2015 North Dakota FIELD CROP PLANT DISEASE MANAGEMENT GUIDE

Compiled by:
Andrew Friskop Extension Plant Pathologist
Samuel G. Markell Extension Plant Pathologist
Mohamed Khan Sugarbeet Specialist
NDSU Department of Plant Pathology

CONTRIBUTORS:
Neil Gudmestad University Distinguished Professor and Potato Pathologist
Gary Secor Professor and Potato and Sugarbeet Pathologist
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DISCLAIMER
This plant disease management guide is based on the latest information available from the North Dakota Agricultural Experiment Station, U.S. Department of Agriculture, U.S. Environmental Protection Agency (EPA) and the agricultural chemical industry. The information conformed to federal and state regulations at the time of printing. The user should determine that the intended use is consistent with label directions. Designation that a product is labeled for control of a crop disease does not imply endorsement by the authors of use of that product or the degree of efficacy of that product for that use.

Always follow the label directions. See individual fungicide labels for important information on:

- Safety recommendations and worker protection requirements
- Guidelines for ground, irrigation or aerial application
- Mixing procedures and tank mixes allowed
- Rotational and grazing restrictions
- Resistance management statements
LABEL PRECAUTIONS, RESTRICTIONS

Field re-entry, handling and loading precautions
Most fungicide labels state that workers either should not enter a sprayed field until the sprays have dried or should not enter for 24 hours unless they wear appropriate protective clothing. Information on use of protective clothing during mixing and loading also is given on the label. See the label for details.

Replant restrictions
Labels for all formulations of Ridomil have restrictions on what crops can be planted in less than a year following application of the product. These restrictions may vary somewhat depending on the formulation. Check these and all other labels before application to determine if replant restrictions will cause problems when determining what crop to plant next season.

Dosages
All dosages given in this guide are stated as the amount of formulated product (lb., oz., fl. oz., quarts) to use.

Restricted-use fungicides are fluids that are not available to the general public and are to be purchased and used by a certified pesticide applicator.

Fungicides containing triphenyltin hydroxide are restricted-use fungicides. These include products such as Super Tin, Agri Tin and Super Tin 4L. These are designated as RUP and Restricted-use Pesticide in the tables.

Disclaimer
The information given herein is for educational purposes only. North Dakota State University does not endorse commercial products or companies, even though reference may be made to trade names, trademarks or service names. Omission of labeled products is possible if information about the product was not available at the time of printing or if it had questionable efficacy. Products not normally available in North Dakota are omitted from the guide. Seed treatment chemicals that are primarily insecticides with subminimal amounts of fungicide also are omitted.

The plant pathology faculty at North Dakota State University assume no responsibility for property damage, personal injury or other loss due to the use of fungicides listed in this publication because they have no control over the use or misuse of these products.

FUNGICIDE FORMULATIONS

Most fungicides are solids that are not soluble in water. To use them, they must be made into a formulation (preparation). Some of the more common formulations are listed below. The common abbreviation for each formulation is given in parentheses following the name.

Wettable powders (WP)
Many fungicides are wettable powders consisting of solid fungicide and a wetting agent. When mixed with water, they form a suspension. Many of these suspensions settle out quickly, so an agitator is needed in the spray tank to keep the particles in suspension.

Water-soluble pouch (WSP)
Some fungicides are available in water-soluble pouch containers. These pouches dissolve in the mixing tank and release the fungicide. This reduces the exposure of mixer and loader personnel to dust from the fungicide.

Dusts (D)
Dusts are powders that are mixed with inert ingredients to form a product with a low percent of active material. These are used around the home garden, and a few formulations are used in commercial applications.

Granules (G)
The active ingredient is incorporated into small granules of inert material such as clay. Granules are incorporated into the soil.

Emulsifiable concentrates (EC)
A fungicide that is insoluble in water is dissolved in an organic solvent. An emulsifying agent is incorporated in the formulation so an emulsion is formed when the product is mixed with water. An emulsion is a suspension of very tiny drops of the solvent/fungicide in the water. It usually has a milky appearance (milk itself is an emulsion of fats in water).

Flowables (F)
Flowables are insoluble fungicides ground into a very fine product, usually by a wet-grinding process. These particles are nearly colloidal and are suspended in water to form a thick liquid. They remain suspended in water for relatively long periods of time but should be agitated before use. They are dust-free, easy to mix, remain in suspension longer than wettable powders and also may resist washing off the plant better than the wettable powders. Examples of flowables include Champ Flowable, Kocide 4.5 LF, Vitavax 200 and Dithane F-45. They need to be protected from freezing.

Dry flowable (DF)
See dispersible granules. (Next page)
Dispersible granules (DG)

Dispersible granules also are called dry flowable formulations. They are small granules that pour from a container like a liquid but do not stick to the sides of the container and do not need to be protected from freezing. They are virtually dust-free and disperse readily in water to form a suspension. Examples include Bravo Ultrex DG, Dithane DF, Rainshield NT, Manzate 75 DF and Penncozeb DF.

Fumigants

Fumigants are liquids that turn into a gas after application. They generally are used for soil fumigation.

MODE OF ACTION OF FUNGICIDES

The action of most fungicides takes place outside the host and is called “protection.” A fungicide that acts outside the host is called a “protectant fungicide.” Most older fungicides sprayed on leaves and fruit are of this type. “Therapy” is chemical action inside the host. For example, fungicides are locally systemic and move into the plant at the site of deposition. Several triazole fungicides have several days of therapeutic action against wheat leaf rust and also reduce the production of viable spores; that is, spores capable of growing.

Most protectant fungicides are relatively stable by themselves. Generally, they are relatively insoluble in water and resist removal or chemical change by water, yet must be toxic to fungi. Often a chemical change is brought about by the fungus, the host or the environment before toxicity occurs. Toxicity simply means the ability to damage the fungus cells.

Fungicides may act to produce a toxic reaction in the fungus in several different ways. (1) Some may inhibit (slow down or stop) cell wall formation. (2) Some affect the permeability of the cell wall, causing a leaking of nutrient materials from the cell. (3) Some fungicides may combine with essential metals in a way that they become unavailable for normal cell functions, including the functioning of essential enzymes. (4) Other fungicides may inhibit respiration or nuclear division, or may break dormancy of spores.

Some fungicides also may be toxic to plants if applied at rates too high or if applied under unfavorable environmental conditions. This is called phytotoxicity. Formulations of maneb + zinc are less phytotoxic to many vegetables than formulations that contain only maneb. Sometimes the method of formulation may make a fungicide less phytotoxic.

TOXICITY OF FUNGICIDES

Effects of chemicals on humans

Fungicides have various levels of toxicity to humans. Human exposure (skin, eye, internal) to fungicides can result in mild to severe reaction. Due to high levels of toxicity, some fungicides are restricted-use only.

Symptoms associated with chemical poisoning are listed below. All symptoms are not associated with every pesticide. Some of these symptoms are described below, but consulting a physician always is wise. Avoid diagnosing the effects on yourself or others.

- Eyes watering excessively
- Stomach cramps
- Dizziness
- Vomiting
- Excessive sweating
- Pupils of the eye reduced in size
- Rapid heart beat
- Muscle tremors or convulsions
- Extreme nervousness
- Mental confusion, lack of coordination
- Uncontrolled drooling or watering at the mouth
- Severe burns of the skin
- Loss of ability to use muscles
- Difficulty in breathing
- Unconsciousness

First aid

The following list should be considered:
- Stop exposure
- Call a physician
- Remove contaminated and restrictive clothing
- Drench contaminated area with water; flush repeatedly
- Provide fresh air but prevent chilling and overheating
- Avoid giving alcohol
- Provide milk for patient to drink
- Antidote - to be administered only by a physician

North Dakota Poison Control Center
Toll-free: (800) 732-2200

Toxicity ratings of pesticides

Pesticides generally are categorized according to acute oral toxicity (the toxicity when taken by mouth), but because users may absorb a significant quantity of the pesticide through their skin, dermal toxicity (toxicity when absorbed through the skin) is of equal or greater practical importance.

LD50 values generally show relative toxicities among the chemicals and are not truly representative of effects on humans, especially since they usually are obtained on rats. Actual toxicities do not constitute the only hazards associated with exposure to the chemicals. For instance, a chemical with low toxicity may be hazardous due to concentration, high volatility, careless use or effects of long-term exposure.
LD₅₀ depends upon body weight. Thus, a given amount of chemical would have greater effect on a child than on an adult. LD₅₀ also is proportional to the percent of active ingredient. A material only 50 percent active requires twice as much to produce a toxic effect as 100 percent pure material.

The lower the LD₅₀ value, the greater the toxicity. A common standard for comparison is aspirin, which has an LD₅₀ of 1,200 mg/kg and is considered slightly toxic.

The following table illustrates the various toxicity classes:

<table>
<thead>
<tr>
<th>Oral Toxicity</th>
<th>Dermal (Skin) Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD₅₀-mg/kg</td>
<td>Toxicity Class</td>
</tr>
<tr>
<td>1-50</td>
<td>High</td>
</tr>
<tr>
<td>50-500</td>
<td>Moderate</td>
</tr>
<tr>
<td>500-5,000</td>
<td>Low</td>
</tr>
<tr>
<td>Over 5,000</td>
<td>Very Low</td>
</tr>
<tr>
<td>LD₅₀-mg/kg</td>
<td>Toxicity Class</td>
</tr>
<tr>
<td>1-200</td>
<td>Severe</td>
</tr>
<tr>
<td>200-2,000</td>
<td>Moderate</td>
</tr>
<tr>
<td>2,000-20,000</td>
<td>Mild</td>
</tr>
<tr>
<td>Over 20,000</td>
<td>Very Mild</td>
</tr>
</tbody>
</table>

Information on the LD₅₀ of a specific fungicide and other toxicology information are available on the MSDS (Material Safety Data Sheet) for each product. These generally may be found at www.cdms.net/.

PROTECTING GROUNDWATER

Pesticides differ in their persistence and mobility in soil. Those that are highly persistent or highly mobile are more liable to contaminate groundwater than those that are not. Areas of the state where groundwater is most at risk are areas with coarse-textured soils, are low in organic matter and have a high water table. Most fungicides are relatively immobile, especially in clay soils with high organic matter, because they are adsorbed on clay particles or on the organic matter.

A few fungicides are somewhat mobile. Take care in the use of these fungicides, particularly the application of these products through a sprinkler irrigation system in high-risk areas. Risks may be reduced by minimizing the amount of water used for application through a sprinkler system, more use of ground or aerial application instead of application through the sprinkler system, and use of a different fungicide that is less mobile.

The persistence and mobility of fungicides commonly used in North Dakota may be found in NDSU Extension Service publication EB-49, “Persistence and Mobility of Pesticides in Soil and Water.”

HANDLING CHEMICALS

Avoid splashing and spilling. Wear a mask especially when handling dusts or powders. Some chemicals, when combined, have increased toxicity (potentiation). Rinse containers several times after using chemicals. Pour rinsate into the spray tank when using the same chemical. Dispose of containers as indicated in the next section. Keep a record of plant disease control chemicals used and methods of handling.

FUNGICIDE LABELS

Fungicides are named according to their chemical composition or the chemical name. An example of a chemical name is a coordination production of zinc ion and manganese ethylene bisdithiocarbamate; the chemical names are required on the label. Since chemical names often are long, common names frequently are used; for example, the common name for the above chemical is mancozeb. Manufacturers use trade names to identify their specific products. For example, there are various trade names for mancozeb, such as Dithane, Manzate and Penncozeb.

In addition to the names on labels, various other required label information includes precautions in handling, antidotes or telephone contacts to use in case of accidental poisoning, recommendations for use, materials contained in the package and their percentages, the manufacturer’s or distributor’s name and address, and the EPA registration number.

Some fungicides are made up in various formulations for different uses or methods of application, such as wettable powders, dusts, emulsifiable concentrates, granules, flowables, dispersible granules or solutions. The nature of the chemical sometimes restricts it to one or a few of these formulations.

SEED TREATMENT

Cereals

Fungicidal seed treatment helps protect the seed from rotting and the emerging seedlings from damping off and seedling blight. These are caused by soil-borne pathogens. When seeds germinate under favorable soil conditions, the danger of seed and seedling attack from soil-borne pathogens is lessened unless seed is of poor quality. Treatment of seed with a protectant fungicide may help protect against soil-borne pathogens and thus help stand establishment when seeds are germinating under unfavorable conditions, such as cold, wet weather. Many products are available for protection against seedling blight.

Treating seeds with a fungicide also helps protect them from diseases that are seed-borne. These include the covered smuts, bunt, scab, black point and black semi-loose smut of barley, and loose smuts of wheat, barley and oats. Loose smuts of wheat and barley are internally seed-borne. Loose smut of oats is seed-borne as spores under the hulls. These smuts cannot be controlled by conventional protectant seed treatment fungicides, but are...
controlled by systemic seed treatment products. The embryo test can be used by the North Dakota State Seed Department to determine if loose smut is present in barley seed. This test cannot be used for the loose smuts of oats or wheat or black semiloose smut of barley. All current barley varieties are susceptible to loose smut. An embryo test is recommended for barley seed; if infection is 2 percent or greater, seed treatment of barley with an effective fungicide seed treatment is advised.

Common (Bipolaris, Helminthosporium or Cochliobolus) root rot of wheat and barley is a chronic problem in North Dakota, causing average yield losses of 5 to 11 percent, with much greater losses in some fields in certain years. Several seed treatment products are labeled for suppression of common root rot. Some seed treatments are also labeled for suppression of Fusarium root rot and take all root rot.

**Chickpeas**
Treating chickpea seed to protect against Pythium is essential for good emergence. A seed treatment to protect against seed-borne Ascochyta is important because this is a common and serious disease.

**Dry beans and soybeans**
Treating seed may reduce seedling blight during weather that is unfavorable for emergence. Do not use streptomycin with Rhizobium inoculant. If using captan seed treatments, in-furrow inoculant is preferable because inoculant does not survive well on captan-treated seed. Several products can be used to reduce the root rot potential, and many newer products have a broad spectrum of activity.

**Flax**
Treating flax seed with a fungicide helps protect against seed rot, damping off and seedling blight. Seed treatment is especially important in cases where the seed coats are broken, allowing entry of pathogens. Seed from fields heavily infected with Pasmo (Septoria linicola) may be susceptible to seedling blight and should be seed treated.

**Potatoes**
Treatment of cut-seed pieces helps protect the cut surface against seed-piece decay. Most seed treatments are fungicides that will protect against fungi such as Pythium, Rhizoctonia and Fusarium. Fungicides do not protect against bacteria such as Erwinia or Clavibacter. However, control of fungi indirectly helps control Erwinia bacteria because seed decay is greater in seed infected with fungi. The addition of streptomycin to fungicide has limited value because it will control only bacteria contaminating cut surfaces and may inhibit wound healing. Seed treatment will reduce or help control new infections but will not cure existing decay, prevent lenticel infection or prevent infection of roots and stolons away from the seed piece due to soil or environmental inoculum. Seed treatment is no substitute for using good, sound, healthy seed. Seed should be stored at less than 40 F during the winter. In the spring, warm the seed to 50 to 60 F for 1 1/2 to two weeks before planting or until it just begins to sprout. Do not handle the seed until it is warm. Plant the cut seed in warm (50 to 58 F at planting depth), moist soil. If cut seed must be held, store in a well-ventilated area for suberization at 50 to 60 F with a relative humidity of 85 percent. Hold for one week, then lower the temperature to 50 to 60 F. Ideally, plant when seed and soil are the same temperature; the optimum is 50 F.

**Safflower**
Safflower rust is both seed-borne and soil-borne. The most devastating phase of the disease is a seedling blight, and root and foot rot. Typical rust pustules develop later on the leaves. Seed-borne safflower rust is controlled by seed treatment.

**Sunflower**
Soil-borne downy mildew infections were controlled with metalaxyl or mefenoxam seed treatment in the past. The downy mildew fungus, however, has developed insensitivity to metalaxyl and mefenoxam in much of North Dakota, South Dakota and Minnesota, so these fungicides are not effective. Several fungicides or fungicide-insecticide combinations have received state or federal labels for seed treatment of sunflower for seed rot and seedling blights.

**APPLICATION OF SEED TREATMENT**
Seed may be treated commercially or it may be treated on the farm. Commercial seed treatment may use a slurry treater or various automatic seed treaters. The various automatic seed treaters differ considerably, so they cannot be discussed here. Commercial seed treatment has become more common in recent years for many crops.

On-farm treatment may use various home-type or slurry mixers. Drill-box seed treatment is popular because no extra steps are required; the seed is treated in the drill-box at planting time. Good disease control depends on uniform fungicide coverage of the seed, but this is more difficult to accomplish in drill-box treatment because the means of mixing the seed and fungicide is inadequate. For effective drill-box treatment, fill the box with one-third the quantity of seed and fungicide and mix carefully with a paddle; repeat with the next third and then the final third. The paddle should not be used for any other purpose and should be stored in a safe place, out of reach of children and animals.

On-farm auger seed treatment methods are common. The fungicide is metered into the base of the auger used to fill the drum box. This method assures fairly good mixing and coverage.

All seed treatments have certain basic precautions. Use care in handling seed treatment products; many are irritating to the eyes, nose and skin. Treated seed is identified by the dye used in the chemical, and treated seed should not be fed to livestock or used for human food. Pesticide containers should be disposed of properly.
in a landfill or buried in an area with no surface drainage to nearby waterways. If seed treatment cannot be done outdoors, it should be done in a well-ventilated room. Commercial seed treaters should have an adequate air exhaust system for treatment rooms. Workers exposed to seed treatment chemicals for long periods of time should have an approved chemical mask. The filter should be changed frequently. Recommended rates of application should be followed carefully because higher rates may injure the seed and lower rates may not give satisfactory disease control.

Forage legume seed should be treated well in advance of planting and inoculated with nitrogen-fixing *Rhizobia* at planting time. If dry beans have been treated with streptomycin for control of externally borne blight bacteria, inoculating with *Rhizobia* is not available.

**FIELD CROP FOLIAR SPRAYS**

Foliar fungicides are used to control fungal disease organisms that attack the above-ground portions of plants. Fungicides are used to protect the potential yield and quality of a crop. Many fungicides protect foliage from infection; therefore, these fungicides must be on the foliage before the fungus spores germinate.

Several foliar fungicides act differently from the protectants described above. For example, benimidazole fungicides thiabendazole and thiophanate methyl are absorbed by the plant and translocated up the plant by the conducting tissues. They are called systemic fungicides. They only move up the plant; they do not move down. Thus, to control white mold on dry beans, complete coverage of stems, lower leaves and blossoms is required. Spraying only the upper leaves is not satisfactory because the fungicide will not move down to the location where it is needed. Strobilurin and triazole fungicides are locally systemic; they have some upward mobility and translaminar movement and some limited therapeutic action. Metalaxyl will move down from potato foliage into tubers in limited amounts to provide tuber protection against metalaxyl-sensitive strains of the late blight fungus and pink rot infection.

Spray control programs to prevent disease have been developed from data through years of research. Because each disease develops in a distinct manner, the decision to use a disease prevention program is based on weather conditions, disease development, potential yield of the crop and the dollars returned to management with use of the fungicides.

Many fungicides are registered for application through a sprinkler irrigation system, as well as by a spray. If a fungicide can be applied through a sprinkler system (fumigation), this is noted under application.

Most fungicide labels contain information on field re-entry, handling and loading precautions. Most labels state that workers either should not enter a sprayed field until the sprays have dried or should not enter for 24 hours unless they wear appropriate protective clothing. Information on the use of protective clothing during mixing and loading also is given on the label. See the label for details.

**Spraying**

Spraying can be done with many different types of ground and air equipment. Getting good coverage is important: At least 5 gallons per acre (gal/A) should be used for aerial application and higher gallon amounts are required for ground equipment.

Droplet size for aerial application should be 200 to 400 microns (1/64 to 1/128 inch) in diameter. Generally, if nozzles are pointed back, appropriate nozzles are used and pressures do not exceed 30 or 35 pounds per square inch (psi), the correct droplet size will result. Application should be made with the boom 8 to 10 feet above the crop.

Some plant surfaces have a waxy or hairy coating, making good coverage difficult. The spray will collect in large, erect droplets, which then run off. Wheat and cabbage leaves are good examples. Frequently, using a wetting agent improves coverage. Usually this is a spreader-sticker. Certain fungicides may work better with certain spreader-stickers than others. This type of information usually can be found on the label or in supplemental brochures. Spreaders-stickers may be incorporated into some flowable formulations, so adding a spreader-sticker to the spray tank is not necessary. However, the label must be checked on each product for this use.

**RESISTANCE TO FUNGICIDES**

Fungi may develop tolerance or resistance to certain fungicides. Several examples where this occurs in North Dakota are described below.

The sugar beet leaf spot fungus (*Cercospora*) has developed resistance to the systemic benimidazole fungicides (benomyl, thiabendazole and thiophanate methyl) in the Red River Valley and southern Minnesota. These fungicides should be used at all in the southern Red River Valley and no more than once a season in a tank mix with an unrelated fungicide in the northern Red River Valley.

Resistance to the benimidazole fungicides thiabendazole (TBZ or Mertect) and thiophanate methyl (*Topsin M*) has developed recently in the potato *Fusarium* dry rot pathogen *Fusarium sambucinum* and the potato silver scurf pathogen *Helminthosporium solani*. This resistance is common throughout the United States and Canada.

Resistance to iprodione has been reported from other parts of the country. Cross-resistance to the chemically related product vinclozolin is common when resistance to iprodione develops.
The A2 mating type of the late blight fungus, which is common in North Dakota and Minnesota, is resistant to metalaxyl and mefenoxam.

In North Dakota, reduced sensitivity to strobilurin fungicides has been observed in populations of the early blight fungus Alternaria sp. on potato and to the ascochyta blight pathogen (Ascochyta rabiei) on chickpeas (this does not cause ascochyta blight on lentils or field peas). Greater than 90% of the early blight fungus, Alternaria solani, are resistant to the QoI fungicides pyraclostrobin, fluoxastrobin, and azoxystrobin. Additionally, a very high proportion of the Ascochyta rabiei population affecting chickpea is resistant to pyraclostrobin.

Tolerance of the leafspot fungus to triphenyltin hydroxide was widespread in southern Minnesota and the southern Red River Valley in 1999 and common in the Northern Red River Valley. However, tin-tolerant isolates do not survive as well as sensitive isolates when alternative fungicides are used. With appropriate FRAC (Fungicide Resistance Action Committee) rotations, tin-tolerant isolates have largely disappeared.

In contrast, benzimidazole-resistant strains survive well when alternative fungicides are used and persist for a long time. The best way to combat resistance is to prevent or delay it by alternating the different classes of fungicides and by avoiding constant use of fungicides known to trigger development of resistant fungi. Using tank mixes of unrelated fungicides also is reported to retard the development of resistance.

FUNGICIDE RESISTANCE MANAGEMENT STATEMENTS

The following statements are recommendations for commonly used fungicides. Information from the FRAC is available at www.frac.info/.

1. Methyl benzimidazole carbamates (MBC; Group 1) – High risk. Both mixtures and alternations with non-Group 1 fungicides are acceptable methods of preventing/managing resistance to Group 1 fungicides. For high-risk pathogens, mixtures are preferred to alternations.

2. Dicarboximides (Group 2) – Medium to high risk. Minimize the selection pressure by minimizing the number of applications. As a guide, do not apply more than two to three per crop per season. Maintain regular, prolonged times without exposure to Group 2 fungicides. When applying for Botrytis control, restrict applications to those times when Botrytis infection pressure is high. Where Botrytis resistance is well-established, use combinations to stabilize Botrytis control, but their application must follow the same rules as for Group 2 fungicides alone.

3. Sterol biosynthesis inhibitors (SBI; Groups 3, 5, 17 and 18) – Low to medium risk. Repeated applications of SBI fungicides alone should not be used on the same crop in one season against a high-risk pathogen in areas of high disease pressure for that particular pathogen. For crop/pathogen situations where repeated spray applications are made during the season, alternation or mixtures with an effective noncross-resistant fungicide are recommended. Where alternation or the use of mixtures is not feasible because of a lack of effective or compatible noncross-resistant partner fungicides, then input of SBIs should be reserved for critical parts of the season or crop growth stage. If SBI performance should decline and sensitivity testing has confirmed the presence of less sensitive forms, SBIs should be used only in mixture or alternation with effective noncross-resistant partner fungicides. The introduction of the new classes of chemistry offers new opportunities for more effective resistance management. The use of different modes of action should be maximized for the most effective resistance management strategies. Users must adhere to the manufacturers’ recommendations. In many cases, reports of “resistance” have, on investigation, been attributed to cutting recommended rates of use, or to poor or mistimed application. Fungicide input is only one aspect of crop management. Fungicide use does not replace the need for resistant crop varieties, good agronomic practice, plant hygiene/sanitation, etc.

4. Phenylamides (PA; Group 4) – High risk. The Group 4 fungicides should be used on a preventative and not curative or eradicative basis. For foliar applications, Group 4 fungicides should be used in prepacked mixtures with an unrelated effective partner and used in a sound management program. Where using residual partners, use between three-fourths and full recommended rates. The Group 4 fungicide dosage in the mixture depends on its intrinsic activity and is defined by the respective company. The Group 4 fungicides should not be used as soil treatments against airborne diseases. When solo formulations are made available for soil use, strategies that prevent any possibilities for foliar applications must be implemented. For seed treatment, mixtures rather than straight Group 4 fungicides should be used whenever possible. The number of Group 4 fungicide applications should be limited (two to four consecutive applications per crop and year). The application intervals should not exceed 14 days and may be shorter in cases of high disease pressure. If rates and application intervals are reduced, the total amount of the Group 4 fungicide used per season should not exceed that of the full rate, and the total exposure time should remain the same. The rate of the mixing partners should remain the same for both intervals. Group 4 fungicide sprays are recommended early season during the period of active vegetative growth of the crop. The grower should switch to non-Group 4 products not later than the normal standard application interval of the non-Group 4 product.

5. Quinone outside inhibitors (QoI; Group 11) – High risk. When using a Group 11 fungicide as a solo product, the number of applications should be no more than one-third of the total number of fungicide applications per season. In programs with tank mixes or pre-mixes of a Group 11 fungicide, applications should be no more than one-half of the total number of fungicide applications per
season. In programs in which applications of Group 11 fungicides are made with both solo products and mixtures, the number of Group 11 fungicide-containing applications should be no more than half of the total number of fungicide applications per season.

6. **Succinate dehydrogenase inhibitor (SDHI):** *(group 7)* Medium to high risk. This group includes fungicides such as boscalid, benodamil, flutolanil, mepronil, fluopyram, florfuran, carboxin, oxycarboxin, thifluzamide, bixafen, fluxapyroxad, furametpyr, isopyrazam, penflufen, pencyprid, sedaxane and boscalid. Laboratory and field studies have confirmed target site mutations to SDHI. Limit use of SDHI and rotate with other chemistries of different modes of action.

Recent research has indicated that >90% of the *Alternaria solani* (cause of early blight of potato) are resistant to the SDHI fungicide, boscalid. Currently, there are five known mutations in the early blight pathogen which convey resistance to boscalid that have been identified in ND isolates. However, these mutations may or may not affect other SDHI fungicides, such as fluopyram, fluxapyroxad and pencyprid. When selecting SDHI fungicides for management of early blight of potato, consult comments in the ‘Remarks’ column for more information on resistance.

