

## 5. Dry Edible Beans

### DRY EDIBLE BEAN INSECTS

**Table 5–1.** Chemical Control Options for Insects in Dry Edible Beans — Seedcorn Maggot, Wireworms

| Integrated Pest Management Options  | Active Ingredient                              | Trade Name         | Rate  | Comments (label precautions, re-entry periods, etc.)   |
|---|--|--------------------|---|--|
| <b>SEEDCORN MAGGOT (<i>Delia platura</i>)</b>   |  |                    |   |  |
| <b>Seed Treatment</b>   |  |                    |   |  |
| Seedcorn maggot problems in dry beans are rare in Ontario. Risk factors include cool, wet springs when germination is delayed. In fields at high risk, including early-planted fields where large amounts of manure, green manure or residue have recently been incorporated, use insecticide seed treatment. | thiamethoxam                                   | Cruiser 5FS        | 50–83 mL/<br>100 kg seed                              | <b>For use in commercial seed treatment facilities only.</b> Use higher rate when expecting high insect populations. May be mixed with Apron Maxx RTA for control of seed and soil-borne pathogens. Do not graze or feed livestock on treated areas for 45 days after planting.  |
|   | thiamethoxam<br>+ metalaxyl-M<br>+ fludioxonil | Cruiser Maxx Beans | 195 mL/<br>100 kg seed                                | <b>For use in commercial seed treatment facilities only.</b> Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. For anthracnose control, tank-mix with 10 mL of Dynasty 100FS/100 kg seed. Do not graze or feed livestock on treated areas for 45 days after planting.   |
| <b>WIREWORMS (<i>Limonius</i> spp. and others)</b>  |  |                    |   |  |
| <b>Seed Treatment</b>   |  |                    |   |  |
| See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> , for sampling methods.   | imidicloprid                                   | Stress Shield 600  | 104 mL/<br>100 kg seed<br>(62.5 g ai/<br>100 kg seed) | <b>For use in commercial seed treatment facilities only.</b> For control of certain seed and soil-borne pathogens in legume seeds and seedlings, mix Stress Shield 600 with the following seed treatment fungicides: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, Apron Max RFC and Apron Max RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Make sure that specific legume crop to be treated is registered on the fungicide partner as well.<br><br>Use high rate for early seeding, when insect populations are expected to be high or extended control period for aphids is needed. This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.<br><br>Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with Stress Shield 600. |
|   | thiamethoxam<br>+ metalaxyl-M<br>+ fludioxonil | Cruiser Maxx Beans | 195 mL/<br>100 kg seed                                | <b>For use in commercial seed treatment facilities only.</b> Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. For anthracnose control, tank-mix with 10 mL of Dynasty 100FS/100 kg seed. Do not graze or feed livestock on treated areas for 45 days after planting.   |

## DRY EDIBLE BEAN INSECTS

**Table 5–2.** Chemical Control Options for Insects in Dry Edible Beans — Mexican Bean Beetle

**LEGEND:** PHI = Pre-Harvest Interval (in days)

| Integrated Pest Management Options   | Active Ingredient | Trade Name   | Rate                              | PHI | Comments (label precautions, re-entry periods, etc.)   |
|--|-------------------|--------------|-----------------------------------|-----|--|
| <b>MEXICAN BEAN BEETLE (<i>Epilachna varivestis</i>)</b>   |                   |              |                                   |     |  |
| <b>Foliar Treatment</b>  |                   |              |                                   |     |  |
| Mexican bean beetles are less of a problem in very hot, dry summers. Early-maturing bean varieties may be grown with little or no injury. Several natural enemies help keep populations below action thresholds. Insecticides are only recommended if populations are extremely high, as they will also kill the natural enemy population. See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> , for more information. | dimethoate        | Cygon 4 E    | 0.7–1.0 L/ha<br>(280–400 mL/acre) | 7   | Do not feed treated threshings or crop refuse to livestock.<br><br>This product is toxic to bees. Restrict application to the period after dark when bees are inside the hives, or in the early morning before the bees are foraging in the fields. <b>DO NOT</b> apply to such crops as alfalfa when in full bloom. |
|  |                   | Lagon 480 EC |                                   |     |  |

**DRY EDIBLE BEAN INSECTS**

**Table 5-3.** Chemical Control Options for Insects in Dry Edible Beans — Potato Leafhopper

**LEGEND:** PHI = Pre-Harvest Interval (in days)      N/A = not applicable

| Integrated Pest Management Options   | Active Ingredient                        | Trade Name         | Rate  | PHI | Comments (label precautions, re-entry periods, etc.)   |
|--|--|--------------------|---|-----|--|
| <b>POTATO LEAFHOPPER (<i>Empoasca fabae</i>)</b>   |  |                    |   |     |  |
| <b>Seed Treatments</b>   |  |                    |   |     |  |
| Consider using insecticide seed treatment on fields with a history of leafhopper infestations, to reduce the number of foliar applications required. Insecticide seed treatments last at least 4–6 weeks after planting, eliminating the need for at least one foliar insecticide application. | thiamethoxam                             | Cruiser 5FS        | 86–143 mL/<br>100 kg seed                             | N/A | <b>For use in commercial seed treatment facilities only.</b> Use higher rate when expecting high insect populations. May be mixed with Apron Maxx RTA for control of seed and soil-borne pathogens. Do not graze or feed livestock on treated areas for 45 days after planting.  |
|  | thiamethoxam + metalaxyl-M + fludioxonil | Cruiser Maxx Beans | 195 mL/<br>100 kg seed                                | N/A | <b>For use in commercial seed treatment facilities only.</b> Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. For anthracnose control, tank-mix with 10 mL of Dynasty 100FS/100 kg seed. Do not graze or feed livestock on treated areas for 45 days after planting.   |
|  | imidacloprid                             | Stress Shield 600  | 104 mL/<br>100 kg seed<br>(62.5 g ai/<br>100 kg seed) | N/A | <b>For use in commercial seed treatment facilities only.</b> For control of certain seed and soil-borne pathogens in legume seeds and seedlings, mix Stress Shield 600 with the following seed treatment fungicides: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, Apron Max RFC and Apron Max RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Make sure that specific legume crop to be treated is registered on the fungicide partner as well.<br><br>Use high rate for early seeding, when insect populations are expected to be high or extended control period for aphids is needed. This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.<br><br>Do not apply any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with Stress Shield 600. |

