

# Plant Disease Control

## Integrated Plant Disease Management

### Cereals

#### Cereal Leaf Diseases

Cereal leaf diseases continue to hurt growers on two fronts: yield and quality. The following management practices are recommended for effective control of leaf diseases in all cereal crops, especially high-value barley.

**Scouting:** Scout fields prior to, during, and following flag leaf emergence to check for disease levels. Healthy flag and upper leaves are critical, since more than 50% of grain filling is contributed by upper leaves.

**Crop Rotation:** Rotate crops (e.g. wheat/oilseed/barley/pulse) to reduce the build-up of disease inoculum in crop residue. If at all possible, do not follow wheat with wheat or barley with barley. When a short rotation is absolutely necessary, seed in the second year a variety that is more resistant to an anticipated disease problem.

**Clean Seed:** Use certified seed and/or seed that has been tested at an accredited laboratory and is known to have low or no seed-borne disease. Treating with an appropriate fungicide will reduce the possibility of introducing seedborne inoculum into a field.

**Seed Treatments:** Seed treatments together with quality seed help emerging crops by controlling most seed-borne disease and allowing the crop to get a good start (quicker, more uniform plant emergence and better seedling vigour). Seed treatments protect young plants against seedling diseases but do not prevent later infection by cereal leaf diseases.

**Resistant Varieties:** Provincial crop/seed guides provide a comprehensive listing of the performance of adapted varieties, including their resistance status to specific diseases.

**Foliar Fungicides:** Foliar fungicides applied at the proper time in accordance with manufacturer's recommendations can control cereal leaf diseases and help to attain target yields. The greatest benefit occurs when disease pressure is high or with varieties that have poor resistance.

**Spraying Practices:** For maximum effectiveness, foliar fungicides should be applied preventively (when infection levels are low). Good spray coverage with minimal drift is essential. Ideally, the best time to spray is when the wind is light; humidity is above 60%; and air temperature is between 10 and 25°C.

#### Fusarium Head Blight

Fusarium head blight (FHB) of cereals causes a reduction in yield as a result of floret sterility and the loss of light weight kernels during combining. More important is the effect on grain quality and food safety. In Manitoba, FHB currently occurs throughout all crop regions and will damage wheat crops whenever environmental conditions favour the disease. In Saskatchewan, FHB is established in eastern regions but has occurred in other areas throughout the province.

For FHB to occur, three requirements must be met: the disease causing fungus must be present, a susceptible host grown, and environmental conditions favourable for infection and disease development. If any one of these factors is missing disease cannot occur; the severity of disease in the field is a result of the interaction of the above factors.

#### Field Management to Prevent Recurrence

Weather patterns are by far the greatest factor in the recurrence of FHB. The disease is most likely to develop when the plants are flowering, temperatures range from 15 to 30°C and moisture is continuous for 48 to 60 hours. If conditions remain warm and moist, the pathogen can continue to sporulate and spread to other kernels or heads. Under these optimum conditions, crop management has little impact on FHB outbreaks.

#### Crop Rotation and Selection

A break of at least one year – preferably two years – is advised between cereal, grass and corn production. Regardless of the rotation, producers should consider planting cereals that are less susceptible to FHB. Results from previous years show that durum wheat is more susceptible than hard red spring wheat varieties. Barley is more tolerant than wheat, and oats are more tolerant than either wheat or barley.

Avoid planting the more susceptible types of wheat in high risk areas such as the southern part of the Red River Valley and southeastern Saskatchewan. Planting two or more varieties of wheat with differing flowering times or varying planting dates will help reduce the risk of infection. Susceptible crops should definitely not be planted on infected corn stubble. Corn trash is slower to decompose than cereal trash, and acts as a source of inoculum for a

much longer time period. In fields of wheat on wheat stubble, the incidence was about one and a half times higher than in fields of wheat planted into pulse crop residue.

## Potatoes

One of the major threats to Manitoba and Saskatchewan's potato industry is the fungal disease late blight. At present, there are no fungicides registered for use on potatoes that are capable of eradicating the fungus once it is present. As a result, producers are forced to adopt preventive management to control this disease. One of the main components of this strategy is the application of fungicides at specified spray intervals. This interval varies with the type of fungicide used. Shortening or lengthening of this interval should be based on current weather conditions and the status of the disease in the crop.

In Manitoba and Saskatchewan, potato producers can make use of a weather-based late blight forecasting program. The purpose of this program is to predict when environmental conditions are most conducive to disease development and issue warnings based on those predictions.

Accurate weather monitoring and scouting techniques are very important for achieving the most effective use of fungicides. Combining precise weather monitoring with spray interval scheduling may lower input costs for the farmer and lead to a more productive, higher quality crop. These weather monitoring systems monitor key environmental variables, such as relative humidity, temperature, leaf wetness and precipitation.