**FUNGICIDE GROUPS**

The soil application and foliar sprays tables in this guide have a numerical or letter designation (in parentheses) for each chemical component of the listed commercial Fungicides. This number or letter code indicates the Code is developed by the Resistance Action Committee = (FRAC). The purpose of FRAC is to prolong the effectiveness of fungicides liable to encounter resistance problems and to limit crop losses should resistance appear. If field resistance is known to one member of the fungicide group, cross-resistance to other chemicals within that group may be present. This Fungicide Guide is providing information on fungicide groups so that users are aware of potential resistance problems with continued use of chemicals in the same fungicide group. The intrinsic risk for resistance to develop to a given fungicide group varies among chemistries; for example, resistance development among the strobilurins, Group 11, is much more likely than resistance development among the mancozebs or maneb, Group Y. For more information about fungicide resistance and the FRAC fungicide list, see the following Web site:

[www.frac.info](http://www.frac.info)

The following tables (pages 9-16) are derived directly from the FRAC code, and they describe modes of action, chemical group names, common names, and FRAC Code number.
<table>
<thead>
<tr>
<th>MOA</th>
<th>TARGET SITE AND CODE</th>
<th>GROUP NAME</th>
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<th>COMMENTS</th>
<th>FRAC CODE</th>
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<tr>
<td>A1:</td>
<td>RNA polymerase I (PhenylAmides)</td>
<td>PA – fungicides</td>
<td>acylanines</td>
<td>benalaxyl benalaxyl-M (=kiralaxyl) furalaxyl metalexyl metalexyl-M (=fenoxam)</td>
<td>Resistance and cross resistance well known in various Oomycetes but mechanism unknown. High risk. See FRAC Phenylamide Guidelines for resistance management</td>
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<td>A2:</td>
<td>adenosin-deaminase</td>
<td>oxazolidinones</td>
<td>oxadixyl</td>
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<td>A3:</td>
<td>DNA/RNA synthesis (proposed)</td>
<td>hydroxy- (2-amino-) pyrimidines</td>
<td>bupirimate dimethirimol ethirimol</td>
<td>Medium risk Resistance and cross resistance known in powdery mildews. Resistance management required.</td>
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<td>A4:</td>
<td>DNA topoisomerase type II (gyrase)</td>
<td>isoxazoles</td>
<td>hymexazole</td>
<td>Resistance not known.</td>
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<td></td>
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<td>isothiazolones</td>
<td>othilinone</td>
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<td>carboxylic acids</td>
<td>carboxylic acids</td>
<td>oxolinic acid</td>
<td>Bactericide. Resistance known. Risk in fungi unknown. Resistance management required.</td>
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<tr>
<td>B3:</td>
<td>β-tubuline assembly in mitosis</td>
<td>benzamides</td>
<td>toluamides</td>
<td>zoxamide</td>
<td>Low to medium risk. Resistance management required.</td>
<td>22</td>
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<td></td>
<td></td>
<td>thiazole carboxamide</td>
<td>ethylamino-thiazole-carboxamide</td>
<td>ethaboxam</td>
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<td>B4:</td>
<td>cell division (proposed)</td>
<td>phenylureas</td>
<td>Phenylureas</td>
<td>pencycuron</td>
<td>Resistance not known</td>
<td>20</td>
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<td>B5:</td>
<td>delocalisation of spectrin-like proteins</td>
<td>benzamides</td>
<td>pyridinylmethyl-benzamides</td>
<td>fluopicolide</td>
<td>Resistance not known</td>
<td>43</td>
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<td>C1: complex I NADH Oxido-reductase</td>
<td>pyrimidinamines pyrazole-MET1</td>
<td>pyrimidinamines pyrazole-5-carboxamides</td>
<td>phenyl-benzamides phenyl-oxo-ethyl thiophene amide pyridinyl-ethyl-benzamides furan-carboxamides oxathio-carboxamides thiazole-carboxamides pyrazole-4-carboxamides pyridine-carboxamides</td>
<td>diflumetorim tolenpyrad benodanil flutolanil mepronil isofetamid fluopyram carboxin oxyxarboxin thifluamide benzovindifluypyr bixafen fluxapyroxad furametpyr isopyrazam pentflufen penthiopyrad sedaxane</td>
<td>Resistance not known.</td>
<td>39</td>
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<tr>
<td>C2: complex II: succinate-dehydrogenase</td>
<td>SDHI (Succinate dehydrogenase Inhibitors)</td>
<td>methoxy-acrylates methoxy-acetamide methoxy-carbamates Oximo-acetates oximo-acetamides oxazolidine-diones dihydro-dioxazines Imidazolinones benzyl-carbamates</td>
<td>azoxystrobin coumoxystrobin enoxostrobin flufenoxystrobin picoxystrobin pyroxystrobin mandestrobir pyraclostrobin pyramistolostrobir triclopyricarb kresoxim-methyl trifloxystrobin dimoxystrobin fenaminstrobir metominostrobir orystrobir famoxadone fluoxastrobin fenamidone pyribencarb</td>
<td></td>
<td>Resistance known for several fungal species in field populations and lab mutants. Target site mutations in sdh gene, e.g. H/Y (or H/L) at 257, 267, 272 or P225L, dependent on fungal species. Resistance management required. Medium to high risk. See FRAC SDHI Guidelines for resistance management.</td>
<td>7</td>
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<tr>
<td>C3: complex III: cytochrome bcl (ubiquinol oxidase) at Qo site ( cyt b gene)</td>
<td>Qol-fungicides (Quinone outside Inhibitors)</td>
<td>methoxy-acrylates methoxy-acetamide methoxy-carbamates Oximo-acetates oximo-acetamides oxazolidine-diones dihydro-dioxazines Imidazolinones benzyl-carbamates</td>
<td>methoxy-acrylates methoxy-acetamide methoxy-carbamates Oximo-acetates oximo-acetamides oxazolidine-diones dihydro-dioxazines Imidazolinones benzyl-carbamates</td>
<td>azoxystrobin coumoxystrobin enoxostrobin flufenoxystrobin picoxystrobin pyroxystrobin mandestrobir pyraclostrobin pyramistolostrobir triclopyricarb kresoxim-methyl trifloxystrobin dimoxystrobin fenaminstrobir metominostrobir orystrobir famoxadone fluoxastrobin fenamidone pyribencarb</td>
<td>Resistance known in various fungal species. Target site mutations in cyt b gene (G143A, F129L) and additional mechanisms. Cross resistance shown between all members of the Qol group. High risk. See FRAC Qol Guidelines for resistance management.</td>
<td>11</td>
</tr>
<tr>
<td>C4: complex III: cytochrome bcl (ubiquinone reductase) at Qo site</td>
<td>Qil - fungicides (Quinone inside Inhibitors)</td>
<td>cyano-imidazole</td>
<td>cyanimidazole cyanofamid</td>
<td>cyanimidazole cyanofamid</td>
<td>Resistance risk unknown but assumed to be medium to high (mutations at target site known in model organisms). Resistance management required.</td>
<td>21</td>
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<tr>
<td>C5: uncouplers of oxidative phosphorylation</td>
<td>dinitrophenyl crotonates 2,6-dinitro-anilines (pyr.-hydrzones)</td>
<td>dinitrophenyl crotonates 2,6-dinitro-anilines (pyr.-hydrzones)</td>
<td>dinitrophenyl crotonates 2,6-dinitro-anilines (pyr.-hydrzones)</td>
<td>binapacryl meptyldinocap dinocap fluazinam</td>
<td>Resistance not known. Also acaricidal activity. Low risk. However, resistance claimed in Botrytis in Japan. Reclassified to U 14 in 2012.</td>
<td>29</td>
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<td>MOA</td>
<td>TARGET SITE AND CODE</td>
<td>GROUP NAME</td>
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<tr>
<td>C6:</td>
<td>inhibitors of oxidative phosphorylation, ATP synthase</td>
<td>organo tin compounds</td>
<td>tri-phenyl tin compounds</td>
<td>fentin acetate</td>
<td>Some resistance cases known. Low to medium risk.</td>
<td>30</td>
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<tr>
<td>C7:</td>
<td>ATP production (proposed)</td>
<td>thiophene-carboxamides</td>
<td>thiophene-carboxamides</td>
<td>silthiofam</td>
<td>Resistance reported. Risk low.</td>
<td>38</td>
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<tr>
<td>C8:</td>
<td>complex III: cytochrome bc1 (ubiquinone reductase) at Qo site, stigmatellin binding sub-site</td>
<td>QoSI fungicides (Quinone outside Inhibitor, stigmatellin binding type)</td>
<td>triazolo-pyrimidylamine</td>
<td>amelotradin</td>
<td>Not cross resistant to QoI fungicides. Resistance risk assumed to be medium to high (single site inhibitor). Resistance management required.</td>
<td>45</td>
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<tr>
<td>D1:</td>
<td>methionine biosynthesis (proposed) (cgs gene)</td>
<td>AP - fungicides (Anilino-Pyrimidines)</td>
<td>anilino-pyrimidines</td>
<td>cyprodinil</td>
<td>Resistance known in Botrytis and Venturia, sporadically in Oculimacula. See FRAC Anilino-pyrimidine Guidelines for resistance management.</td>
<td>9</td>
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<tr>
<td>D2:</td>
<td>protein synthesis</td>
<td>enopyranuronic acid antibiotic</td>
<td>enopyranuronic acid antibiotic</td>
<td>blasticidin-S</td>
<td>Low to medium risk. Resistance management required.</td>
<td>23</td>
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<tr>
<td>D3:</td>
<td>protein synthesis</td>
<td>hexopyranosyl antibiotic</td>
<td>hexopyranosyl antibiotic</td>
<td>kasugamycin</td>
<td>Resistance known in fungal and bacterial (P. glumae) pathogens. Medium risk. Resistance management required.</td>
<td>24</td>
</tr>
<tr>
<td>E1:</td>
<td>signal transduction (mechanism unknown)</td>
<td>aza-naphthalenes</td>
<td>aryloxyquinoline</td>
<td>quinoxyfen</td>
<td>Resistance to quinoxyfen known. Medium risk. Resistance management required. Cross resistance found in Erysiphe (Uncinia) necator but not in Blumeria graminis.</td>
<td>13</td>
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<td>E2:</td>
<td>MAP/Hisidine-Kinase in osmotic signal transduction (os-2, HOG1)</td>
<td>PP-fungicides (Phenyl/Pyrroles)</td>
<td>phenylpyrroles</td>
<td>fenpiclonil</td>
<td>Resistance found sporadically, mechanism speculative. Low to medium risk. Resistance management required.</td>
<td>12</td>
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<td>MOA</td>
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<tr>
<td>E3:</td>
<td>MAP/Hisidine-Kinase in osmotic signal transduction (os-1, Daft)</td>
<td>dicarboximides</td>
<td>dicarboximides</td>
<td>chlozolinate iprodione procymidine vinclozolin</td>
<td>Resistance common in Botrytis and some other pathogens. Several mutations in Q-1, mostly 1365S. Cross resistance common between the group members.</td>
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<tr>
<td>F1:</td>
<td>formerly dicarboximides</td>
<td>formerly dicarboximides</td>
<td>formerly dicarboximides</td>
<td>formerly dicarboximides</td>
<td>formerly dicarboximides</td>
<td>formerly dicarboximides</td>
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<tr>
<td>F2:</td>
<td>phospholipid biosynthesis, methyltransferase</td>
<td>phosphoro-thiolates</td>
<td>phosphoro-thiolates</td>
<td>edifenphos iprobenfos (IBP) pyrazophos</td>
<td>Resistance known in specific fungi. Low to medium risk. Resistance management required if used for risky pathogens.</td>
<td>6</td>
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<tr>
<td>F3:</td>
<td>lipid peroxidation (proposed)</td>
<td>aromatic hydrocarbons</td>
<td>aromatic hydrocarbons</td>
<td>biphenyl chloroneb dicloran quintozene (PCNB) tecnazene (TCNB) tolclofos-methyl</td>
<td>Resistance known in some fungi. Low to medium risk. Cross resistance patterns complex due to different activity spectra.</td>
<td>14</td>
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<tr>
<td>F4:</td>
<td>cell membrane permeability, fatty acids (proposed)</td>
<td>carbamates</td>
<td>carbamates</td>
<td>iodocarb propamocarb prothiocarb</td>
<td>Low to medium risk. Resistance management required.</td>
<td>28</td>
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<td>F5:</td>
<td>formerly CAA-fungicides</td>
<td>formerly CAA-fungicides</td>
<td>formerly CAA-fungicides</td>
<td>formerly CAA-fungicides</td>
<td>formerly CAA-fungicides</td>
<td>formerly CAA-fungicides</td>
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<tr>
<td>F6:</td>
<td>microbial disrupters of pathogen cell membranes</td>
<td>Bacillus sp. and the fungicidal lipopeptides produced</td>
<td>Bacillus subtilis syn. B.amyloliquefaciens* strain QST 713 Bacillus amyloliquefaciens strain FZB24 Bacillus amyloliquefaciens strain MB1600 Bacillus amyloliquefaciens strain D747</td>
<td>Bacillus subtilis syn. B.amyloliquefaciens are Bacillus subtilis and B. subtilis var. amyloliquefaciens (previous taxonomic classification) Resistance not known. Induction of host plant defence described as additional mode of action for strain FZB24</td>
<td>*synonyms for Bacillus amyloliquefaciens are Bacillus subtilis and B. subtilis var. amyloliquefaciens (previous taxonomic classification)</td>
<td>44</td>
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<tr>
<td>F7:</td>
<td>cell membrane disruption (proposed)</td>
<td>terpene hydrocarbons and terpenes alcohols</td>
<td>extract from Melaleuca alternifolia (tea tree)</td>
<td>extract from Melaleuca alternifolia (tea tree)</td>
<td>Resistance not known</td>
<td>46</td>
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<tr>
<td>G1:</td>
<td>C14- demethylase in sterol biosynthesis (erg1/cyp51)</td>
<td>DMI-fungicides (DeMethylation Inhibitors) (SBI: Class I)</td>
<td>triazoles</td>
<td>imidazoles</td>
<td>There are big differences in the activity spectra of DMI fungicides. Resistance is known in various fungal species. Several resistance mechanisms are known incl. target site mutations in cyp51 (erg 11) gene, e.g. V136A, Y137F, A379G, I381V; cyp51 promoter; ABC transporters and others. Generally wise to accept that cross resistance is present between DMI fungicides active against the same fungus. DMI fungicides are Sterol Biosynthesis Inhibitors (SBIs), but show no cross resistance to other SBI classes. <strong>Medium risk.</strong> See FRAC SBI Guidelines for resistance management.</td>
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<td>G2:</td>
<td>14-reductase and isomerase in sterol biosynthesis (erg24, erg2)</td>
<td>amines (&quot;morpholines&quot;) (SBI: Class II)</td>
<td>morpholines</td>
<td>piperidines</td>
<td>Decreased sensitivity for powdery mildews. Cross resistance within the group generally found but not to other SBI classes. <strong>Low to medium risk. See FRAC SBI Guidelines for resistance management.</strong></td>
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<tr>
<td>G3:</td>
<td>3-keto reductase, C4- de-methylation (erg27)</td>
<td>hydroxyanilides (SBI: Class III)</td>
<td>hydroxyanilides</td>
<td>hydroxyanilides</td>
<td>Low to medium risk. Resistance management required.</td>
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<tr>
<td>G4:</td>
<td>squalene-epoxidase in sterol biosynthesis (erg1)</td>
<td>thioamides (SBI class IV)</td>
<td>thioamides</td>
<td>allylamines</td>
<td>Resistance not known, fungicidal and herbicidal activity</td>
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<td>H3:</td>
<td>trehalase and inositol-biosynthesis</td>
<td>glucopyranosyl antibiotic</td>
<td>glucopyranosyl antibiotic</td>
<td>validamycin</td>
<td>Resistance not known</td>
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<td>H4:</td>
<td>chitin synthase</td>
<td>polyoxins</td>
<td>peptidyl pyrimidine nucleoside</td>
<td>polyoxin</td>
<td>Resistance known. Medium risk. Resistance management required.</td>
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<td>H5:</td>
<td>cellulose synthase</td>
<td>CAA-fungicides (Carboxylic Acid Amides)</td>
<td>cinnamic acid amides</td>
<td>dimethomorph</td>
<td>Resistance known in <em>Plasmopara viticola</em> but not in <em>Phytophthora infestans</em>. Cross resistance between all members of the CAA group. Low to medium risk. See FRAC CAA Guidelines for resistance management.</td>
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<td>I1:</td>
<td>reductase in melanin biosynthesis</td>
<td>MBI-R (Melanin Biosynthesis Inhibitors – Reductase)</td>
<td>isobenzo-furanone</td>
<td>fthalide</td>
<td>Resistance not known</td>
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<td>pyrrolo-quinolinone</td>
<td>pyroquilon</td>
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<td>triazolobenzo-thiazole</td>
<td>tricyclazole</td>
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<td>I2:</td>
<td>dehydratase in melanin biosynthesis</td>
<td>MBI-D (Melanin Biosynthesis Inhibitors – Dehydratase)</td>
<td>cyclopropane-carboxamide</td>
<td>carproamid</td>
<td>Resistance known. Medium risk. Resistance management required.</td>
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<td></td>
<td>carboxamide</td>
<td>didocymet</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>propionamide</td>
<td>fenoxanil</td>
<td></td>
</tr>
<tr>
<td>P1:</td>
<td>salicylic acid pathway</td>
<td>benzo-thiadiazole BTH</td>
<td>benzo-thiadiazole BTH</td>
<td>acibenzolar-S-methyl</td>
<td>Resistance not known</td>
</tr>
<tr>
<td>P2</td>
<td>benzothiazole</td>
<td>benzenothiazole</td>
<td>probenazole (also antibacterial and antifungal activity)</td>
<td>Resistance not known</td>
<td>P 2</td>
</tr>
<tr>
<td>P3</td>
<td>thiadiazole-carboxamide</td>
<td>thiadiazole-carboxamide</td>
<td>tiadinil isotianil</td>
<td>Resistance not known</td>
<td>P 3</td>
</tr>
<tr>
<td>P4</td>
<td>natural compound</td>
<td>polysaccharides</td>
<td>laminarin</td>
<td>Resistance not known</td>
<td>P 4</td>
</tr>
<tr>
<td>P5</td>
<td>plant extract</td>
<td>complex mixture, ethanol extract</td>
<td>extract from <em>Reynoutria sachalinensis</em> (giant knotweed)</td>
<td>Resistance not known</td>
<td>P 5</td>
</tr>
<tr>
<td>MOA</td>
<td>TARGET SITE AND CODE</td>
<td>GROUP NAME</td>
<td>CHEMICAL GROUP</td>
<td>COMMON NAME</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>unknown</td>
<td>cyanoacetamide-oxime</td>
<td>cyanoacetamide-oxime</td>
<td>cymoxanil</td>
<td>Resistance claims described. Low to medium risk. Resistance management required.</td>
<td>27</td>
</tr>
<tr>
<td>unknown</td>
<td>phosphonates</td>
<td>ethyl phosphonates</td>
<td>fosetyl-Al</td>
<td>Few resistance cases reported in few pathogens. Low risk</td>
<td>33</td>
</tr>
<tr>
<td>unknown</td>
<td>phthalamic acids</td>
<td>phthalamic acids</td>
<td>teclothalam (Bactericide)</td>
<td>Resistance not known</td>
<td>34</td>
</tr>
<tr>
<td>unknown</td>
<td>benzotriazines</td>
<td>benzotriazines</td>
<td>triazoxide</td>
<td>Resistance not known</td>
<td>35</td>
</tr>
<tr>
<td>unknown</td>
<td>benzene-sulfonamides</td>
<td>benzene-sulfonamides</td>
<td>flusulfamide</td>
<td>Resistance not known</td>
<td>36</td>
</tr>
<tr>
<td>unknown</td>
<td>pyridazinones</td>
<td>pyridazinones</td>
<td>diclofizine</td>
<td>Resistance not known</td>
<td>37</td>
</tr>
<tr>
<td>unknown</td>
<td>thiocarbamate</td>
<td>thiocarbamate</td>
<td>methasulfocarb</td>
<td>Resistance not known</td>
<td>42</td>
</tr>
<tr>
<td>unknown</td>
<td>phenyl-acetamide</td>
<td>phenyl-acetamide</td>
<td>cyflufenamid</td>
<td>Resistance in <em>Sphaerotheca</em>. Resistance management required</td>
<td>U 6</td>
</tr>
<tr>
<td>actin disruption (proposed)</td>
<td>aryl-phenyl-ketone</td>
<td>benzophenone</td>
<td>metrafenone</td>
<td>Less sensitive isolates detected in wheat powdery mildew. Medium risk. Resistance management required.</td>
<td>U 8</td>
</tr>
<tr>
<td>cell membrane disruption (proposed)</td>
<td>guanidines</td>
<td>guanidines</td>
<td>dodine</td>
<td>Resistance known in <em>Venturia inaequalis</em>. Low to medium risk. Resistance management recommended.</td>
<td>U 12</td>
</tr>
<tr>
<td>unknown</td>
<td>thiazolidine</td>
<td>cyano-methylene-thiazolidine</td>
<td>flutanil</td>
<td>Resistance not known</td>
<td>U 13</td>
</tr>
<tr>
<td>unknown</td>
<td>pyrimidinone-hyrazones</td>
<td>pyrimidinone-hyrazones</td>
<td>ferimzone</td>
<td>Resistance not known Reclassified from C5 in 2012</td>
<td>U 14</td>
</tr>
<tr>
<td>oxysterol binding protein (OSBP) inhibition (proposed)</td>
<td>piperidinyl-thiazole-isoxazolines</td>
<td>piperidinyl-thiazole-isoxazolines</td>
<td>oxathiapiprolin</td>
<td>Resistance risk assumed to be medium to high (single site inhibitor). Resistance management required.</td>
<td>U 15</td>
</tr>
<tr>
<td>complex III: cytochrome bc1, unknown binding site (proposed)</td>
<td>4-quinoly-acetate</td>
<td>4-quinoly-acetate</td>
<td>tebufluquin</td>
<td>Not cross resistant to Qo. Resistance risk unknown but assumed to be medium. Resistance management required.</td>
<td>U 16</td>
</tr>
<tr>
<td>not classified</td>
<td>unknown</td>
<td>diverse</td>
<td>diverse</td>
<td>mineral oils, organic oils, potassium bicarbonate, material of biological origin</td>
<td>Resistance not known</td>
</tr>
<tr>
<td>MOA</td>
<td>TARGET SITE AND CODE</td>
<td>GROUP NAME</td>
<td>CHEMICAL GROUP</td>
<td>COMMON NAME</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>inorganic</td>
<td>inorganic</td>
<td>copper (different salts)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>inorganic</td>
<td>inorganic</td>
<td>sulphur</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>dithiocarbamates and relatives</td>
<td>dithio-carbamates and relatives</td>
<td>ferbam mancozeb maneb metiram propineb thiram zineb ziram</td>
<td>Generally considered as a low risk group without any signs of resistance developing to the fungicides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>phthalimides</td>
<td>phthalimides</td>
<td>captan captafol folpet</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>chloronitrides (phthalonitrides)</td>
<td>chloronitrides (phthalonitrides)</td>
<td>chlorothalonil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>sulfamides</td>
<td>sulfamides</td>
<td>dichlofluanid tolyfluanid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>guanidines</td>
<td>guanidines</td>
<td>guazatine iminocadine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>triazines</td>
<td>triazines</td>
<td>anilazine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>quinones (anthraquinones)</td>
<td>quinones (anthra-quinones)</td>
<td>dithianon</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>quinoxalines</td>
<td>quinoxalines</td>
<td>chinomethionat / quinomethionate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>maleimide</td>
<td>maleimide</td>
<td>fluoroimide</td>
<td></td>
</tr>
</tbody>
</table>
### Alfalfa - Clover - Small-seeded Legumes
#### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Disease Control²</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mefenoxam (4)</td>
<td>Slurry</td>
<td>0.64 fl oz/cwt</td>
<td>X</td>
<td>For control of Pythium damping off and early season Phytophthora only.</td>
</tr>
<tr>
<td>Apron XL, 33.3 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td>For control of Pythium damping off and early season Phytophthora only.</td>
</tr>
<tr>
<td>Allegiance FL, 28.35%</td>
<td>Sebring 318 FS, 28.35%</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Allegiance Dry Seed Protectant, 12.5%</td>
<td>Drill box</td>
<td>4 oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belmont 2.7 FS, 28.98%</td>
<td>Slurry or mist</td>
<td>0.75-1.5 oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Thiram (M3)</td>
<td>Liquid or slurry</td>
<td>8 fl oz/cwt</td>
<td>X</td>
<td>For small-seeded legumes.</td>
</tr>
<tr>
<td>42-S Thiram, 42%</td>
<td>Signet 480 FS, 42%</td>
<td>8 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.  
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
³Seedling blights due to various fungal infections of seed.

