

Fungicide “Cheat Sheet” for Alternaria Leaf Spot and Head Rot in Broccoli and Other Cole Crops

Product and Rate/A	Active Ingredient	FRAC ¹ Group	Rating for Risk of Fungicide Resistance	PHI	Restricted Use ²	Maximum Use	Rotation Restrictions (No. of apps before rotate to another FRAC group)	Cole Crops on Label ³	Disease Control	
									Relative Control of ALS ⁴	Activity on DM ⁵
Bravo Weather Stik 1.5 pt (+ many other formulations)	chlorothalonil	M5	Very low	7 days	No	11.7 pts (= 7 apps)	none	ALL	Mediocre	Good
Quadris 6-15.5 fl oz	azoxystrobin	11	High	0 days	No	90 fl oz (= 5-15 apps)	none	ALL	Mediocre	Good
Switch 10-14 oz	cyprodinil + fludioxonil	9 12	Medium	7 days	No	56 oz (= 4-5 apps)	2	ALL	Excellent	None
Alternity 11-14 oz	cyprodinil + fludioxonil	9 12	Medium	7 days	No	56 oz (= 4-5 apps)	2	ALL	Excellent*	None
Priaxor 6-8.2 fl oz	fluxapyroxad + pyraclostrobin	7 11	Medium-High High	3 days	Yes	24.6 fl oz (= 3 apps)	2	ALL	Best	Good
Endura 6-9 oz	boscalid	7 11	Medium-High	0 days	No	18 fl oz (= 2 apps)	2	ALL	Excellent	None
Luna Experience 6-8.6 fl oz	fluopyram + tebuconazole	7 3	Medium-High Medium	7 days	Yes	34 fl oz (= 4 apps)	2	Brassica leaf greens only	Excellent	None
Luna Sensation 5-7.6 fl oz	fluopyram + trifloxystrobin	7 11	Medium-High High	0 days	Yes	15.3 fl oz (= 2 apps)	2	ALL	Excellent	Good
Miravis Prime 11.4 fl oz	pydiflumetofen + fludioxonil	7 12	Medium-High Low-Medium	7 days	Yes	34.2 fl oz (= 3 apps)	2	ALL	Excellent*	None
Inspire Super 16-20 fl oz	cyprodinil + difenoconazole	9 3	Medium Medium	7 days	No	80 fl oz (= 4 apps)	2	ALL	Very Good	None
Vango Esq 14-20 fl oz	cyprodinil + difenoconazole	9 3	Medium Medium	7 days	No	80 fl oz (= 4 apps)	2	ALL	Very Good*	None
Quadris Top 12-14 fl oz	azoxystrobin + difenoconazole	11 3	High Medium	1 day	No	56 fl oz (= 4 apps)	1	ALL	Very Good	Good
Viathon 2 pt	tebuconazole + potassium phosphite	3 P07	Medium Low	7 days	No	8 pt (= 4 apps)	none	Brassica leaf greens only	Good	Good
Organic OMRI Listed										
Oso 5%SC 6.5-13 fl oz	Polyoxin D zinc salt	19	Medium	0 days	No	78 fl oz (= 6 apps)	none	ALL	Very Good**	None

1 **FRAC:** Fungicide Resistance Action Committee group. Fungicides that belong to the same FRAC group are at risk for developing cross-resistance. For best fungicide resistance management practices, fungicides belonging to different FRAC groups should be rotated.

2 **Restricted Use:** DEC spray license required to use.

3 **ALL Cole crops** includes broccoli, cabbage, cauliflower and Brussels sprouts. Often, kale, collards, kohlrabi and mustard greens also on label (see labels for details). **Luna Experience** and **Viathon** are only labeled on Brassica leaf greens such as broccoli raab, Chinese cabbage (Bok Choy), collards, mizuna, etc. NOT broccoli (see label).