The following management practices are recommended for effective control of late blight in potato crops.

**Scouting:** To effectively schedule preventative fungicide applications and eliminate unnecessary fungicide use, local weather forecasts should be used to identify conditions conducive to disease development. Scout fields to identify hot spots and other sources of disease when conditions are favourable.

**Crop Varieties and Disease Resistance:** Select varieties with resistance to late blight wherever possible. Where practical, the use of short season varieties may help reduce the period of use for fungicides.

**Healthy Seed:** Obtain seed from sources with effective disease management practices. The use of certified seed is recommended in Manitoba and legislated in Saskatchewan. Grade seed carefully while cutting and discard suspicious looking tubers and seed pieces.

**Sanitation and Cull Clean-up:** Follow a program of sanitation for storage facilities and equipment to eliminate sources of the disease. Avoid leaving tubers, including debris or slivers from seed cutting, in cull piles for any length of time. Dispose of cull piles in an approved manner so they do not serve as a source of late blight inoculum for future infections. Dispose by burying, using a cover, spreading out on the field over winter, or feeding to livestock.

**Cultural Practices and Rotation:** Use proper cultural practices including: rotate potato crops with non-late blight hosts; use proper hilling to reduce infection in tubers; increase spacings of plants to reduce canopy density; manage irrigation use to avoid increasing disease risk during prolonged periods of wetness; identify and destroy hot spots of infected fields; control weed hosts and remove and destroy volunteer potatoes.

## Canola

For the past 25 years, sclerotinia stem rot has been one of the two prominent diseases affecting canola in Manitoba and Saskatchewan. An important factor of disease development is environmental conditions. The disease is much more widespread and severe during wet years.

Fungicide applications are an important element in controlling the development and spread of sclerotinia. Fungicide spray decisions are based on soil moisture, weather conditions, crop stage and density, and the history of disease in your area.

The sclerotinia resting bodies require moist soil conditions for up to 10 days for germination to occur and the sporebearing structures (apothecia) to form. Usually these conditions do not occur until the crop canopy closes. The spores released from the apothecia utilize the canola petals as a food source and fall into the canola canopy where they infect individual plants. Lesions form up and down the stem, wilting leaves and eventually killing the plant. Fungicide should be applied between the 20 to 50% flower stages to protect the petals from being colonized by the spores.

## Pulse Crops

There are a variety of pulse crops produced in Manitoba and Saskatchewan including field pea, field bean, lentil, chickpea and soybean. Pulse crops are adapted to different regions and will require unique agronomic and disease management practices. Some diseases will attack all pulse crops, e.g. sclerotinia (white mould) and seedling/root rots caused by *Pythium*, *Rhizoctonia*, *Fusarium*, *Botrytis* species. Some diseases may occur on more than one type of pulse crop, but the pathogen species infecting each is specific to that crop. This is the case for the ascochyta blights, powdery mildews and anthracnose. It is important to source a variety of information on pulse disease control from grower organizations such as the Saskatchewan Pulse Growers ([www.saskpulse.com](http://www.saskpulse.com)), provincial specialists, and field diagnostic guides. Most foliar diseases are favoured by warm, moist conditions and lush crop canopies, but root rots and powdery mildew can be present in dry years as well. In general, pulse disease management will need to include the following practices:

**Use of clean seed and seed treatments:** Plant certified seed or seed that has been tested at an accredited lab and known to have zero or acceptable levels of seed-borne disease and high germination. Seed treatments will help protect seed and seedlings from low levels of seedborne and soilborne pathogens.

**Crop Rotation:** It is important to keep at least three years between the same type of pulse crop to allow for the breakdown of crop residue on which disease pathogens survive. Since there are diseases that affect more than one type of pulse crop, it is still important to maintain at least two years even between different pulse crops.

**Crop Varieties with Disease Resistance:** Refer to provincial seed guides for varieties adapted to your region. Choose varieties with disease resistance, when available.

**Scouting and Foliar Fungicide Application:** Begin crop scouting at the vegetative stages for aggressive diseases such as ascochyta blight in chickpea. Scout for other foliar diseases at early bloom, e.g. ascochyta blight and anthracnose in lentil. It is too late to apply fungicide to control sclerotinia (white mould) once symptoms are observed, so forecasting to determine risk is necessary.

There are now a number of foliar fungicides registered for pulse crops. Use foliar fungicides only when disease risk and potential loss are significant. Rotate fungicides from different fungicide groups to prevent the development of resistant pathogen populations.

