Table 6.1.3. Characteristics of apple scab fungicides.

Fungicide and Rate/100 Gal (assuming 300 gpa for std. trees)	Protection	Retention	Redistribution	After-Infection Activity (hr) [4]	Pre-symptom	Post-symptom
Captan, Captec (captan) 50WP 2 lb; 80WDG 1.25 lb; 4L 1 qt.	VG	VG	G	18-24	none	none
copper (Champ, COCS, Cuprofix, Kocide) recommended rates.	G	G	G	?	_	_
Dithane (mancozeb) DF Rainshield; M45, 2 lb; F45 Rainshield, 1.6 qt. [3]	VG	VG	G	18-24	none	none
Ferbam Granuflo (ferbam) 0.9 lb	G	G	G	15-20	none	none
Flint (trifloxystrobin) 50WP 0.67 oz	VG	E	G	48-72[2]	none	G
Fontelis (penthiopyrad) 6.7 fl oz	E	E	F-G	48	?	F
Indar 2F (fenbuconazole) 2.33 fl oz	VG	VG	G	none	E	VG
Inspire Super (difenoconazole + cyprodinil) 1.33 fl oz.	VG	VG	G	48	E	VG
liquid lime sulfur 1.5-2 gal §	F	F-G	F-G	72-96	none	F
Luna Sensation (fluopyram + trifloxystrobin) 1.9 fl oz	E	E	F-G	48	?	F
Luna Tranquility (fluopyram + pyrimethanil) 5.3 fl oz	E	E	F-G	48	?	?
Manzate (mancozeb) Prostick, 2 lb; Max 1.6 qt [3]	VG	VG	G	18-24	none	none
Merivon (fluxapyroxad + pyraclostrobin) 1.8 fl oz	E	E	G	48	?	F
Penncozeb (mancozeb) 75DF 2 lb;[3]	VG	VG	G	18-24	none	none
Polyram (metiram) 80WP, 2 lb [3]	VG	VG	G	18-24	none	none
Procure (triflumizole) 480 SC, 2.5 oz [1]	F	VG	P	72-96	E	G-VG
Rally (myclobutanil) 40WP, 2 oz [1]	F	VG	P	72-96	E	G-VG
Rubigan (fenarimol)						
Scala (pyrimethanil) 600SC, 3.3 oz	G	G	?	48-72		
Sovran (kresoxim-methyl) 50WP, 1.33 oz	VG	E	G	48-72[2]	none	none
sulfur, 5 lb actual §	F	F-G	F-G	none	none	G
Syllit (dodine) 3.4 FL, 12 oz [1]	VG	VG	G	18-24	none	none
Topguard (flutriafol) 4.3 fl oz					E	VG

Table 6.1.3. Characteristics of apple scab fungicides.

Fungicide and Rate/100 Gal (assuming 300 gpa for std. trees)	Protection	Retention	Redistribution	After-Infection Activity (hr) [4]	Pre-symptom	Post-symptom
Topsin M (thiophanate-methyl) 70WP, 6 oz [1]	F	G	P-F	18-24		
Vangard (cyprodinil) 75WG, 1.67 oz	G	G	?	48-72	E	VG
Vintage (fenarimol) 1EC, 3-4 fl oz [1]	F	VG	P	72-96	E	G-VG
Ziram (ziram) 76DF1 1/2 lb	F-G	P-F	F-G	15-20	none	none

[1] Not effective against resistant strains of the fungus.
[2] The after-infection activity of Sovran and Flint may be only 48 hr in orchards with resistant populations of apple scab.
[3] Note that efficacy will drop if the lower rate program is used.
[4] Given the wide spread prevalence of fungicide resistance in regional populations of apple scab, one should not rely on post-infection activity.
§ potentially acceptable in certified organic programs.
(§) not all formulations of the active ingredient are acceptable in certified organic programs.
Key: **P** = poor, **F** = fair, **G** = good, **VG** = very good, **E** = excellent.

6.2 Notes on Apple Scab Management

6.2.1 Implications of Inoculum Dose

Economic losses to apple scab in commercial orchards usually appear following convergence of three factors:

1. High levels of carry-over inoculum are present in leaf litter in the orchard.
2. Weather conditions favor ascospore infections between green tip and bloom.
3. Fungicide protection is inadequate to prevent infections at some point between green tip and bloom.

The importance of high inoculum levels as a contributor to scab epidemics cannot be over-emphasized. No one can control the weather, and bad weather may interfere with fungicide applications. However, several methods are available for reducing inoculum in orchards. Any one of these methods can reduce inoculum by at least 70%, thereby converting high-inoculum orchards into moderate or low-inoculum orchards. Using one of these inoculum reduction strategies does not eliminate the need for fungicide protection beginning at green tip, but it reduces risks of control failures in bad scab years.

6.2.2 Orchard Sanitation for High-Inoculum Orchards.

The inoculum dose in overwintering leaves can be reduced by using any one of the following methods:

a) Apply 40 lb/A of urea fertilizer (mixed in 100 gal of water/A) after harvest, either before leaf-fall, in autumn after leaf-fall, or sometime after snow melt but before bud break. Urea softens senescent and fallen leaves and stimulates their microbial breakdown, promoting faster removal by earthworms that feed on them. It may also directly suppress ascospore formation. Treat the entire orchard, including the ground cover in the row middles. Apply the spray using either an air blast sprayer with the upper nozzles turned off or a boom sprayer set up to spray both under the trees and the row middles. Reduce subsequent nitrogen fertilizer rates by the amount of N applied under the drip line of the tree rows. Ignore the amount of N applied to the row middles, as the ground cover will use this.
b) Shred overwintering leaves using a flail mower set low enough to contact the fallen leaves. Leaves must be raked or blown from under trees, or the mower must be offset to reach them. Shredded leaves decay more quickly; flail-mowing leaves in spring disorients many of the leaf pieces so they eject ascospores toward the soil instead of up into the air. Prunings can be chopped at the same time. However, the low mower settings required to effectively shred leaves may leave row middles so denuded as to be slippery or muddy at the time when early fungicide sprays are needed.
c) Apply 2.5 ton/A of lime in early winter after leaves have fallen from trees. Lime raises the pH of fallen leaves enough to increase the rate of microbial breakdown of the fallen leaves.

6.2.3 Determining Inoculum Levels in Orchards

In research trials, the first fungicide spray for apple scab has been safely delayed until as late as tight cluster in orchards where scab was very well controlled throughout the previous season and the predicted ascospore dose (PAD) was therefore very low. To apply this option, an assessment of foliar scab must be made as close as possible to the time of leaf fall in autumn since late leaf infections can be an important source of inoculum for the following season. It is not safe to assume that there were few or no infections in an orchard based on casual observations during harvest or late sprays. Even packout evaluations of scab do not adequately estimate the scab present in an orchard. If a grower is going