## DRY EDIBLE BEAN INSECTS

**Table 5–3.** Chemical Control Options for Insects in Dry Edible Beans — Potato Leafhopper

| Integrated Pest Management Options  |                 | Active Ingredient        | Trade Name   | Rate  | PHI | Comments (label precautions, re-entry periods, etc.)   |
|---|-----------------|--------------------------|--------------|---|-----|--|
| <b>POTATO LEAFHOPPER (<i>Empoasca fabae</i>) (cont'd)</b>   |                 |                          |              |   |     |  |
| <b>Foliar Treatment</b>   |                 |                          |              |   |     |  |
| Some tolerant varieties are available ( <a href="http://www.gobeans.ca">www.gobeans.ca</a> ). See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> , for action threshold charts and sampling methods. | dimethoate      | Cygon 480 EC             | Lagon 480 EC | 0.7–1.0 L/ha<br>(280–400 mL/acre)   | 7   | Some residual activity is expected from this product. Ground or aerial application. Do not feed treated threshings or crop refuse to livestock. Maximum 3 applications/yr.<br><br>This product is toxic to bees. Restrict application to the period after dark when bees are inside the hives, or in the early morning before the bees are foraging in the fields. <b>DO NOT</b> apply to such crops as alfalfa when in full bloom.  |
|   |                 | lamba-cyhalothrin        |              |   |     |  |
|   | Silencer 120 EC | 83 mL/ha<br>(34 mL/acre) | 14           | This product has no systemic activity. <b>Ground application only.</b> For best results, apply during the early morning, before temperatures rise, and during the evening. Do not graze or harvest treated forage, straw or hay for livestock feed. Maximum 3 applications/yr. 24-hr re-entry period.<br><br>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site. |     |  |
|   | flupyradifurone | Sivanto Prime            |              | 500–750 mL/ha<br>(202–303 mL/acre)  | 7   | The maximum amount of Sivanto Prime allowed per crop season is 2,000 mL/ha. Apply as a foliar application ensuring thorough coverage. Do not make any application of Sivanto Prime following soil, in-furrow or seed treatment applications of a Group 4D insecticide.<br><br>Toxic to adult bees in laboratory studies via oral exposure, however, not toxic to bees through contact exposure, and field studies conducted with this product have shown no effects on honeybee colony development. Minimize spray drift to reduce exposure to bees in habitats close to the application site. Application during the crop blooming period, and when flowering weeds are present, may only be made in the early morning and the evening when most bees are not foraging. |

## DRY EDIBLE BEAN INSECTS

**Table 5–4.** Chemical Control Options for Insects in Dry Edible Beans — Bean Leaf Beetle

| Integrated Pest Management Options  |  | Active Ingredient                              | Trade Name  | Rate                   | PHI   | Comments (label precautions, re-entry periods, etc.)   |
|---|--|--|---|------------------------|---|--|
| <b>BEAN LEAF BEETLE (<i>Certoma trifurcata</i>)</b>   |  |  |   |                        |   |  |
| <b>Seed Treatments</b>  |  |  |   |                        |   |  |
| Use in fields with a history of early season infestations. If defoliation after seedling is a concern, a well timed foliar will provide control.  |  | thiamethoxam<br>+ metalaxyl-M<br>+ fludioxonil | Cruiser Maxx<br>Beans   | 195 mL/<br>100 kg seed | N/A   | <b>For use in commercial seed treatment facilities only.</b> Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. For anthracnose control, tank-mix with 10 mL of Dynasty 100FS/100 kg seed. Do not graze or feed livestock on treated areas for 45 days after planting. |
| <b>Foliar Treatment</b>   |  |  |   |                        |   |  |
| Use defoliation thresholds for dry beans found in OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> . During pod stages, with higher value and stringent quality standards in dry beans, if 5%–8% of the pods inspected have feeding scars, control may be necessary. Ensure that adults are still presently active in the field before a spray is applied. | lambda-cyhalothrin                             | Matador<br>120 E<br><br>Silencer<br>120 EC     | ground:<br>83–233 mL/ha<br>(34–94 mL/acre)<br><br>aerial:<br>83 mL/ha<br>(34 mL/acre) | 14                     | Use the higher rate to target higher pest populations or conditions conducive to bean pod mottle virus. Ground and aerial application. For best results, apply during the early morning, before temperatures rise, and during the evening. Use 100–200 L of water/ha for ground application. Use 20 L of water/ha for aerial applications. Do not graze or feed on treated forage. Maximum 3 applications/yr. 24-hr re-entry period.<br><br>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.  |  |
|   | lambda-cyhalothrin<br>+<br>chlorantraniliprole | Voliam<br>Xpress                               | 500 mL/ha<br>(202 mL/ha)  | 14                     | Apply no later than when the first feeding is seen on foliage. Maximum of 3 applications/yr by ground, 1 application/yr by air. Apply in a minimum of 100–200 L of water/ha for ground applications, 40 L of water/ha for aerial applications.<br><br>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.  |  |
|   | thiamethoxam<br>+<br>lambda-cyhalothrin        | Endigo   | 180 mL/ha<br>(73 mL/acre)   | 21                     | Base the need and timing of application on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Allow at least 7 days between treatments. Do not graze or harvest treated forage, straw or hay for livestock feed. Do not apply this product within 45 days of planting if seeds were treated with a neonicotinoid product. Do not exceed a total of 540 mL/ha of Endigo per season. Maximum of 3 applications/yr. Use a minimum of 100–200 L of water/ha for ground application and 20 L of water/ha for aerial applications.<br><br>Toxic to bees. To minimize exposure to bees from foliar application, <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site. |  |
|   | dimethoate                                     | Cygon<br>480 EC<br><br>Lagon<br>480 EC         | 0.7–1.0 L/ha<br>(280–400 mL/acre)   | 7                      | Some residual activity is expected from this product. Ground or aerial application. Do not feed treated threshings or crop refuse to livestock. Maximum 3 applications/yr.<br><br>This product is toxic to bees. Restrict application to the period after dark when bees are inside the hives, or in the early morning before the bees are foraging in the fields. <b>DO NOT</b> apply to such crops as alfalfa when in full bloom.   |  |