### Alfalfa - Clover - Small-seeded Legumes
#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application ¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| Bacillus subtilis strain QST 713 (44)  
Serenade ASO | Aerial sprays or fungigation | 2-6 qt/A | X                | Begin application when environmental conditions and plant stage are conducive to disease development. |
| Pyraclostrobin (11)  
Headline, 23.6%  
Headline SC, 23.3% | Spray or fungigation | 6-9 fl oz/A | X                | For use in alfalfa. PHI is 14 days.                                      |

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
²Dosage = amount of formulated product to apply.  
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
# Barley-Oat-Rye-Wheat Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Appl.</th>
<th>Dosage</th>
<th>Disease Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Azoxystrobin (11)</strong></td>
<td>Slurry</td>
<td>0.153-0.382 fl oz/cwt</td>
<td>X</td>
<td>For wheat and barley. Also controls dwarf bunt and common bunt. Always use with Dividend Extreme or Dividend XL RTA.</td>
</tr>
<tr>
<td>Dynasty, 9.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Carboxin (7) + PCNB (14)</strong></td>
<td>Slurry or mist</td>
<td>3-4 fl oz/cwt wheat, oats, barley</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Vitavax-PCNB, 17%:17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clothianidin + Metalaxyl (4) + Metconazole (3)</strong></td>
<td>Ready to apply</td>
<td>5-7.5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>NipsIt SUITE 2.93% : 0.88% : 0.44%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Difenconazole (3) + Mefenoxam (4)</strong></td>
<td>Ready to apply</td>
<td>2.5 fl oz/cwt common bunt, loose smut, <em>Fusarium</em> seed scab</td>
<td>X(bunt)</td>
<td>X</td>
</tr>
<tr>
<td>Dividend XL RTA 3.21% : 0.27%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 fl oz/cwt common bunt, loose smut, <em>seed-borne Septoria</em>, general seed rots, <em>seed-borne Fusarium</em>, <em>Pythium</em> damping off, partial control of common root rot</td>
<td>X(bunt)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10 fl oz/cwt above diseases plus partial control of take-all, common root rot and <em>Rhizoctonia</em> root rot</td>
<td>X(bunt)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

1Dosage = amount of formulated product to apply.
2X = product labeled for crop and disease; Blank = product not labeled for specific disease.
3Seedling blights due to fungal infections of the seed such as black point and scab.
## Barley-Oat-Rye-Wheat (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Appl.</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Disease Control&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Covered Smut</td>
<td>Loose Smut</td>
</tr>
<tr>
<td>Difenoconazole (3) + Mefenoxam (4) cont Dividend Extreme 7.73%: 1.87%</td>
<td>Slurry</td>
<td>1 fl oz/cwt common bunt, loose smut, <em>Fusarium</em> seed scab</td>
<td>X(bunt)</td>
<td>X</td>
</tr>
<tr>
<td>Ethaboxam (22) Intego Solo, 34.2%</td>
<td>Slurry or mist</td>
<td>0.20-0.26 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Fludioxonil (12) Maxim 4FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spirato 480 FS</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Ipconazole (3) Rancona 3.8 FS, 40.7%</td>
<td>Mist or slurry</td>
<td>0.051-0.085 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rancona Apex, 0.44%</td>
<td>Mist or slurry</td>
<td>5.0-8.73 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rancona 3.8 FS, 40.7%</td>
<td>Slurry or mist</td>
<td>0.085 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ipconazole (3) + Metalaxyl (4) Rancona Pinnacle, 0.434%:0.57%</td>
<td>Mist or slurry</td>
<td>5.0-8.33 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<sup>1</sup>Dosage = amount of formulated product to apply.  
<sup>2</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
<sup>3</sup>Seedling blights due to fungal infections of the seed such as black point and scab.
## Barley-Oat-Rye-Wheat (continued)

### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Appl.</th>
<th>Dosage(^1)</th>
<th>Disease Control(^2)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ipconazole (3) + Metalaxyl (4) + Imidicloprid</strong></td>
<td>Mist or Slurry</td>
<td>Mist or Slurry 5.0 – 8.33 fl oz/cwt</td>
<td>X X X X X</td>
<td>For protection against seedling diseases and seed rot fungi, smuts, bunts, and some insects</td>
</tr>
<tr>
<td>Warden Cereals HR, 0.421%: 0.562%: 14.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warden Cereals WR, 0.439%, 0.585%, 2.95%</td>
<td>Mist or Slurry</td>
<td>Mist or Slurry 5.0-8.33 fl oz/cwt</td>
<td>X X X X X</td>
<td></td>
</tr>
<tr>
<td>Rancona Crest WR, 0.439%: 0.585%: 2.95%</td>
<td>Mist or Slurry</td>
<td>Mist or Slurry 5.0 – 8.33 fl oz/cwt</td>
<td>X X X X X</td>
<td></td>
</tr>
<tr>
<td>Rancona Crest, 0.421%: 0.562%: 14.1%</td>
<td>Mist or Slurry</td>
<td>Mist or Slurry 5.0 – 8.33 fl oz/cwt</td>
<td>X X X X X</td>
<td></td>
</tr>
<tr>
<td><strong>Mefenoxam (4)</strong></td>
<td>Mist or slurry</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td>For Pythium damping off control. See label for Dividend-Apron XL-LS combination.</td>
</tr>
<tr>
<td>Apron XL, 33.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mefenoxam (4) + Difenconazole (3) + Thiamethoxam</strong></td>
<td>Slurry</td>
<td>Slurry 5.0 fl oz/cwt</td>
<td>X X X X X</td>
<td></td>
</tr>
<tr>
<td>Cruiser Maxx Cereals 0.56%: 3.36%: 2.80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Metalaxyl (4)</strong></td>
<td>Mist or slurry</td>
<td>Mist or slurry 0.375-0.75 fl oz/cwt</td>
<td>X</td>
<td>For control of Pythium damping off only.</td>
</tr>
<tr>
<td>Allegiance FL, 28.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sebring 318 FS, 28.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyna-Shield, 28.35%</td>
<td>Slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Belmont 2.7 FS, 28.98%</td>
<td>Slurry or mist</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Metalaxyl (4) + Metconazole (3)</strong></td>
<td>Mist or slurry</td>
<td>Mist or slurry 1.0-1.5 fl oz/cwt</td>
<td>X X X X X</td>
<td>For control of seed-borne and soil-borne diseases.</td>
</tr>
<tr>
<td>Metlock CT, 4.51%: 2.25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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\(^1\) Dosage = amount of formulated product to apply.

\(^2\) X = product labeled for crop and disease; Blank = product not labeled for specific disease.

\(^3\) Seedling blights due to fungal infections of the seed such as black point and scab.
Barley-Oat-Rye-Wheat (continued)
Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Appl.</th>
<th>Dosage(^1)</th>
<th>Disease Control(^2)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Covered Smut</td>
<td>Loose Smut</td>
</tr>
<tr>
<td>Metconazole (3)</td>
<td>Mist or Slurry</td>
<td>0.045 – 0.09 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PCNB (Terraclor) (14)</td>
<td>Slurry</td>
<td>2-4 oz/bu barley, oats 2 oz/bu wheat</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Slurry or mist</td>
<td>0.4-0.8 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>PCNB Seed Coat, 24%</td>
<td>Liquid or Slurry</td>
<td>4.6 oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pyraclostrobin (11) + Triticazole (3) + Metalaxyl (4)</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sedaxane (7)</td>
<td>Vibrance 43.7%</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Thiram (M3)</td>
<td>42-S Thiram, 42%</td>
<td>2 fl oz/bu</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Prothociozone (3) + Penflufen (7) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>1 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

\(^1\) Dosage = amount of formulated product to apply.

\(^2\) X = product labeled for crop and disease; Blank = product not labeled for specific disease.

\(^3\) Seedling blights due to fungal infections of the seed such as black point and scab.
## Barley-Oat-Rye-Wheat (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Appl.</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Disease Control&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Covered Smut</td>
<td>Loose Smut</td>
</tr>
<tr>
<td>Tebuconazole (3) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>3.4–5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sativa M RTU, 0.48%:0.64%</td>
<td>Slurry or mist</td>
<td>5-6.5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sativa IM RTU, 0.46%:0.615%</td>
<td>Slurry or mist</td>
<td>5.0-6.5 fl oz/cwt oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sativa IM Max, 0.46%:0.615%</td>
<td>Slurry or mist</td>
<td>3.4-5.0 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sativa IMF Max, 0.45%, 0.6%, 0.36%</td>
<td>Slurry or mist</td>
<td>5.0-6.5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Foothold 0.499%:0.668%</td>
<td>Slurry or mist</td>
<td>Slurry or mist</td>
<td>5.0-6.5 fl oz/cwt</td>
<td>X</td>
</tr>
</tbody>
</table>

<sup>1</sup>Dosage = amount of formulated product to apply.  
<sup>2</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
<sup>3</sup>Seedling blights due to fungal infections of the seed such as black point and scab.
## Barley-Oat-Rye-Wheat (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Appl.</th>
<th>Dosage¹</th>
<th>Covered Smut</th>
<th>Loose Smut</th>
<th>Seedling Blight</th>
<th>Common Root Rot</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedaxane (7) + Difenconazole (3) + Mefenoxam (4) Vibrance Extreme 1.22%: 5.86% : 1.46%</td>
<td>Slurry</td>
<td>2.8 – 5.6 fl oz/cwt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>For control of seed-borne, soil borne, and early season diseases</td>
</tr>
<tr>
<td>Sedaxane (7) + Difenconazole (3) + Mefenoxam (4) + Fludioxonil (12) Vibrance Quattro, 1.45%; 3.47%; 0.87%; 0.72%</td>
<td>Slurry</td>
<td>5.0 fl oz/cwt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Ready to apply formulation for commercial or on-farm applications. For control of seed and soil-borne diseases of cereals.</td>
</tr>
<tr>
<td>Sedaxane (7) + Difenconazole (3) + Mefenoxam (4) + Fludioxonil (12) + Thiamethoxam Cruiser Vibrance Quattro, 1.45%; 3.47%; 0.87%; 0.72%; 5.75%</td>
<td>Slurry</td>
<td>5.0 fl oz/cwt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Ready to apply formulation for commercial or on-farm applications. For control of seed and soil-borne diseases of cereals. Insecticide thiamethoxam for wireworm control.</td>
</tr>
<tr>
<td>Tebuconazole (3) + Metalaxyl (4) + Imazalil Raxil MD Extra, 0.34%:0.58%: 1.0%</td>
<td>Slurry or mist</td>
<td>5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Not registered for rye or oats.</td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³Seedling blights due to fungal infections of the seed such as black point and scab.
## Barley-Oat-Rye-Wheat (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Appl.</th>
<th>Dosage(^1)</th>
<th>Disease Control(^2)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Covered Smut</td>
<td>Loose Smut</td>
<td>Seedling(^3) Blight</td>
</tr>
<tr>
<td>Prothioconazole (3) + Tebuconazole (3) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>5-7.5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Raxil Pro MD, 1.47%; 0.29%; 0.59%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tebuconazole (3) + Metalaxyl (4) + Fludioxonil (12) + Imidacloprid</td>
<td>Slurry</td>
<td>3.4-5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Foothold Virock, 0.45%; 0.60%; 0.36%; 11.16%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiabendazole (1)</td>
<td>Slurry</td>
<td>1.3 fl oz/cwt for seedborne common bunt, 2.6 fl oz/cwt for soilborne common bunt, 0.17 fl oz/cwt for Fusarium seed scab</td>
<td>X (bunt)</td>
<td></td>
</tr>
<tr>
<td>Mertect 340-F, 42.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triticonazole (3)</td>
<td>Concentrated product</td>
<td>3.1 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Charter, 2.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triticonazole (3) + Metalaxyl (4)</td>
<td>RTA</td>
<td>5.4 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Charter F2 1.32%; 0.79%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triticonazole (3) + Thiram (M3)</td>
<td>Ready to apply</td>
<td>5.5 fl oz/cwt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Charter PB 1:25%; 12.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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\(^3\)Seedling blights due to fungal infections of the seed such as black point and scab.
## Foliar Sprays

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<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leaf Spot</td>
<td>Leaf Rust</td>
</tr>
<tr>
<td><em>Bacillus pumilus</em> strain QST 2808 BalladPLUS</td>
<td>Aerial sprays or fungigation</td>
<td>1-4 qt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><em>Copper</em> (M1) Champ DP, 57.6%</td>
<td>Spray or fungigation</td>
<td>1-1.33 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Champ WG 77%</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Champ Formula 2, Flowable, 37.5%</td>
<td>Spray or fungigation</td>
<td>1-1.33 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cuprofix Ultra 40 Disperss 71.1%</td>
<td>Spray or fungigation</td>
<td>1-1.25 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Kocide 2000, DF 53.8%</em></td>
<td>Spray or fungigation</td>
<td>1.25-1.5 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Kocide 3000, DF 46.1%</em></td>
<td>Spray or fungigation</td>
<td>0.5-0.75 lb</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Kocide 4.5 LF, 37.5%</em></td>
<td>Spray or fungigation</td>
<td>1-1.33 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>MasterCop, 21.48%</em></td>
<td>Spray or fungigation</td>
<td>0.5-1.5 pt/A</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

²Dosage = amount of formulated product to apply.

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⁴Leaf spot includes fungal leaf diseases such as tan spot, Septoria blotch and spot blotch on wheat, and spot blotch and net blot on barley.
## Barley-Oat-Rye-Wheat (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leaf Spot⁴</td>
<td>Leaf Rust</td>
</tr>
<tr>
<td><strong>Mancozeb (M3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dithane DF</td>
<td>Spray or fungigation</td>
<td>2.1 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rainshield NT, 75%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dithane F-45, 37%</td>
<td>Spray or fungigation</td>
<td>1.6 qt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dithane M-45, 80%</td>
<td>Spray or fungigation</td>
<td>2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dithane WSP, 80%</td>
<td>Spray or fungigation</td>
<td>2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Koverall, 75%</td>
<td>Spray or fungigation</td>
<td>2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Manzate Flowable, 37%</td>
<td>Spray or fungigation</td>
<td>1.6 qt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Manzate ProStick, 75%</td>
<td>Spray or fungigation</td>
<td>2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Penncozeb, 80% WP, 80%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Penncozeb 75 DF, 75%</td>
<td>Spray or fungination</td>
<td>1-2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Roper DF Rainshield, 75%</td>
<td>Spray or fungigation</td>
<td>2.0 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Mancozeb (M3) + Copper (M1)</strong></td>
<td>Spray or fungigation</td>
<td>2-2.5 lbs/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>ManKocide, 15% + 46.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Penthiopyrad (7)</strong></td>
<td>Spray or fungigation</td>
<td>10-24 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Vertisan, 20.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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## Barley-Oat-Rye-Wheat (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leaf Spot⁴</td>
<td>Leaf Rust</td>
</tr>
<tr>
<td>Triazoles Cyproconazole (3)</td>
<td>Spray or fungigation</td>
<td>1.5-5.5 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Alto, 8.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metconazole (3)</td>
<td>Spray or fungigation</td>
<td>10-17 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Caramba, 8.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propiconazole (3)</td>
<td>Spray or fungigation</td>
<td>2-4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tilt 3.6EC, 41.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitness, 41.8%</td>
<td>Spray or fungigation</td>
<td>2.4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PropiMax EC, 41.8%</td>
<td>Spray or fungigation</td>
<td>2.4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Topaz 41.8%</td>
<td>Spray or fungigation</td>
<td>2.4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bumper 41.8 EC 41.8%</td>
<td>Spray or fungigation</td>
<td>2.4 fl oz</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bumper ES, 40.85%</td>
<td>Spray</td>
<td>2-4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Propiconazole E-AG, 41.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leaf Spot</td>
<td>Leaf Rust</td>
</tr>
<tr>
<td>Prothioconazole (3)</td>
<td>Spray</td>
<td>4.3-5.7 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Proline 480 SC, 41%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tebuconazole (3), 38.7%</td>
<td>Spray</td>
<td>4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Monsoon, Muscle, Onset, Orius 3.6F, Tebucon, Tebustar, Tebuzol, and Toledo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prothioconazole + Tebuconazole (3)</td>
<td>Spray</td>
<td>6.5-8.2 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prosaro 421 SC, 19.0%.19.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QoIs Azoxyystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6.0-12.0 fl oz/A (12.0 fl oz/A, powdery mildew)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quadris, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satori, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-9 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Headline EC, 23.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headline SC, 23.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leaf Spot⁴</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Leaf Rust</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stem Rust</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Powdery Mildew</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fusarium Head Blight</td>
<td></td>
</tr>
<tr>
<td>Fluoxastrobin (11) Evito 480SC, 40.3%</td>
<td>Spray or fungigation</td>
<td>2.0-4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Picoxystrobin (11) Aproach, 22.5%</td>
<td>Spray or fungigation</td>
<td>3.0-6.0 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>QoI + SDHI Fluxapyroxad (7) + Pyraclostrobin (11) Priaxor 14.33% : 28.58%</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Qols + Triazoles Trifloxystrobin (11) + Propiconazole (3) Stratego 11.4%:11.4%</td>
<td>Spray or fungigation</td>
<td>10 fl oz/A (wheat)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pyraclostrobin (11) + Metconazole (3) Twinline 12.0%:7.4%</td>
<td>Spray or fungigation</td>
<td>7-9 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Leaf spot includes fungal leaf diseases such as tan spot, Septoria blotch and spot blotch on wheat, and spot blotch and net blot on barley.
⁵See fungicide resistance management statements on Pages 7-8.
### Barley-Oat-Rye-Wheat (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picoxystrobin (11) + Cyproconazole (3)</td>
<td>Spray or fungigation</td>
<td>3.4-6.8 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Aproach Prima, 17.94%; 7.17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Propiconazole (3)</td>
<td>Spray or fungigation</td>
<td>7-14 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quilt 7.0%; 11.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quilt Xcel 13.5%; 11.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Tebuconazole (3)</td>
<td>Spray or fungigation</td>
<td>6.4-8.6 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Custodia, 11.0%; 18.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur (M)</td>
<td>Spray</td>
<td>6-15lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sulfur DF, 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

²Dosage = amount of formulated product to apply.

³X = product labeled for crop and disease; Blank = product not labeled for specific disease.

⁴Leaf spot includes fungal leaf diseases such as tan spot, Septoria blotch and spot blotch on wheat, and spot blotch and net blot on barley.

⁵See fungicide resistance management statements on Pages 7-8.
## Canola (Rapeseed) Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage$^1$</th>
<th>Disease Control$^2$</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothianidin+ Penflufen (7)+ Trifloxystrobin (11) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>21.5 fl oz/cwt</td>
<td>X</td>
<td>Registered for commercial use as a seed treatment in canola only. Contains both fungicide and insecticide.</td>
</tr>
<tr>
<td>Difenoconazole (3) + Metalaxyl M (4) + Fludioxonil (12) + Thiamethoxam</td>
<td>RTA slurry</td>
<td>23 fl oz/cwt</td>
<td>X</td>
<td>Commercial use only. Contains both insecticide and fungicide. Contains higher concentration of insecticide - to be used for high flea beetle pressure.</td>
</tr>
<tr>
<td>Ethaboxam (22)</td>
<td>Slurry or mist</td>
<td>0.2-0.3 fl oz/cwt</td>
<td>X</td>
<td>For control of <em>Pythium</em>.</td>
</tr>
<tr>
<td>Fludioxonil (12)</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Spirato 480 FS</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4)</td>
<td>Mist or slurry</td>
<td>0.25-0.5 fl oz/cwt</td>
<td>X</td>
<td>For <em>Pythium</em> damping off only.</td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Slurry or mist</td>
<td>1.5-3.1 fl oz/cwt</td>
<td>X</td>
<td>Control of <em>Rhizoctonia solani</em> and suppression of <em>Fusarium</em> sp. and <em>Pythium</em> sp.</td>
</tr>
<tr>
<td>Sedaxane (7)</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt or 2.5-5 gai/100 kg seed</td>
<td>X</td>
<td>For seed decay, seedling blight and damping off caused by <em>Rhizoctonia solani</em>.</td>
</tr>
</tbody>
</table>

$^1$Dosage = amount of formulated product to apply.

$^2$X = product labeled for crop and disease; Blank = product not labeled for specific disease.

$^3$Seedling blights due to various fungal infections of seed.
## Canola (Rapeseed)

### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Disease Control²</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedaxane (7) + Difenoconazole (3) + Mefenoxam (4) + Fludioxonil (12) + Thiamethoxam Helix Vibrance, 0.26%, 1.25%, 0.40%, 0.13%, 20.7%</td>
<td>Slurry</td>
<td>23 fl oz/cwt</td>
<td>X X</td>
<td>For use in commercial seed treatment facilities with closed transfer systems. For seed decay, seedling blight and damping off caused by <em>Pythium</em>, <em>Fusarium</em>, and <em>Rhizoctonia</em></td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.

²X = product labeled for crop and disease; Blank = product not labeled for specific disease.

³Seedling blights due to various fungal infections of seed.

## Canola

### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control²</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxytrobin (11)</td>
<td>Spray or fungigation</td>
<td>6.0-15.5 fl oz/A</td>
<td>X X X</td>
<td>Resistance statement 5⁴ Alternaria Black Spot alone: 8.0 fl oz/A at pod stage (95% petal fall) Blackleg: 6.2 fl oz/A at 2- to 4-leaf stage <em>Alternaria</em> Black Spot or <em>Sclerotinia</em> Stem rot: 9.2-15.4 fl oz/A at 10-25% flowering (3-7 days after first flower).</td>
</tr>
<tr>
<td>Bacillus subtilis strain QST 2808 (44) Serenade ASO</td>
<td>Spray or fungigation</td>
<td>2-6 qt/A</td>
<td>X</td>
<td>Begin applications when environmental conditions and plant stage are conducive to disease development. For disease suppression.</td>
</tr>
<tr>
<td>Bosphial (7) Endura, 70%</td>
<td>Spray or fungigation</td>
<td>5-6 oz/A</td>
<td>X</td>
<td>Apply at 20-50% flowering prior to the onset of disease. Apply a second application if conditions continue to be favorable for disease development.</td>
</tr>
<tr>
<td>Fluxopyroxad (7) + Pyraclostrobin (11) Priaxor 14.33% + 28.58%</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X X X</td>
<td>Resistant statement 5⁵ &amp; 6⁶. For blackspot, apply at early pod development, for blackleg apply at 2 to 4 leaf stage, for <em>sclerotinia</em> apply at 20% to 50% bloom, and a second application may be made 14 days later if weather conditions are favorable for disease development. Do not make more than two consecutive applications of priaxor or more than 16 oz per season.</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

²Dosage = amount of formulated product to apply.

³X = product labeled for crop and disease; Blank = product not labeled for specific disease.

⁴See fungicide resistance management statements on Pages 7-8.
## Canola (continued)

### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Dosage&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Disease Control&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alternaria Black Spot</td>
<td>Black-leg</td>
</tr>
<tr>
<td>Metconazole (3) Quash WDG, 50%</td>
<td>Wettatable Granule</td>
<td>2-4 oz/A</td>
<td>X</td>
<td>Apply at 20-50% bloom, 10-20 gpa by ground, 5 gpa by air. 35-day PHI. Do not make more than 1 application or apply more than 4 fl oz/A.</td>
</tr>
<tr>
<td>Prothioconazole (3) Proline 480 SC, 41%</td>
<td>Spray</td>
<td>4.3-5.7 fl oz/A</td>
<td>X</td>
<td>A 2(ee) allows for application of Proline at 4.3-5.7 oz/A at 2-4 leaf stage for blackleg management. Use higher rate if field has history of severe disease or if susceptible variety grown. Apply at 20-50% flowering for white mold. Do not make more than 2 applications per year. For maximum disease control, apply in 15-20 gpa by ground or 5 gpa by air. Do not apply within 36 days of harvest.</td>
</tr>
<tr>
<td>Penthiopyrad (7) Vertisan, 20.6%</td>
<td>Spray or fungigation</td>
<td>14-20 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Picoxystrobin (11) Aproach, 22.5%</td>
<td>Spray</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pyraclostrobin (11) Headline EC, 23.6% Headline SC, 23.3%</td>
<td>Spray</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pythium oligandrum DV 74 Polyversum (44) 1.0%</td>
<td>Spray or fungigation</td>
<td>1.5-3 fl oz</td>
<td>X</td>
<td>Research at NDSU showed efficacy against white mold when applied at 1.5 fl oz, 30 days before flowering and at 3 fl oz at flowering. Do not mix with chemical fungicides.</td>
</tr>
</tbody>
</table>

<sup>1</sup>Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
<sup>2</sup>Dosage = amount of formulated product to apply.
<sup>3</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.
<sup>4</sup>See fungicide resistance management statements on Pages 7-8
## Canola (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alternaria Black Spot</td>
<td>Black-leg</td>
</tr>
<tr>
<td>Thiophanate Methyl (1)</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td>Resistance statement ¹⁴</td>
</tr>
<tr>
<td>Tinsp M WSB, T-Methyl 70 W WSB, 70% Cercobin</td>
<td></td>
<td></td>
<td></td>
<td>Apply 1-2 lb once at 20-50% flowering, or apply 1 lb twice with the first application at 20-30% flowering and the second application at 40-50% flowering. Do not apply more than 2 lbs product/acre/season.</td>
</tr>
<tr>
<td>Thiophanate Methyl, WDG 85%</td>
<td>Spray or fungigation</td>
<td>0.8-1.6 lb/A</td>
<td>X</td>
<td>Apply 0.8-1.6 lb once at 20-50% flowering, or apply 0.8 lb twice, with the first application at 20-30% flowering and the second application at 40-50% flowering. Do not apply more than 1.6 lbs product/acre/season.</td>
</tr>
<tr>
<td>T-Methyl E-AG 4.5F</td>
<td>Spray or fungigation</td>
<td>20-40 fl oz/A</td>
<td>X</td>
<td>See label for specific application timings. Do not apply more than 40 fl oz of T-Methyl E-AG per acre per season.</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴See fungicide resistance management statements on Pages 7-8.

### Canola
#### Soil Application

<table>
<thead>
<tr>
<th>Organism</th>
<th>Application</th>
<th>Dosage¹</th>
<th>White mold² (Sclerotinia sclerotiorum)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coniothyrium mimitans</td>
<td>Soil incorporation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td>Fungus attacks sclerotia of the fungus in the soil.</td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³See fungicide resistance management statements on Pages 7-8.

### Chickpea (Garbanzo Bean)
#### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Control² of Seedling Diseases³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxyostrobin (11)</td>
<td>Slurry</td>
<td>0.153-0.765 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Maxim 4FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Spirato 480 FS</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³Seedling blights due to various fungal infections of seed.
Note: Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
### Chickpea (Garbanzo Bean) Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Control(^2) of Seedling Diseases(^3)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fludioxonil (12) + Mefenoxam (4) Αpron Maxx RFC 2.31%:3.46%</td>
<td>Slurry</td>
<td>1.5 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Ipconazole (3) Rancona 3.8 FS, 40.7%</td>
<td>Slurry or mist</td>
<td>0.085 fl oz/cwt</td>
<td>X</td>
<td>Does not provide control of Pythium</td>
</tr>
<tr>
<td>Ipconazole (3) + Metalaxyl (4) Rancona Summit, 0.902%:1.443%</td>
<td>Slurry or mist</td>
<td>4.0 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mefenoxam (4) Apron XL, 33.3%</td>
<td>Slurry or mist</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td>For Pythium damping off.</td>
</tr>
<tr>
<td>Mefenoxam (4) + Fludioxonil (12) + Thiamethoxam Cruiser Maxx, 1.7%:1.12%:22.61%</td>
<td>Slurry or mist</td>
<td>3 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and insect.</td>
</tr>
<tr>
<td>Metalaxyl (4) Allegiance, 28.35%</td>
<td>Slurry or mist</td>
<td>0.75-1.0 fl oz/cwt</td>
<td>X</td>
<td>For Pythium damping off.</td>
</tr>
<tr>
<td>Metalaxyl (4) Allegiance, FL 28.35%</td>
<td>Slurry or mist</td>
<td>0.25-0.5 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4) Sebring 318 FS, 28.35%</td>
<td>Slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4) Dyna-Shield, 28.35%</td>
<td>Slurry or mist</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4) Belmont 2.7 FS, 28.98%</td>
<td>Slurry or mist</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Prothioconazole (3) + Penflufen (7) + Metalaxyl (4) EverGol Energy 7.18% : 3.59% : 5.74</td>
<td>Slurry or mist</td>
<td>1 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and seed rot and damping off caused by Rhizoctonia.</td>
</tr>
<tr>
<td>Pyraclostrobin (11) Stamina 18.4%</td>
<td>Slurry or mist</td>
<td>0.4-1.5 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and for control of seed and seedling disease caused by Rhizoctonia solani.</td>
</tr>
<tr>
<td>Sedaxane (7) Vibranxe, 43.7%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt or 2.5-5 gal/100 kg of seed</td>
<td>X</td>
<td>For seed decay, seedling blights, and damping off caused by Rhizoctonia solani.</td>
</tr>
<tr>
<td>Thiabendazole (1) Mertect 340-F, 42.3%</td>
<td>Slurry</td>
<td>2.04 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne Ascochyta.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) Trilex, 22%</td>
<td>Slurry</td>
<td>0.32 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) + Metalaxyl (4) Trilex 2000, 7.12%:5.69%</td>
<td>RTU or slurry or mist</td>
<td>1.0 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
</tbody>
</table>

\(^1\)Dosage = amount of formulated product to apply.

\(^2\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.

\(^3\)Seedling blights due to various fungal infections of seed.