## Resistance Management

Any fungal pathogen population may contain strains naturally resistant to a fungicide and other fungicides within the same Group. A gradual or total loss of disease control may occur over time if these fungicides are used repeatedly in the same fields. Other resistance mechanisms that are not linked to site of action but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance management strategies should be followed.

### To delay fungicide resistance:

- Where possible, rotate the use of a fungicide, and others within the same Group, with different Groups that control the same pathogens.
- Avoid application of more than the maximum number listed in the label. Also avoid consecutive sprays of a fungicide, or other fungicides in the same Group, in a season.
- Fungicide use should be based on an integrated pest management (IPM) program that includes scouting and accurate recording related to pesticide use and crop rotation. An IPM program also considers cultural, biological and other chemical control practices.
- Monitor treated fungal populations for signs of resistance development. If disease continues to progress after treatment with a product, do not increase the use rate. Discontinue use of the product and switch to another fungicide with a different target site of action, if available.
- Contact your local extension specialist or certified crop advisor for any additional pesticide resistance-management and/or IPM recommendations for specific crops and disease problems in your area.

Table 1: Fungicide Groups Based on Mode of Action

Group	Chemical Group/ Mode of Action	Foliar Fungicide Common Name	Seed Treatment Common Name
1	MBC/ inhibition of tubulin formation	Senator 70WP	Crown*, DCT*, Mertect SC, Senator-PSPT
2	Dicarboximides/ affect cell division, DNA/RNA synthesis and metabolism	Ronilan EG, Rovral Flo	Foundation Lite *
3	DMI/ inhibition of sterol biosynthesis	Propiconazole-based Fungicides, Folicur, Stratego 250EC*	Baytan 30, Charter, Dividend XL RTA*, Gemini*, Helix*, Helix XTra*, Raxil 250 FL
4	PA/ affect RNA synthesis	Ridomil Gold/Bravo*	Allegiance FL, Apron FL, Apron Maxx RTA*, Dividend XL RTA*, Helix*, Helix XTra*, Prosper FL*
7	Carboximides/ affect mitochondrial transport chain	Lance	Crown*, Gaucho CS FL*, Prosper FL*, Vitaflo 280*, Vitavax rs Fungicide*, Vitavax Single Solution
11	QoI/ inhibition of mitochondrial respiration	Headline EC, Quadris, Reason 500SC, Stratego 250EC*, Tanos 50 DF*	None
12	PP/ affect proteins involved in membrane permeability	None	Apron Maxx RTA*, Helix*, Helix XTra*, Maxim 480FS, Maxim PSP
15	Cinnamic acids/ affect cell wall synthesis	Acrobat MZ*, Acrobat 50WP	None
22	Benzamide/ inhibition of tubulin formation	Gavel 75 DF*	None
28	Carbamates/ affect cell membrane permeability	Tattoo C*	None
29	2,6-Dinitroanilines/ uncouples oxidative phosphorylation	Allegro 500F	None
M	Multi-site activity	Acrobat MZ*, Bravo 500, Copper-based Fungicides, Gavel 75 DF*, Kumulus DF, Mancozeb-based Fungicides, Polyram DF, Ridomil Gold/Bravo*, Tattoo C*	Agrox B-2, Agrox CD, Captan Flowable, DB-Red L, DCT*, Foundation Lite*, Gaucho CS FL*, Gemini*, Mancozeb-based Fungicides, Polyram 16D, Prosper FL*, Raxil T, Thiram 75WP, Vitaflo 280*, Vitavax rs Fungicide*
U	Cyanoacetamideoximes/ unknown	Curzate 60 DF, Tanos 50 DF*	None

\* Products contain more than one active ingredient and appear in more than one group.

**MBC** = Methyl Benzimidazole Carbamates

**DMI** = Demethylation Inhibitors (SBI Class I)

**PA** = Phenyl Amides

**QoI** = Quinone outside Inhibitors

**PP** = Phenyl Pyrroles

**SBI** = Sterol Biosynthesis Inhibitors

# Foliar Fungicide Tables

**Table 2. Foliar Fungicides for Disease Control in Potatoes**

FUNGICIDES	Page	Botrytis Gray Mould	Early Blight, Late Blight
Acrobat WP <sup>†</sup>	233	Ⓜ	
Acrobat MZ	233	•	
Allegro 500F	234	Ⓜ	
Bravo 500	235	•	•
Copper 53W	236	•	
Copper Spray	236	•	
Curzate 60 DF <sup>†</sup>	238	Ⓜ	
Dithane DG Rainshield NT	246	•	
Gavel 75 DF	239	•	
Headline EC	240	•	
Kocide 101	236	•	
Kocide 2000	236	•	
Kocide DF	236	•	
Lance	244	①	
Manzate DF	246	•	
Parasol Flowable	236	•	
Parasol WP	236	•	
Penncozeb 75 DF	246	•	
Polyram DF	247	•	
Quadris	250	•	
Reason 500SC	251	•	
Ridomil Gold/Bravo	252	•	•
Tanos 50 DF	257	•	
Tattoo C	258	Ⓜ	

<sup>†</sup> must not be used alone, only as a tank mix (consult individual label)

① early blight only

Ⓜ late blight only

**Note:** Before using any pesticide on potatoes, consult the list of Agricultural Pesticides Approved for Use, available from Simplot Canada and McCain Foods (Canada).