## DRY EDIBLE BEAN INSECTS

**Table 5–5.** Chemical Control Options for Insects in Dry Edible Beans — Western Bean Cutworm, Tarnished Plant Bug

**LEGEND:** PHI = Pre-Harvest Interval (in days)

| Integrated Pest Management Options  | Active Ingredient                        | Trade Name      | Rate                                | PHI | Comments (label precautions, re-entry periods, etc.)  |
|---|--|-----------------|-------------------------------------|-----|---|
| <b>WESTERN BEAN CUTWORM (<i>Striacosta albicosta</i>)</b>   |  |                 |                                     |     |   |
| <b>Foliar Treatment</b>   |  |                 |                                     |     |   |
| <p>Larvae mine into the pod, feeding directly on the seed. Their entry holes also allow for the introduction of pod diseases. All these activities have a negative impact on yield, seed quality and increase pick. It is difficult to scout for WBC eggs or larvae in dry beans. Use pheromone traps instead to monitor for presence and peak flight. If pod feeding is easily found, spray is necessary. Apply insecticide 10–20 days after peak moth flight when larval feeding is expected.</p> <p>Additional information on pest status and management recommendations are provided at the Ontario WBC Trap Network: <a href="http://www.cornpest.ca">www.cornpest.ca</a>.</p> | lambda-cyhalothrin                       | Matador 120 EC  | 83–187 mL/ha<br>(34–76 mL/acre)     | 21  | <p>Ground or aerial application. For best results, apply in the early morning, before temperatures rise, or during the evening. Use 100–200 L water/ha for ground application, 20 L water/ha for aerial application. Spray no later than 10 days after egg hatch. Maximum 3 applications/yr. Do not make more than 2 applications of 83 mL/ha by air. 24-hr re-entry period.</p> <p>This product is toxic to bees when exposed to direct treatment, drift, or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p>   |
|   |  | Silencer 120 EC | 83–187 mL/ha<br>(33.6–75.7 mL/acre) | 21  | <p>Cutworm activity is greatest during the late evening and night. Time application as close as possible to insect-feeding activity. For western bean cutworm control, repeat sprays at 4–7-day intervals. Use 100–200 L water/ha for ground application, 20 L water/ha for aerial application. Spray no later than 10 days after egg hatch. Maximum 3 applications/yr. Do not make more than 2 applications of 83 mL/ha by air. 24-hr re-entry period.</p> <p>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p> |
|   | chlorantraniliprole                      | Coragen         | 250–375 mL/ha<br>(101–151 mL/acre)  | 1   | <p>For ground application, use a minimum water volume of 100 L/ha and 50 L/ha for aerial. Use high rate of Coragen under heavy pest pressure. Apply when rain is not expected in the next 24 hr. Apply when plants are small, so that lower portions of plant can receive adequate coverage. Minimum of 3 days between applications. Maximum 4 applications/yr. Do not exceed a total of 1.125 L of Coragen/ha/season. 12-hr re-entry period.</p>   |
|   | lambda-cyhalothrin + chlorantraniliprole | Voliam Xpress   | 500 mL/ha<br>(202 mL/ha)            | 14  | <p>Apply no later than when the first feeding is seen on foliage. Maximum of 3 applications/yr by ground, 1 application/yr by air. Apply in a minimum of 100–200 L of water/ha for ground applications, 40 L of water/ha for aerial applications.</p> <p>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p>   |

**DRY EDIBLE BEAN INSECTS**

**Table 5-5.** Chemical Control Options for Insects in Dry Edible Beans — Western Bean Cutworm, Tarnished Plant Bug

**LEGEND:** PHI = Pre-Harvest Interval (in days)

| Integrated Pest Management Options  | Active Ingredient  | Trade Name      | Rate                            | PHI | Comments (label precautions, re-entry periods, etc.)   |
|---|--------------------|-----------------|---------------------------------|-----|--|
| <b>TARNISHED PLANT BUG (<i>Lygus lineolaris</i>) and <i>LYGUS</i> spp.</b>  |                    |                 |                                 |     |  |
| <b>Foliar Treatment</b>   |                    |                 |                                 |     |  |
| <p><i>Lygus</i> spp. can sting the developing pods, resulting in damaged seeds. Monitor beans during the early pod-filling stages. A treatment may be required when there are 1–2 bugs per sweep later in the season.</p> | dimethoate         | Cygon 4 E       | 0.7–1 L/ha<br>(280–400 mL/acre) | 7   | <p>Some residual activity is expected from this product. Ground or aerial application. Do not feed treated threshings or crop refuse to livestock. Maximum 3 applications/yr.</p> <p>This product is toxic to bees. Restrict application to the period after dark when bees are inside the hives, or in the early morning before the bees are foraging in the fields. <b>DO NOT</b> apply to such crops as alfalfa when in full bloom.</p>   |
|   |                    | Lagon 480 E     |                                 |     |  |
|   | lambda-cyhalothrin | Matador 120 E   | 83 mL/ha<br>(34 mL/acre)        | 21  | <p>This product has no systemic activity. Ground and aerial application. For best results, apply during the early morning, before temperatures rise, and during the evening. Use 100–200 L of water/ha for ground application. Use 20 L of water/ha for aerial applications. Do not graze or feed on treated forage. Maximum 3 applications/yr. 24-hr re-entry period.</p> <p>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p> |
|   |                    | Silencer 120 EC | 83 mL/ha<br>(34 mL/acre)        | 14  | <p>This product has no systemic activity. <b>Ground application only.</b> For best results, apply during the early morning, before temperatures rise, and during the evening. Do not graze or harvest treated forage, straw or hay for livestock feed. Maximum 3 applications/yr. 24-hr re-entry period.</p> <p>This product is toxic to bees when exposed to direct treatment, drift or residues on flowering crops or weeds. <b>DO NOT</b> apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.</p>   |