Note: Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control Ascochyta³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacillus subtilis</strong></td>
<td>Spray or fungigation</td>
<td>2-6 qt/A</td>
<td>Begin applications when environmental conditions and plant stage are conducive to disease development.</td>
<td></td>
</tr>
<tr>
<td>strain QST 713 (44)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serenade ASO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Boscalid (7)</strong></td>
<td>Spray or fungigation</td>
<td>6 oz/A</td>
<td>X</td>
<td>Labeled for control of Botrytis gray mold, Sclerotinia white mold and rust. Apply at the beginning of flowering, prior to the onset of disease. Make a second application at full blossom if conditions continue to be favorable for disease development.</td>
</tr>
<tr>
<td>Endura, 70%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chlorothalonil (M5)</strong></td>
<td>Spray or fungigation</td>
<td>1.25-1.8 lb/A</td>
<td>X</td>
<td>State label allows application to begin at onset of disease, with maybe 2-4 weeks before flowering. Repeat at 7- to 10-day intervals. Do not make more than 4 applications per growing season. Do not apply within 14 days of harvest.</td>
</tr>
<tr>
<td>Bravo Ultrex, or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equus DF 82.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Boscalid (7)</strong></td>
<td>Spray or fungigation</td>
<td>1.38-2 pt/A</td>
<td>X</td>
<td>Begin application during early bloom and repeat at 7- to 10-day intervals. Do not apply more than 11.1 lbs/A per season.</td>
</tr>
<tr>
<td>Endura, 70%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chlorothalonil (M5)</strong></td>
<td>Spray or fungigation</td>
<td>1.38-2 pt/A</td>
<td>X</td>
<td>State label allows application to begin at onset of disease, with maybe 2-4 weeks before flowering. Repeat at 7- to 10-day intervals. Do not make more than 4 applications per growing season. Do not apply within 14 days of harvest.</td>
</tr>
<tr>
<td>Bravo Weatherstick ZN,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Boscalid (7)</strong></td>
<td>Spray or fungigation</td>
<td>1.38-2 pt/A</td>
<td>X</td>
<td>Begin application during early bloom and repeat at 7- to 10-day intervals. Do not apply more than 11.1 lbs/A per season.</td>
</tr>
<tr>
<td>Endura, 70%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chlorothalonil (M5)</strong></td>
<td>Spray or fungigation</td>
<td>1.38-2 pt/A</td>
<td>X</td>
<td>State label allows application to begin at onset of disease, with maybe 2-4 weeks before flowering. Repeat at 7- to 10-day intervals. Do not make more than 4 applications per growing season. Do not apply within 14 days of harvest.</td>
</tr>
<tr>
<td>Bravo Weatherstick, 54%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chlorothalonil (M5)</strong></td>
<td>Spray or fungigation</td>
<td>1.38-2 pt/A</td>
<td>X</td>
<td>State label allows application to begin at onset of disease, with maybe 2-4 weeks before flowering. Repeat at 7- to 10-day intervals. Do not make more than 4 applications per growing season. Do not apply within 14 days of harvest.</td>
</tr>
<tr>
<td>Echo 720, 54.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cyprodinil (9) +</strong></td>
<td>Spray</td>
<td>11-14 fl oz/A</td>
<td>For suppression of white mold. Begin applications prior to or at the onset of disease. Make first application at 10-20% bloom. Do not apply more than 56 fl oz/A per season. PHI = 7 days.</td>
<td></td>
</tr>
<tr>
<td>Fluoxastrobin (12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch 62.5WG, 37.5%; 25.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fluopyram (7) +</strong></td>
<td>Spray</td>
<td>8.0-10.3 fl oz/A</td>
<td>X</td>
<td>Apply at early flower or at the first sign of disease, whichever occurs first. Do not make more than two sequential applications before rotating with a fungicide from a different group. Continue applications as needed on a 10-14 day interval. Do not apply within 7 days of cutting or swathing the crop for harvest or within 14 days of harvest.</td>
</tr>
<tr>
<td>Prothioconazole (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProPulse 17.4%:17.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fluxapyroxad (7) +</strong></td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X</td>
<td>Resistance statement 5. For optimal disease control, begin applications prior to disease development.</td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priaxor 14.33%:28.58%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prothioconazole (3)</strong></td>
<td>Spray</td>
<td>5.0-5.7 fl oz/A</td>
<td>X</td>
<td>NDSU has documented that <em>Ascochyta rabiei</em> is resistant QoI fungicides (FRAC 11) in ND and neighboring states, and that chemistry may not control <em>Ascochyta</em> blight.</td>
</tr>
<tr>
<td>Proline 480 SC, 41%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
² Dosage = amount of formulated product to apply.  
³ X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
⁴ See fungicide resistance management statements on Pages 7-8.
<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control Ascochyta³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penthio pyrad (7)</td>
<td>Spray or fungigation</td>
<td>14-20 fl oz/A</td>
<td>X</td>
<td>Begin applications prior to disease development. For white mold, make initial application at beginning bloom and follow with a second application at full bloom. Do not exceed 41 fl oz/A per year. PHI = 21 days.</td>
</tr>
<tr>
<td>QoIs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6.2-15.4 fl oz/A</td>
<td>X</td>
<td>Resistance Statement 5⁴ NDSU has documented that <em>Ascochyta rabiei</em>, the pathogen that causes Ascochyta Blight on chickpeas, is resistant to QoI fungicides in ND and neighboring states. As a result, QoI fungicide applications (Including Headline, Quadris, and mixes with them) may not manage the disease.</td>
</tr>
<tr>
<td>Satori, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Chlorothalonil (M5)</td>
<td>Spray</td>
<td>1.6-2.4 pt/A</td>
<td>X</td>
<td>Quadris Opti should not be tank mixed with COC, MS0 or silicon adjuvants.</td>
</tr>
<tr>
<td>Quadris, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satori, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Difenconazole (3)</td>
<td>Spray or fungigation</td>
<td>8-14 fl oz/A</td>
<td>X</td>
<td>Maximum of 56 fl oz/A season. 14-day PHI. Quadris Top should be used with an adjuvants such as a non-ionic based surfactant or crop oil concentrate or blend.</td>
</tr>
<tr>
<td>Quadris Top 18.2%:11.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Propiconazole (3)</td>
<td>Spray or fungigation</td>
<td>14 fl oz/A</td>
<td>X</td>
<td>Maximum of 42 fl oz/A season. 14-day PHI.</td>
</tr>
<tr>
<td>Quilt, 7.0%:11.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-9 fl oz/A</td>
<td>X</td>
<td>Maximum of 18 fl oz/A per season. 21-day PHI</td>
</tr>
<tr>
<td>Headline EC, 23.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headline SC, 23.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picoxystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>Labeled for white mold when applied at beginning of bloom at 8-12 fl oz/A. Do not apply more than 24 fl oz/A per season. PHI = 14 days.</td>
</tr>
<tr>
<td>Aproach, 22.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
²Dosage = amount of formulated product to apply.  
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
⁴See fungicide resistance management statements on Pages 7-8.
### Corn (Field) and Sorghum Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage$^1$</th>
<th>Control$^2$ of Seedling Blights$^3$</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Azoxystrobin (11)</strong>&lt;br&gt; Dynasty, 9.6%</td>
<td>Slurry</td>
<td>0.0688 fl oz/80,000 kernel count unit</td>
<td>X</td>
<td>Also controls seed-borne head smut. Use only in combination with labeled rates of Maxim and Apron XL products.</td>
</tr>
<tr>
<td><strong>Captan (M4)</strong>&lt;br&gt; The following captan products are registered for seed treatment of corn and sorghum: Captan - Diazinon Seed Treater, 36.67%&lt;br&gt; Methoxychlor, 70.9%&lt;br&gt; Kernel Guard, 14.67% (corn only)&lt;br&gt; Nu-Gro Captan 4000, 38.7%&lt;br&gt; Sorghum Guard, 32.75%</td>
<td>See individual labels for rates of application, formulations, method of application and registered use</td>
<td>See individual labels for amounts of formulated product to apply</td>
<td>X</td>
<td>Captain - Diazinon Seed Treater contains 25% diazinon insecticide.&lt;br&gt; Kernel Guard contains 15% diazinon and 25% lindane.&lt;br&gt; Sorghum Guard contains 16.6% lindane insecticide.</td>
</tr>
<tr>
<td><strong>Carboxin (7)</strong>&lt;br&gt; Kernel Guard Supreme, 14%</td>
<td>Drill box</td>
<td>1.5 oz/42 lb</td>
<td>X</td>
<td>Kernel Guard contains 10.42% permethrin.</td>
</tr>
<tr>
<td><strong>Ethaboxam (22)</strong>&lt;br&gt; Intego Solo, 34.2%</td>
<td>Slurry or mist</td>
<td>0.2-0.3 fl oz/cwt</td>
<td>X</td>
<td>For control of <em>Pythium</em>. Also registered for sweet corn, sorghum and grain (milo).</td>
</tr>
<tr>
<td><strong>Fludioxonil (12)</strong>&lt;br&gt; Maxim 4FS, 40.3%&lt;br&gt; Spirato 480FS 40.3%</td>
<td>Slurry</td>
<td>0.036-0.072 fl oz/80,000 kernel count&lt;br&gt; 0.08 fl oz/cwt for sweet corn</td>
<td>X</td>
<td>For control of seed-borne and soil-borne fungi which causes seed decay, damping off and seedling blight, and seed-borne head smut.</td>
</tr>
<tr>
<td><strong>Fludioxonil (12) + Mefenoxam (4)</strong>&lt;br&gt; Maxim XL, 21% : 8.4%</td>
<td>Water-based slurry</td>
<td>.071 fl oz/80,000 kernel count unit of seed</td>
<td>X</td>
<td>Controls seedling blights and fungi causing seed decay and damping off. For field corn.</td>
</tr>
<tr>
<td><strong>Fludioxonil (12) + Mefenoxam (4) + Azoxystrobin (11) + Thiabendazole (1)</strong>&lt;br&gt; Maxim Quattro 3.32%:2.65%:1.33%:26.5%</td>
<td>Water-based slurry</td>
<td>0.46 fl oz/80,000 kernel count</td>
<td>X</td>
<td>Also controls seed-borne smut.</td>
</tr>
<tr>
<td><strong>Ipconazole (3)</strong>&lt;br&gt; Vortex, 40.7%</td>
<td>Water-based Slurry</td>
<td>0.044 fl oz/cwt</td>
<td>X</td>
<td>For protection against soil-borne and seed-borne diseases.</td>
</tr>
</tbody>
</table>

$^1$Dosages for corn apply to field corn. Dosages for sweet corn vary with some products, and others are not registered for sweet corn, so consult the label for sweet corn information. Dosages are amount of formulated product to apply.

$^2$X = product labeled for crop and disease; Blank = product not labeled for specific disease.

$^3$Seedling blights due to various fungal infections of seed.
## Corn (Field) and Sorghum (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Control² of Seedling Blights³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mancozeb (M3) Dithane DF Rainshield NT, 75%</td>
<td>Slurry</td>
<td>1.6-3.2 oz/bu field corn, 1.6-2.7 oz/bu sorghum</td>
<td>X</td>
<td>Dithane DF, F-45 and M-45 registered for seed treatment of field corn and sorghum but not for seed treatment of sweet corn.</td>
</tr>
<tr>
<td>Dithane F-45, 37%</td>
<td>Drill box or slurry</td>
<td>2.4-4.8 fl oz/bu field corn, 2.4-4.0 fl oz/bu sorghum</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dithane ST, 37%</td>
<td>Slurry or mist</td>
<td>2.4-4.8 fl oz/bu field corn, 2.4-4.0 fl oz/bu sorghum</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dithane M-45, 80% or Dithane WSP, 80%</td>
<td>Drill box or slurry</td>
<td>1.5-3.0 oz/bu field corn, 1.5-2.5 oz/bu sorghum</td>
<td>X</td>
<td>Grain Guard and Grain Guard Plus registered for sorghum only. Grain Guard Plus contains 18.75% lindane insecticide.</td>
</tr>
<tr>
<td>Grain Guard, 50%</td>
<td>Drill box</td>
<td>3 oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Grain Guard Plus, 50%</td>
<td>Drill box</td>
<td>3 oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Manzate ProStick, 75%</td>
<td>Slurry</td>
<td>1.5-3 oz/bu corn, 1.5-2.5 oz/bu sorghum</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Manzate Flowable, 37%</td>
<td>Slurry</td>
<td>2.4-4.8 oz/bu corn, 2.4-4.0 oz/bu sorghum</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Penncozeb 80 WP, 80%</td>
<td>Drill box or slurry</td>
<td>1.5-3 oz/bu field corn, 1.5-2.5 oz/bu sorghum</td>
<td>X</td>
<td>Treated seed should be labeled &quot;must not be used for food, feed or oil purposes.&quot;</td>
</tr>
<tr>
<td>Penncozeb 75 DF, 75%</td>
<td>Drill box or slurry</td>
<td>1.6-3.2 oz/bu field corn, 1.6-2.7 oz/bu sorghum</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mefenoxam (4) Apron XL, 33.3%</td>
<td>Liquid or slurry</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td>For control of Pythium damping off only.</td>
</tr>
<tr>
<td>Metalaxyl (4) Allegiance FL, 28.35% or Sebring 318 FS, 28.35%</td>
<td>Mist or slurry</td>
<td>0.375-0.75 fl oz/cwt sorghum</td>
<td>X</td>
<td>For control of Pythium damping off only.</td>
</tr>
<tr>
<td>Dyna-Shield, 28.35%</td>
<td>Slurry</td>
<td>0.75 fl oz/cwt corn</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metconazole (3) Metlock 40%</td>
<td>Liquid or slurry</td>
<td>0.045-0.09 fl oz/cwt</td>
<td>X</td>
<td>Disease protection for Rhizoctonia damping-off, Fusarium seed/seeding dieback seed decay fungi and head smut.</td>
</tr>
<tr>
<td>Metalaxyl (4) + Metconazole (3) Metlock CT, 4.51%: 2.25%</td>
<td>Liquid or slurry</td>
<td>1.0-1.5 fl oz/cwt</td>
<td>X</td>
<td>Disease protection for Rhizoctonia damping-off, Fusarium seed/seeding dieback seed decay fungi and head smut.</td>
</tr>
</tbody>
</table>

¹Dosages for corn apply to field corn. Dosages for sweet corn vary with some products, and others are not registered for sweet corn, so consult the label for sweet corn information. Dosages are amount of formulated product to apply.  
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
³Seedling blights due to various fungal infections of seed.
## Corn (Field) and Sorghum (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Seedling Blights&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pyraclostrobin (11)</strong>&lt;br&gt;Stamina, 18.4%</td>
<td>Slurry or mist</td>
<td>0.4-0.8 fl oz/cwt</td>
<td>X</td>
<td>Controls seed and seedling disease caused by <em>Rhizoctonia solani</em>, seed-borne fungi causing seed decay and seedling blight.</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11) + Bacillus subtilis MBI 600</strong>&lt;br&gt;Xanthion, 23.6%; 5.0%</td>
<td>In-furrow Spray</td>
<td>3.6-7.2 fl oz/1000 ft of row</td>
<td>X</td>
<td>Product must be mixed in a 5:1 ratio of pyraclostrobin to <em>Bacillus subtilis</em>. Also for suppression of <em>Rhizoctonia solani</em>, <em>Fusarium</em> sp. and <em>Pythium</em> sp.</td>
</tr>
<tr>
<td><em>Bacillus subtilis</em> strain QST 713 (44)&lt;br&gt;Serenade Soil, 1.34%</td>
<td>In-furrow</td>
<td>2-6 fl qt/A</td>
<td>X</td>
<td>For control of <em>Pythium</em> and <em>Rhizoctonia</em>. Apply as directed spray in the seed furrow and to the covering soil at planting. A 2 (ee) allows application of Serenade Soil at 1 fl qt/A.</td>
</tr>
<tr>
<td><strong>Sedaxane (7)</strong>&lt;br&gt;Vibrance, 43.7%</td>
<td>Slurry</td>
<td>2.5-5 gai/100 kg of seed corn&lt;br&gt;2.5-5 gai/100 kg of seed sorghum</td>
<td>X</td>
<td>For seed decay, seedling blights, and damping off caused by <em>Rhizoctonia</em></td>
</tr>
<tr>
<td><strong>Thiamethoxam + Fludioxonil (12)+ Mefenoxam (4) + Azoxystrobin (11)</strong>&lt;br&gt;Cruiser Extreme 25.0% : 1.25% : 1.0% : 0.50%</td>
<td>Water-based slurry</td>
<td></td>
<td>X</td>
<td>For protection against damage from certain insects, soil-borne and seed-borne diseases.</td>
</tr>
<tr>
<td><em>Thiram</em> (M3)&lt;br&gt;42-S Thiram, 42%&lt;br&gt;Signet 480 FS, 42%</td>
<td>Liquid or slurry</td>
<td>1.5 fl oz/bu field corn&lt;br&gt;5.0 fl oz/cwt sweet corn&lt;br&gt;2 fl oz/bu sorghum</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Tolclofos-methyl (14)</strong>&lt;br&gt;Rizolex, 42%</td>
<td>Slurry or mist</td>
<td>0.3 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne diseases. Controls <em>Rhizoctonia solani</em>.</td>
</tr>
<tr>
<td><strong>Trifloxystrobin (11)</strong>&lt;br&gt;Trilex, 22%</td>
<td>Slurry or mist</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup>Dosages for corn apply to field corn. Dosages for sweet corn vary with some products, and others are not registered for sweet corn, so consult the label for sweet corn information. Dosages are amount of formulated product to apply.

<sup>2</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.

<sup>3</sup>Seedling blights due to various fungal infections of seed.
## Corn Nematicide
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Control</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| Abamectrin + Thiamethoxam  
Avicta Duo Corn, 12.4%:28.1%  
Avicta Duo 250 Corn, 11.3%: 14.2% | Commercially applied | Root nematodes (by abamectrin) and various insects (by thiamethoxam) | Crop Protection LLC has an Avicta Complete Corn commercial brand that recommends the combination of multiple separate seed treatment products. |
| Abamectrin + Thiamethoxam + Thiabendazole (1) + Fludioxonil (12) + Mefenoxam (4) + Azoxystrobin (11)  
Avicta Complete Corn 250, 10.3%: 11.7%: 2.34%: 0.30%: 0.23%: 0.12%  
Avicta Complete Corn 500, 10.20%: 23.10%: 2.31%: 0.30%: 0.23%: 0.12% | Commercially applied | Root nematodes (by abamectrin), various insects (by thiamethoxam), and various diseases (by thiabendazole, fludioxonil, mefenoxam, and azoxystrobin) | Syngenta Crop Protection LLC has a commercially treated blend of nematicide, insecticide, and fungicide seed treatment products. |
| Clothiandin + Bacillus firmus  
Poncho Votivo, 40.3% and 8.1% | Commercially applied | Provides early season protection of the corn plant against root nematodes and broad control of insect pests. | The Bacillus firmus bacterium creates a living barrier that prevents nematodes from reaching the roots. |

## Corn (Field)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| Bacillus subtilis strain QST 713 (44)  
Serenade ASO | Spray or fungigation | 2-6 qt/A | X | X | Begin applications when environmental conditions and plant stage are conducive to disease development. |
| Bacillus pumilus strain QST 2808  
BalladPLUS | Spray or fungigation | 1-4 qt/A | X | X | Begin applications when environmental conditions and plant stage are conducive to disease development. |
| Chlorothalonil (M5)  
Equus 720 SST, 54.0 %  
Equus DF, 82.5% | Spray or fungigation | 0.75-2.0 pts/A | X | X | Begin applications when conditions favors disease development. Maximum use rate per season is 12.0 pts/A for Equus 720 SST and 10.9 lbs/A for Equus DF. PHI = 14 days |

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
²Dosage = amount of formulated product to apply.  
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
⁴Leaf spots include fungal leaf diseases such as the Helminthosporium leaf blights on corn.  
⁵See fungicide resistance management statements on Pages 7-8.
# Corn (Field)
## Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (M1) MasterCop, 21.46%</td>
<td>Spray or fungigation</td>
<td>0.5-1.5 pt/A</td>
<td></td>
<td>Apply when disease first appears and every 7 to 10 days as needed. Manium use rate per season is 6.0 pts/A.</td>
</tr>
<tr>
<td>Flutriafol (3) Topguard 11.8%</td>
<td>Spray</td>
<td>7-14 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fluapyroxad (7) + Pyraclostrobin (11) Priaxor 14.33% : 28.58%</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mancozeb (M3) Koverall, 75%</td>
<td>Sprays or fungigation</td>
<td>1.5 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Manzate ProStick, 75%</td>
<td>Sprays or fungigation</td>
<td>1.5 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Penncozeb 75DF</td>
<td>Sprays or fungigation</td>
<td>1-1.15 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Manzate Flowable, 37%</td>
<td>Sprays or fungigation</td>
<td>1.2 qt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Roper DF Rainshield, 75%</td>
<td>Sprays or fungigation</td>
<td>1.5 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Penthioptyrad (7) Vertisan, 20.6%</td>
<td>Spray or fungigation</td>
<td>10-24 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Propiconazole (3) Tilt, Propimax, or Bumper 41.8 EC, Propiconazole E-AG, 41.8% Fitness, 41.8% Topaz 41.8% Bumper ES, 40.85%</td>
<td>Spray or fungigation</td>
<td>4 fl oz/A for rusts 2-4 fl oz/A for Helminthosporium leaf blights 4 fl oz/A for Gray leaf spot and eye spot</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tebuconazole (3) Orius 3.6F, 38.7% Tebuzol 3.6F, Monsoon, Onset 3.6L</td>
<td>Spray or fungigation</td>
<td>4-6 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

¹ Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
² Dosage = amount of formulated product to apply.
³ X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴ Leaf spots include fungal leaf diseases such as the Helminthosporium leaf blights on corn.
⁵ See fungicide resistance management statements on Pages 7-8.
### Corn (Field) (continued)

#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rust</td>
<td>Leaf Spots</td>
</tr>
<tr>
<td>QoIs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6.0-9.0 fl oz/A rust</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quadris, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satori, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoxastrobin (11)</td>
<td>Spray or fungigation</td>
<td>2.0-5.7 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Evito 480SC, 40.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Headline EC, 23.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headline SC, 23.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picoxystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Aproach, 22.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### QoIs + Triazole

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rust</td>
<td>Leaf Spots</td>
</tr>
<tr>
<td>QoIs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Propiconazole (3)</td>
<td>Spray or fungigation</td>
<td>7-14 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quilt 7.0% : 11.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quilt Xcel 13.5%:11.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Tebuconazole (3)</td>
<td>Spray or fungigation</td>
<td>9-12.9 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Custodia, 11.0%; 18.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Tetoconazole (3)</td>
<td>Spray or fungigation</td>
<td>10.0-17.0 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Affliance, 9.35%; 7.48%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Leaf spots include fungal leaf diseases such as the Helminthosporium leaf blights on corn.
⁵See fungicide resistance management statements on Pages 7-8.
## Corn (Field) (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pyraclostrobin (11)</strong> + <strong>Metconazole (3)</strong> Headline AMP 13.64%:5.14%</td>
<td>Spray</td>
<td>10-14.4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Trifloxystrobin (11)</strong> + <strong>Prothioconazole (3)</strong> Stratego YLD, 32.3%:10.8%</td>
<td>Spray or fungigation</td>
<td>4.0-5.0 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Picoxystrobin (11)</strong> + <strong>Cyproconazole (3)</strong> Aproach Prima, 17.94%: 7.17%</td>
<td>Spray or fungigation</td>
<td>3.4-6.8 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Fluoxastrobin (11)</strong> + <strong>Flutriafol (3)</strong> Fortix, 14.84%; 19.3%</td>
<td>Spray or fungigation</td>
<td>4-6 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Leaf spots include fungal leaf diseases such as the Helminthosporium leaf blights on corn.
⁵See fungicide resistance management statements on Pages 7-8.

### Crambe
#### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Control² of Seedling Blight³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fludioxonil (12)</strong> Maxim 4FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For Rhizoctonia and Fusarium.</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11)</strong> Stamina, 18.4%</td>
<td>Slurry or mist</td>
<td>1.5-3.1 fl oz/cwt</td>
<td>X</td>
<td>For supression of Rhizoctonia solani, Fusarium sp. and Pythium sp.</td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³Seedling blights due to various fungal infections of seed.
Note: Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Control(^2) of Seedling Blights(^3)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Azoxystrobin (11)</strong>&lt;br&gt;Dynasty, 9.6%</td>
<td>Slurry</td>
<td>0.153-0.765 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td><strong>Captan (M4)</strong>&lt;br&gt;Captan 4000, 38.4%</td>
<td>See label for rates of application, formulations and registered use</td>
<td>See label for amounts of formulated product to apply</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Chloroneb (14)</strong>&lt;br&gt;Chloroneb 65W, 65%</td>
<td>Slurry</td>
<td>4 oz/cwt</td>
<td>X</td>
<td>May be used as a supplemental seed treatment for improved suppression of Rhizoctonia and Pythium.</td>
</tr>
<tr>
<td><strong>Fludioxonil (12)</strong>&lt;br&gt;Maxim 4FS, 40.3%&lt;br&gt;Spirato 480 FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi. Registered for control of Rhizoctonia and Fusarium.</td>
</tr>
<tr>
<td><strong>Fludioxonil (12) + Mefenoxam (4)</strong>&lt;br&gt;Apron Maxx RFC 2.31%:3.46%</td>
<td>Slurry</td>
<td>1.5 fl oz/cwt</td>
<td>X</td>
<td>For Fusarium and Rhizoctonia control.</td>
</tr>
<tr>
<td><strong>Ipconazole (3)</strong>&lt;br&gt;Rancona 3.8 FS, 40.7%</td>
<td>Slurry or mist</td>
<td>0.085 fl oz/cwt</td>
<td>X</td>
<td>Does not provide control of Pythium</td>
</tr>
<tr>
<td><strong>Ipconazole (3) + Metalaxyl (4)</strong>&lt;br&gt;Rancona Summit, 0.902%:1.443%</td>
<td>Slurry or mist</td>
<td>4.0 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Mefenoxam (4)</strong>&lt;br&gt;Apron XL, 33.3%</td>
<td>Slurry or mist</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td>For Pythium control. For both commercial and on-farm use.</td>
</tr>
<tr>
<td><strong>Metalaxyl (4)</strong>&lt;br&gt;Allegiance FL, 28.35%&lt;br&gt;Sebring 318 FS,&lt;br&gt;28.35%Allegiance Dry Seed Protectant, 12.5%&lt;br&gt;Dyna-Shield, 28.35%&lt;br&gt;Belmont 2.7 FS, 28.98%</td>
<td>Mist or slurry&lt;br&gt;Drill box&lt;br&gt;Slurry&lt;br&gt;Slurry or mist</td>
<td>0.75 fl oz/cwt&lt;br&gt;4 oz/cwt&lt;br&gt;0.75 fl oz/cwt&lt;br&gt;0.75 fl oz/cwt</td>
<td>X&lt;br&gt;X&lt;br&gt;X&lt;br&gt;X</td>
<td>Metalaxyl is only for Pythium damping control. For use only with commercial seed treatment equipment. Apron Dry Seed Protectant is for drill box application to seed not previously treated with Apron; thorough mixing of fungicide and seed is essential for good control.</td>
</tr>
<tr>
<td><strong>Mefenoxam (4) + Fludioxonil (12) + Thiamethoxam</strong>&lt;br&gt;CruiserMaxx 1.7%:1.12%:22.6%</td>
<td>Slurry or mix</td>
<td>3 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and insects. Contains thiamethoxam for insect control.</td>
</tr>
</tbody>
</table>

\(^1\)Dosage = amount of formulated product to apply.
\(^2\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.
\(^3\)Seedling blights due to various fungal infections of seed.

Note: Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
## Dry Edible Bean (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage</th>
<th>Control of Seedling Blights</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metalaxyl (4) + PCNB (14) + Carboxin (7)</td>
<td>Drill box</td>
<td>6-8 oz/cwt</td>
<td>X</td>
<td>Controls early season <em>Pythium</em> and <em>Rhizoctonia</em>.</td>
</tr>
<tr>
<td>Prothioconazole (3) + Penflufen (7) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>1 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and seed rot and damping off caused by <em>Rhizoctonia</em>.</td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Slurry or mist</td>
<td>0.4-1.5 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Sedaxane (7)</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt or 2.5-5 gai/100 kg of seed</td>
<td>X</td>
<td>For seed decay, seedling blights, and damping off caused by <em>Rhizoctonia</em>.</td>
</tr>
<tr>
<td>Thiram (M3)</td>
<td>Liquid or slurry</td>
<td>2 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Trifloxystrobin (11)</td>
<td>Slurry</td>
<td>0.32 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>1.0 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
</tbody>
</table>

1. Dosage = amount of formulated product to apply.
2. X = product labeled for crop and disease; Blank = product not labeled for specific disease.
3. Seedling blights due to various fungal infections of seed.

