

# Apple Fungicides Resistance Management

July, 2018

The following table lists fungicides registered for use on apple in British Columbia for apple scab and powdery mildew, categorized by resistance group. Fungicides in the same group have similar or identical modes of action. Over-use of fungicides in the same chemical group will lead to resistance problems. See *Fungicide Resistance Management* below for best practices to help prevent fungicide resistance.

## Fungicides Registered on Apple in Canada for control of apple scab and/or powdery mildew

Fungicide	Group No.*	Chemical Group	Diseases	Risk of Resistance
Nova (myclobutanil)	3	DMI Fungicides (triazoles)	Apple Scab, PowderyMildew	Medium. Resistance to apple scab has been detected in B.C. Resistance may be developing to powdery mildews. Limit use of group 3 fungicides to 1 or 2 sprays per season and stop using if resistance is suspected.
Fullback (flutriafol)	3	DMI Fungicides (triazoles)	Apple Scab, PowderyMildew	Medium. Limit use of group 3 fungicides to 1 or 2 sprays per season
Inspire (difenoconazole)	3	DMI Fungicides (triazoles)	Apple Scab, suppression of Powdery Mildew	Medium. Limit use of group 3 fungicides to 1 or 2 sprays per season
Inspire Super (difenoconazole + cyprodinil)	3 + 9	DMI Fungicides (triazoles) + Anilinopyrimidines	Apple Scab, suppression of Powdery Mildew	Medium. Limit use of group 3 fungicides to 1 or 2 sprays per season
Aprovia Top (difenoconazole + benzovindiflupyr)	3 + 7	DMI Fungicides (triazoles) + SDHI (pyrazole-4- carboxamides)	Apple Scab, Powdery Mildew	Medium – difenoconazole Med-High - benzovindiflupyr
Sovran (kresoxim-methyl)	11	QoI Fungicides	Apple Scab, PowderyMildew	High. Resistance to scab has been detected in B.C.
Flint (trifloxystrobin)	11	QoI Fungicides	Apple Scab, PowderyMildew	Limit use of group 11 fungicides to 2 per season. Stop using if resistance is suspected.

Fungicide	Group No.*	Chemical Group	Diseases	Risk of Resistance
Pristine (boscalid + pyraclostrobin)	7 + 11	SDHI (pyridine carboxamides) + QoI Fungicides	Apple Scab, Powdery Mildew	boscalid - medium to high; pyraclostrobin - high. See note above for group 11.
Aprovia (benzovindiflupyr)	7	SDHI (pyrazole-4-carboxamides)	Apple Scab, Powdery Mildew	Medium to High
Kenja (isofetamid)	7	SDHI (phenyl-oxo-ethyl thiophene amide)	Apple Scab	Medium to High
Sercadis (fluxapyroxad)	7	SDHI (pyrazole-4-carboxamides)	Apple Scab, Powdery Mildew	Medium to High
Fontelis (penthioopyrad)	7	SDHI (pyrazole-4-carboxamides)	Apple Scab, Powdery Mildew	Medium to High
Luna Tranquility (fluopyram +pyrimethanil)	7+9	SDHI (pyridinyl-ethyl-benzamides) + Anilinopyrimidines	Apple Scab, Powdery Mildew	fluopyram: medium to high; pyrimethanil: medium
Scala (pyrimethanil)	9	Anilinopyrimidines	Apple Scab, Post harvest rots	Medium
Diplomat (polyoxin D zinc salt)	19	Polyoxins	Powdery Mildew (suppression)	Medium
Allegro (fluazinam)	29	Dinitro Anilines	Apple Scab	Low
Captan/Maestro (captan)	M4	Phthalimides	Apple Scab	Low
Dithane/Manzate (mancozeb)	M3	Dithiocarbamates	Apple Scab	Low
Polyram (metiram)	M3	Dithiocarbamates	Apple Scab	Low
Granuflo-T (thiram)	M3	Dithiocarbamates	Apple Scab	Low
Ziram (ziram)	M3	Dithiocarbamates	Apple Scab (pinpoint)	Low
Kumulus or Cosavet DF (sulphur)	M1	Inorganics	Powdery Mildew, some activity on scab	Low
Cueva (copper octanoate)	M1	Inorganics	Apple scab, Fire blight	Low
Serenade Max ( <i>Bacillus subtilis</i> )	NC	Biologicals	Powdery Mildew, Fire Blight (suppression)	Low
Petro Canada Spray Oil 13E (mineral oil)	NC	Diverse	Powdery Mildew (suppression)	Low
OxiDate (hydrogen peroxide + peroxyacetic acid)	NC	Diverse	Powdery Mildew (suppression), apple scab (partial suppression)	Low

Fungicide	Group No.*	Chemical Group	Diseases	Risk of Resistance
Equal or Syllit (dodine)	U12	Guanidines	Apple scab	Medium. Apple scab resistance present. Not recommended for use on apple in the B.C. Interior.
Senator (thiophanate-methyl)	1	Benzimidazoles	Apple Scab, PowderyMildew	High. Apple scab resistance present. Not recommended for use against apple scab in the B.C. Interior.

\* Resistance Management Group. M = multi-site inhibitor; NC = not classified

## Fungicide Resistance Management

Fungicide resistance management is important to prolong the effectiveness of "at risk" fungicides and to limit crop losses should resistance occur.

### To help prevent resistance from developing:

- Alternate between different fungicide groups. Do not use more than 2 back-to-back sprays of fungicides with the same group number. In particular, use products rated with a medium to high risk carefully, and limit the number of applications. Products with a low risk of resistance can generally be used more often.
- Use recommended tank mixes.
- Use only recommended dose rates.
- Ensure sprayer is properly calibrated to deliver accurate and thorough coverage.
- Limit use of eradicants to the early "primary scab" season. Switch to other protectant fungicides after mid-June.
- Integrate with non-chemical control methods.
- Discontinue use of a product if resistance is suspected and consult your crop advisor.