## DRY EDIBLE BEAN DISEASES

**Table 5–6.** Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — Seedling Diseases, Pythium Damping-Off

| Integrated Pest Management Options   | Active Ingredient                            | Trade Name | Rate                          | Comments (label precautions, re-entry periods, etc.)   |
|--|--|------------|-------------------------------|--|
| <b>SEED and SEEDLING DISEASES</b>  |  |            |                               |  |
| <b>SEEDLING DISEASES</b>   |  |            |                               |  |
| <b>Seed Treatment</b>  |  |            |                               |  |
| Seedling diseases are present in all fields and all soil types. Maintain or build up good soil tilth by following a good crop rotation (3 yr between bean crops of any kind). Do not overwork the soil and avoid working it when it is wet. Apply seed treatments that will help protect the plant from root rots during germination and early growth. Use tolerant varieties. Consult your seed company and the Ontario Pulse Crops Committee Variety Trials. | diazinon<br>+ captan<br>+ thiophanate-methyl | DCT        | 1 L of slurry/<br>100 kg seed | Due to the threat of anthracnose infection to this crop, ALL edible bean seed should be treated with DCT or Dynasty 100FS. Seedling blights and damping-off are also controlled. Use full rate and ensure good coverage by applying as a slurry. Available as a 400-g container that will treat 77 kg of dry bean seed. To make a slurry, use 520 g seed treatment/L of water. For control of pythium and phytophthora root rots, add metalaxyl. |



## DRY EDIBLE BEAN DISEASES

**Table 5–6.** Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — Seedling Diseases, Pythium Damping-Off

| Integrated Pest Management Options  | Active Ingredient                              | Trade Name                | Rate   | Comments (label precautions, re-entry periods, etc.)  |
|---|--|---------------------------|--|---|
| <b>PYTHIUM DAMPING-OFF (<i>Pythium</i> spp.)</b>  |  |                           |  |   |
| <b>Seed Treatment</b>   |  |                           |  |   |
| <p>This disease can occur on all soil types but losses are greatest on wet, clay soils. Minimize soil compaction and remove excess moisture through increased drainage. Treat seed with metalaxyl or metalaxyl-M and plant into warm soils (16°C). Rotate 3–4 yr between bean crops.</p> <p>Due to the threat of anthracnose infection to this crop, ALL edible bean seed should be treated with DCT or Dynasty 100FS. See <i>Table 5–8. Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — Anthracnose, Phytophthora spp.</i>, on page 135, for more details.</p> | metalaxyl-M                                    | Apron XL LS               | 20–40 mL/<br>100 kg seed                       | <b>For use in commercial seed treatment facilities only.</b> Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Do not graze or feed livestock on seeded area for 4 weeks after planting. Read label for information regarding resistant strains of fungus.   |
|   | metalaxyl                                      | Allegiance FL<br>Apron FL | 46–110 mL/<br>100 kg seed                      | Do not graze or feed livestock on seeded area for 4 weeks after planting.   |
|   | fludioxonil<br>+ metalaxyl-M                   | Apron Maxx<br>RTA         | 325 mL/<br>100 kg seed                         | For both commercial seed treatment plants and on-farm treatment using standard gravity- or mist-type seed treatment equipment. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.  |
|   |  | Apron Maxx<br>RFC         | 100 mL<br>+ 230 mL of<br>water/<br>100 kg seed | For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. For anthracnose control, tank-mix with DCT or 10 mL of Dynasty 100FS/100 kg seed.   |
|   | thiamethoxam<br>+ metalaxyl-M<br>+ fludioxonil | Cruiser Maxx<br>Beans     | 195 mL/<br>100 kg seed                         | <b>For use in commercial seed treatment facilities only.</b> Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. For anthracnose control, tank-mix with 10 mL of Dynasty 100FS/100 kg of seed.   |
|   | penflufen<br>+ prothioconazole<br>+ metalaxyl  | EverGol<br>Energy         | 65 mL/<br>100 kg seed                          | For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.  |
|   | ethaboxam                                      | Intego Solo<br>Fungicide  | 19.6 mL/<br>100 kg seed                        | For commercial and on-farm treating. Regulations under the <i>Seeds Act</i> require that an appropriate colourant be added when this product is applied to seed.<br><br>For best results, use Intego Solo Fungicide combined with other oomycete-active seed treatment fungicides, such as metalaxyl, to broaden the spectrum of activity. Intego Solo Fungicide can also be used in combination with a broad-spectrum registered seed treatment fungicide having activity against <i>Rhizoctonia solani</i> and other fungal pathogens inciting seed and seedling disease. |