Note: Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.

## Dry Edible Bean
### Biological Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage</th>
<th>Control of Seedling Blights</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus subtilis</em> GB 03</td>
<td>Slurry</td>
<td>0.125 oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Bacillus pumilus</em> GB 34 Yield Shield, 0.28%</td>
<td>Slurry</td>
<td>0.102/cwt</td>
<td>X</td>
<td>Suppression of root diseases caused by <em>Rhizoctonia</em> and <em>Fusarium</em>.</td>
</tr>
</tbody>
</table>

1. Dosage = amount of formulated product to apply.
2. X = product labeled for crop and disease; Blank = product not labeled for specific disease.
3. Seedling blights due to various fungal infections of seed.

Note: Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
### Dry Edible Bean
#### Soil Application

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Control² of Rhizoctonia</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11) + Metalaxyl (4) Uniform 28.2%:10.9%</td>
<td>In-furrow</td>
<td>0.34 fl oz/1,000 linear feet of row</td>
<td>X</td>
<td>Apply in a 7 inch band. One application per season.</td>
</tr>
<tr>
<td><em>Bacillus subtilis</em> strain QST 713 (44) Serenade Soil, 1.34%</td>
<td>In-furrow</td>
<td>2.6 fl qt/A</td>
<td>X</td>
<td>Apply as directed spray in the seed furrow and to covering soil at planting.</td>
</tr>
<tr>
<td>PCNB (14) Terraclor FL, 40%</td>
<td>In-furrow spray</td>
<td>2.2-3.3 fl oz/1,000 linear feet of row</td>
<td>X</td>
<td>Spray planting furrow and covering soil at planting. Do not apply to seed. Use lower rates on lighter soils.</td>
</tr>
<tr>
<td>Terraclor 75 WP, 75%</td>
<td>In-furrow spray</td>
<td>1.4-2.2 oz/1,000 linear feet of row</td>
<td>X</td>
<td>Apply as a directed spray in the seed furrow and to covering soil at planting.</td>
</tr>
<tr>
<td>Terraclor EC, 23.8%</td>
<td>In-furrow spray</td>
<td>4.4-6.6 fl oz/1,000 linear feet of row</td>
<td>X</td>
<td>Spray planting furrow and covering soil at planting. Do not apply directly to seed. Use lower rates on lighter soils.</td>
</tr>
<tr>
<td>PCNB 2 Spray, 24%</td>
<td>In-furrow spray</td>
<td>8.8 fl oz/1,000 linear feet of row</td>
<td>X</td>
<td>Apply in planting furrow and covering soil at planting.</td>
</tr>
<tr>
<td>Terraclor 10G, 10%</td>
<td>In-furrow granules</td>
<td>0.75-1 lb/1,000 linear feet of row</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>PCNB (14) + Metalaxyl (4) Ridomil Gold PC GR 10%: 0.5%</td>
<td>In-furrow granules</td>
<td>0.75 lb/1,000 linear feet of row</td>
<td>X</td>
<td>Resistance statement 4³. Adjust application equipment so granules are mixed with soil surrounding seed. See label for planting restrictions within 12 months of application.</td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³See fungicide resistance management statements on Pages 7-8.

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### Dry Edible Bean
#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus subtilis</em> strain QST 713 (44) Serenade ASO</td>
<td>Spray or fungigation</td>
<td>2-6 qt/A</td>
<td>X</td>
<td>Begin applications when environmental conditions and plant stage are conducive to disease development.</td>
</tr>
</tbody>
</table>

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⁴See fungicide resistance management statements on Pages 7-8.
### Dry Edible Bean Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacillus subtilis</strong></td>
<td>Spray or fungiation</td>
<td>2-6 qt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>strain QST 713 (44)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serenade ASO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Boscalid (7)</strong></td>
<td>Spray or fungigation</td>
<td>8-11 oz/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Endura, 70%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chlorothalonil (M5)</strong></td>
<td>Spray or fungigation</td>
<td>1 3/8-2 pt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bravo WeatherStik</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echo, Echo 720, Chlorothalonil 720, Equus 720 SST, 54%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bravo Ultrex DG, or Equus DF, 82.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echo Zn, Bravo ZN or Terranil Zn, 38.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echo 90 DF, 90%</td>
<td>Spray or fungigation</td>
<td>1.25-1.8 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴See fungicide resistance management statements on Pages 7-8.
## Dry Edible Bean (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Copper (M1)</strong> Basicop WP, 53%</td>
<td>Spray</td>
<td>2-4 lbs/A</td>
<td>X</td>
<td>Begin applications at onset of disease. Make first application at 10-20% bloom. Do not apply more than 28 oz/A of Cannonball per season 7 day PHI.</td>
</tr>
<tr>
<td>Champ DP, 57.6%</td>
<td>Spray or fungigation</td>
<td>0.66-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Champ Formula 2 Flowable, 37.5%</td>
<td>Spray or fungigation</td>
<td>0.66-2 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cuprofix Ultra 40 Disprss 71.1%</td>
<td>Spray or fungigation</td>
<td>0.75-2 lbs/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 2000, 53.8%</td>
<td>Spray or fungigation</td>
<td>0.75-2.25 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 3000, 46.1%</td>
<td>Spray or fungigation</td>
<td>0.5-1.25 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 4.5 LF, 37.5%</td>
<td>Spray or fungigation</td>
<td>0.66-2 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>MasterCop, 21.46%</td>
<td>Spray or fungigation</td>
<td>0.5-1.0 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Badge X2, 45.31%</td>
<td>Spray or fungigation</td>
<td>0.5-1.25 lbs/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Badge SC, 32.17%</td>
<td>Spray or fungigation</td>
<td>1-2 lbs/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fludioxonil (12)</strong> Cannonball WP, 50%</td>
<td>Spray or fungigation</td>
<td>7 fl oz/A</td>
<td>X</td>
<td>Apply at early flower or at the first sign of disease, whichever occurs first. Do not make more than two sequential applications before rotating with a fungicide from a different group. Continue applications as needed on a 10-14 day interval. Do not apply within 7 days of cutting or swathing the crop for harvest or within 14 days of harvest.</td>
</tr>
<tr>
<td><strong>Fluopyram (7) + Prothioconazole (3)</strong> ProPulse 17.4%:17.4%</td>
<td>Spray</td>
<td>10.3 fl oz/A</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴See fungicide resistance management statements on Pages 7-8.
### Dry Edible Bean (continued)
#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anthracnose</td>
<td>Rust</td>
</tr>
<tr>
<td>Cypprodinil (9)+</td>
<td>Spray</td>
<td>11-14 oz/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Fludioxonil (12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch 62.5 WG 37.5%:25.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluazinam (29)</td>
<td>Spray or fungigation</td>
<td>0.5-0.85 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Omega 500F, 40%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluxapyroxad (7) +</td>
<td>Spray or fungigation</td>
<td>4-8 oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pyraclostrobine (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priaxor 14.336%:28.58%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iprodione (2)</td>
<td>Ground spray or fungigation</td>
<td>1.5-2.0 pt/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rovral 4F, 41.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nevado 4F, 41.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penthiopyrad (7)</td>
<td>Spray or fungigation</td>
<td>14-20 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Vertisan, 20.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴See fungicide resistance management statements on Pages 7-8.
## Dry Edible Bean (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prothioconazole (3)</strong></td>
<td>Spray</td>
<td>5.7 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Proline 480 SC, 41%</td>
<td></td>
<td></td>
<td></td>
<td>Apply Proline prior to disease onset or at 15-25% flowering when conditions are favorable for disease development. Do not make more than 3 applications per year. Repeat applications as needed on a 5- to 14-day interval. For maximum disease control, apply in 20 or more gpa by ground. Do not apply within 7 days of cutting or swathing for harvest.</td>
</tr>
<tr>
<td><strong>Tebuconazole (3), 38.7%</strong></td>
<td>Spray or fungigation</td>
<td>X</td>
<td></td>
<td>See labels for information on spray scheduling, preharvest intervals and re-entry intervals. Do not apply more than 12 fl oz per year.</td>
</tr>
<tr>
<td>Orius 3.6F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tebuzol 3.6F, Monsoon, Onset 3.6F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Azoxyystrobin (11) Qols</strong></td>
<td>Spray or fungigation</td>
<td>X</td>
<td>X</td>
<td>Resistance statement 5⁴</td>
</tr>
<tr>
<td>Quadris, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td>Apply preventatively for best results. Additional applications may be required on a 7- to 14-day interval. PHI: 14 days.</td>
</tr>
<tr>
<td>Satori, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Azoxyystrobin (11) + Chlorothalonil (M5)</strong></td>
<td>Spray</td>
<td>X</td>
<td>X</td>
<td>Maximum of 42 fl oz/A per season. 14-day PHI</td>
</tr>
<tr>
<td>Quadris Opti, 4.6%;46%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Azoxyystrobin (11) + Propiconazole (3)</strong></td>
<td>Spray or fungigation</td>
<td>X</td>
<td>X</td>
<td>For white mold, make preventative application at beginning bloom and at 8-12 fl oz/A. Do no apply more than 24 fl oz/A per season and no more than 2 sequential applications. 14-day PHI.</td>
</tr>
<tr>
<td>Quilt, 7.0%, 11.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Picoxystrobin (11) Aproach, 22.5%</strong></td>
<td>Spray or fungigation</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

²Dosage = amount of formulated product to apply.

³X = product labeled for crop and disease; Blank = product not labeled for specific disease.

⁴See fungicide resistance management statements on Pages 7-8.
<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application ¹</th>
<th>Dosage ²</th>
<th>Disease Control ³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-9 fl oz/A</td>
<td>X X</td>
<td>Apply prior to onset of disease. Maximum of 2 applications per season. 21-day PHI.</td>
</tr>
<tr>
<td>Headline EC, 23.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headline SC, 23.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur (M)</td>
<td>Spray</td>
<td>7 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Microthiol Disperss, 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiophanate-methyl (1)</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A-1 application or 1-1.5 lb/A - 2 applications</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Topsin M WSB, or T-methyl 70W WSB or T-Methyl WSB E-AG Cercobin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topsin or T-Methyl E-AG or Incognito, 46.2% or Topsin 4.5 FL, 45%</td>
<td>Spray or fungigation</td>
<td>30-40 fl oz/A 1 application or 20-30 fl oz/A if 2 applications</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Thiophanate Methyl 85 WDG, 85% Incognito 85 WDG, 85%</td>
<td>Spray or fungigation</td>
<td>0.8-1.6 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
²Dosage = amount of formulated product to apply.  
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
⁴See fungicide resistance management statements on Pages 7-8.
# Flax

## Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Seedling Blight&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Captan (M4)</strong> &lt;br&gt; Captan 400, 37.4%</td>
<td>Slurry</td>
<td>2-3.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Fludioxonil (12)</strong> &lt;br&gt; Maxim 4FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spirato 480 FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Mancozeb (M3)</strong> &lt;br&gt; Dithane DF Rainshield NT, 75%</td>
<td>Slurry</td>
<td>2.1-4.3 oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dithane F-45, 37%</td>
<td>Drill box or slurry</td>
<td>3.2-6.4 fl oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dithane WSP or Penncozeb 80 WP, 80%</td>
<td>Drill box or slurry</td>
<td>2.4 oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Penncozeb 75 DF, 75%</td>
<td>Drill box or slurry</td>
<td>2.1-4.3 oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Manzate 75 ProStick, 75%</td>
<td>Slurry</td>
<td>2.4 oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Manzate Flowable, 37%</td>
<td>Slurry</td>
<td>3.2-6.4 fl oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Thiram (M3)</strong> &lt;br&gt; 42-S Thiram, 42%</td>
<td>Liquid or slurry</td>
<td>3 fl oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Signet 480 FS, 42%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup>Dosage = amount of formulated product to apply.<br>
<sup>2</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.<br>
<sup>3</sup>Seedling blights due to various fungal infections of seed.

## Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Dosage&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Pasmo (Septoria linicola) Control&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Azoxyrstrobin (11)</strong> &lt;br&gt; Quadris 22.9% &lt;br&gt; Satori, 22.9% &lt;br&gt; Equation, 22.9%</td>
<td>Spray or fungigation</td>
<td>6-15.5 fl oz</td>
<td>X</td>
<td>Resistance statement 5&lt;sup&gt;5&lt;/sup&gt;. Controls downy mildew and <em>Alternaria</em> leaf spot. Make Quadris applications preventatively for best results. Additional applications may be required under favorable environmental conditions. Do not apply more than 27 fl oz/A/season. PHI: 30 days.mid-flowering 14-7 days after flower initiation.</td>
</tr>
<tr>
<td><strong>Fluxopyroxad (7) + Pyraclostrobin (11)</strong> &lt;br&gt; Priaxor 14.33%.28.58%</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X</td>
<td>Resistance statement 5 and 6&lt;sup&gt;5&lt;/sup&gt;. For optimal disease control, apply prior to disease development and continue 7 to 14 days later if conditions are conducive. Do not apply more than 2 applications and 16 fl oz/A per season. PHI=21 days.</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11)</strong> &lt;br&gt; Headline EC, 23.6% &lt;br&gt; Headline SC, 23.3%</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>For optimal disease control, apply Headline before disease onset. Resistance statement 5&lt;sup&gt;5&lt;/sup&gt;. Apply at early to mid-flowering (4-7 days after flower initiation). Make second application if disease persists. Do not apply more than 24 fl oz/season. 21-day PHI.</td>
</tr>
</tbody>
</table>

<sup>1</sup>Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.<br>
<sup>2</sup>Dosage = amount of formulated product to apply.<br>
<sup>3</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.<br>
<sup>4</sup>Leaf spot includes fungal leaf diseases such as tan spot, Septoria blotch and spot blotch on wheat, and spot blotch and net blot on barley.<br>
<sup>5</sup>See fungicide resistance management statements on Pages 7-8.
# Grasses (Forage)
## Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Seedling Blights&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fludioxonil (12)</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Maxim 4 FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spirato 480 FS, 40.3%</td>
<td>Slurry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mefenoxam (4)</td>
<td>Slurry or mist</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td>Apron XL LS controls only Pythium. For both commercial and on-farm use.</td>
</tr>
<tr>
<td>Apron XL LS, 32.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4)</td>
<td>Drill box</td>
<td>3-4 oz/cwt</td>
<td>X</td>
<td>Acquire and Allegiance controls only Pythium.</td>
</tr>
<tr>
<td>Allegiance Fl 28.35%</td>
<td>Slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td>Allegiance Dry Seed Protectant is for drill box application to seed not previously treated with Apron; thorough mixing of fungicide and seed is essential for good control.</td>
</tr>
<tr>
<td>Sebring 318 FS, 28.35%</td>
<td>Drill box</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allegiance Dry Seed Protectant, 12.5%</td>
<td>Drill box</td>
<td>3-4 oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dyna-Shield, 28.35%</td>
<td>Slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Thiram (M3)</td>
<td>Liquid or slurry</td>
<td>8 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>42-S Thiram, 42%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiram 50WP Dyed, 50%</td>
<td>Drill box or slurry</td>
<td>8 oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Signet 480 FS, 42%</td>
<td>Liquid or slurry</td>
<td>8 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup>Dosage = amount of formulated product to apply.

<sup>2</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.

<sup>3</sup>Seedling blights due to various fungal infections of seed.
# Lentils
## Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Control(^2) of Seedling Blights(^3)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxytrobin (11)</td>
<td>Slurry</td>
<td>0.153-0.765 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi. Not for <em>Pythium</em> if used alone.</td>
</tr>
</tbody>
</table>
| **Dynasty 9.6%, Protege 9.6%**<br>
**Maxim 4FS, 40.3%**<br>
**Spirato 480 FS, 40.3%** | Slurry | 0.08-0.16 fl oz/cwt | X | For seed-borne and soil-borne fungi. |
| Ipconazole (3) | Slurry or mist | 0.085 fl oz/cwt | X | Does not provide control of *Pythium* |
| **Rancona 3.8 FS, 40.7%**<br>
**Rancona Summit, 0.902%: 1.443%** | Slurry or mist | 4.0 fl oz/cwt | X | |
| Ipconazole (3) + Metalaxyl (4) | Slurry or mist | 0.32-0.64 fl oz/cwt | X | Use 0.32-0.64 fl oz/cwt for *Pythium* damping off. For early season *Phytophthora*, use 0.64 fl oz/cwt. |
| **Apron XL, 33.3%**<br>
**Maxim RTU 1.1%:0.73%**<br>
**Maxim RFC 3.46%:2.31%** | Slurry or mist | 0.75 fl oz/cwt | X | Metalaxyl controls only *Pythium*. |
| Mefenoxam (4) + Fludioxonil (12) | Slurry or mist | 0.5 fl oz/cwt | X | For protection against damping-off and seed rots. |
| **Cruiser Maxx 1.7%:1.12%:22.61%**<br>
**EverGol Energy 7.18%:3.59%:5.74%**<br>
**Prothioconazole (3) + Penflufen (7) + Metalaxyl (4)**<br>
**Stamina, 18.4%**<br>
**Stamina, 18.4%**<br>
**Belmont 2.7 FS, 28.98%** | Slurry or mist | 1.0 fl oz/cwt | X | For seed-borne and soil borne fungi and seed rot and damping off caused by *Rhizoctonia*. |
| **Dynasty 9.6%, Protege 9.6%**<br>
**Maxim 4FS, 40.3%**<br>
**Spirato 480 FS, 40.3%** | Slurry | 0.4-1.5 fl oz/cwt | X | For seed-borne and soil-borne fungi. |

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1 Dosage = amount of formulated product to apply.  
2 X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
3 Seedling blights due to various fungal infections of seed.  

**Note:** Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
### Lentils (continued)
#### Seed Treatment

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<th>Chemical</th>
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<th>Dosage$^1$</th>
<th>Control$^2$ of Seedling Blights$^3$</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>Sedaxane (7) Vibrance, 43.7%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt or 2.5-5 gal/100 kg of seed</td>
<td>X</td>
<td>For seed decay, seedling blights, and damping off caused by <em>Rhizoctonia</em></td>
</tr>
<tr>
<td>Thiabendazole (1) Mertect 340-F, 42.3%</td>
<td>Slurry</td>
<td>1.05 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne control of <em>Ascochyta rabiei</em>.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) Trilex, 22%</td>
<td>Slurry</td>
<td>0.32 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) + Metalaxyl (4) Trilex 2000, 7.12%:5.69%</td>
<td>Slurry or mist</td>
<td>1.0 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

$^1$Dosage = amount of formulated product to apply.
$^2$X = product labeled for crop and disease; Blank = product not labeled for specific disease.
$^3$Seedling blights due to various fungal infections of seed.

**Note:** Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.

---

### Lentils
#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application$^1$</th>
<th>Dosage$^2$</th>
<th>Ascochyta Control$^3$</th>
<th>Anthracnose Control$^3$</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus subtilis</em> strain QST 713 (44) Serenade ASO</td>
<td>Spray or fungigation</td>
<td>2-6 qt/A</td>
<td></td>
<td></td>
<td>Begin applications when environmental conditions and plant stage are conducive to disease development.</td>
</tr>
<tr>
<td>Bosalid (7) Endura, 70%</td>
<td>Spray or fungigation</td>
<td>8-11 oz/A</td>
<td>X</td>
<td></td>
<td>Resistance Statement 6$^4$ Also controls white mold. Begin applications prior to disease development and repeat on a 7- to 14-day interval. Do not make more than 2 applications per season (22 oz/A/season).</td>
</tr>
<tr>
<td>Chlorothalonil (M5) Equus 720 SST, 54.0%</td>
<td>Spray or fungigation</td>
<td>1.0-1.5 pts/A</td>
<td>X</td>
<td>X</td>
<td>Begin applications prior to disease development. Repeat applications at 7-10 day intervals. Do not apply more than 8.0 pts/A/year. PHI = 14 days.</td>
</tr>
<tr>
<td>Penthiopyrad (7) Vertisan, 20.6%</td>
<td>Spray or fungigation</td>
<td>14-20 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Begin applications prior to disease development. For white mold, make initial application at beginning bloom and follow with a second application at full bloom. Do not exceed 41 fl oz/A per year. PHI = 21 days.</td>
</tr>
</tbody>
</table>

$^1$Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
$^2$Dosage = amount of formulated product to apply.
$^3$X = product labeled for crop and disease; Blank = product not labeled for specific disease.
$^4$See fungicide resistance management statements on Pages 7-8.
## Lentils (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Ascochyta Control³</th>
<th>Anthracnose Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluopyram (7) + Prothioconazole (3)</strong>&lt;br&gt; ProPulse 17.4%:17.4%</td>
<td>Spray</td>
<td>8.0-10.3 fl oz/A</td>
<td>X</td>
<td></td>
<td>Apply at early flower or at the first sign of disease, whichever occurs first. Do not make more than two sequential applications before rotating with a fungicide from a different group. Continue applications as needed on a 10-14 day interval. Do not apply within 7 days of cutting or swathing the crop for harvest or within 14 days of harvest.</td>
</tr>
<tr>
<td><strong>Fluxapyroxad (7) + Pyraclostrobin (11)</strong>&lt;br&gt;Priaxor 14.33%:28.58%</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Resistance statement 5 and 6⁴ Begin applications prior to disease development and continue on a 7-14 day interval if conditions are conducive to disease development. Maximum applications per season=2 PHI=21 days</td>
</tr>
<tr>
<td><strong>Prothioconazole (3)</strong>&lt;br&gt;Proline 480 SC, 41%</td>
<td>Spray</td>
<td>5.0-5.7 fl oz/A</td>
<td>X</td>
<td></td>
<td>Resistance Statement 3⁴ Apply at early flowering or at the first sign of disease. Use the higher rate when conditions are favorable for severe disease pressure and/or when growing more susceptible varieties. Do not make more than 3 applications per year. Repeat applications as needed on a 10- to 14-day interval. Do not apply within 7 days of cutting or swathing the crop for harvest.</td>
</tr>
<tr>
<td><strong>Qols</strong></td>
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</tr>
<tr>
<td><strong>Azoxystrробin (11)</strong>&lt;br&gt;Quadris, 22.9%&lt;br&gt;Satori, 22.9%</td>
<td>Spray or fungigation</td>
<td>6.0-15.5 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Resistance Statement 5⁴. Begin applications prior to disease development and continue on a 7- to 14-day interval. Do not apply more than 2.88 qt/A/season for Quadris.</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11)</strong>&lt;br&gt;Headline EC, 23.6%&lt;br&gt;Headline SC, 23.3%</td>
<td>Spray or fungigation</td>
<td>6-9 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Begin applications prior to disease development and repeat on a 7- to 14-day interval if conditions are conducive for disease development.</td>
</tr>
<tr>
<td><strong>Picoxystrobin (11)</strong>&lt;br&gt;Aproach, 22.5%</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Begin applications prior to disease development and continue on a 7-14 day interval when disease pressure is high. Apply no more than 24 fl oz/A per season. 14-day PHI.</td>
</tr>
</tbody>
</table>

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³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴See fungicide resistance management statements on Pages 7-8.
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage</th>
<th>Control of Seedling Blight</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11)</td>
<td>Slurry</td>
<td>0.153-0.765 fl oz/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dynasty 9.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Captan (M4)</td>
<td>See label for directions</td>
<td>1 oz/bu</td>
<td>X</td>
<td>Does not control seed-borne Ascochyta.</td>
</tr>
<tr>
<td>Captan 75%</td>
<td></td>
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</tr>
<tr>
<td>Fludioxonil (12)</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Maxim 4FS, 40.3%</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Spirato 480FS, 40.3%</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ipconazole (3)</td>
<td>Slurry or mist</td>
<td>0.085 fl oz/cwt</td>
<td>X</td>
<td>Does not provide control of Pythium</td>
</tr>
<tr>
<td>Rancona 3.8 FS, 40.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ipconazole (3) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>4.0 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Rancona Summit, 0.902%: 1.443%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mefenoxam (4)</td>
<td>Slurry or mist</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td>Use 0.32-0.64 fl oz/cwt for Pythium damping off. For early season Phytophthora, use 0.64 fl oz/cwt.</td>
</tr>
<tr>
<td>Apron XL, 33.3%</td>
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</tr>
<tr>
<td>Mefenoxam (4) + Fludioxonil (12)</td>
<td>Slurry</td>
<td>5 fl oz/cwt</td>
<td>X</td>
<td>For control of seed rots due to Pythium, Phytophthora, Fusarium, Rhizoctonia.</td>
</tr>
<tr>
<td>Apron Maxx RTA 1.1%:0.73%</td>
<td></td>
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</tr>
<tr>
<td>Apron Maxx RFC 2.31%:3.46%</td>
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<td></td>
</tr>
<tr>
<td>Maxim XL 8.4%:21%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mefenoxam (4) + Fludioxonil (12) + Thiamethoxam</td>
<td>Slurry or mist</td>
<td>1.5 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cruiser Maxx 1.7%:1.12%:22.61%</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Metalaxyl (4)</td>
<td>Mist or slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td>For Pythium damping off. See labels for higher rates for systemic downy mildew.</td>
</tr>
<tr>
<td>Allegiance Fl, 28.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sebring 318 FS, 28.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allegiance Dry Seed Protectant 12.5%</td>
<td>Drill box</td>
<td>4 fl oz/cwt</td>
<td>X</td>
<td>Apron Dry Seed Protectant for drill box application to seed not previously treated with Apron. Thorough mixing of fungicide and seed is essential for good control.</td>
</tr>
<tr>
<td>Dyna-Shield, 28.35%</td>
<td>Slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Belmont 2.7 FS, 28.98%</td>
<td>Slurry or mist</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
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<tr>
<td>Prothioconazole + Penfluton + Metalaxyl</td>
<td>Slurry or mist</td>
<td>1.0 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and seed rot and damping off caused by Rhizoctonia.</td>
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<td>EverGol Energy 7.18%:3.59%:5.74%</td>
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3Seedling blights due to various fungal infections of seed.  
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#### Seed Treatment (Continued)

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<th>Chemical</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Seedling Blight&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>Pyraclostrobin (11) Stilma, 18.4%</td>
<td>Slurry or mist</td>
<td>0.4-1.5 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
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<tr>
<td>Sedaxane (7) Vibranse, 43.7%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt or 2.5-5 gal/100 kg of seed</td>
<td>X</td>
<td>For seed decay, seedling blights, and damping off caused by <em>Rhizoctonia</em></td>
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<tr>
<td>Thiabendazole (1) Mertect 340-F, 42.3%</td>
<td>Slurry</td>
<td>1.05 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne control of <em>Ascochyta rabiei</em>.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) Trilex, 22%</td>
<td>Slurry</td>
<td>0.32 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) + Metalaxyl (4) Trilex 2000, 7.12%;5.69%</td>
<td>Slurry or mist</td>
<td>1.0 fl oz/cwt</td>
<td>X</td>
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<th>Dosage&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;3&lt;/sup&gt; of Powdery Mildew</th>
<th>Control&lt;sup&gt;3&lt;/sup&gt; of <em>Ascochyta</em> Blight</th>
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<tr>
<td><em>Bacillus subtilis</em> strain QST 713 (44) Serenade ASO, 1.34%</td>
<td>Spray or fungigation</td>
<td>2-6 qt/A</td>
<td></td>
<td></td>
<td>Begin applications when environmental conditions and plant stage are conducive to disease development.</td>
</tr>
<tr>
<td>Fluxapyroxad (7) + Pyraclostrobin (11) Priaxor 14.33%;28.58%</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Resistance statement 5 and 6&lt;sup&gt;4&lt;/sup&gt; Begin application prior to disease development and continue on a 7-14 day interval if conditions are conducive to disease development. Maximum applications per season=2 PHI=21 Pea hay may be fed no sooner than 14 days after last application.</td>
</tr>
<tr>
<td>Penthiopyrad (7) Vertihan, 20.6%</td>
<td>Spray or fungigation</td>
<td>14-20 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Begin applications prior to disease development. For white mold, make initial application at beginning bloom and follow with a second application at full bloom. Do not exceed 41 fl oz/A per year. PHI = 21 days.</td>
</tr>
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## Foliar Sprays (Continued)