**Table 3. Foliar Fungicides for Disease Control in Cereals**

FUNGICIDES	Page	Wheat	Barley	Oats	Rye	Corn	Common Rust (Corn)	Crown Rust (Oats)	Leaf Rust	Stem Rust	Stripe Rust	Septoria (Wheat, Barley, Oats,)	Tan Spot (Wheat)	Net Blotch, Scald (Barley)	Powdery Mildew	Spot Blotch	Gray Leaf Spot (Corn)	Fusarium Head Blight
Bravo 500	235	X										①	•					④
Bumper 418EC	248	X	X	X				•	②	②	①	•	•	•	②			
Dithane DG Rainshield NT	246	X							①			①	•					
Headline EC	240	X	X		X	X	•		③		②	①	•	•	③	②	•	
Manzate DF	246	X							①			①	•					
Penncozeb 75 DF	246	X							①			①	•					
Stratego 250EC	256	X							①	①	①	①	•		①			
Tilt 250E	248	X	X	X				•	②	②	①	•	•	•	②			

① wheat only

② wheat and barley

③ wheat and rye

④ suppression only

**Table 4. Foliar Fungicides for Oilseed and Pulse Crops**

FUNGICIDES	Page	Canola	Beans	Chickpeas	Lentils	Peas	Soybeans	Alternaria Blackspot (Canola)	Anthracnose (Beans, Lentils)	Ascochyta Blight (Chickpeas, Lentils, Peas)	Bacterial Blight (Beans)	Blackleg (Canola)	Botrytis Gray Mould (Beans, Chickpeas, Lentils, Peas)	Downy Mildew, Anthracnose (Beans)	Frogeye Leaf Spot (Soybeans)	Mycosphaerella Blight (Peas)	Powdery Mildew (Peas)	Rust (Beans)	Sclerotinia White Mold (Canola, Beans)
Bravo 500	235			X	X	X			①	•						•			
Bumper 418EC	248	X	X									•							•
Copper 53W	236		X								•			•					
Dithane DG Rainshield NT	246				X			①	①										
Headline EC	240	X	X	X	X	X	X	•	•						•	•	•	•	
Kocide 101	236	X	X								•								
Kumulus DF	243					X											•		
Lance	244	X	X	X	X	X		•		•			④						⑤
Parasol Flowable	236		X								•								
Parasol WP	236		X								•								
Quadris	250	X	X	X	X	X		•	•	•		•				•			•
Ronilan EG	253	X	X										②						•
Rovral Flo	254	X						•											③
Senator 70 WP	255		X																②
Tilt 250E	248	X	X									•							•

- ① lentils only
- ② beans only
- ③ canola only
- ④ except beans
- ⑤ includes chickpeas & lentils

**Table 5. Foliar Fungicides for Disease Control in Specialty Crops**

FUNGICIDES	Page	Alfalfa grown for seed	Canaryseed	Bluegrass, Fescues and Ryegrass grown for seed	Common Leaf Spot (Seed Alfalfa)	Leaf and Stem Spot Diseases	Leaf Rust, Stem Rust (Grass Seed)	Powdery Mildew (Grass Seed)	Septoria (Canaryseed)
Bumper 418EC			X						①
Dithane DG Rainshield NT	241	X				•			
Headline EC	235	X		X	•		•	①	
Tilt 250E	252	X							①

- ① suppression only

# Acrobat MZ/ Acrobat 50 WP Fungicide Group – 15, M

(Refer to page 230)

## Company:

BASF Canada  
 Acrobat MZ - PCP# 24546  
 Acrobat 50 WP - PCP# 27700

## Formulation:

Acrobat MZ - 9% dimethomorph and 60% mancozeb formulated as a wettable powder. Container size - 10 kg.

Acrobat 50 WP - 50% dimethomorph formulated as a wettable powder. Container size - 1.82 kg.

## Crops:

Potatoes.

## Diseases Controlled:

**Acrobat MZ** - Early and late blight. Reduction of late blight tuber rot.

**Acrobat 50 WP** - Late blight. Reduction of late blight tuber rot.

## Crop Stage:

Make the first application when the disease threatens or when the first visible signs of disease occur in the field or nearby. Apply every 5 to 7 days under high disease pressure or every 7 to 10 days under low disease pressure. Do not apply more than 3 times per season. It is recommended to apply this product alternately with a fungicide having a different mode of action. Under high level of late blight infection, apply after top kill to control tuber blight.