## DRY EDIBLE BEAN DISEASES

**Table 5–7.** Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — *Fusarium* Seed and Root Rot

| Integrated Pest Management Options  | Active Ingredient                              | Trade Name            | Rate   | Comments (label precautions, re-entry periods, etc.)   |
|---|--|-----------------------|--|--|
| <b>SEED and SEEDLING DISEASES</b>   |  |                       |  |  |
| <b>FUSARIUM SEED and ROOT ROT (<i>Fusarium solani</i> f. sp. <i>phaseoli</i>)</b>   |  |                       |  |  |
| <b>Seed Treatment</b>   |  |                       |  |  |
| <p>Fusarium begins as small, reddish-brown lesions on the taproot that join to form larger lesions, or streaks, as the plant ages. The lesion can extend up to the soil line. The splitting of the tap root, crown and lower stem often reveals a brown-reddish internal discolouration of the water-conducting tissue.</p> <p>Longitudinal cracks and adventitious roots may develop on damaged plants. These adventitious roots are formed above the damaged area. Late infection seldom results in dead plants but rather in stunted, unthrifty-looking ones. Disease development is promoted by soil compaction, short crop rotations and moisture stress.</p> <p>Due to the threat of anthracnose infection to this crop, ALL edible bean seed should be treated with DCT or Dynasty 100FS. See <i>Table 5–8 Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — Anthracnose, Phytophthora spp.</i>, on page 135, for more details. Other seed treatment products may be needed to protect against other edible bean diseases.</p> | diazinon<br>+ captan<br>+ thiophanate-methyl   | DCT                   | 1 L of slurry/<br>100 kg seed                  | Due to the threat of anthracnose infection to this crop, ALL edible bean seed should be treated with DCT or Dynasty 100FS. Seedling blights and damping-off are also controlled. Use full rate and ensure good coverage by applying as a slurry. Available in a 400-g container that will treat 77 kg of dry bean seed. To make a slurry, use 520 g seed treatment/L of water. For control of pythium and phytophthora root rots, add metalaxyl. |
|   | carbathiin<br>+ thiram                         | Vitaflo 280           | 260 mL/<br>100 kg seed                         | <b>For use in commercial seed treatment facilities only.</b> Ensure good seed coverage. This product will not control anthracnose if seed is severely infected.  |
|   | fludioxonil<br>+ metalaxyl-M                   | Apron Maxx<br>RTA     | 325 mL/<br>100 kg seed                         | For both commercial seed treatment plants and on-farm treatment using standard gravity- or mist-type seed treatment equipment. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.   |
|   |  | Apron Maxx<br>RFC     | 100 mL<br>+ 230 mL of<br>water/<br>100 kg seed | For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. For anthracnose control, tank-mix with DCT or 10 mL of Dynasty 100FS/100 kg seed.  |
|   | thiamethoxam<br>+ metalaxyl-M<br>+ fludioxonil | Cruiser Maxx<br>Beans | 195 mL/<br>100 kg seed                         | <b>For use in commercial seed treatment facilities only.</b> Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. For anthracnose control, tank-mix with 10 mL of Dynasty 100FS/100 kg of seed.  |
|   | trifloxystrobin                                | Trilex FS             | 21 mL/<br>100 kg seed                          | <b>For use in commercial seed treatment facilities only.</b> Apply using standard commercial seed treatment equipment. Not for use in hopper-box, planter-box, slurry-box or similar seed treatment applications. Uniform application on seed is necessary to ensure seed safety and best disease protection.  |
|   | penflufen<br>+ prothioconazole<br>+ metalaxyl  | EverGol<br>Energy     | 65 mL/<br>100 kg seed                          | For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.   |

## DRY EDIBLE BEAN DISEASES

**Table 5–8.** Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — Anthracnose, *Phytophthora* spp.

| <b>Integrated Pest Management Options</b>  |  | <b>Active Ingredient</b> | <b>Trade Name</b>                  | <b>Rate</b> | <b>PHI</b>  | <b>Comments (label precautions, re-entry periods, etc.)</b> |
|--|--|--------------------------|------------------------------------|-------------|---|---|
| <b>LEGEND:</b> PHI = Pre-Harvest Interval (in days)      N/A = not applicable  |  |                          |                                    |             |   |   |
| <b>ANTHRACNOSE (<i>Colletotrichum lindemuthianum</i>)</b>  |  |                          |                                    |             |   |   |
| <b>Seed Treatment</b>  |  |                          |                                    |             |   |   |
| Anthracnose is best controlled by planting disease-free seed and using a seed treatment containing DCT or Dynasty 100FS. Should disease still appear, use a foliar fungicide as a rescue treatment.  | diazinon<br>+ captan<br>+ thiophanate-methyl | DCT                      | 1 L of slurry/<br>100 kg seed      | N/A         | Due to the threat of anthracnose infection to this crop, ALL edible bean seed should be treated with DCT or Dynasty 100FS. Available in a 400-g container that will treat 77 kg of dry bean seed. To make slurry, use 520 g seed treatment/L of water. Use full rate and ensure good coverage by applying as a slurry. For control of pythium and phytophthora root rots, add metalaxyl.  |   |
|  | azoxystrobin                                 | Dynasty<br>100FS         | 10 mL/<br>100 kg seed              | N/A         | Due to the threat of anthracnose infection to this crop, ALL edible bean seed should be treated with DCT or Dynasty 100FS. For additional disease control, use in combination with Apron Maxx RFC or Cruiser Maxx Beans.  |   |
| <b>Foliar Treatment</b>  |  |                          |                                    |             |   |   |
| Rainy weather favours this disease, as spores are splashed from diseased areas and carried in wind-borne water droplets or by surface water throughout the field. Take note of weather forecasts, as wet conditions over a prolonged period of time can result in epidemics. Timing of foliar fungicides is important. Apply treatment when disease first appears. | azoxystrobin                                 | Quadris                  | 500 mL/ha<br>(200 mL/acre)         | 15          | Ground and aerial application. Apply 1st application at early flower or when disease first appears. If necessary, re-apply 10–14 days later if disease persists. Maximum 2 applications/yr.   |   |
|  | pyraclostrobin                               | Headline<br>EC           | 400 mL/ha<br>(160 mL/acre)         | 30          | Ground and aerial application. Apply when disease first appears. If necessary, re-apply 10–14 days later if disease persists. This product should not be tank-mixed with Lance, as precipitates can develop. To minimize risk of precipitates forming, use water >10°C and spray solution promptly. Maximum 2 applications/season.  |   |
|  | fluopyram<br>+ prothioconazole               | Propulse                 | 500–700 mL/ha<br>(202–303 mL/acre) | 14          | <b>Ground application only.</b> Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha/season (2 applications). Do not graze treated area and do not harvest for forage or hay. |   |
|  | pyraclostrobin<br>+ fluxapyroxad             | Priaxor                  | 0.3 L/ha<br>(120 mL/acre)          | 30          | Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr re-entry period.   |   |
| <b>PHYTOPHTHORA spp. — Suppression only</b>  |  |                          |                                    |             |   |   |
| <b>Seed Treatment</b>  |  |                          |                                    |             |   |   |
| See Table 2–7. <i>Chemical Control Options for Diseases in Soybeans — Soybean Cyst Nematode, Phytophthora Root Rot</i> , on page 40.   | ethaboxam                                    | Intego Solo<br>Fungicide | 19.6 mL/<br>100 kg seed            | N/A         | For commercial and on-farm treating. Regulations under the Seeds Act require that an appropriate colourant be added when this product is applied to seed.<br><br>For best results, use Intego Solo Fungicide combined with other oomycete-active seed treatment fungicides, such as metalaxyl, to broaden the spectrum of activity. Intego Solo Fungicide can also be used in combination with a broad-spectrum registered seed treatment fungicide having activity against <i>Rhizoctonia solani</i> and other fungal pathogens inciting seed and seedling disease.          |   |