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<tr>
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<th>Dosage$^{2}$</th>
<th>Control$^{3}$ of Powdery Mildew</th>
<th>Control$^{3}$ of Ascochyta Blight</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prothioconazole (3)</td>
<td>Spray</td>
<td>5.7 fl oz/A</td>
<td></td>
<td>X</td>
<td>Apply at early flowering or at the first sign of disease. Use higher rate when conditions are favorable for severe disease pressure and/or when growing more susceptible varieties. Do not make more than 3 applications per year. Repeat applications as needed on a 5- to 14-day interval. Do not apply within 7 days of cutting or swathing the crop for harvest.</td>
</tr>
<tr>
<td>Proline 480 SC, 41%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Qols</td>
<td>Spray or fungigation</td>
<td>6.0-15.5 fl oz/A</td>
<td>X</td>
<td>X</td>
<td>Resistance statement 5. Products also control many other fungal leaf diseases. Make applications preventatively for best results. Additional applications may be required under favorable environmental conditions. PHI: 14 days for Quadris, 21 days for Headline, 14 days for Aproach</td>
</tr>
<tr>
<td>Afoxystrobin (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadris, 22.9%</td>
<td>Spray or fungigation</td>
<td>6-9 fl oz/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Satori, 22.9%</td>
<td></td>
<td></td>
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<tr>
<td>Equation, 22.9%</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Headline EC, 23.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headline SC, 23.3%</td>
<td></td>
<td></td>
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<td>Picoxystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Aproach, 22.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur (M)</td>
<td>Spray or fungigation</td>
<td>3-5 lb/A</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kumulus DF, 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sulfur has been used in Wisconsin and the Prairie Provinces of Canada. Its economic return has not been determined for North Dakota.</td>
</tr>
<tr>
<td>Liquid Sulfur Six, 52%</td>
<td>Spray or fungigation</td>
<td>3-4 pt/A</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micro Sulf, 80%</td>
<td>Spray or fungigation</td>
<td>3-5 lb/A</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microthiol Disperss, 80%</td>
<td>Spray or fungigation</td>
<td>7 lb/A</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^{1}$Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
$^{2}$Dosage = amount of formulated product to apply.  
$^{3}$X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
$^{4}$See fungicide resistance management statement on Pages 7-8.
# Potato Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Disease Control²</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11) Dynasty, 9.6%</td>
<td>Water-based slurry</td>
<td>0.10-3.75 fl oz/cwt</td>
<td>X</td>
<td>For suppression of black scurf and stem canker and seed-borne black dot, and for protection against silver scurf.</td>
</tr>
<tr>
<td>Fludioxonil (12) Maxim 0.5%</td>
<td>Dust</td>
<td>8.0 oz/cwt</td>
<td>X</td>
<td>Maxim and Maxim MZ are formulated as dusts to be applied to cut or single-drop seed before planting. Maxim products effectively suppress Fusarium dry rot seed decay, stem cankers and tuber black scurf caused by seed-borne <em>Rhizoctonia solani</em> and seed-borne <em>Helminthosporium solani</em>, the causal agent of silver scurf disease. Half rates are recommended for processing (fries).</td>
</tr>
<tr>
<td>Fludioxonil (12) Maxim 4FS</td>
<td>Liquid</td>
<td>0.04-0.08 fl oz/cwt</td>
<td>X</td>
<td>Maxim and Maxim MZ are formulated as dusts to be applied to cut or single-drop seed before planting. Maxim products effectively suppress Fusarium dry rot seed decay, stem cankers and tuber black scurf caused by seed-borne <em>Rhizoctonia solani</em> and seed-borne <em>Helminthosporium solani</em>, the causal agent of silver scurf disease. Half rates are recommended for processing (fries).</td>
</tr>
<tr>
<td>Fludioxonil (12) + mancozeb (M3) Spirato 480FS 40.3%</td>
<td>Slurry</td>
<td>0.08 fl oz</td>
<td>X</td>
<td>To aid in control of certain insects and <em>Fusarium</em> dry rot and other fungal diseases.</td>
</tr>
<tr>
<td>Fludioxonil (12) + Thiamethoxam Cruiser Maxx Potato 7.0%:28%</td>
<td>Liquid</td>
<td>0.19-0.27 fl oz/cwt rate depends on seeding rate</td>
<td>X</td>
<td>To aid in control of certain insects and <em>Fusarium</em> dry rot and other fungal diseases.</td>
</tr>
<tr>
<td>Mancozeb (M4) Koverall, 75%</td>
<td>Slurry</td>
<td>1.25lb/50 gal water</td>
<td>X</td>
<td>For suppression of <em>Fusarium</em> dry rot, <em>Rhizoctonia</em>, seed-borne common scab and silver scurf. Only Mancozeb will reduce the spread of <em>Phytophthora infestans</em>, the cause of late blight, during seed-cutting operations.</td>
</tr>
<tr>
<td>Mancozeb (M4) Moncoat MZ, 6.0% : 1.5%</td>
<td>Dust</td>
<td>0.75-1lb/cwt</td>
<td>X</td>
<td>For suppression of <em>Rhizoctonia</em> and <em>Fusarium</em> dry rot seed decay. MZ added to suppress <em>Fusarium</em> dry rot seed decay.</td>
</tr>
<tr>
<td>Penflufen (7) + Prothioconazole (3) Emesto Silver 9.35%:1.68%</td>
<td>Diluted Spray Slurry</td>
<td>0.31 fl oz-cwt</td>
<td>X</td>
<td>For suppression of <em>Rhizoctonia solani</em>, black scurf, stem and stolon canker caused by seed-borne and soil-borne <em>Rhizoctonia</em>, silver scurf caused by <em>Helminthosporium solani</em> and seed piece rot caused by <em>Fusarium</em>. For added <em>Fusarium</em> protection apply a MZ product designed for potatoes.</td>
</tr>
<tr>
<td>Thiophanate methyl (1) ST-Methyl 540 FS, 46.2%</td>
<td>Slurry</td>
<td>0.5-0.7 fl oz/cwt</td>
<td>X</td>
<td>For aiding the control of dry rot, black scurf and stem canker, and silver scurf</td>
</tr>
</tbody>
</table>

¹ Dosage = amount of formulated product to apply.
² X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³ Fusarium, *Rhizoctonia solani* and *Helminthosporium solani*. These fungi cause dry rot, *Rhizoctonia* stem canker and silver scurf.
⁴ Includes Erwinia, cause of soft rot decay, and *Clavibacter*, cause of ring rot.
<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Control of Rhizoctonia(^2)</th>
<th>Pythium Leak</th>
<th>Pink Rot</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus subtilis</em> Strain QST 713 (44)</td>
<td>In-furrow at planting</td>
<td>2-6 fl qt/A</td>
<td>X</td>
<td></td>
<td></td>
<td>Apply as directed spray in the seed furrow and to the covering soil at planting for management of Rhizoctonia</td>
</tr>
<tr>
<td>Azoxystrobin (11) Quadris, 22.9% Satori, 22.9% Equation, 22.9%</td>
<td>In-furrow spray</td>
<td>0.4-0.6 fl oz/1,000 ft of row (5.8-8.7 fl oz/A with 36&quot; rows)</td>
<td>X</td>
<td></td>
<td></td>
<td>Resistance statement 5(^3). For control of black scurf (<em>Rhizoctonia solani</em>) and Silver scurf (<em>Helminthosporium solani</em>). Also controls black dot caused by <em>Colletotrichum coccodes</em>. Apply as in-furrow spray in 5-15 gal of water at planting.</td>
</tr>
<tr>
<td>Pyraclostrobin (11) Headline EC, 23.6% Headline SC, 22.3%</td>
<td>In-furrow spray</td>
<td>0.4-0.8 fl oz/1,000 ft of row</td>
<td>X</td>
<td></td>
<td></td>
<td>Maximum application rate is 0.73 fl oz/1,000 feet of row.</td>
</tr>
<tr>
<td>Cyazofamid (21) Ranman 34.5%</td>
<td>In-furrow lay by</td>
<td>0.42 fl oz/1,000 ft row 2.75 fl oz/A in minimum of 20 gallons of finished spray solution</td>
<td></td>
<td>X</td>
<td></td>
<td>For additional control of Pink Rot.</td>
</tr>
<tr>
<td>Azoxystrobin(11)+ Mefenoxam (4) Quadris Ridomil Gold SL</td>
<td>In-furrow spray</td>
<td>0.82 fl oz/1,000 ft. of row</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Maximum application rate of 1.5lb of azoxystrobin and 0.5 lb of mefenoxam products per acre per season.</td>
</tr>
<tr>
<td>Fluazinam (29) Omega 500F, 40%</td>
<td>In-furrow spray</td>
<td>1.5-3.0 pts/A</td>
<td></td>
<td></td>
<td></td>
<td>For suppression of Powdery Scab. Apply in-furrow over the seed piece immediately prior to covering over the seed piece with soil using at least 5 to 10 gpa. Use 1.5 pint per acre rate on fields with a history of low levels of powdery scab or with low numbers of spore balls present in the soil. Apply 3 pints per acre rate to fields with a history of moderate to heavy disease pressure or with moderate to high numbers of spore balls present in the soil. 24 c labels for use in Minnesota and North Dakota.</td>
</tr>
<tr>
<td>Flutolanil (7) Moncut, 70%</td>
<td>In-furrow</td>
<td>0.79-1.18 oz/1,000 ft. row of a 36 in row</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluxapyroxad (7)+ Pyraclostrobin (11) Priaxor 14.33%: 28.58%</td>
<td>In-furrow spray</td>
<td>0.48-0.6 fl oz/1,000 ft. row.</td>
<td>X</td>
<td></td>
<td></td>
<td>Resistance statement 5 and 6(^3). For 34-inch rows or less, use a maximum of 0.48 fl oz product per 1000 row feet</td>
</tr>
<tr>
<td>Penthiopyrad (7) Vertisan, 20.6%</td>
<td>In-furrow</td>
<td>0.7-1.6 fl oz/1,000 ft row</td>
<td>X</td>
<td></td>
<td></td>
<td>Maximum rate per acre per application is 24 fl oz.</td>
</tr>
</tbody>
</table>

\(^1\)Dosage = amount of formulated product to apply.

\(^2\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.

\(^3\)See fungicide resistance management statement on Pages 7-8.
### Soil Application (Continued)

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Control of Rhizoctonia(^2)</th>
<th>Pythium Leak</th>
<th>Pink Rot</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluopicolide (43) Presidio, 39.5%</td>
<td>6-8 inch band, in furrow</td>
<td>4 fl oz/A</td>
<td></td>
<td></td>
<td>X</td>
<td>Apply in band at planting directly over seed pieces. To avoid resistance and maximize disease control, an effective fungicide must be tank mixed with Presidio fungicide.</td>
</tr>
<tr>
<td>Mefenoxam (4) Ridomil Gold EC or SL, 48%</td>
<td>6-8 inch band, in furrow or impregnated on dry fertilizer</td>
<td>0.42 fl oz /100 ft. of row</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Resistance statement (^4). For postharvest control of pythium leak and pink rot caused by <em>Phytophthora erythroseptica</em>.</td>
</tr>
<tr>
<td>Ultra Flourish, 25.1%</td>
<td></td>
<td>0.84 fl oz /100 ft. of row</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Platinum Ridomil Gold contains 4.5% thiamethoxam for control of various potato insects.</td>
</tr>
<tr>
<td>Platinum Ridomil Gold, 9%</td>
<td></td>
<td>2.2 fl oz /1,000 ft. row</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Apply in a band at planting directly over the seed pieces. For Pythium leak control, apply in combination with mefenoxam fungicide. Soil applications have not been shown to be efficacious with this fungicide. Foliar applications are recommended.</td>
</tr>
<tr>
<td>Phosphites (33) Sodium (mono - and dibasic), Potassium, and Ammonium Phosphites (33), Several products</td>
<td>check label</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

\(1\)Dosage = amount of formulated product to apply.

\(2\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.

\(3\)See fungicide resistance management statement on Pages 7-8.

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### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application(^1)</th>
<th>Dosage(^2)</th>
<th>Disease Control(^3)</th>
<th>Remarks(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boscalid (7) Endura, 70%</td>
<td>Spray or fungigation</td>
<td>2.5-4.5 oz/a (EB) 5.5-10 oz/A (white mold)</td>
<td>X</td>
<td>Resistance statement (^6). Recent NDSU Research has indicated that &gt;90% of the <em>A. solani</em> is resistant to boscalid. 10-day PHI. Also controls <em>Sclerotinia</em> white mold and Botrytis. For white mold control, apply prior to infection generally just prior to row closure. For early blight control, apply prior to disease onset. Do not exceed 20 oz/A per season.</td>
</tr>
</tbody>
</table>

\(1\)Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

\(2\)Dosage = amount of formulated product to apply.

\(3\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.

\(4\)Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.

\(5\)See fungicide resistance management statement on Pages 7-8.
### Potato (continued)
#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage</th>
<th>Disease Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Penthiopyrad (7)</strong></td>
<td>Spray or fungigation</td>
<td>10-24 fl oz/A (early blight)</td>
<td>Late Blight</td>
<td>Early Blight</td>
</tr>
<tr>
<td>Vertisan, 20.6%</td>
<td></td>
<td>14-24 fl oz/A (white mold)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14-24 fl oz/A (black dot)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Bacillus subtilis</strong></td>
<td>Spray or fungigation</td>
<td>2-6 qt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>strain QST 713 (44) Serenade ASO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chlorothalonil (M5)</strong></td>
<td>Spray or fungigation</td>
<td>0.75 pt/ A 1&lt;sup&gt;st&lt;/sup&gt; application. 1.0-1.5 pt/A subsequent applications</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bravo WeatherStik, Equus 720 or Chlortanil 720, 54%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bravo Ultrex DG, 82.5%</td>
<td>Spray or fungigation</td>
<td>0.7-1.4 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bravo Zn, Echo Zn or Terranil Zn, 38.5%</td>
<td>Spray or fungigation</td>
<td>1.0-2.13 pt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Equus DF, 82.5%</td>
<td>Spray or fungigation</td>
<td>0.7 lb/A first application. 0.9-1.36 lb/A subsequent applications</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Echo 90 DF, 90%</td>
<td>Spray or fungigation</td>
<td>0.63-1.25 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Fluxapyroxad (7) + Pyraclostrobin (11)</strong></td>
<td>Spray or fungigation</td>
<td>4 to 8 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Priaxor 14.33%:28.58%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup>Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
<sup>2</sup>Dosage = amount of formulated product to apply.
<sup>3</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.
<sup>4</sup>Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them. <sup>5</sup>See fungicide resistance management statement on Pages 7-8.
## Potato (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Late Blight</th>
<th>Early Blight</th>
<th>Remarks³</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Copper (M1)</strong> Basicop WP, 53%</td>
<td>Spray</td>
<td>3-6 lbs/A</td>
<td>X</td>
<td>X</td>
<td>Do not apply Basicop through irrigation system.</td>
</tr>
<tr>
<td>Champ DP, 57.6%</td>
<td>Spray or fungigation</td>
<td>0.66-2.66 lb/A</td>
<td>X</td>
<td>X</td>
<td>Coppers are not effective under high disease pressure.</td>
</tr>
<tr>
<td>Champ WG, 77%</td>
<td>Spray or fungigation</td>
<td>1-1 ½ lbs/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Champ Formula 2 Flowable, 37.5%</td>
<td>Spray or fungigation</td>
<td>0.66-2.66 pt/A</td>
<td>X</td>
<td></td>
<td>Control will be improved by tank mixing with other compatible registered fungicides.</td>
</tr>
<tr>
<td>Cuprofix Ultra 40 Disperss 71.1%</td>
<td>Spray or fungigation</td>
<td>.75-3.0 lb/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 2000, 53.8%</td>
<td>Spray or fungigation</td>
<td>1.25-6lb/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 3000, 46.1%</td>
<td>Spray or fungigation</td>
<td>0.5-1.75 lb</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 4.5 LF, 37.5%</td>
<td>Spray or fungigation</td>
<td>0.66-2.66 pt/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>MasterCop, 21.46%</td>
<td>Spray or fungigation</td>
<td>0.5-1.5 pt/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Badge X2, 45.31%</td>
<td>Spray or fungigation</td>
<td>0.5-1.75 lbs/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Badge SC, 32.17%</td>
<td>Spray or fungigation</td>
<td>1-3 lbs/A</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Copper Sulfate (M1)</strong> Blue Viking Star Glow Powder or Triangle Brand Copper Sulfate Instant Powder</td>
<td>Spray</td>
<td>10 lb/A</td>
<td></td>
<td></td>
<td>For application with Diquat desiccant to enhance vine desiccation and suppress late blight.</td>
</tr>
<tr>
<td><strong>Cymoxanil (27)</strong> Curzate 60 DF, 60%</td>
<td>Spray or fungigation</td>
<td>3 1/3 oz/A</td>
<td>X</td>
<td></td>
<td>Must be tank-mixed with a protectant fungicide. Do not apply within 14 days of harvest.</td>
</tr>
<tr>
<td><strong>Dimethomorph (40)</strong> Forum, 43.5%</td>
<td>Spray or fungigation</td>
<td>6 oz/A</td>
<td>X</td>
<td></td>
<td>Do not exceed 30 oz/A per season. Do not apply Forum alone; must be tank-mixed with fungicides other than mefenoxam or metalaxyl registered for late blight control. 4-day PHI.</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
²Dosage = amount of formulated product to apply.  
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
⁴Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.  
⁵See fungicide resistance management statement on Pages 7-8.
Potato (continued)
Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Late Blight</td>
<td>Early Blight</td>
</tr>
<tr>
<td>Fluopyram (7) + Pyrimethanil (9)</td>
<td>Spray or fungigation</td>
<td>11.2 fl oz/A</td>
<td>X</td>
<td>Resistance statement 6⁵: None of the currently known SDHI mutations of the pathogen causing early blight (<em>Alternaria solani</em>) that affect boscalid appear to affect fluopyram. Also effective against white mold, botrytis, brown spot, and black dot. Apply Luna Tranquility mid-season on a 7 to 14 day interval. For resistance management of early blight and improved late blight management mix Luna Tranquility with an EBDC or chlorothalonil. Do not apply more than 2 sequential applications or any Group 7 or 9 containing fungicide before rotating with a fungicide form a different group. PHI=7 days.</td>
</tr>
<tr>
<td>Luna Tranquility 11.3%:33.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluazinam (29) Omega 500F, 40%</td>
<td>Spray or fungigation</td>
<td>5.5 fl oz/A for late blight 5.5-8 fl oz/A for white mold 1.5-3.0 pints/A in-furrow for powdery scab</td>
<td>X</td>
<td>Begin applications when conditions favor disease development. Repeat applications at 7-10 days. Do not apply more than 3.5 pts per acre per season. Do not apply within 14 days of harvest. Provides some tuber protection against late blight when used at the end of the season.</td>
</tr>
<tr>
<td>Ipodione (2) Rovral 4F, 41.6%</td>
<td>Ground spray or fungigation</td>
<td>1-2 pt/A, early blight</td>
<td>X</td>
<td>Resistance statement 2⁵: Rovral and Nevado 4F also are labeled for control of white mold. Do not apply within 14 day of harvest. If pH of spray water is above 7.0, buffer it to pH 5.0-7.0.</td>
</tr>
<tr>
<td>Nevado 4F, 41.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mancozeb (M3) Dithane DF</td>
<td>Spray or fungigation</td>
<td>0.5-2 lb/A</td>
<td>X</td>
<td>Do not apply within 14 days of harvest. Vine kill should occur 14 days before harvest. Do not apply more than 11.2 lb ai/A per season of total EBDC (mancozeb, maneb or metiram). We recommend that this product be used with an Integrated Pest Management Program.</td>
</tr>
<tr>
<td>Rainshield NT, 75%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dithane F-45, 37%</td>
<td>Spray or fungigation</td>
<td>0.8-1.6 qt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dithane M-45, 80%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Koverall, 75%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Manex II, 37%</td>
<td>Spray or fungigation</td>
<td>0.8-1.6 qt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Manzate ProStick, 75%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Manzate Flowable, 37%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Penncozeb, 80%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Penncozeb DF, 75%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Roper DF Rainshield, 75%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.
⁵See fungicide resistance management statement on Pages 7-8.
<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage</th>
<th>Disease Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mancozeb (M3) + Copper (M1) Mankocide, 15.0%:46.1%</td>
<td>Spray or fungigation</td>
<td>1.5-5.0 lbs/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mancozeb (M3) + Zoxamide (22) Gavel, 66.7%:8.3%</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>All Dead (40) + Difenconazole (3) Revus Top, 21.9%:21.9%</td>
<td>Spray or fungigation</td>
<td>5.5-7.0 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mefenoxam (4) + Chlorothalonil (M5) Ridomil Gold/Bravo WP, 4.5%:72%</td>
<td>Spray or fungigation</td>
<td>2 lb/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mefenoxam (4) + Copper Hydroxide (M1) Ridomil Gold/Copper WP, 5%:60%</td>
<td>Spray or fungigation</td>
<td>2.0 lb/A + 0.8 lb ai/A of maneb, mancozeb, metiram or chlorothalonil</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

1 Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
2 Dosage = amount of formulated product to apply.
3 X = product labeled for crop and disease; Blank = product not labeled for specific disease.
4 Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.
5 Mefenoxam provides average control of new mating types of the late blight fungus; it provides excellent control for mefenoxam-sensitive strains of the A1 mating type. Most late blight strains present since 1998 are resistant to mefenoxam.
6 See fungicide resistance management statement on Pages 7-8.
### Potato (continued)

#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Late Blight</th>
<th>Early Blight</th>
<th>Remarks⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mefenoxam (4) + Mancozeb (M3)</td>
<td>Spray or fungigation</td>
<td>2.5 lb/A</td>
<td>X³</td>
<td>X</td>
<td>Resistance statement ⁴. Do not apply Ridomil Gold MZ within 14 days of harvest. For late blight control, begin applications when conditions are favorable for late blight, but before infection, and continue at 14-day intervals until threat of disease is over. To minimize the potential for resistance, do not make more than 3 applications. The full rate of a protectant fungicide should be applied between Ridomil applications, regardless of the Ridomil formulation used. See label for rotation restrictions: waiting period to plant after Ridomil application (all formulations) is 0 days for dry beans, soybeans, potatoes and sugar beets; 40 days for wheat, barley and oats; 9 months for corn and sweet corn; and 12 months for all other crops. Two applications (flowering and 14 days later) at 2.5 lb rate will control A1 late blight tuber rot, Pythium leak and Phytophthora erythroseptica pink rot. For aerial applications, minimum of 5 gal/A spray is recommended.</td>
</tr>
<tr>
<td>Metconazole (3)</td>
<td>Spray or fungigation</td>
<td>2.5-4.0 fl oz/A</td>
<td>x</td>
<td></td>
<td>Also effective on black dot, brown spot, and white mold. Use in a tank mix with Chlorothalonil or Mancozeb. Do not apply more than 2 applications per season. PHI=1 day</td>
</tr>
<tr>
<td>Metiram (M3)</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A</td>
<td>X</td>
<td>X</td>
<td>Do not apply within 14 days of harvest. Vine kill should occur 14 days before harvest. Do not exceed 14 lbs/A per season. We recommend that this product be used with an Integrated Pest Management Program. See label for further restrictions.</td>
</tr>
<tr>
<td>Potassium Phosphite (33) + Chlorothalonil (M5)</td>
<td>Spray or fungigation</td>
<td>4.0-5.5 pt/A</td>
<td>X</td>
<td>X</td>
<td>Also for pink rot. See label for application instructions. Do not apply more than 17 pts/A/season. Do not apply within 6 weeks of harvest.</td>
</tr>
<tr>
<td>Propamocarb (28)</td>
<td>Spray or fungigation</td>
<td>0.7 pt/A low disease risk 0.9 pt/A medium disease risk 1.2 pt/A high disease risk</td>
<td>X</td>
<td></td>
<td>Do not apply more than 6 pts of Previcur/acre/season. Do not apply within 14 days of harvest. Use in a tank mix with 0.9 lb ai/acre of chlorothalonil (1.2 pt/acre of Bravo Weatherstik or equivalent) or 1 lb ai mancozeb (1.25 lb/acre of Dithane M-45 or equivalent).</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.
⁵See fungicide resistance management statements on Pages 7-8.
<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage</th>
<th>Late Blight Control</th>
<th>Early Blight Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrimethanil (9) Scala, 54.6%</td>
<td>Spray or fungigation</td>
<td>7 fl oz/A</td>
<td>X</td>
<td>Also effective against Botrytis. Use only in tank mix with protectant such as mancozeb and chlorothalonil. Do not apply more than 35 fl oz/A per season. Do not make more than 2 consecutive applications of Scala. PHI= 7 days.</td>
<td></td>
</tr>
<tr>
<td>Sodium (mono and dibasic), Potassium, and Ammonium Phosphites (33)</td>
<td>Spray or fungigation</td>
<td>check label</td>
<td>X</td>
<td>Provides better control when alternated with other fungicides. Also provides suppression of storage rot diseases such as pink rot.</td>
<td></td>
</tr>
<tr>
<td>Thiophanate methyl (1) Topsin M WSB, or T-Methyl E-AG 70 WSB, 70%</td>
<td>Spray or fungigation</td>
<td>1-1.5 lbs/A</td>
<td></td>
<td>Resistance statement 1º. Topsin M, Topsin 4.5 Fl acre, Incognito 4.5F, Incognito 85 WDG, and Thiophanate methyl WDG are labeled for white mold control in potatoes.</td>
<td></td>
</tr>
<tr>
<td>Topsin 4.5 FL, 45% or T-Methyl E-AG 4.5F, Cercobin, 41.3%</td>
<td>Spray or fungigation</td>
<td>20-30 fl oz/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiophanate Methyl 85 WDG, 85% Incognito 85 WDG, 85%</td>
<td>Spray or fungigation</td>
<td>0.8-1.2 lb/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incognito 4.5F, 46.2%</td>
<td>Spray or fungigation</td>
<td>20-30 fl oz/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

2Dosage = amount of formulated product to apply.

3X = product labeled for crop and disease; Blank = product not labeled for specific disease.

4Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.

5See fungicide resistance management statements on Pages 7-8.

*Designates restricted-use pesticide.
## Potato (continued)

### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spray or fungigation</td>
<td></td>
<td>Late Blight</td>
<td>Early Blight</td>
</tr>
<tr>
<td><strong>QoIs</strong></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Azoxystrobin (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadris, 22.9%</td>
<td>Spray or fungigation</td>
<td>6.0-15.5 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Satori, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation, 22.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Chlorothalonil (M5)</td>
<td>Spray</td>
<td>1.6 pt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quadris Opti, 4.6% : 46%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) + Difenoconazole (3)</td>
<td>Spray or fungigation</td>
<td>8-14 oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quadris Top 18.2%:11.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Famoxadone (11) + Cymoxanil (27)</td>
<td>Spray or fungigation</td>
<td>6-8 oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tanos, 25% : 25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.
⁵See fungicide resistance management statements on Pages 7-8.
*Designates restricted-use pesticide
# Potato (continued)

## Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage</th>
<th>Disease Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Qols (continued)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fenamidone (11)</strong></td>
<td>Spray</td>
<td>5.5-8.2 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Fluoxastrobin (11)</strong></td>
<td>Spray or fungigation</td>
<td>3.8 fl oz/a</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11)</strong></td>
<td>Spray or fungigation</td>
<td>6-9 fl oz/A early Blight</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11) + Metiram (M3)</strong></td>
<td>Spray or fungigation</td>
<td>2.0-2.9 lbs/A for black dot &amp; early blight; 2.9 lbs/A for late blight</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Trifloxystrobin (11)</strong></td>
<td>Spray</td>
<td>2.9-3.8oz/A early blight 3.8 oz/A late blight</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

1. Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
2. Dosage = amount of formulated product to apply.
3. X = product labeled for crop and disease; Blank = product not labeled for specific disease.
4. Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.
5. See fungicide resistance management statements on Pages 7-8.