## How it Works:

**Acrobat MZ** has protectant, systemic and antisporulant activity. The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity. The active ingredient dimethomorph penetrates into the leaf tissue and moves within the leaf.

**Acrobat 50 WP** has protectant, systemic and antisporulant activity. The active ingredient dimethomorph penetrates into the leaf tissue and moves within the leaf.

## Cost (2005 suggested retail price):

**Acrobat MZ** - \$32.90/acre.

**Acrobat 50 WP** - \$26.59/acre.

## Rate:

**Acrobat MZ** - Apply at 1.0 kg per acre.

**Acrobat 50 WP** - Apply at 182 g per acre. Do not apply Acrobat 50 WP alone. This fungicide must be tank mixed one of the following fungicides: Polyram DF, Dithane DG Rainshield, or Bravo 500, at the recommended product label rate.

## Water Volume:

Use sufficient water to obtain adequate spray coverage.

Ground - 80 L/acre.

Aerial - minimum 20 L/acre.

## Tank Mixes:

**Acrobat MZ** - None registered.

**Acrobat 50 WP** - Must be tank mixed with one of the following fungicides: Polyram DF, Dithane DG Rainshield, or Bravo 500

## Restrictions:

**Rainfall:** Do not apply when rain is expected within 2 - 3 hours. Apply to dry foliage.

**Preharvest Interval:** Acrobat MZ - 14 days. Acrobat 50 WP - 4 days

**Recropping:** Do not replant in treated area within 120 days of last application.

**Environment:** Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. This product is highly toxic to aquatic organisms. Do not apply within 100 m of streams, ponds, rivers and lakes when applying by air and within 50 m when applying by ground. When using Acrobat 50 WP consult the labels of the tank mix partner and observe the largest buffer zone of the product used in the tank mix.

**Storage:** Store under cool, dry conditions in secure, well ventilated buildings away from food or feed.

**Resistance:** Plant disease fungi can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecast and recommendations.

## Hazard Rating:

Caution: Potential skin sensitizer.

# Allegro 500F

Fungicide Group – 29  
(Refer to page 230)

## Company:

Syngenta – PCP# 27517

## Formulation:

40% fluazinam. Container size – 2 x 10 L.

## Crops:

Potatoes

## Diseases Controlled:

Late blight

## Crop Stage:

Begin applications when the plants are 15-20 cm tall or when conditions favour disease development. Repeat application at 7-10 day intervals. Do not make more than 10 applications in a season.

## How it Works:

Fluazinam is a pyridinamine fungicide with protective (contact) activity.

## Cost (2005 suggested retail price):

\$16.00/acre.

## Rate:

0.16 L/acre.

## Water Volume:

80-240 L/acre. Spray volumes vary with amount of plant growth; apply in sufficient water to obtain adequate coverage of foliage.

## Tank Mixes:

None registered.

## Restrictions:

**Application:** Do not apply by air.

**Resistance:** This product is a Group 29 fungicide and is considered to have low risk of resistance development. It is recommended to not rely exclusively on the same product for pest control. Prolong the effectiveness of this product by not making more than 3 consecutive applications before alternating to a fungicide with a different mode of action. Use as part of an integrated pest management program.

**Preharvest interval:** 14 days

**Re-cropping:** Can be replanted with potatoes as soon as practical after the last application, 30 days for other root crops and leafy vegetables, and 70 days for all other crops. Fluazinam will carry over, do not use in areas treated with this product during the previous season.

**Environment:** Do not apply during periods of dead calm or when winds are gusty. Do not contaminate aquatic habitats when cleaning and rinsing spray equipment or containers. Do not overspray non-target terrestrial or aquatic habitats.

## Precautions:

Keep out of reach of children. Causes skin irritation. Harmful if swallowed or absorbed through skin. Avoid contact with eyes. Wear coveralls over long sleeved shirt, long pants, chemical resistant gloves, socks and footwear. Avoid breathing spray mist.

## Hazard Rating:



Caution Poison

Warning - skin irritant.

Potential skin sensitizer.

# Bravo 500

## Fungicide Group – M

(Refer to page 230)

### Company:

Syngenta PCP# 15723

### Formulation:

500 g/L chlorothalonil formulated as a suspension.  
Container sizes - 2 x 10 L case, 200 L drum.

### Crops:

Wheat (all wheat including durum & winter wheat), potatoes, lentils, chickpeas and field peas.

