cabrio, and Pristine are all registered for control of powdery mildew on strawberry and should provide excellent control. Sulfur is also effective for powdery mildew control if used in a seven- to 10-day-interval protectant program. Sulfur has little or no activity against the other strawberry diseases.

The use of cultivars with resistance to powdery mildew should be emphasized, and the use of highly susceptible cultivars must be avoided.

Red Stele in Established Plantings

The emphasis for control of red stele should be placed on the use of resistant cultivars and good soil drainage. However, if red stele develops in an established planting, the use of Ridomil Gold may help reduce losses. Ridomil Gold should be applied in sufficient water to move the fungicide into the root zone of the plants. The label states: "Make one application at time of transplanting or in the spring after the ground thaws before first growth. Make another application in the fall after harvest."

Aliette WDG is also registered for red stele control. It is registered as a pre-plant dip and a foliar spray. The *pre-plant dip* label reads as follows: Use 2.5 lbs per 100 gallon and "Apply as a pre-plant dip to strawberry roots and crowns for 15 to 30 minutes.



Disease Control Considerations	Verticillium Wilt	Red Stele	Black Root Rot	Nematodes	Viruses	Fruit Rot	Leaf Spots	Powdery Mildew
1. Good drainage	-	++	++	-	-	++	+	-
2. No shade	-	+	-	-	-	++	++	-
3. No infested runoff	+	++	+	+	-	U	-	U
4. Rotation	++ ^a	++ ^a	++ ^a	++ ^a	-	-	+	-
5. Resistant cultivars	++ ^b	++ ^c	-	-	-	-	++ ^d	++
6. Disease-free plants	++	++	+	+	++	-	+	+
7. Adequate plant and row spacing	-	-	-	-	-	++	++	+
8. Mulch for winter injury/fruit rot	-	-	++	-	U	++	-	-
9. Fruit storage conditions	-	-	-	U	-	++	-	-
10. Renovation	+	-	-	+	-	-	++	+
11. Weed control	+	-	-	+	U	++	+	+

All possible control strategies must be employed if strawberry diseases are to be controlled.
Key: ++ = most important controls; + = helpful controls; - = no controls; and U = unknown.

^a Rotations: Verticillium wilt, black root rot, nematodes are three to five years; red stele is much longer, perhaps more than 20 years.

^b Resistant to Verticillium wilt: Earliglow, Sunrise, Catskill, Guardian, Midway, Redchief, Surecrop, Delite, Sparkle.

^c Resistant to some strains of red stele: Earliglow, Redglow, Sunrise, Guardian, Midway, Redchief, Surecrop, Delite, Sparkle.

^d Resistant to leaf spot: Guardian, Midland, Redchief, Surecrop. Resistant to leaf scorch: Catskill, Guardian, Midland, Redchief, Sunrise, Surecrop.

Plant within 24 hours after dipping.” The *foliar application* label reads as follows: “In the spring begin foliar applications when the plants start active growth. If disease conditions persist or re-occur, make additional applications on a 30- to 60-day interval.” The use rate is 2.5 to 5 lbs per acre.

Phosphorous Acid (Agri-Fos, ProPhyt, Phostrol)

Several products containing phosphorous acid (PA, also called phosphite or phosphonate) are sold as nutritional supplements and plant conditioners, but only Agri-Fos, ProPhyt, and Phostrol are currently registered for control of plant diseases. These products are registered on strawberry for control of *Phytophthora* root rot (red stele). They are essentially the same active ingredient that occurs in the fungicide Aliette (fosetyl-AL), and most have labels that are very similar to the label of Aliette.