## DRY EDIBLE BEAN DISEASES

**Table 5–9.** Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — *Rhizoctonia*

| Integrate Pest Management Options  | Active Ingredient                              | Trade Name            | Rate   | Comments (label precautions, re-entry periods, etc.)   |
|--|--|-----------------------|--|--|
| <b>RHIZOCTONIA (<i>Rhizoctonia solani</i>)</b>   |  |                       |  |  |
| <b>Seed Treatment</b>  |  |                       |  |  |
| <p>This disease occurs when conditions are cool and wet during planting or when these conditions result in a delay in seedling emergence or development. Mid-to-late-season moisture stress (dry conditions) can increase the disease incidence. Management practices include: (1) selecting varieties with good general tolerance to root rots, (2) promoting root growth through a good fertility program, (3) rotating crop (3 yr between bean crops), (4) not overworking the soil and avoiding working it when it is wet, (5) removing excessive water through increased tile drainage and minimizing compaction and (6) applying seed treatments that protect the plant during germination and early growth. Consult your seed company for variety information.</p> <p>Due to the threat of anthracnose infection to this crop, ALL edible bean seed should be treated with DCT or Dynasty 100FS. See Table 5–8 <i>Chemical Control Options for Seed and Seedling Diseases in Dry Edible Beans — Anthracnose, Phytophthora spp.</i>, on page 135, for more details. Other seed treatment products may be needed to protect against other edible bean diseases.</p> | azoxystrobin                                   | Dynasty 100FS         | 10 mL/<br>100 kg seed                          | One application as a seed treatment. For additional disease control, use in combination with Apron Maxx RFC or Cruiser Maxx Beans.   |
|  | carbathiin<br>+ thiram                         | Vitaflo 280           | 260 mL/<br>100 kg seed                         | <b>For use in commercial seed treatment facilities only.</b> Ensure good seed coverage.  |
|  | fludioxonil<br>+ metalaxyl-M                   | Apron Maxx<br>RTA     | 325 mL/<br>100 kg seed                         | For both commercial seed treatment plants and on-farm treatment using standard gravity- or mist-type seed treatment equipment. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers prior to use. Ensure uniform coverage.   |
|  |  | Apron Maxx<br>RFC     | 100 mL<br>+ 230 mL of<br>water/<br>100 kg seed | For commercial and on-farm treating. Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting.  |
|  | thiamethoxam<br>+ metalaxyl-M<br>+ fludioxonil | Cruiser Maxx<br>Beans | 195 mL/<br>100 kg seed                         | <b>For use in commercial seed treatment facilities only.</b> Compatible with <i>Rhizobium</i> -based inoculants. Check with inoculant manufacturers for details prior to use. Do not graze or feed livestock on treated areas for 45 days after planting. For anthracnose control, tank-mix with DCT or 10 mL of Dynasty 100FS/100 kg of seed. |
|  | trifloxystrobin                                | Trilex FS             | 21 mL/<br>100 kg seed                          | <b>For use in commercial seed treatment facilities only.</b> Apply using standard commercial seed treatment equipment. Not for use in hopper-box, planter-box, slurry-box or similar seed treatment applications. Uniform application on seed is necessary to ensure seed safety and best disease protection.                                  |
|  | penflufen<br>+ prothioconazole<br>+ metalaxyl  | EverGol Energy        | 65 mL/<br>100 kg seed                          | For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.   |

## DRY EDIBLE BEAN DISEASES

**Table 5–10.** Chemical Control Options for Foliar, Stem and Pod Diseases in Dry Edible Beans — Asian Soybean Rust

**LEGEND:** PHI = Pre-Harvest Interval (in days)

| Integrated Pest Management Options   | Active Ingredient                | Trade Name  | Rate                               | PHI | Comments (label precautions, re-entry periods, etc.)  |
|--|----------------------------------|-------------|------------------------------------|-----|---|
| <b>ASIAN SOYBEAN RUST (<i>Phakopsora pachyrhizi</i>)</b>   |                                  |             |                                    |     |   |
| <b>Foliar Treatment</b>  |                                  |             |                                    |     |   |
| Edible beans are a host for Asian soybean rust. The extent to which these crops are impacted has yet to be determined. See Table 2–14. <i>Chemical Control Options for Diseases in Soybeans — Asian Soybean Rust</i> , on page 49, for more details on this disease. | pyraclostrobin                   | Headline EC | 400–600 mL/ha<br>(160–240 mL/acre) | 30  | Ground and aerial application. Classified as a strobilurin fungicide; use in a preventive fungicide program (pre-infection). See label for resistance management strategy. Maximum 2 applications/yr.   |
|  | azoxystrobin                     | Quadris     | 500 mL/ha<br>(200 mL/acre)         | 15  | Ground and aerial application. Apply 1st application at early flower or when disease first appears. If necessary, re-apply 10–14 days later if disease persists. Maximum 2 applications/yr.   |
|  | propiconazole                    | Tilt 250 E  | 500–750 mL/ha<br>(200–300 mL/acre) | 30  | Ground and aerial application. Make first application at the first sign of disease followed by a second application 14 days after the first application, if environmental conditions continue to be favourable for disease development. See label for resistance management strategy. Maximum 2 applications/yr.  |
|  | azoxystrobin<br>+ propiconazole  | Quilt       | 1.0–1.5 L/ha<br>(400–600 mL/acre)  | 30  | Ground and aerial application. Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressures. A second application at a 14-day interval may be needed if disease persists. Good spray coverage and canopy penetration are important for best results. Apply in a minimum of 45 L of water/ha for ground application. See label for resistance management strategy. Maximum 2 applications/yr.  |
|  | picoxystrobin                    | Acapela     | 0.6–0.88 L/ha<br>(240–350 mL/acre) | 14  | Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Use high rate and shorter interval when disease pressure is high. Apply no more than 1 application before switching to a fungicide with a different mode of action. Maximum 1.75 L/ha/season. 12-hr re-entry period.   |
|  | penthiopyrad                     | Vertisan    | 1–1.75 L/ha<br>(0.4–0.7 L/acre)    | 21  | Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Do not apply more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 3 L/ha/yr. 12-hr re-entry period.   |
|  | fluopyram<br>+ prothioconazole   | Propulse    | 500–700 mL/ha<br>(202–303 mL/acre) | 14  | <b>Ground application only.</b> Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha/season (2 applications). Do not graze treated area and do not harvest for forage or hay. |
|  | pyraclostrobin<br>+ fluxapyroxad | Priaxor     | 0.3–0.45 L/ha<br>(120–160 mL/acre) | 30  | Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr re-entry period.   |