4 **ALS: Alternaria leaf spot and head rot.** Relative disease control based on 2018 on-farm fungicide trial. ***Miravis Prime** not tested in 2018, but FRAC 7 is excellent on ALS. ***Vango ESQ** is a generic version of Inspire Super and **Alternity** is a generic of Switch. **Relative performance of Oso 5%SC is based on 2021 fungicide trial at AgriTech (Smart et. al.).

5 **DM: downy mildew.** Best control of DM is provided by Orondis Opti/Ultra, Revus and Presidio.

Fungicide Recommendations for ALS in Broccoli

Fungicide “Cheat Sheet” provides roster of fungicides labeled in broccoli and other common Cole crops for use on ALS. The relative control of ALS was based on results from an on-farm trial conducted in 2018 under severe ALS pressure (Hoeping) – for more information on this trial, see newsletter article in VegEdge May 15, 2019, [New Fungicide Recommendations for Alternaria Leaf Spot and Head Rot in Broccoli](#) and presentation at Empire State Producers Expo 2019, [Control of Alternaria Head Rot in Broccoli Featuring Exciting Results from 2018 On-Farm Fungicide Trial](#).

- Spray fungicides preventatively before disease establishes itself, because lower frame leaves serve as inoculum to infect heads. When disease pressure is low, Bravo could be an economical choice at this timing.
- Once the canopy fills in, aeration is reduced and leaf wetness is prolonged, especially during late-August and into the fall. Begin application of systemic/translaminar fungicides with very good to excellent activity on ALS at this time.
- All fungicides listed in the Cheat Sheet except Bravo and Oso5%SC, are at risk of ALS developing resistance.
 - See ALS Fungicide Cheat Sheet/labels for rotation restrictions and seasonal maximum use rates.
 - Be mindful of pre-mixes that have more than one FRAC group per fungicide that need to be managed for fungicide resistance.
- For best fungicide resistance management practices:
 1. Do not apply more than 1-2 applications before alternating to another FRAC group.
 2. Do not use more than 2 applications per FRAC group per crop.
 - Bravo is the exception to this, because its multi-site mode of action reduces its risk for fungicide resistance and may be used up to 7 times.
- Use an adjuvant with fungicides that have translaminar or systemic activity (all fungicides except Bravo) for improved efficacy.
 - Do not apply a copper bactericide in the same tank mix with an adjuvant, or excessive leaf burn injury may occur.
- Save products with 0 (Endura, Quadris, Luna Sensation, Oso 5%SC), 1 (Quadris Top) or 3 days (Priaxor) PHI for close to and during harvest.
- Note that Luna Experience, Endura, Miravis Prime, Inspire Super/Vango ESQ, Switch/Alterity and Oso 5%SC have no activity on DM.
 - ALS fungicides with good DM activity include Bravo and those with FRAC 11 active ingredients (Quadris, Quadris Top, Priaxor, Luna Sensation).
 - Best control of DM is provided by Orondis Opti/Ultra, Revus and Presidio. Note that none of these fungicides do not have activity on ALS.
- **Be aware that it is highly suspected (not officially confirmed) that ALS has developed fungicide resistance to Quadris (a.i. axoystrobin). Therefore, use of Quadris and other FRAC 11 fungicides (such as Cabrio) are not recommended for control of ALS.** Premixes with FRAC 11 that contain FRAC 3 or 7 (such as Quadris Top, Priaxor and Luna Sensation) are okay, because it is the FRAC 3 and 7 active ingredients that are doing the work.
- **Do your fungicide spray program “puzzle” ahead of time.** Although there are several fungicide options, it can be tricky to not exceed 2 apps per FRAC per crop, especially when most products contain premixes of two FRAC groups (e.g. Inspire Super contains FRAC 3 and 9).
 - It is a good idea to design a 4-week program to use from full canopy fill through harvest. Prior to this, Bravo should suffice unless ALS pressure is high.
 - Start with the products that you want to use during harvest with 0 PHI and work backwards to avoid no more than 2 apps per FRAC.
 - Although expensive, Switch (FRAC 9, 12) is an excellent rotation partner with the many FRAC 3 and 7 products.