### Diseases Controlled:

**Wheat** - Tan Spot, Septoria Glume Blotch, Septoria Leaf Spot. Suppression of Fusarium Head Blight (Scab).

**Potatoes** - Early and late blight, Botrytis vine rot.

**Lentils** - Anthracnose and Ascochyta blight.

**Chickpeas** - Ascochyta blight

**Peas** - Mycosphaerella blight

### Crop Stage:

**Wheat** - For control of Tan Spot and Septoria, begin application at flag leaf emergence and repeat 10 to 14 days later when ears are visible. A third application when ears are fully emerged may be necessary, if conditions favour disease spread. For suppression of Fusarium Head Blight apply Bravo at early flowering. For best results, this application must be made before flowering has started in the majority of tillers and before the beginning of weather favouring disease. Do not make more than 3 applications per season. Rates and number of applications will depend upon disease severity and weather conditions.

**Potatoes** - Begin application when plants are 6 to 8 inches (15 to 20 cm) high or when disease threatens. Repeat applications at 7 to 10-day intervals or as necessary to maintain disease control. Under severe disease conditions use the higher rates at 7-day intervals.

**Lentils** - One application, must occur at early flowering. Two applications - first application before flowering when bud formation is evident. Second application must occur at early to mid-flowering, 10 to 14 days after the first application, but before rows close in to form a dense canopy. Rates and number of applications will depend upon disease and weather conditions.

**Chickpeas** - Make first application at early flowering and remaining applications at 10-day intervals. Do not make more than 3 applications per season. Rate and number of applications will depend upon disease severity and weather conditions.

**Peas** - Begin application at early flowering and repeat 10 days later at early pod set or mid-flowering if necessary. Make a third application 10 to 14 days after the second application at pod fill or later flowering should conditions remain favourable for disease. Do not make more than 3 applications per season. Rates and the number of applications will depend upon disease severity and weather conditions.

### How it Works:

The active ingredient chlorothalonil is a chloronitrile fungicide with contact activity.

### Cost (2005 suggested retail prices):

\$7.02 to \$11.70/acre for wheat.

\$5.62 to \$11.70/acre for potatoes.

\$9.36 to \$18.72/acre for lentils.

\$9.36 to \$18.72/acre for chickpeas.

\$9.36 to \$14.04/acre for peas.

### Rate:

**Wheat** - 0.6 L to 1 L/acre for the control of Tan Spot and Septoria.

0.8 L to 1 L/acre for the suppression of Fusarium Head Blight.

**Potatoes** - 0.48 to 1 L/acre for control of late blight. 0.65 to 1 L/acre for control of early blight and botrytis stem rot.

**Lentils** - 0.8 to 1.6 L/acre.

**Chickpeas** - 1.2 to 1.6 L/acre for first application. 0.8 to 1.2 L/acre for subsequent applications.

**Peas** - 0.8 L to 1.2 L/acre for the control of Mycosphaerella blight.

### Water Volume:

Volume will vary with amount of plant growth. Use sufficient water to obtain adequate spray coverage. Spray volume will usually range from 90 to 640 L/acre for dilute sprays and 20 to 40 L/acre for concentrate sprays. For aerial application, use the recommended rate in a minimum of 12 L/acre.

**Chickpeas** - 90 L/acre. Ground application

## Tank Mixes:

**Fungicides:** On potatoes, Bravo may be applied with Quadris for the control of early blight. Do not apply sequential applications of this tank mix and do not exceed 3 tank mix applications per season. Do not apply to potatoes later than 2 days before harvest.

Do not combine with pesticides, surfactants or fertilizers unless prior use has shown the combination physically compatible and non-injurious under your conditions of use.

**Herbicides:** On lentils, do not apply in combination with Poast herbicide and Merge surfactant or within 48 hours of the application of Poast and Merge.

**Fertilizers:** None registered.

**Insecticides:** None registered.

## Restrictions:

**Grazing:** Do not graze treated areas. Do not feed straw from treated crop to livestock.

**Preharvest Interval:** Potato - 1 day.

Lentils and chickpeas - 48 days.

Wheat - 30 days.

Peas - 32 days.

**Recropping:** None.

**Application:** On lentils do not make more than 2 applications in the same season. On chickpeas, wheat and peas, do not make more than 3 applications per season. Do not apply by air for chickpeas.

**Storage:** Store in a cool, dry, ventilated place. Protect from excessive heat.

**Environment:** Do not apply if weather conditions favour drift from area being treated. Do not contaminate lakes, streams or ponds. Allow a buffer zone of 15 m between area being treated and aquatic systems for ground applications and a buffer zone of 100 m for aerial application.

**Re-entry:** Do not re-enter treated area within 48 hours. If required, and at least 4 hours have passed since application, individuals may re-enter treated area for short-term tasks not involving hand labour. Long pants, long-sleeved shirt, and chemical resistant gloves must be worn.

