

## Fungicide Selection for Botrytis and Anthracnose Management 2016

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This is a supplement to the Strawberry IPM Guide.

<http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2016/2016SEStrawberryIPMGuide.pdf>

Carefully read pages 8 and 20 in that guide.

The need to manage Botrytis fruit rot (gray mold; BFR) and anthracnose fruit rot (AFR), caused by "*Colletotrichum acutatum*" has become more complex. Growers need to use products that work against resistant strains of BFR and manage AFR.

**NOTE:** Only specific plant sources have been identified as having anthracnose infestations. At this time most growers know if their plant supply had problems or not; if you do not know ask your plant supplier.

The Table below shows our current understanding of the efficacy of fungicides for the Carolinas. A large number of farms are experiencing problems with Botrytis strains that are resistant to one or more fungicide.

	FRAC	Botrytis	Botrytis Resistance	Anthracnose
<b>Captan or Captec</b>	M4	++	None	++
<b>Thiram</b>	M3	++	None	+
<b>Switch</b>	9/12	++	Resistance NOT Prevalent	++
<b>Captevate</b>	M3+17	+++	Elevate Resistance Prevalent	++
<b>Elevate</b>	17	+++	Resistance Prevalent	Not effective
<b>Fontelis</b>	7	+++	Resistance Prevalent	+
<b>Kenja</b>	7	+++	Resistance Prevalent	Not effective
<b>Ph-D, OSO, Tavano</b>	19	++	No Data	No Data
<b>Fracture</b>		+	No Data	No Data
<b>Scala</b>	9	++	Resistance Prevalent	Not effective
<b>Rovral</b>	2	++	Resistance Prevalent	Not effective
<b>Pristine</b>	7+11	+++	Resistance Prevalent	+++*
<b>Cabrio</b>	11	+	Resistance Widespread	+++*
<b>Merivon</b>	7+11	+++	Resistance Prevalent	+++*
<b>Abound or Azaka</b>	11	+	Resistance Widespread	+*
<b>Tilt and generics</b>	3	Not Effective	Not applicable	++

\*Resistance issues to FRAC 11 fungicides have been reported in 2015 and 2016 in FL and CA, respectively

**BOTRYTIS CONTROL:** *Botrytis cinerea* historically has a high potential to develop resistance. Therefore, it is important to give these recommendations serious consideration:

1. Use members of any FRAC code (except M3 or M4) no more than twice per season (For example, if you used Fontelis once and Merivon once you maxed out the 2 applications for FRAC 7 fungicides).
2. Resistance profiles vary from farm-to-farm. Sample gray mold populations for their resistance profile through Clemson University. For instructions to submit your samples go to:

[http://www.clemson.edu/extension/horticulture/fruit\\_vegetable/peach/diseases/gm\\_collectioninstructions.pdf#new](http://www.clemson.edu/extension/horticulture/fruit_vegetable/peach/diseases/gm_collectioninstructions.pdf#new)

Based on samples submitted to Clemson, the Table shows the prevalence of resistance in Botrytis populations. If you do not know your profile, it is best to avoid over-reliance on products where resistance is prevalent.

**If you know your resistance profile for BFR control:** we recommend to base the disease management on protectants thiram and captan applications and only in cases of high disease risk situations (such as 2 or more days of expected rain at temperatures in the 70s) do we recommend to add FRAC 7, 9, 17, or 19 to the protectant (i.e. captan or thiram) AND if your profile shows there is no or little resistance to these products. Switch may be applied as a solo product (no protectant needed at this point). Again, do not use any of these products (other than M3 or M4) more than twice per season.

**AFR CONTROL:** Resistance to FRAC 11 fungicides (Pristine, Cabrio, Merivon, Abound, Azaka) has been found in Florida and California. Infected plants that came into the Carolinas in the fall of 2015 did not appear to have resistance based on a limited number of samples but the risk for resistance is high. Therefore, we strongly recommend that the FRAC 11 fungicides be used only in mixture at the low label rate with the medium labeled rate of captan products (Captan or Captec) alternated with captan alone. Also, recently, we have documented reduced activity with azoxystrobin (Abound, Azaka) with certain strains of the anthracnose fruit rot (AFR) pathogen. Cabrio, Merivon, or Pristine have offered better control of AFR in recent research efforts.

Pristine can be used if your profile shows the FRAC 7 component is known to be effective against BFR. If FRAC 7 resistance is diagnosed or you don't know, we recommend using Cabrio.

Like BFR, our data shows early bloom sprays are also critically important for AFR management.

**Therefore a suggested sequence of sprays to control AFR and BFR is:**

Application 1: early bloom spray (when covers come off and/or there are 2-4 flowers per plant  
captan + Cabrio

Application 2:

CaptEvate (if your resistance profile shows you do not have FRAC 17 resistance in the BFR population)  
OR

captan alone; medium to high rates (If your resistance profile indicates FRAC 17 resistance or you do not know).

Application 3: same as application 1.

Application 4 and every 7-10 days: Rotate the following: captan; captan+ Cabrio.

Before predicted periods of cool and wet weather and during bloom, incorporate Switch for better Botrytis control and if your resistance profile says Botrytis is sensitive to Switch, or you do not know. Switch also has decent anthracnose control. Pristine, Merivon, or Cabrio show the best efficacy against AFR under high anthracnose pressure in research studies and either can be used if there is no resistance to FRAC 7. Also, if weather conditions (warm & wet) favor AFR, or you start to approach the upper limit of FRAC 11 fungicides allowed (4-5 applications), consider rotating to a tank mix of captan + Tilt.

Reduce the number of sprays when weather is not favorable. Use the Strawberry Fruit Infection Decision Tool to guide timing of fungicide applications: <https://strawberries.ces.ncsu.edu/strawberry-fruit-infection-risk-tool/>

See the Strawberry IPM Guide for more detailed Information on total IPM Programs and download the MyIPM app to learn more about FRAC codes. See: [diagnosis.ces.ncsu.edu/strawberry](https://diagnosis.ces.ncsu.edu/strawberry) with help in diagnosis and [strawberries.ces.ncsu.edu/strawberries-diseases](https://strawberries.ces.ncsu.edu/strawberries-diseases) for Disease Factsheets.