## DRY EDIBLE BEAN DISEASES

**Table 5–11.** Chemical Control Options for Foliar, Stem and Pod Diseases in Dry Edible Beans — Bean Rust

**LEGEND:** PHI = Pre-Harvest Interval (in days)

| Integrated Pest Management Options  | Active Ingredient             | Trade Name    | Rate  | PHI | Comments (label precautions, re-entry periods, etc.)  |
|---|-------------------------------|---------------|---|-----|---|
| <b>BEAN RUST (<i>Uromyces appendiculatus</i>)</b>   |                               |               |   |     |   |
| <b>Foliar Treatment</b>   |                               |               |   |     |   |
| <p>This disease is extremely rare in Ontario, arriving late in the season. Some dry bean market classes (e.g., pinto beans) can be very susceptible to rust. Consult your seed company for variety information or <a href="http://www.gobeans.ca">www.gobeans.ca</a> for more information.</p> <p>If rust arrives during flowering and early pod set, a treatment may be necessary.</p> | propiconazole                 | Tilt 250 E    | 500 mL/ha<br>(200 mL/acre)                      | 30  | Ground and aerial application. Apply when disease is first detected. Maximum 2 applications/yr.   |
|   |                               | Bumper 418 EC | 300 mL/ha<br>(121 mL/acre)                      | 30  | Ground and aerial application. Apply when disease is first detected. Maximum 2 applications/yr.   |
|   | pyraclostrobin                | Headline EC   | 400–600 mL/ha<br>(160–240 mL/acre)              | 30  | Ground and aerial application. Apply when disease first appears. If necessary, re-apply 10–14 days later if disease persists. Do not tank-mix with Lance as precipitates can develop. Maximum 2 applications/yr.  |
|   | pyraclostrobin + fluxapyroxad | Priaxor       | 0.3 L/ha<br>(120 mL/acre)                       | 30  | Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr re-entry period.   |
|   | copper octanoate              | Cueva         | 0.5%–2% solution,<br>applied at<br>470–940 L/ha | 1   | Ground application. For best control, begin treatment 2 weeks before disease normally appears or when weather forecasts predict a long period of wet weather. Alternatively, begin treatment when disease first appears and repeat at 5–10-day intervals. Maximum 15 applications/yr. 4-hr re-entry period. |

## DRY EDIBLE BEAN DISEASES

**Table 5–12.** Chemical Control Options for Foliar, Stem and Pod Diseases in Dry Edible Beans — White Mould

**LEGEND:** PHI = Pre-Harvest Interval (in days)

— = no information on label

| Integrated Pest Management Options  | Active Ingredient            | Trade Name    | Rate                                | PHI | Comments (label precautions, re-entry periods, etc.)  |
|---|------------------------------|---------------|-------------------------------------|-----|---|
| <b>WHITE MOULD (<i>Sclerotinia sclerotiorum</i>)</b>  |                              |               |                                     |     |   |
| <p>Avoid soybeans, canola and other hosts in a 3-yr rotation, since these crops are susceptible to white mould. Rotate with non-host crops such as wheat, corn and barley. In fields with a history of the disease, select varieties with an upright structure. Lower plant populations and increased row width promote rapid drying of the plants and soil surface and therefore reduce potential for infection. Avoid excess fertilization. Those fields at risk have a past history of white mould and above-average foliage growth. All products must be used as a preventive measure, as they will not be effective once the disease is present.</p> | boscalid                     | Lance         | 560–770 g/ha<br>(227–312 g/acre)    | 21  | Ground and aerial application. Best used as a preventive measure. Apply at 20%–50% flowering. Apply a second time 7–10 days later, up to 50% flowering, if disease persists or weather conditions are favourable for disease development. Do not tank-mix with Headline as precipitates can develop. Plant-back interval of 14 days for crops not on label. 4-hr re-entry period.   |
|   | fluazinam                    | Allegro 500F  | 0.6–1.0 L/ha<br>(243–400 mL/acre)   | 14  | Ground and aerial application. Best used as a preventive measure. Apply when plants are at early to mid-bloom (10%–30% bloom) and with repeat application, if necessary, 7–10 days later. Use sufficient water to ensure thorough coverage of foliage. Maximum 2 applications/yr and maximum of 2 L of product per season. 24-hr re-entry period.   |
|   | iprodione                    | Rovral WDG    | 1.0–1.5 kg/ha<br>(0.4–0.6 kg/acre)  | —   | Apply at 25%–75% bloom. Do not feed treated bean refuse to livestock. 12-hr re-entry period.  |
|   | thiophanate-methyl           | Senator 70 WP | 1.75–2.25 kg/ha<br>(700–900 g/acre) | 14  | Apply when conditions favouring development of disease exist (warm, humid weather combined with heavy, dense crop foliage). Do not feed treated bean refuse to livestock.   |
|   | dicloran                     | Botran 75 WP  | 3.25 kg/ha<br>(1.3 kg/acre)         | 2   | Begin application when disease is anticipated, usually close to full bloom. Do not feed treated bean refuse to livestock.   |
|   | <i>Coniothyrium minitans</i> | Contans WG    | 0.5–4 kg/ha<br>(0.20–1.6 kg/acre)   | 0   | <b>Provides suppression only.</b> Good option for organically grown beans. <b>Ground application only.</b> This product should be applied at least 3 months prior to anticipated outbreak (e.g., prior to planting). Product should be incorporated as thoroughly as possible to a depth of 5–20 cm. Rate should be increased to 2–4 kg/ha (0.8–1.6 kg/acre) if incorporated to a depth greater than 5 cm. A post-harvest application may be applied in the fall to treat the soil prior to spring planting of a susceptible crop. Treated soils in the fall should not be disturbed to avoid bringing untreated sclerotia from lower soil layers to the top soil layer. Maximum 2 applications/yr. |
|   | <i>Bacillus subtilis</i>     | Serenade ASO  | 4.0–15.0 L/ha<br>(1.6–6.0 L/acre)   | 0   | <b>Provides suppression only.</b> Good option for organically grown beans. Ground and aerial application. Under conditions of moderate-to-high disease pressure, use the higher rate and shorter application intervals. For maximum effectiveness, apply prior to, or at the early stages of disease development. Apply in sufficient water volume to ensure full coverage for effective control. Repeat as necessary on a 7–10-day interval.   |
|   | fluopyram + prothioconazole  | Propulse      | 750 mL/ha<br>(303 mL/acre)          | 14  | <b>Ground application only.</b> Begin applications preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals for best protection. Ensure good penetration for optimum results. Do not exceed 1.5 L/ha/season (2 applications). Do not graze treated area and do not harvest for forage or hay.   |
|   | picoxystrobin                | Acapela       | 0.88 L/ha<br>(350 mL/acre)          | 14  | Ground and aerial application. Make preventive application at 100% bloom (1 flower blooming on all plants) and follow with second application 7–10 days later at full bloom. Apply no more than 1 application before switching to a fungicide with a different mode of action. Maximum 1.75 L/ha/season. 12-hr re-entry period.   |
|   | metconazole                  | Quash         | 280 g/ha<br>(113.3 g/acre)          | 21  | Ground and aerial application. Apply prior to disease development. Make first application at 20%–50% bloom stage, before disease symptoms are visible. Make a second application at full bloom (minimum 7-day interval). Do not make more than 2 applications or apply more than 560 g/ha per season.   |