## Hazard Rating:

Warning, causes severe eye damage.

# Copper-based Fungicides

Fungicide Group – M  
(Refer to page 230)

## Copper 53W/Copper Spray/Kocide 101/Kocide 2000/Kocide DF/ Parasol WP/Parasol Flowable

### Company:

United Agri Products, (Copper 53W – PCP# 09934, Copper Spray – PCP# 19146)

E.I. du Pont Canada Company (Kocide 101 – PCP# 14417, Kocide 2000 - PCP# 27348, Kocide DF – PCP# 24538)

Nufarm (Parasol WP – PCP# 24671, Parasol Flowable PCP# 25901)

### Formulation:

**Copper 53 W** - 53% tribasic copper sulphate formulated as a wettable powder.

Container size - 10 kg.

**Copper Spray** - 50% copper oxychloride formulated as a wettable powder.

Container size - 10 x 2 kg case.

**Kocide 101** - 50% copper as copper hydroxide formulated as a wettable powder.

Container size - 5 kg.

**Kocide 2000** - 35% copper as copper hydroxide formulated as a dry flowable

Container size - 10 kg.

**Kocide DF** - 40% copper as copper hydroxide formulated as a dry flowable.

Container size - 10 kg.

**Parasol WP** - 50% copper equivalent as copper hydroxide formulated as a wettable powder.

Container size - 10 kg.

**Parasol Flowable** - 24.4% copper equivalent as copper hydroxide formulated as a flowable.

Container size - 10L.

### Crops:

Potatoes, beans.



**Restrictions:**

**Application:** Do not apply Copper Spray, Copper 53W, Kocide 2000, Kocide 101, Parasol Flowable, and Parasol WP by air.

**Storage:** Store in cool, dry, ventilated area, away from feed or food. Keep away from heat, fire and sparks.

**Preharvest Interval:** 1 day.

**Environment:** Do not apply or allow to drift onto streams or any body of water.

**Hazard Rating:**

Warning Poison (Copper 53W, Copper Spray)



Caution Poison (Kocide 101, Kocide 2000, Parasol Flowable, Parasol WP)



Danger Poison (Kocide DF)

**Curzate 60 DF**

**Fungicide Group – U**  
(Refer to page 230)

**Company**

E.I du Pont Canada Company PCP# 26284

**Formulation:**

60% cymoxanil formulated as a dry flowable.  
Container size - 1.8 kg

**Crops:**

Potatoes

**Diseases Controlled:**

Late blight

**Crop Stage:**

Use Curzate 60 DF only in a tankmix with Manzate DF. Do not use Curzate 60 DF alone.

Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5 to 7 day intervals. Apply no more than 7 applications per crop.

**How it Works:**

The active ingredient cymoxanil is a highly active, locally systemic fungicide. It works at several levels of preventative, curative and inhibitive (against sporulation) activity.

The active ingredient mancozeb in Manzate DF is a dithiocarbamate fungicide with contact activity.

**Cost** (2005 suggested retail price):

\$11.65/acre.

**Rate:**

Apply Curzate 60 DF at 0.09 kg/acre  
Plus  
Manzate DF at 0.54 - 0.65 kg/acre

**Water Volume:**

Utilize sufficient water to obtain thorough coverage: 80 to 400 L/acre.

**Tank Mixes:**

Do not use Curzate 60 DF alone. Use only in a tank mix with Manzate DF.

**Restrictions:**

**Rainfall:** Curzate is rainfast within 2 hours after application.

**Re-entry:** Do not re-enter treated area within 24 hours.

**Preharvest Interval:** 8 days

**Application:** Do not apply by air.

**Storage:** Store product in original container in a secure, dry area away from food or feed. Protect against humid air and water. Not for use or storage in or around the home. Keep container tightly closed.

**Environment:** A buffer zone of 50m is required between the down-wind edge of the boom and sensitive aquatic habitats such as ponds, lakes, rivers, streams, and wetlands. Do not contaminate these habitats when cleaning and rinsing equipment or containers. Do not clean sprayer near well or water source or near desirable vegetation.

## Hazard Rating:

 Danger Poison

# Gavel 75 DF

**Fungicide Group – 22, M**  
(Refer to page 230)

## Company:

Dow AgroSciences PCP# 26842

## Formulation:

66.7% mancozeb and 8.4% zoxamide formulated as a dry flowable. Container sizes: 3.5 kg, 20 kg, 25 kg

## Crops:

Potatoes

## Diseases Controlled:

Early and late blight

## Crop Stage:

Optimum disease control is achieved when the fungicide is applied in a regularly scheduled preventative spray program. Begin applications at the first sign of disease or when blight is reported in the area. Apply at 0.90 kg/acre every 7 days under high disease pressure when either disease is present and environmental conditions favour continued disease development. Gavel 75 DF can be applied at 0.68 kg/acre every 7 days under low disease pressure and environmental conditions unfavorable for disease development. Do not apply more than 6 applications per season.

