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

<table>
<thead>
<tr>
<th>Product and Rate/A</th>
<th>Active Ingredient</th>
<th>FRAC Group</th>
<th>PHI</th>
<th>Restricted Use</th>
<th>Maximum Use</th>
<th>Rotation Restrictions (No. of apps before rotate to another FRAC group)</th>
<th>Disease Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bravo Weather Stik 1.5 pt</td>
<td>chlorothalonil</td>
<td>M5</td>
<td>7 days</td>
<td>No</td>
<td>11.7 pts (= 7 apps)</td>
<td>N/A</td>
<td>Mediocre</td>
</tr>
<tr>
<td>Quadris 6-15.5 fl oz</td>
<td>azoxystrobin</td>
<td>11</td>
<td>0 days</td>
<td>No</td>
<td>90 fl oz (= 5-15 apps)</td>
<td>N/A</td>
<td>Mediocre</td>
</tr>
<tr>
<td>Switch 10-14 oz</td>
<td>cyprodinil + fludioxonil</td>
<td>9 12</td>
<td>7 days</td>
<td>No</td>
<td>56 oz (= 4-5 apps)</td>
<td>2</td>
<td>Excellent</td>
</tr>
<tr>
<td>Priaxor 6-8.2 fl oz</td>
<td>fluxapyroxad + pyraclostrobin</td>
<td>7 11</td>
<td>3 days</td>
<td>Yes</td>
<td>24.6 fl oz (= 3 apps)</td>
<td>2</td>
<td>Best</td>
</tr>
<tr>
<td>Endura 6-9 oz</td>
<td>boscalid</td>
<td>7 11</td>
<td>0 days</td>
<td>No</td>
<td>18 fl oz (= 2 apps)</td>
<td>2</td>
<td>Excellent</td>
</tr>
<tr>
<td>Luna Sensation 5-7.6 fl oz</td>
<td>fluopyram + trifloxystrobin</td>
<td>7 11</td>
<td>0 days</td>
<td>Yes</td>
<td>15.3 fl oz (= 2 apps)</td>
<td>2</td>
<td>Excellent</td>
</tr>
<tr>
<td>Inspire Super 16-20 fl oz</td>
<td>cyprodinil + difenoconazole</td>
<td>9 3</td>
<td>7 days</td>
<td>No</td>
<td>80 fl oz (= 4 apps)</td>
<td>2</td>
<td>Very Good</td>
</tr>
<tr>
<td>Quadris Top 12-14 fl oz</td>
<td>azoxystrobin + difenoconazole</td>
<td>11 3</td>
<td>1 day</td>
<td>No</td>
<td>56 fl oz (= 4 apps)</td>
<td>1</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

*Other Cole crops* includes cabbage, cauliflower and Brussels sprouts. Often, kale, collards, kohlrabi and mustard greens also on label (see labels for details). Note that Luna Experience and Viathon fungicides containing active ingredient mefanoxam, are labeled only on Brassica leafy greens (broccoli raab, Chinese cabbage (Bok Choy), collards, mizuna, etc.) and not on Head and Stem Brassicas (broccoli, cabbage, etc.).

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 ALS: Alternaria leaf spot and head rot. Relative disease control based on 2018 on-farm fungicide trial.

4 DM: Downy mildew. If fungicide has no activity on DM and protection against this disease is desired, add fungicide with DM activity such as Bravo to the tank mix. Best control of DM is provided by Orondis Opti/Ultra, Revus and Presidio.

Compiled by Christy Hoepting (August 2020)
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 (Hoepting) – 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](https://vegedge.gardening.uiuc.edu/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](https://www.youtube.com/watch?v=Q5Q5Q5Q5Q5).

- 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, 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), 1 (Quadris Top) or 3 days (Priaxor) PHI for close to and during harvest.

- Note that Endura, Switch and Inspire Super 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. axoxyostrobin). 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.