

Fungicide Selection for Botrytis and Anthracnose Fruit Rot Management 2017

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This is a supplement to the Strawberry IPM Guide. <http://www.smallfruits.org/SmallFruitsRegGuide>. Carefully read pages related to fungicide resistance and selection in the IPM 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: Specific plant sources may be identified as having AFR infestations. In that case growers need to manage both BFR and AFR.

The Table below shows our current understanding of the efficacy (+++ = high efficacy) of fungicides for the Southeastern US (north of Florida). A large number of farms are experiencing problems with Botrytis strains that are resistant to one or more fungicide.

	FRAC	BFR	Botrytis Resistance	AFR
Captan or Captec	M4	++	None	++
Captevate	M4+17	+++	Prevalent for 'Elevate'	++
Thiram	M3	++	None	+
Fracture	M12	+	No Data	No Data
Topsin M	1	Not effective	Widespread	Not effective
Rovral	2	++	Prevalent	Not effective
Tilt and generics	3	Not Effective	Not applicable	++
Fontelis	7	+++	Prevalent	+
Kenja	7	+++	NOT Prevalent	Not effective
Scala	9	++	Prevalent	Not effective
Pristine	7+11	+++	Prevalent	+++*
Merivon	7+11	+++	Prevalent	+++*
Luna Sensation	7+11	+++	NOT Prevalent	+++*
Cabrio	11	Not effective	Widespread	+++*
Abound or Azaka	11	Not effective	Widespread	+*
Switch	9+12	++	NOT Prevalent	++
Elevate	17	+++	Prevalent	Not effective
Ph-D, OSO, Tavano	19	++	NOT Prevalent	No Data

*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 (<http://www.clemson.edu/extension/peach/commercial/diseases/index.html>). Based on samples submitted to Clemson, the Table above 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, Luna Sensation) has been found in Florida and California. So far we have not seen resistance elsewhere North of Florida however, it is a good idea to use the FRAC 11 fungicides only in mixture at the lower 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 resistance profile shows the FRAC 7 component is still effective against BFR. If FRAC 7 resistance is diagnosed or you don't know, we recommend using Cabrio (plus captan).

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

For cases when there is no risk of anthracnose and growers need to focus on gray mold control (most fields): Initiate the first application with Switch and then rotate two or more of the following: polyoxin D; thiram; captan; CaptEvote; captan + Fontelis OR Kenja. But only thiram or captan can be applied more than twice per season due to resistance management.

Options: For a reduced fungicide program, initiate applications at FIRST bloom as above but apply subsequent sprays before predicted wet weather that favors Botrytis; end applications about 26 to 30 days before expected final harvests. Increase the time between spray applications when dry weather persists. Research trials have documented that 4 sprays during bloom are sufficient to offer season-long Botrytis fruit rot control. Also, consult available forecasting models linked through the Strawberry IPM guide.

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 (medium to high rate) + Cabrio EG (12 oz)

Application 2: CaptEvote (if your resistance profile shows you do not have FRAC 17 resistance in the BFR population) **OR** captan alone (if your resistance profile indicates FRAC 17 resistance).

Application 3: same as application 1.

Application 4 and every 7-10 days: Rotate the following: captan; captan + Cabrio EG (12 oz).

Before predicted periods of cool and wet weather during bloom, use Switch for better Botrytis control. Use Switch with captan IF Botrytis pressure is expected to be heavy. 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.

See the Strawberry IPM Guide for more detailed Information on total IPM Programs and download the MyIPM-SED app to learn more about disease/pest management and FRAC codes. Also see: diagnosis.ces.ncsu.edu/strawberry with help in diagnosis and strawberries.ces.ncsu.edu/strawberries-diseases for Disease Factsheets.