

Major Apple Diseases in West Virginia

Disease	Usual stage of occurrence*	Infection conditions
Early season		
Scab	Green tip to whenever conditions are favorable	Extended wet periods, 33-76 F
Powdery mildew	Leaves; tight cluster, until shoot growth stops	Dry weather, 50-75 F
Cedar apple rust	Tight cluster-2 nd cover	Extended wet periods above 56 F
Quince rust	Pink - 1 st cover	Extended wet periods above 56 F
Fire blight	Bloom to mid-season	Open blossoms, daily mean above 60 F, wetting
Mid-season		
Frogeye-leaf spot (Black rot)	Pink - harvest	Moderate and wet, optimum 80 F
Moldy core	Bloom - petal fall	Moderate and wet
Brooks fruit spot	2 nd - 4 th covers	Moderate and wet
Sooty blotch (complex)	2 nd cover - harvest	Wet, optimum 64-81 F
Fly speck	2 nd cover - harvest	Wet, optimum 68 F
Late season		
Black rot	Pink to late season	Warm and wet periods, hail, insect, or mechanical fruit injury
Bitter rot	Mid to late season	
White rot	Mid to late season	

Effectiveness of fungicides for early season disease control

Fungicide and rate	Scab	Powdery mildew	Rust diseases
Captan 50W 6 lb/A	G	N	S
EBDC 75DF 3.2 lb/A	F	N	F
Polyram 80 DF 3 lb/A	F	N	F
Ziram 76DF 8 lb/A	F-G*	N	G
Dodine 65W 1.5 lb/A	E	N	N
Combinations of Dodine + SI	E	E-G	E
Nova 5-7.5 oz + EBDC 3 lb	E	E	E
Nova 5-7.5 oz + Captan 3.25 lb	E	E	E
Nova 5-7.5 oz + Ziram 3.25 lb	E	E	E
Rubigan 9 oz + EBDC 3 lb	E	E	E
Rubigan 9 oz + Captan 3.25 lb	E	E	G
Rubigan 9 oz + Ziram 3.25 lb	E	E	E
Procure 12 oz + EBDC 3 lb	E	G	E
Procure 12 oz + Captan 3.25 lb	E	G	G
Procure 12 oz + Ziram 3.25 lb	E	G	E
Indar 2F 8 oz + + EBDC 3 lb	E	G	E
Indar 2F 8 oz + Captan 3.25 lb	E	G	E
Indar 2F 8 oz + Ziram 3.25 lb	E	G	E
Inspire Super MP 4 oz + 4 oz	E	G	E
Flint 50WG 2 oz/A	E	G-E	F-G
Sovran 50WG 4 oz/A	E	G-E	F-G
Pristine 38 WG 14.5 oz/A	G-E	G	F
Scala 5SC 5 oz + EBDC	G	N	F
Vanguard 75WG 3 oz + EBDC	G	N	F
Sulfur 6-9 lb/A	F	G	N
Sulfur 15 lb/A	G	G	N
Triadimefon 2-4 oz/A	S	E	E
EBDC + Captan	G	N	G
EBDC + Ziram	G	N	G

Restrictions of some apple fungicide options

Suggested fungicides	Rate per 100 gal dil.	Rate/A	REI	PHI
Captan 80WDG	2 lb	6.5 lb	24 hr	0 days
Ziram 76DF/WDG	2 lb	6.5 lb	48 hr	14 days
EBDC* +captan or +ziram	1 lb +1 lb	3 lb +3 lb	48 hr	77 days
Benz. + EBDC*	2-3 oz+1 lb	9 oz +3 lb	24 hr	77 days
Benz. + captan or + ziram	2-3 oz+1 lb	9 oz +3 lb	24 or 48 hr	14 days*
Flint 50WG	--	2-3 oz	12 hr	14 days
Sovran 50WG	1-1.6 oz	4-6.4 oz	12 hr	30 days
Cuprofix **	1-1.6 lb	3-5 lb	24 hr	
Inspire Super MP	1 oz + 1 oz	4 oz + 4 oz	12 hr	72 days

* Observe 77 day pre-harvest interval for EBDC's.

Benz. = benzimidazole (Topsin-M - 12 hr REI, 0 day PHI).

EBDC = mancozeb or Polyram. ** Coppers can russet fruit

Here are some general observations on the usefulness of the common scab fungicides:

- Mancozeb fungicides at 3 lb/A are probably still the cheapest option for prebloom scab control, but they must be applied at 5-7 day intervals during rainy weather rather than at 10-day intervals as was common with SI+ mancozeb combinations.

- If one compares 3 lb/A of Captan 50W (or the equivalent of another formulation) with 3 lb/A of mancozeb, captan will almost always provide better scab control than mancozeb. Captan usage is limited, however, by its higher pricing, its incompatibility with oil sprays, and its minimal activity against rust diseases. Where incompatibility with oil is not a factor, combinations of mancozeb and captan are a great choice for prebloom scab sprays. I would like to see the total pounds per acre at around 4.5 to 6 depending on scab history and weather conditions (based on captan 50W formulations; this will be less if using captan 80W formulations).

- Dodine may still work in some orchards, but don't trust it unless you've had leaf samples tested for fungicide resistance and I've told you the results. Significant crop loss can result from just one or two early-season applications of dodine in dodine-resistant orchards.

- Vanguard and Scala fungicides usually provide scab control similar to that provided by mancozeb at 3 lb/A. However, Vanguard and Scala can both provide 48-60 hr of post-infection activity against apple scab (counting from the start of the wetting period), whereas mancozeb sprays will provide only 18-36 hr of "kickback" activity when counting from the start of wetting periods, with the longer duration limited to colder infection periods. Vanguard and Scala do not redistribute well, so combinations of mancozeb at 3 lb/A plus either 3 oz/A of Vanguard or 5 fl oz/A of Scala are recommended when these products are used. Vanguard may lose effectiveness at temperatures above 70° F.

- Flint, Sovran, and Pristine are excellent protectant fungicides that provide better scab control than mancozeb or captan used alone. They can also arrest spore production if visible scab lesions are present in trees. However, they will not stop epidemics as effectively as SI fungicides did in SI-sensitive orchards if they are applied after scab infections are established. Do not rely on them for postinfection or "kickback" activity beyond 48 hours. They are a good choice for use at petal fall and first cover if you suspect resistance or if you have experienced failure of the SI fungicides.

- SI fungicides in combination with either captan or mancozeb might still be used at petal fall and first cover **unless** resistance is documented or unless an increase in fruit scab at harvest has been observed in the past two years when using an SI program. Continuing to use the SI's after resistance is documented but before a control failure is noticed represents a period of risk that should be considered seriously if these materials are to be used. SI's applied at that timing will provide significant suppression of powdery mildew as well as postinfection activity against any scab and rust infections that may have slipped through during the prebloom and bloom sprays. Using SI's in two applications after bloom should minimize selection pressures for SI-resistant scab while still maximizing the other benefits that SI's provide for apple disease management programs. Be aware that with the widespread documentation of resistance to SI's in W. Va., the proverbial horse may already be out of the barn.