*Designates restricted-use pesticide
## Potato (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁴,⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Late Blight</td>
<td>Early Blight</td>
</tr>
<tr>
<td><strong>Cyazofamid (21)</strong></td>
<td>Spray or fungigation</td>
<td>0.42 fl oz/1,000 linear ft. row or 1.4-2.75 fl oz/A as broadcast spray</td>
<td>X</td>
<td>Also for pink rot and <em>Pythium</em> leak control. Do not apply more than 27.5 fl oz per season. Alternate sprays of Ranman with a fungicide from a different chemistry class.</td>
</tr>
<tr>
<td>Ranman, 34.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em><em>Triphenyltin Hydroxide (TPTH)</em> RUP (30)</em>*</td>
<td>Spray or fungigation</td>
<td>2.5-3.75 oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Super Tin 80WP AgPak, 80% or Agri Tin, 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Super Tin* 4L, or Agri Tin* 4L, 40%</td>
<td>Spray or fungigation</td>
<td>4-6 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Check the NDSU blight hotline, (888) 482-7286, for information on infection potential of early blight and late blight. Whenever late blight is severe, vine killing is extremely important and should be done at least 2 weeks before harvest to prevent tuber infections. Hilling of soil around the vines should be done just before killing them.
⁵See fungicide resistance management statements on Pages 7-8.

*Designates restricted-use pesticide
# Safflower Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage</th>
<th>Control(^2) of Seed-borne Rust</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carboxin (7)</strong>&lt;br&gt;Vitavax 34, 34%</td>
<td>Slurry</td>
<td>2 fl oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Carboxin (7) + Thiram (M3)</strong>&lt;br&gt;Vitavax 200, 17%:17%</td>
<td>Liquid or slurry</td>
<td>4 fl oz/cwt</td>
<td></td>
<td>State label granted 5/24/90.</td>
</tr>
<tr>
<td><strong>Fludioxonil (12)</strong>&lt;br&gt;Maxim 4FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spirato 480FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mancozeb (M3)</strong>&lt;br&gt;Dithane DF Rainshield NT, 75%</td>
<td>Slurry</td>
<td>2.1 oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dithane F-45, 37%</td>
<td>Drill box or slurry</td>
<td>3.2 fl oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dithane WSP, 80%</td>
<td>Drill box or slurry</td>
<td>2 oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manzate ProStick, 75%</td>
<td>Slurry</td>
<td>2 oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penncozeb 80 WP, 80%</td>
<td>Drill box or slurry</td>
<td>2 oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penncozeb 75 DF, 75%</td>
<td>Drill box or slurry</td>
<td>2.1 oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thiram (M3)</strong>&lt;br&gt;42-S Thiram, 42%&lt;br&gt;Thiram 50WP Dyed, 50%&lt;br&gt;Signet 480FS, 44%</td>
<td>Liquid or slurry</td>
<td>2 fl oz/bu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drill box or slurry</td>
<td>4 oz/cwt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid or slurry</td>
<td>2 fl oz/bu</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Dosage = amount of formulated product to apply.

\(^2\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.
### Safflower
#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Alternaria Leaf Spot Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6.0-15.5 fl oz/A</td>
<td>X</td>
<td>Resistance statement 5. Also controls downy mildew. Make Quadris applications preventatively for best results. Additional applications may be required under favorable environmental conditions. Do not apply more than 27 fl oz of product/season. PHI = 30 days.</td>
</tr>
<tr>
<td>Pyraclostrobin (11) Headline EC, 23.6%</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>Also controls <em>Septoria</em> spp. Apply prior to disease development for optimum control</td>
</tr>
<tr>
<td>Fluxopyrad (7) + Pyraclostrobin Priaxor 14.33%:28.58%</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X</td>
<td>Also controls <em>Septoria</em> spp. For suppression of Sclerotinia. Apply prior to disease development. Maximum of 2 applications per season. PHI = 21 days.</td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.

---

### Soybean
#### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Control² of Seedling Blights³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11) Dynasty, 9.6%</td>
<td>Slurry</td>
<td>0.153-0.459 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi causing decay, damping off and seedling blight.</td>
</tr>
<tr>
<td>Captain (M4) Captain 4000, 38.4% Hi-Moly/Captan-D, 48.9% Hi-Moly Captain, 18.44%</td>
<td>See individual labels for rates of application, formulations and registered use</td>
<td>See individual labels for rates of application, formulations and registered use</td>
<td>X</td>
<td>Hi-Moly contains molybdenum.</td>
</tr>
<tr>
<td>Carboxin (7) Vitavax-34, 34%</td>
<td>Slurry</td>
<td>3-4 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Germate Plus, 14%</td>
<td>Drill box</td>
<td>1.5 oz/42 lb (2 oz/bu)</td>
<td>X</td>
<td>Vitavax 34 may be used on seed previously treated with captan or thiram. Germate Plus contains 15% diazinon and 25% lindane insecticide. Kernel Guard Supreme contains 10.42% permethrin.</td>
</tr>
<tr>
<td>Kernel Guard Supreme, 14%</td>
<td>Drill box</td>
<td>1.5 oz/50 lb</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Carboxin (7) + Captain (M4) Enhance, 20%:19%</td>
<td>Drill box</td>
<td>3 oz/bu</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³Seeding blights due to various fungal infections of seed.

**Note:** Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
## Soybean (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Seedling Blights&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroneb (14) Chloroneb 65W, 65%</td>
<td>Slurry</td>
<td>4 oz/cwt</td>
<td>X</td>
<td>May be used as a supplemental seed treatment for improved suppression of Rhizoctonia and Pythium.</td>
</tr>
<tr>
<td>Clothianidin + Ipconazole (3) + Metalaxyl (4) + Ethaboxam (22) Intego Suite System, (Inovate Pro) - 24.03%; 1.203%; 0.965%; (Intego Solo) - 34.2%</td>
<td>Slurry or mist</td>
<td>2.81 fl oz/cwt + 0. fl oz/cwt</td>
<td>X</td>
<td>Registered for control of seed rots, <em>Pythium</em>, <em>Fusarium</em> and <em>Rhizoctonia</em>.</td>
</tr>
<tr>
<td>Ethaboxam (22) Intego Solo, 34.2%</td>
<td>Slurry or mist</td>
<td>0.3-0.6 fl oz/cwt</td>
<td>X</td>
<td>For control of <em>Pythium</em> and early season <em>Phytophthora</em>.</td>
</tr>
<tr>
<td>Fludioxonil (12) Maxim 4FS, 40.3% Spirato 480FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt or .0038-.0076 mg ai seed</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi. Registered for control of <em>Rhizoctonia</em> and <em>Fusarium</em>.</td>
</tr>
<tr>
<td>Ipconazole (3) Rancona 3.8 FS, 40.7%</td>
<td>Slurry or mist</td>
<td>0.085 fl oz/cwt</td>
<td>X</td>
<td>Does not provide control of <em>Pythium</em></td>
</tr>
<tr>
<td>Ipconazole (3) + Metalaxyl (4) Rancona Summit 0.902%:1.443% Rancona Xtra 1.029%:1.647%</td>
<td>Slurry or mist</td>
<td>4.0 fl oz slurry/cwt 3.5-15 fl oz slurry/cwt</td>
<td>X</td>
<td>For seed and seedling diseases.</td>
</tr>
<tr>
<td>Mefenoxam (4) Apron XL, 33.3%</td>
<td>Slurry or mist</td>
<td>0.16-0.64 fl oz/cwt</td>
<td>X</td>
<td>For <em>Pythium</em> and early season <em>Phytophthora</em> control only. For both commercial and on-farm use.</td>
</tr>
</tbody>
</table>

<sup>1</sup>Dosage = amount of formulated product to apply.
<sup>2</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.
<sup>3</sup>Seedling blights due to various fungal infections of seed.

**Note:** Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Seedling Blights&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mefenoxam (4) + Fludioxonil (12) + Thiamethoxam</td>
<td>Slurry or mist</td>
<td>3 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and insects.</td>
</tr>
<tr>
<td>Cruiser Maxx, 1.7%:1.12%:22.61%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slurry or mist</td>
<td>3.2 fl oz/cwt or 1.49 fl oz/140,000 seeds</td>
<td>X</td>
<td>For protection against certain early season insects, soil-borne and seed-borne diseases.</td>
<td></td>
</tr>
<tr>
<td>Cruiser Maxx Advanced 3.21%:1.07%:21.5%</td>
<td>Water based slurry</td>
<td></td>
<td>X</td>
<td>For protection against certain early season insects, soil-borne and seed-borne diseases.</td>
</tr>
<tr>
<td>Cruiser Maxx Plus 3.21%:1.07%:21.50%</td>
<td>Water based slurry</td>
<td>3.2 fl oz/cwt or 1.49 fl oz/140,000 seeds</td>
<td>X</td>
<td>For protection against certain early season insects, soil-borne and seed-borne diseases.</td>
</tr>
<tr>
<td>Cruiser Maxx EZ 3.46%:1.15%:23.10%</td>
<td>Water based slurry</td>
<td>3.5 fl oz/100 lb seed or 0.0057-0.0113 mg ai seed</td>
<td>X</td>
<td>For protection against insects, seed-borne diseases, and seedling diseases.</td>
</tr>
<tr>
<td>Mefenoxam (4) + Fludioxonil (12)</td>
<td>Slurry or mist (on-farm application)</td>
<td>5 fl oz/cwt</td>
<td>X</td>
<td>See labels for inoculant remarks.</td>
</tr>
<tr>
<td>Apron Maxx RTA, 1.1%:0.73%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apron Maxx RFC, 3.46%:2.31%</td>
<td>Slurry</td>
<td>1.5 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Maxim XL, 8.4%:21%</td>
<td>Slurry or mist</td>
<td>0.167-0.334 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Warden RTA 2.2%:0.72%</td>
<td>Slurry or mist</td>
<td>5 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4)</td>
<td>Mist or slurry</td>
<td>“</td>
<td>see remarks</td>
<td>Metalaxyl is for Pythium damping off and early season Phytophthora control only. For use only with commercial seed treatment equipment.</td>
</tr>
<tr>
<td>Allegiance FL, 28.35%</td>
<td>Mist or slurry</td>
<td>“</td>
<td>“</td>
<td></td>
</tr>
<tr>
<td>Dyna-Shield, 28.35%</td>
<td>Slurry</td>
<td>“</td>
<td>“</td>
<td></td>
</tr>
<tr>
<td>Sebring 18FS 30.14%</td>
<td>Mist or slurry</td>
<td>0.75-1.50 fl oz/cwt</td>
<td>“</td>
<td></td>
</tr>
<tr>
<td>Belmont 2.7 FS, 28.98%</td>
<td>Mist or slurry</td>
<td>“</td>
<td>“</td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4) + Ipconazole (3) + Clothianidin</td>
<td>Slurry or mist</td>
<td>4.78 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi and insects. Products need to be mixed together.</td>
</tr>
<tr>
<td>Inovate Seed Protectant 1.64%:1.029%:47.8%</td>
<td></td>
<td></td>
<td>“</td>
<td></td>
</tr>
<tr>
<td>Penflufen (7) + Prothioconazole (3) + Metalaxyl (4)</td>
<td>Slurry or mist</td>
<td>1 fl oz/cwt</td>
<td>X</td>
<td>For seed rot and damping off caused by Rhizoctonia, Fusarium, and Pythium. Also, for seed decay caused by Phomopsis.</td>
</tr>
<tr>
<td>EverGol Energy SB, 3.59%, 7.18%, 5.74%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> Dosage = amount of formulated product to apply.

<sup>2</sup> X = product labeled for crop and disease; Blank = product not labeled for specific disease.

<sup>3</sup> Seedling blights due to various fungal infections of seed.

**Note:** Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
## Soybean (continued)
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Control² of Seedling Blights³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedaxane (7)</td>
<td>Slurry</td>
<td>0.08-.16 fl/oz cwt or 2.5-5 gai/100 kg seed</td>
<td>X</td>
<td>Seed decay, seedling blight and damping off caused by <em>Rhizoctonia solani</em></td>
</tr>
<tr>
<td>Sedaxane (7) + Fludioxonil (12) + Mefenoxam (4) + Thiamethoxam</td>
<td>Slurry</td>
<td>3.38 fl oz/cwt</td>
<td>X</td>
<td>For suppression of <em>Rhizoctonia</em> sp., <em>Pythium</em> sp., <em>Phytophthora</em>, and <em>Fusarium</em> sp. Thiamethoxam is for broad spectrum insect control.</td>
</tr>
<tr>
<td>Tolclofos-methyl (14)</td>
<td>Slurry or mist</td>
<td>0.3 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne diseases. Controls <em>Rhizoctonia solani</em> and <em>Fusarium</em> species</td>
</tr>
<tr>
<td>Trifloxystrobin (11)</td>
<td>Slurry</td>
<td>0.32 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) + Metalaxyl (4)</td>
<td>RTU or slurry or mist</td>
<td>1.0 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
³Seedling blights due to various fungal infections of seed.

**Note:** Some seed treatments may affect Rhizobia inoculants; read inoculant label for specific information.
# Soybean
## Soil Application

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Control(^2) of Pythium, Phytophthora</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11) + Metalaxyl (4) Uniform 28.2%:10.9%</td>
<td>In-furrow</td>
<td>0.34 fl oz/1,000 linear feet of row</td>
<td>X</td>
<td>Apply in a 7 inch band. One application per season.</td>
</tr>
<tr>
<td>Bacillus subtilis QST 713 (44) Serenade Soil, 1.34%</td>
<td>In-furrow spray</td>
<td>2-6 fl qt/A</td>
<td>X</td>
<td>Apply as a directed spray in the seed furrow and to cover soil at planting.</td>
</tr>
<tr>
<td>Mefenoxam (4)</td>
<td>In-furrow spray</td>
<td>0.08-0.28 fl oz/1,000 ft. of row</td>
<td>X</td>
<td>Resistance statement 4(^3). Do not apply directly to seed but to soil that will be mixed in covering the seed. Use lower rates for early to midseason control; full rates for full-season control. See label for planting restrictions within 12 months of application.</td>
</tr>
<tr>
<td>Mefenoxam (4) Ridomil Gold EC, 48%</td>
<td>In-furrow spray</td>
<td>1.5-6 oz/1,000 ft. of row</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mefenoxam (4) Ridomil Gold GR, 2.5%</td>
<td>In-furrow, 7” band or T-band</td>
<td>0.08-0.28 fl oz/1,000 ft. of row</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pyraclostrobin (11) Headline EC, 23.6%</td>
<td>In-furrow spray</td>
<td>0.4-0.8 fl oz/1,000 ft. row</td>
<td>For suppression of Rhizoctonia. For 22” rows, use maximum of 0.5 fl oz/1,000 ft. of row. For 30” rows, use maximum of 0.7 fl oz/1,000 ft. of row.</td>
<td></td>
</tr>
<tr>
<td>Azoxystrobin (11) Equation, 22.8%</td>
<td>In-furrow spray</td>
<td>0.4-0.8 fl oz/1,000 ft. row</td>
<td>For suppression of Rhizoctonia.</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Dosage = amount of formulated product to apply.  
\(^2\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
\(^3\)See fungicide resistance management statements on Pages 7-8.
## Soybean Nematicide
### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage</th>
<th>Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abamectrin Avicta 500FS, 46.3%</td>
<td>Commercially applied</td>
<td></td>
<td>Nematodes</td>
<td>Syngenta Crop Protection LLC has a commercially treated blend of nematicide, insecticide, and fungicide seed treatment products.</td>
</tr>
<tr>
<td>Abamectrin + Thiamethoxam + Mefenoxam (4) + Fludioxonil (12) Avicta Complete Beans 500, 22.20%; 11.10%; 1.67%; 0.55%</td>
<td>Commercially applied</td>
<td></td>
<td>Nematodes (by abamectrin), various insects (by thiamethoxam), and various diseases (by mefenoxam and fludioxonil)</td>
<td>Syngenta Crop Protection LLC has a commercially treated blend of nematicide, insecticide, and fungicide seed treatment products.</td>
</tr>
<tr>
<td>Pasteuria nishizawae – Pn1 Clariva pn, 15.0%</td>
<td>Slurry</td>
<td>0.9-33.8 fl oz/100 lbs seed</td>
<td>Soybean cyst nematode</td>
<td></td>
</tr>
<tr>
<td>Clothiandin + Bacillus firmus Poncho Votivo, 40.3%; 8.1%</td>
<td>Commercially applied</td>
<td></td>
<td>Provides early season protection of the soybean plant against root nematodes and broad control of insect pests.</td>
<td>The <em>Bacillus firmus</em> bacterium creates a living barrier that prevents nematodes from reaching the roots.</td>
</tr>
</tbody>
</table>

## Soybean Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage</th>
<th>White Mold Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus subtilis</em> strain QST 713 (44) Serenade ASO</td>
<td>Spray or fungigation</td>
<td>2-6 qt/A</td>
<td>X</td>
<td>For suppression.</td>
</tr>
<tr>
<td><em>Bacillus pumilis</em> QST 2808 (44) BalladPLUS, 1.38%</td>
<td>Spray or fungigation</td>
<td>0.5-4 qt/A</td>
<td>X</td>
<td>Use 0.5 to 4 qt/A in tank mix with labeled rates of strobilurins fungicides when conditions are conducive to disease development. Use 1 to 4 qt/A stand-alone.</td>
</tr>
</tbody>
</table>

1. Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
2. Dosage = amount of formulated product to apply.
3. X = product labeled for crop and disease; Blank = product not labeled for specific disease.
4. See fungicide resistance management statements on Pages 7-8.
## Soybean (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>White Mold Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boscalid (7)</strong> Endura, 70%</td>
<td>Spray or fungigation</td>
<td>5.5-11 oz/A</td>
<td>X</td>
<td>For optimal white mold control, apply at early flowering. If environment remains favorable for disease development, make a second application 7-14 days after initial application. PHI=21 days.</td>
</tr>
<tr>
<td><strong>Penthiopyrad (7)</strong> Vertisan, 20.6%</td>
<td>Spray or fungigation</td>
<td>10-30 fl oz/A</td>
<td>X</td>
<td>Begin applications prior to disease development. Vertisan controls several diseases. For white mold, make initial application at beginning of bloom and a second application at full bloom. Apply no more than 61 fl oz/A per year with no more than 2 sequential applications. PHI = 14 days.</td>
</tr>
<tr>
<td><strong>QoIs</strong> Azoxystrobin (11) Quadris, 22.9% Satori, 22.9% Equation, 22.9%</td>
<td>Spray</td>
<td>6.0-15.5 fl oz/A</td>
<td></td>
<td>Resistance statement 5⁴. Both products control pod and stem blight, soybean rust and brown spot.</td>
</tr>
<tr>
<td><strong>Fluoxystrobin (11)</strong> Evito 480SC, 40.3%</td>
<td>Spray or fungigation</td>
<td>2.0-5.7 fl oz/A</td>
<td></td>
<td>For control of Asian soybean rust and many fungal leaf spots. Begin applications preventively and continue as needed on 14- to 21-day interval. Do not apply more than 11.4 fl oz per year.</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11)</strong> Headline EC, 23.6% Headline SC, 23.3%</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td></td>
<td>Apply prior to onset of disease. PHI = 21 days. Controls pod and stem blight and several fungal leaf spot pathogens.</td>
</tr>
<tr>
<td><strong>Picoxystrobin (11)</strong> Aproach, 22.5%</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>Apply prior to disease development. Aproach is labeled for suppression of downy mildew. For white mold, make initial application at beginning bloom and a second application at full bloom. Apply no more than 36 fl oz/A season. PHI = 14 days.</td>
</tr>
<tr>
<td><strong>Qols + Triazoles</strong> Azoxystrobin (11) + Propiconazole (3)</td>
<td>Spray or fungigation</td>
<td>14-20.5 fl oz/A</td>
<td></td>
<td>Resistance statement 5⁴ and 3⁴. Quilt controls several diseases in soybeans including soybean rust. Do not apply more than 42 fl oz/A. PHI: 21 days for seed; 0 for forage or hay. Quilt Xcel controls several diseases in soybeans. Do not apply more than 42 oz/a/year. Do not apply after R6 stage soybeans.</td>
</tr>
<tr>
<td>Quilt, 7%:11.6% Quilt Xcel, 13.5%:11.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Azoxystrobin (11) + Cyproconazole (3)</strong> Quadris Xtra, 18.2%:7.3%</td>
<td>Spray or fungigation</td>
<td>5.0-6.8 fl oz/A</td>
<td></td>
<td>Quadris Xtra controls several diseases in soybeans, including soybean rust. Quadris Xtra is extremely phytotoxic to certain apple varieties, so don’t spray when drift may reach apples. Do not apply more than 13.6 fl oz/A. Do not apply within 30 days of harvest.</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴See fungicide resistance management statements on Pages 7-8
<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage</th>
<th>White Mold Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11) + Difenconazole (3)</td>
<td>Quadris TOP, 18.2%:11.4%</td>
<td>Spray or fungigation</td>
<td>8-14 fl oz/A</td>
<td>For management of multiple leaf spot diseases. Do not apply more than 56 fl oz of Quadris Top per season. Quadris Top should be used with an adjuvant such as a non-ionic based surfactant or crop oil concentrate or blend. PHI=14 days.</td>
</tr>
<tr>
<td>Azoxystrobin (11) + Tebuconazole (3)</td>
<td>Custodia, 11.0%; 18.35%</td>
<td>Spray or fungigation</td>
<td>8.6 fl oz/A</td>
<td>Apply as a preventative spray prior to disease development. Do not apply more than 25.9 fl oz/A per season. PHI = 21 days.</td>
</tr>
<tr>
<td>Azoxystrobin (11) + Tetraconazole (3)</td>
<td>Affiance, 9.35%; 7.48%</td>
<td>Spray or fungigation</td>
<td>10.0-14.0 fl oz/A</td>
<td>Apply prior to disease development when conditions favor disease development. Do not make more than three applications per year or apply more than 28.7 fl oz/A per year. PHI = 14 days.</td>
</tr>
<tr>
<td>Picoxystrobin (11) + Cyproconazole (3)</td>
<td>Aproach Prima, 17.94%; 7.17%</td>
<td>Spray or fungigation</td>
<td>5-6.8 fl oz/A</td>
<td>Begin application prior to disease development for several diseases. Use no more than 13.6 fl oz/A per season and no more than 2 sequential applications of a picoxystrobin containing product. PHI = 30 days.</td>
</tr>
<tr>
<td>Trifloxystrobin (11) + Prothioconazole (3)</td>
<td>Stratego YLD 32.3%:10.8%</td>
<td>Spray or fungigation</td>
<td>4.0-4.65 fl oz/A</td>
<td>For leaf spots and Asian soybean rust. Do not make more than 3 applications/season. Do not apply more than 13.95 fl oz/a/year. Do not apply within 21 days of harvest.</td>
</tr>
<tr>
<td>Fluoxastrobin (11) + Flutriafol (3)</td>
<td>Fortix, 14.8%; 19.3%</td>
<td>Spray or fungigation</td>
<td>4-6 fl oz/A</td>
<td>For fungal leaf spots and Asian soybean rust. Apply from R1 to R3. Do not make more than 2 applications per season. Do not apply more than 12 fl oz/A per season. PHI = 21 days for grain and 30 days for seed.</td>
</tr>
</tbody>
</table>

1Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
2Dosage = amount of formulated product to apply.
3X = product labeled for crop and disease; Blank = product not labeled for specific disease.
4See fungicide resistance management statements on Pages 7-8.
### Soybean (continued)
#### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>White Mold Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chlorothalonil (M5)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bravo Ultrex, Equus DF, 82.5%</td>
<td>Spray or fungigation</td>
<td>See label</td>
<td></td>
<td>Chlorothalonil products control pod and stem blight and stem canker, and suppress soybean rust.</td>
</tr>
<tr>
<td>Bravo WeatherStik, Echo 720, Equus 720 SST, or Chlorothalonil 720, 54%</td>
<td>Spray or fungigation</td>
<td>See label</td>
<td></td>
<td>Do not feed soybean hay or thrashings from chlorothalonil-treated fields to livestock.</td>
</tr>
<tr>
<td>Echo 90 DF, 90%</td>
<td>Spray or fungigation</td>
<td>See label</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echo Zn, 38.5%</td>
<td>Spray or fungigation</td>
<td>See label</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Copper Sulfate (M1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuprofix Ultra 40, 71.1%</td>
<td>Spray or fungigation</td>
<td>0.75-1.25 lb/A bacterial diseases 1.25-2.0 lbs/A fungal leaf spots</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cyproconazole (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alto 100 SL, 8.9%</td>
<td>Spray or fungigation</td>
<td>4.0-5.5 fl oz/A</td>
<td></td>
<td>For control of soybean rust and other leaf diseases. See label for specific rate recommendations. Do not apply more than 11 fl oz/season. Do not apply with 30 days of harvest.</td>
</tr>
<tr>
<td><strong>Fluxapyroxad (7) + Pyraclostrosin (11)</strong></td>
<td>Spray or fungigation</td>
<td>4-8 fl oz/A</td>
<td>X Suppression Only</td>
<td>Resistance statement 5 and 6⁴ For control of several Soybean diseases. Do not apply more than 2 applications and 16 fl oz/A PWI=21 days</td>
</tr>
<tr>
<td>Priaxor 14.33%.28.58%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Propiconazole (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tilt 3.6 EC, or Propiconazole E-AG, 41.80%</td>
<td>Spray</td>
<td>4-6 fl oz/A</td>
<td></td>
<td>Resistance statement 3⁴. Propiconazole controls several diseases of soybeans, including soybean rust. Do not apply more than 12 fl oz/A. Apply up to R6.</td>
</tr>
<tr>
<td>Bumper 41.8 EC and Topaz 41.8%</td>
<td>Spray</td>
<td>4-6 fl oz/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bumper ES, 40.85%</td>
<td>Spray</td>
<td>4-6 fl oz/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prothioconazole (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proline 480 SC, 41%</td>
<td>Spray</td>
<td>3.0-5.0 fl oz/A</td>
<td>X</td>
<td>For white mold management, apply Proline at 4.3 fl oz/A prior to disease onset or at the R1 (bloom initiation) stage. A subsequent application may be used 7-14 days later. Also for control of soybean rust and powdery mildew. Do not apply more than 12.9 fl oz/year. 21-day PHI.</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

²Dosage = amount of formulated product to apply.

³X = product labeled for crop and disease; Blank = product not labeled for specific disease.