## DRY EDIBLE BEAN DISEASES

**Table 5–13.** Chemical Control Options for Halo Blight, Common Blight, Brown Spot and Powdery Mildew

| <b>LEGEND:</b> PHI = Pre-Harvest Interval (in days)      — = no information on label   |                          |                   |   |            |  |
|--|--------------------------|-------------------|---|------------|--|
| <b>Integrated Pest Management Options</b>  | <b>Active Ingredient</b> | <b>Trade Name</b> | <b>Rate</b>                               | <b>PHI</b> | <b>Comments (label precautions, re-entry periods, etc.)</b>  |
| <b>HALO BLIGHT (<i>Pseudomonas syringae</i> pv. <i>phaseolicola</i>)</b>   |                          |                   |   |            |  |
| <b>Foliar Treatment</b>  |                          |                   |   |            |  |
| Check with your seed supplier for dry bean varieties resistant to common bacterial blight or halo blight. The bacteria usually do not overwinter in the field. However, to be safe, allow 1 year between susceptible crops. Do not plant seed that has been harvested from infected fields or plant crop next to a field that had significant blight in the previous year. Incorporate infected bean debris into the soil after harvest. Bacterial blights spread easily when plants are wet from rain or dew. Stay out of wet fields with equipment and workers. Clean cultivators when moving from field to field. | copper octanoate         | Cueva             | 0.5%–2% solution, applied at 470–940 L/ha | 1          | <b>Ground application only.</b> For best control, begin treatment 2 weeks before disease normally appears or when weather forecasts predict a long period of wet weather. Alternatively, begin treatment when disease first appears and repeat at 5 to 10 day intervals. Maximum 15 applications/yr. 4-hr re-entry period. |
| <b>COMMON BLIGHT (<i>Xanthomonas campestris</i> pv. <i>phaseoli</i>)</b>   |                          |                   |   |            |  |
| Check with your seed supplier for dry bean varieties resistant to common bacterial blight or halo blight. The bacteria usually do not overwinter in the field. However, to be safe, allow 1 year between susceptible crops. Do not plant seed that has been harvested from infected fields or plant crop next to a field that had significant blight in the previous year. Incorporate infected bean debris into the soil after harvest. Bacterial blights spread easily when plants are wet from rain or dew. Stay out of wet fields with equipment and workers. Clean cultivators when moving from field to field. | copper octanoate         | Cueva             | 0.5%–2% solution, applied at 470–940 L/ha | 1          | <b>Ground application only.</b> For best control, begin treatment 2 weeks before disease normally appears or when weather forecasts predict a long period of wet weather. Alternatively, begin treatment when disease first appears and repeat at 5 to 10 day intervals. Maximum 15 applications/yr. 4-hr re-entry period. |
| <b>BROWN SPOT (<i>Pseudomonas syringae</i> pv. <i>syringae</i>)</b>  |                          |                   |   |            |  |
| This disease has been increasing, especially in specialty bean types.<br><br>Leaf lesions often don't appear water soaked and are much smaller than common bacterial blight and halo blight. When the disease becomes systemic, tan and sunken lesions with reddish-brown borders develop on stems and petioles. Pods may appear bent or have water-soaked lesions with a reddish-brown margin.  | copper octanoate         | Cueva             | 0.5%–2% solution, applied at 470–940 L/ha | 1          | <b>Ground application only.</b> For best control, begin treatment 2 weeks before disease normally appears or when weather forecasts predict a long period of wet weather. Alternatively, begin treatment when disease first appears and repeat at 5 to 10 day intervals. Maximum 15 applications/yr. 4-hr re-entry period. |
| <b>POWDERY MILDEW (<i>Erysiphe</i> spp.)</b>   |                          |                   |   |            |  |
| See Table 2–13. <i>Chemical Control Options for Diseases in Soybeans</i> — <i>Powdery Mildew</i> , on page 48, for information.  | copper octanoate         | Cueva             | 0.5%–2% solution, applied at 470–940 L/ha | 1          | <b>Ground application only.</b> For best control, begin treatment 2 weeks before disease normally appears or when weather forecasts predict a long period of wet weather. Alternatively, begin treatment when disease first appears and repeat at 5–10-day intervals. Maximum 15 applications/yr. 4-hr re-entry period.    |