⁴See fungicide resistance management statements on Pages 7-8.
# Soybean (continued)

## Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>White Mold Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tebuconazole 38.7% (3)</td>
<td>Spray</td>
<td>3-4 fl oz/A</td>
<td></td>
<td>For control of soybean rust and powdery mildew. Do not apply more than 12 fl oz/A per season. These products have a 21-day PHI.</td>
</tr>
<tr>
<td>Orius 3.6F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tebuconazole 3.6F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monsoon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiophanate Methyl (1)</td>
<td>Spray or fungigation</td>
<td>0.751 lb/A</td>
<td>X</td>
<td>Resistance Statement 1⁴</td>
</tr>
<tr>
<td>Topsin M WSB 70WE, T-methyl WSB 70W, 70%</td>
<td></td>
<td></td>
<td></td>
<td>Thiophanate-methyl also controls pod and stem blight but is not labeled for control of soybean rust.</td>
</tr>
<tr>
<td>Topsin M 70WP, or T-Methyl E-AG 70 WSP, 70%</td>
<td></td>
<td></td>
<td></td>
<td>One application at early bloom (R1-R2) followed by a second application 7-14 days later if conditions favorable for continued disease pressure. 21-day PHI. 5 gal/A minimum by air.</td>
</tr>
<tr>
<td>Topsin 4.5 FL, 45% or T-Methyl E-AG 4.5 FL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topsin XTR, 37.5%, Incognito 4.5F, 46.2%, Cercobin, 41.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiophanate Methyl 85 WDG, 85%, Incognito 85 WDG, 85%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiophanate Methyl (1) + Propiconazole (3) Protocol 23.7%:7.1%</td>
<td>Spray</td>
<td>2.0 pt/A</td>
<td>X</td>
<td>Resistance Statement 1 and 3⁴</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴See fungicide resistance management statements on Pages 7-8.
# Sugar Beet Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage¹</th>
<th>Disease Control²</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroneb (14)</td>
<td>Liquid or slurry</td>
<td>6 fl oz/cwt</td>
<td>X, X</td>
<td>For control of Pythium and Rhizoctonia. For use as a supplement to another fungicide.</td>
</tr>
<tr>
<td>Chloroneb 65W, 65%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fludioxonil (12)</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X, X</td>
<td>For control of seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Maxim 4 FS, 40.3%</td>
<td></td>
<td></td>
<td></td>
<td>Provides Suppression of <em>R. solani</em>.</td>
</tr>
<tr>
<td>Spirato 480FS 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hymexazol (32)</td>
<td>Pelleted seed</td>
<td>20-90 g/unit of 100,000 seed</td>
<td>X, X</td>
<td>For control of Pythium and Aphanomyces. Use of rates greater than 45 g may result in phytotoxicity. In fields with known heavy disease pressure, use of Tachigaren and a tolerant variety is suggested.</td>
</tr>
<tr>
<td>Tachigaren, 70%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mefenoxam (4)</td>
<td>Slurry or mist</td>
<td>0.32-0.64 fl oz/cwt</td>
<td>X</td>
<td>For control of Pythium. May be combined with other fungicides if products are known to be compatible. For use only with commercial seed treatment equipment.</td>
</tr>
<tr>
<td>Apron XL, 33.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sebring 318 FS, 32.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metalaxyl (4)</td>
<td>Mist or slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td>For control of Pythium. May be combined with other fungicides if products are known to be compatible.</td>
</tr>
<tr>
<td>Allegiance FL, 28.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyna-Shield 28.35%</td>
<td>Slurry</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sebring 318FS 30.14%</td>
<td>Slurry or mist</td>
<td>0.75 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Belmont 2.7 FS, 28.98%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Dosage = amount of formulated product to apply.
²X = product labeled for crop and disease; Blank = product not labeled for specific disease.
# Sugar Beet (continued)
## Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Disease Control(^2)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penthiopyrad (7) Kabina ST</td>
<td>Commercially applied</td>
<td>0.53-1.06 fl oz/unit of 100,000 seeds</td>
<td>Aphanomyces</td>
<td>X</td>
</tr>
<tr>
<td>Metconazole (3) Metlock, 40%</td>
<td>Mist or slurry</td>
<td>0.008-0.016 fl oz/10,000 seed</td>
<td>Pythium</td>
<td>X</td>
</tr>
<tr>
<td>Thiram (M3) 42-S Thiram, 42% Signet 480 FS, 42%</td>
<td>Liquid or slurry</td>
<td>8 fl oz/cwt</td>
<td>Phoma</td>
<td>X</td>
</tr>
<tr>
<td>Tolclofos-methyl (14) Rizolex, 42%</td>
<td>Slurry or mist</td>
<td>1.5 fl oz/cwt</td>
<td>Rhizoctonia</td>
<td>X</td>
</tr>
<tr>
<td>Pyraclostrobin (11) Stamina, 18.4%</td>
<td>Slurry or mist</td>
<td>1.7-2.5 fl oz/100,000 seeds</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
**Sugar Beet (continued)**

### Soil Application

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Pythium</th>
<th>Control&lt;sup&gt;2&lt;/sup&gt; of Rhizoctonia</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>QoIs Azoxystrobin (11)</strong></td>
<td>Band 7” or less</td>
<td>0.4-0.7 fl oz/1,000 ft of row (9.5-15.4 fl oz/A as a band, not broadcast, with 22” row)</td>
<td>X</td>
<td>X</td>
<td>Resistance statement 5&lt;sup&gt;3&lt;/sup&gt;. Apply Quadris in a band (7” or less) over cotyledonary 4- to 8-leaf sugar beets before average daily temperatures at 4” soil depth reaches 65°F, using 5-15 gpa. Rate is already determined as a BAND spray, not broadcast.</td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11)</strong></td>
<td>In-furrow spray</td>
<td>0.4 -0.8 fl oz/1,000 ft of row</td>
<td>X</td>
<td></td>
<td>For suppression of <em>Rhizoctonia</em>. For 22” row, use maximum of 0.5 fl oz/1,000 ft. of row. For 30” row, use maximum of 0.7 fl oz/1,000 ft. of row.</td>
</tr>
<tr>
<td><strong>Trifloxystrobin (11)</strong></td>
<td>In-furrow spray</td>
<td>2.9-3.6 oz/A in band</td>
<td>X</td>
<td></td>
<td>Resistance statement 5&lt;sup&gt;3&lt;/sup&gt;. For suppression of <em>Rhizoctonia</em>.</td>
</tr>
<tr>
<td><strong>Mefenoxam (4)</strong></td>
<td>7” band preplant incorporated</td>
<td>0.21-0.43 fl oz/1,000 ft of row</td>
<td>X</td>
<td></td>
<td>Resistance statement 4&lt;sup&gt;3&lt;/sup&gt;. See label for planting restrictions within 12 months of application.</td>
</tr>
<tr>
<td><strong>Ridomil Gold EC, 48%</strong></td>
<td>7” band preplant incorporated</td>
<td>4.3-8.6 fl oz/1,000 ft of row</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ridomil Gold GR, 2.5%</strong></td>
<td>7” band preplant incorporated</td>
<td>0.43-0.86 fl oz/1,000 ft of row</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ultra Flourish, 25.1%</strong></td>
<td>In-furrow spray</td>
<td>0.7-1.6 fl oz/1,000 ft of row</td>
<td>X</td>
<td></td>
<td>Maximum rate per acre per application is 30 fl oz.</td>
</tr>
</tbody>
</table>

<sup>1</sup>Dosage = amount of formulated product to apply.

<sup>2</sup>X = product labeled for crop and disease; Blank = product not labeled for specific disease.

<sup>3</sup>See fungicide resistance management statements on Pages 7-8.

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**Sugar Beet Nematicide**

### Seed Treatment

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pasteuria nishizawae</em> – Pn1</td>
<td>Slurry</td>
<td>0.034-1.35 fl oz per 100,000 seeds</td>
<td>Sugar beet cyst nematode</td>
<td></td>
</tr>
<tr>
<td>Chemical (Fungicide Group)</td>
<td>Application¹</td>
<td>Dosage²</td>
<td>Disease Control³</td>
<td>Remarks</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
<td>---------</td>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Bacillus pumilus</strong> strain 2808 (44) BalladPLUS, 1.38%</td>
<td>Spray or fungigation</td>
<td>2.4 qt/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Copper (M1) Basicop WP, 53%</td>
<td>Spray</td>
<td>4 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Champ DP, 57.6%</td>
<td>Spray or fungigation</td>
<td>1.33-3.33 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Champ WG, 77%</td>
<td>Spray or fungigation</td>
<td>2-5 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Champ Formula 2 Flowable, 35.5%</td>
<td>Spray or fungigation</td>
<td>1.33-3.33 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cuprofix Ultra 40 Dispers, 71.1%</td>
<td>Spray or fungigation</td>
<td>1.25-3.0 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 2000, 53.8%</td>
<td>Spray or fungigation</td>
<td>1.5-3.75 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 3000, 46.1%</td>
<td>Spray or fungigation</td>
<td>0.75-2.0 lb</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kocide 4.5 LF, 37.5%</td>
<td>Spray or fungigation</td>
<td>1.33-2.66 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>MasterCop, 21.46%</td>
<td>Spray or fungigation</td>
<td>0.5-1.5 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Difenconazole (3) + Propiconazole (3) 22.8%:22.8% Inspire XT, 23.2%</td>
<td>Spray or fungigation</td>
<td>7 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fenbuconazole (3) Enable 2F, 23.5%</td>
<td>Spray</td>
<td>8 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Flutriafol (3) Topguard 11.8%</td>
<td>Spray</td>
<td>10-14 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Begin when disease is first observed in field. Higher rates are used when disease is severe on susceptible varieties. Use 5-10 gal water with airplane or 20-40 gal water and at least 100 psi with ground equipment. Repeat tin or copper at 10-14 days. Repeat maneb or mancozeb at 7-10 days. ⁵See fungicide resistance management statement on Pages 7-8.
## Sugar Beet (continued)
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluxopyroxad (7) + Pyraclostrobin (11) Priaxor 14.33%:28.58%</td>
<td>Spray or fungigation</td>
<td>6 to 8 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mancozeb (M3) Dithane DF Rainshield NT, 75%</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dithane F-45, 37%</td>
<td>1.2-1.6 qt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dithane M-45, 80%</td>
<td>1.5-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Koverall, 75%</td>
<td>1.5-2 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manex II, 37%</td>
<td>1.2-1.6 qt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manzate Flowable,37%</td>
<td>Spray or fungigation</td>
<td>0.4-1.6 qts/A</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Manzate ProStick, 75%</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Penncozeb, 80%</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Penncozeb DF, 75%</td>
<td>Spray or fungigation</td>
<td>1.5-2 lb/A</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Roper DF Rainshield, 75%</td>
<td>Spray or fungigation</td>
<td>1-2 lb/A</td>
<td>X</td>
</tr>
<tr>
<td>Mancozeb (M3) + Copper (M1) ManKocide 15%: 46.1%</td>
<td>Spray or fungigation</td>
<td>2.5-6.5 lbs/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metconazole (3) Caramba, 8.6%</td>
<td>Spray or fungigation</td>
<td>9-14 fl oz/A</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Begin when disease is first observed in field. Higher rates are used when disease is severe on susceptible varieties. Use 5-10 gal, water with airplane or 20-40 gal. water and at least 100 psi with ground equipment. Repeat tin or copper at 10-14 days. Repeat maneb or mancozeb at 7-10 days.
⁵See current *Sugar Beet Production Guide* for management strategies.
⁶See fungicide resistance management statements on Pages 7-8.
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propiconazole (3)</td>
<td>Spray or fungigation</td>
<td>4 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tilt 3.6 E.C. 41.8% or Propiconazole E-AG 41.8% Bumper 41.8 EC, 41.8% Topaz 41.8% Bumper ES, 40.85%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prothioconazole (3)</td>
<td>Spray</td>
<td>5.0-5.7 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Proline 480 SC, 41.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur (M)</td>
<td>Spray or fungigation</td>
<td>8 pt/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Super Six, 52%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microthiol Disperss 80%</td>
<td>Spray or fungigation</td>
<td>5-10 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Micro Sulf, 80%</td>
<td>Spray or fungigation</td>
<td>5-10 lb/A</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Tetraconazole (3)</td>
<td>Spray or fungigation</td>
<td>13 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Eminent, 11.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentiopyrad (7)</td>
<td>Spray or fungigation</td>
<td>14-30 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Vertisan, 20.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flutriafol (3)</td>
<td>Spray</td>
<td>10-14 fl oz/A</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Topguard, 11.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.
²Dosage = amount of formulated product to apply.
³X = product labeled for crop and disease; Blank = product not labeled for specific disease.
⁴Begin when disease is first observed in field. Higher rates are used when disease is severe on susceptible varieties. Use 5-10 gal. water with airplane or 20-40 gal. water and at least 100 psi with ground equipment. Repeat tin or copper at 10-14 days. Repeat maneb or mancozeb at 7-10 days.
⁵Because benzimidazole (Topsin M)-resistant strains of *Cercospora beticola* have developed in many sugar beet-growing areas, Topsin M should be used only once per season and only in combination with a nonbenzimidazole fungicide.
⁶See current “Sugar Beet Production Guide” for management strategies.
⁷See fungicide resistance management statements on Pages 7-8.
*Designates restricted-use pesticide.
### Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application¹</th>
<th>Dosage²</th>
<th>Disease Control³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiophanate methyl (1)</td>
<td>Spray</td>
<td>0.4 lbs/A</td>
<td>X⁵  X</td>
<td>Resistance statement 1⁶. Tank mix with tin or other effective modes of action for resistance management.</td>
</tr>
<tr>
<td>Nickel 17.1 FL, 45%</td>
<td>Spray or fungigation</td>
<td>10-20 fl oz/A</td>
<td>X⁵  X</td>
<td></td>
</tr>
<tr>
<td>or T-Methyl E-AG 4.5F, Incognito 4.5F, 46.2%, Cercobin, 41.3% Tins M WSB, Tins 70W, or T-methyl 70W WSB, 70% or T-Methyl E-AG 70WSB</td>
<td>Spray or fungigation</td>
<td>0.5-1.0 lb/A</td>
<td>X⁵  X</td>
<td></td>
</tr>
<tr>
<td>Thiophanate Methyl (1) + Propiconazole (3) Protocol 23.7% : 7.1%</td>
<td>Spray or fungigation</td>
<td>1.25-1.33 pt/A</td>
<td>X⁶  X⁶</td>
<td>Resistance statement 1 and 3⁶. For management of leaf spot and powdery mildew. Do not make more than 1 application for <em>Cercospora</em> leaf spot.</td>
</tr>
<tr>
<td>Triphenyltin Hydroxide (TPTH) RUP* (30)</td>
<td>Spray</td>
<td>2.5-5.0 oz/A</td>
<td>X⁶</td>
<td>RESTRICTED-USE PESTICIDE. Do not exceed 15 oz/A of Super Tin 80WP per season. Do not feed treated tops to livestock. Do not enter treated areas within 48 hours of treatment without protective clothing specified on label. Ground application must be with closed cabs. A Sec 24 (c) state label allows treatment up to 7 days before harvest. Do not exceed 24 fl oz/A/season for Super Tin 4L.</td>
</tr>
<tr>
<td>Super Tin 80WP AgPak, 80% or Agri Tin, 80%</td>
<td>Spray</td>
<td>2.5-5.0 oz/A</td>
<td>X⁶</td>
<td></td>
</tr>
<tr>
<td>Super Tin 4L or Agri Tin 4L, 40%</td>
<td>Spray</td>
<td>4.0-8.0 fl oz/A</td>
<td>X⁶</td>
<td></td>
</tr>
</tbody>
</table>

¹Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.

²Dosage = amount of formulated product to apply.

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⁴Begin when disease is first observed in field. Higher rates are used when disease is severe on susceptible varieties. Use 5-10 gal water with airplane or 20-40 gal water and at least 100 psi with ground equipment. Repeat tin or copper at 10-14 days. Repeat maneb or mancozeb at 7-10 days.

⁵See current "Sugar Beet Production Guide" for management strategies.

⁶See fungicide resistance management statements on Pages 7-8.
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Application</th>
<th>Dosage(^1)</th>
<th>Disease Control(^2)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Azoxylostrobin (11)</strong></td>
<td>Slurry</td>
<td>3.75-15 fl oz/cwt</td>
<td>X</td>
<td>Provides suppression against downy mildew.</td>
</tr>
<tr>
<td>Dynasty, 9.6%</td>
<td></td>
<td>0.025-0.1 mg/seed</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Captan (M4)</strong></td>
<td>Slurry</td>
<td>2.4 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Captan 400, 37.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fludioxonil (12)</strong></td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Maxim 4FS, 40.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spirato 480 FS, 40.3%</td>
<td>Slurry</td>
<td>0.08-0.16 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Fludioxonil (12) + Mefenoxam (4)</strong></td>
<td>Slurry</td>
<td>0.167-0.334 fl oz/cwt</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Maxim XL, 21% : 8.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mefenoxam (4)</strong></td>
<td>Slurry</td>
<td>1.28 fl oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apron XL, 33.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Metalaxyl (4)</strong></td>
<td>Mist or slurry</td>
<td>1.5-3.0 fl oz/cwt</td>
<td></td>
<td>In North Dakota, the pathogen causing downy mildew has been resistant to metalaxyl for over a decade. The resistance is thought to be widespread and stable.</td>
</tr>
<tr>
<td>Allegiance FL, 28.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sebring 318 FS, 28.35%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyna-Shield, 28.35%</td>
<td>Slurry</td>
<td>1.5-3 fl oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belmont 2.7 FS, 28.98%</td>
<td>Slurry or mist</td>
<td>1.5-3.0 fl oz/cwt</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pyraclostrobin (11)</strong></td>
<td>Slurry</td>
<td>0.8-2.3 fl oz/cwt</td>
<td>X</td>
<td>For seed-borne and soil-borne fungi.</td>
</tr>
<tr>
<td>Stamina, 18.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thiram (M3)</strong></td>
<td>Liquid or slurry</td>
<td>2 fl oz/bu</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>42-S Thiram, 42%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signet 480 FS, 42%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Dosage = amount of formulated product to apply.

\(^2\)X = product labeled for crop and disease; Blank = product not labeled for specific disease.

\(^3\)An increase in stand has been noted only once in moderately severe tests to date; under very severe conditions, some increase in stand might be expected.
## Sunflower Foliar Sprays

<table>
<thead>
<tr>
<th>Chemical (Fungicide Group)</th>
<th>Application</th>
<th>Dosage$^2$</th>
<th>Rust Control$^3$</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxystrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-15.5 fl oz/A</td>
<td>X</td>
<td>Resistance statement 5$^4$. Apply prior to disease development. Also labeled for control of Alternaria leaf spot.</td>
</tr>
<tr>
<td>Boscalid (7)</td>
<td>Spray or fungigation</td>
<td>8-11 oz/A</td>
<td></td>
<td>For suppression of sclerotinia head rot.</td>
</tr>
<tr>
<td>Penthioptyrad (7)</td>
<td>Spray or fungigation</td>
<td>10-30 fl oz/A</td>
<td>X</td>
<td>For suppression of sclerotinia head rot. Apply prior to disease development. Do not apply more than 61 fl oz/A per season. PHI = 14 days.</td>
</tr>
<tr>
<td>Fluxapyroxad (7) + Pyraclostrobin (11)</td>
<td>Spray or fungigation</td>
<td>4-8 fl oz</td>
<td>X</td>
<td>Resistant statements 5 &amp; 6$^4$. For control of several fungal diseases including <em>Alternaria</em>, <em>Septoria</em>, rust and powdery mildew. For suppression of sclerotinia head rot.</td>
</tr>
<tr>
<td>Pyraclostrobin (11)</td>
<td>Spray or fungigation</td>
<td>6-12 fl oz/A</td>
<td>X</td>
<td>Resistance statement 5$^4$. Apply prior to disease development. Also labeled for control of Alternaria leaf spot, powdery mildew, septoria leaf spot and white rust. Maximum of 2 applications per season. PHI = 21 days.</td>
</tr>
<tr>
<td>Tebuconazole (3) 38.7%</td>
<td>Spray</td>
<td>4-6 fl oz/A</td>
<td>X</td>
<td>For maximum disease control, labels recommend using lowest rate of nonionic surfactant. Apply at earliest sign of infection. Do not apply more than 16 fl oz per season or within 50 days of harvest. See labels for further information or spray scheduling.</td>
</tr>
</tbody>
</table>

$^1$Spray = ground or aerial; Fungigation = application through sprinkler irrigation system.  
$^2$Dosage = amount of formulated product to apply.  
$^3$X = product labeled for crop and disease; Blank = product not labeled for specific disease.  
$^4$See fungicide resistance management statements on Pages 7-8.  

### Soil-Applied Biological Fungicides

<table>
<thead>
<tr>
<th>Organism</th>
<th>Application</th>
<th>Dosage$^1$</th>
<th>Sclerotinia Sclerotiorum (white mold) Control$^2$</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Coniothyrium minitans</em></td>
<td>Soil incorporation</td>
<td>1-2 lb/A depending on crop</td>
<td>X</td>
<td>Fungus attacks sclerotia of the fungus.</td>
</tr>
</tbody>
</table>

$^1$Dosage = amount of formulated product to apply.  
$^2$X = product labeled for crop and disease; Blank = product not labeled for specific disease.
DISTRIBUTOR LIST

Product
Abound
Acquire
Agri Tin
Agri-Mycin 17
Agro products
Alliance
Alto
Aproach
Aproach Prima
Apron seed treatment products
Avicta Systems
Ballad Plus
Basicop
Big 6 Grain Protector
Bravo products
Bumper
Cabrio Plus
Cannonball NP
Capitan seed treatment products
Caramba
Catamaran
Cercobin
Champ products
Charter, Charter PB
Charter F2
Chloroneb 65W
Chlorothalonil 720
Clariva pn
Contents
Cruiser Maxx Products
Cuprox Ultra 40 Disperss
Curzate 60 DF
Custodia
Dithane products
Dividend seed treatment products
Dyna-Shield/Metalaxyl
Dynasty
Echo 720 and Echo Zn
Emesto Silver
Eminent
Enable
Endura
Equation
Equity
Equus
EverGol Energy
Evito
Fitness
Foothold, Foothold Extra
Fortix
Forum
Gavel
Gem 500 SC
Grain Guard
Grain Guard plus
Granol N-M
Granol plus
Headline, Headline AMP, Headline SC
HiMoly-Captan D
Incognito
Inspire XT
Incentive
Intego
Inovate Seed Protectant
Kernal Guard
Kocide Products
Koverall
Kumulus Sulfur
Liquid sulfur six

Company
Syngenta/Crop Protection LLC
BASF
DuPont
Merk
Wilbur Ellis
Bayer CropScience
Syngenta/Crop Protection LLC.
DuPont
Syngenta/Crop Protection LLC.
Syngenta/Crop Protection LLC.
Bayer CropScience
NuFarm
Seed MateBlue Viking Star Glow
Syngenta/Crop Protection LLC.
ADAMA
BASF
BASF
Wilbur Ellis
BASF
Luxembourg-Pamol
Cheminova
NuFarm
BASF
Wilbur Ellis
Arysta
Syngenta/Crop Protection LLC.
Prophyta (Advan)
Syngenta/Crop Protection LLC.
United Phosphorus Inc.
DuPont
ADAMA
DOW
Syngenta/Crop Protection LLC.
Loveland
Syngenta/Crop Protection LLC.
Syngenta/Crop Protection LLC.
Bayer CropScience
Gowan USA LLC
DOW
BASF
Cheminova
Loveland Products
ADAMA
Bayer CropScience
Arysta LifeScience
Loveland Products
Loveland Products
Cheminova
BASF
DOW
Bayer CropScience
Trace
Wilbur Ellis
Wilbur Ellis
BASF
BASF
Trace
ADAMA
Syngenta/Crop Protection LLC.
Winfield Solutions LLC
Valent
Trace
DuPont
Cheminova
Micro flo Co.
Helena Chemical Co.

Product
Luna Tranquility
Manex
Mankocide
Manzate Flowable
Manzate ProStick, 4L
Manzate ProStick
MasterCop
Maxim Products
Mertect 340-F, Mertect DG
Metlock
Microthiol Disperss
Micro Sulf
Moncoat MZ
Moncut
Monsoon
Nevado 4F
Nipsil products
NuFlow M
Nu-Grow Captan Carboxin
Nusan 30
Omega
Onset
Orius
PCNB Seed coat
Penncozeb products
Phosrol
Polyram 80DG
Polyversum
Potato Seed piece fung. Dust
Presidio
Prevail
Previcur
Priaxor
Proline
Propiconazole E-AG
Propimax EC
ProPulse
Prosaro
Prosper EverGol
Protector-L
Protocol
PST 6% Plus Bark
Quadris Xtra, Quadris TOP MP
Quadris, Quadris Opti
Quash
Quilt, Quilt Xcel
Rancona products
Raxil Seed Treatment Products
Raxil PRO MD
Ranman
Bicosciences
Reason
Revus Top
Ridomil formulations
Roper DF Rainshield
Sativa
Satori
Scala
Sebring
Serenade
Signet
Sorghum Guard
SpiraTo 480 FS
Stamina
Switch 62.5WG
Stratego, Stratego YLD
Sulfur 6
Sulfur DF
Super Six
SuperTin 80WP, 4L
Tachigaren 70WP
Tanos
T-Methyl
TebuStar

Company
Bayer CropScience
DuPont
United Phosphorus Inc.
DuPont
United Phosphorus Inc
ADAMA
Syngenta/Crop Protection LLC
Merck
Valent
United Phosphorus Inc.
NuFarm
Gowan
Loveland
ADAMA
Valent
Wilbur Ellis
Wilbur Ellis
Wilbur Ellis
Syngenta/ISK BioSciences
Winfield Solutions
ADAMA
Wilbur Ellis
United Phosphorus Inc.
NuFarm
Loveland
Biopreparaty Co.
Wilbur Ellis
Valent
Trace
Bayer CropScience
BASF
Bayer CropScience
NuFarm
Dow
Bayer CropScience
Bayer CropScience
Bayer CropScience
Trace
Loveland Products
Simplot
Syngenta/Crop Protection LLC.
Syngenta/Crop Protection LLC.
Valent
Syngenta Crop Protection LLC.
Chemtura
Bayer CropScience
Bayer CropScience
Summit Agro USA/ISK

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## Addresses for personnel in NDSU Plant Pathology

<table>
<thead>
<tr>
<th>Address for personnel</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>USPS</td>
<td>BASF</td>
</tr>
<tr>
<td>Department of Plant Pathology</td>
<td>Twinline</td>
</tr>
<tr>
<td>NDSU Dept. #7660</td>
<td>NuFarm</td>
</tr>
<tr>
<td>PO Box 6050</td>
<td>Uniform</td>
</tr>
<tr>
<td>Fargo, ND 58108-6050</td>
<td>Syngenta/Crop Protection LLC.</td>
</tr>
<tr>
<td>Courier: Ex: Federal Express and UPS</td>
<td>Thioflurin</td>
</tr>
<tr>
<td>Department of Plant Pathology</td>
<td>Ultra Flourish</td>
</tr>
<tr>
<td>North Dakota State University</td>
<td>Uniform</td>
</tr>
<tr>
<td>Walster Hall, 306</td>
<td>Vibrance</td>
</tr>
<tr>
<td>Fargo, ND 58102</td>
<td>Vertisan</td>
</tr>
</tbody>
</table>

---

Pesticide certification information for the back of the weed, insect, or fungicide guide:

The printing cost for this publication was paid for in part by fees paid by certified North Dakota Pesticide Applicators and Dealers.

---

For information regarding pesticide certification, contact the North Dakota State University Extension Pesticide Program

NDSU Dept. 7060  
205 Walster Hall  
P.O. Box 6050  
Fargo, ND 58108-6050  
Phone (701) 231-7180 or 231-6388  
Fax 701-231-5907  
Email NDSU.pesticide@ndsu.edu  
www.ndsupesticide.org

For pesticide enforcement, compliance assistance, registration, and other regulatory issues, contact the Agriculture Chemical Division at the North Dakota Department of Agriculture

600 E. Boulevard Dept. 602  
Bismarck, ND 58505-0020  
Toll free 1-800-242-7535  
Phone (701) 328-2231  
FAX (701) 328-4567  
Email NDDA@nd.gov  
www.nd.gov/ndda