## How it Works:

The active ingredient zoxamide is a benzamide fungicide with contact activity.

The mancozeb component is a dithiocarbamate fungicide with contact activity.

## Cost (2005 suggested retail price):

\$13.33 to \$17.65/acre.

## Rate:

Apply at 0.68 to 0.90 kg/acre

## Nozzles:

**Ground** – generally hollow cone, disc – D5 to D7. Consult spray nozzle accessory catalogues for specific information on proper equipment calibration.

**Aerial** – hollow cone brass nozzles with a D-series orifice disc and core (whirlplate) are recommended. Nozzles should point straight down or slightly backward.

## Water Volume:

Thorough, uniform coverage is essential for good disease control.

**Ground** – 90 L/acre.

**Aerial** – 18 to 36 L/acre. Use 36 liters of water under high disease pressure to provide better crop coverage.

## Effects of Weather:

Must be dry on plant leaf prior to rainfall.

## Tank Mixes:

None registered.

## Restrictions:

**Preharvest Interval:** 3 days.

**Recropping:** A 30 day plant back interval (PBI) is required for leafy vegetables and root and tuber vegetables. For all other crops not included on the label, the PBI should be 140 days.

**Storage:** Do not allow product to freeze. Keep away from fire and sparks. Store in a cool, dry, well ventilated place away from feed or food.

### Environment:

**Ground application** – a buffer zone of 25m for application by ground sprayer should be established between the last spray swath and the edge of aquatic systems. A buffer zone of 5m for application by ground sprayer should be established between the last spray swath and the edge of terrestrial habitats such as hedgerows, windbreaks, woodlots, vegetative strips and other vegetation.

**Aerial application** – a buffer zone of 20m is required between the downwind edge of the boom and the closest edge of sensitive aquatic habitats.

**Re-entry:** do not re-enter treated areas within 48 hours of application.

## Hazard Rating:

**Caution** – causes moderate eye irritation. This product is a dermal sensitizer. Avoid contact with skin, eyes or clothing.

# Headline EC

## Fungicide Group – 11

(Refer to page 230)

## Company:

BASF Canada PCP# 27322

## Formulation:

250 g/L of pyraclostrobin formulated as an emulsifiable concentrate

Container size: 6.5 L jug; 104 L tote

## Crops and Staging:

**Alfalfa (Seed production only):** Apply at the beginning of flowering (10-30% bloom) or at the onset of disease. Do not make more than 1 application per year. Do not apply by air.

**Wheat, barley, rye:** For control of leaf diseases apply single application immediately after flag leaf emergence; use higher rate to obtain extended protection; apply second application 10 to 14 days later if disease persists or weather conditions are favourable for disease development.

**Corn:** For optimum disease control begin all applications prior to disease development and continue on a 7 to 14 day interval if conditions are conducive to disease development.

### Chickpea, lentil, dry field pea, dry field bean, faba bean:

Apply at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (anthracnose in lentil, ascochyta blight in chickpea); apply a second application 10 to 14 days later if disease persists or weather conditions are favourable for disease development. Anthracnose in lentils and ascochyta blight in chickpeas both develop quickly once established so early detection is critical.

**Potatoes:** Apply prior to row closure when conditions become favourable for the development of disease (whichever comes first); use higher rates and shorter spray intervals under heavy disease pressure; do not make more than 6 applications of Headline per season.

**Grasses grown for seed (bluegrass, fescue, ryegrass):** Apply prior to disease development; apply second application 14 to 21 days later if disease conditions persist.

## How it Works:

The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad spectrum preventive and curative fungicide.

## Cost (2005 suggested retail price):

\$16.57/acre at the 0.16 L/acre rate.

## Crops, Diseases Controlled and Rates:

### Cereals (Ground and aerial application)

Crop	Diseases controlled:	Rates (L / acre):
Wheat	Tan spot ( <i>Pyrenophora tritici-repentis</i> ) Septoria leaf spot ( <i>Septoria tritici</i> ; <i>S. nodorum</i> ) Leaf rust ( <i>Puccinia recondita</i> )	0.12 – 0.24
	Powdery mildew ( <i>Erysiphe graminis</i> f. sp. <i>tritici</i> ) Spot blotch ( <i>Cochliobolus sativus</i> ) Stripe rust ( <i>Puccinia striiformis</i> )	0.16 – 0.24
Barley	Net blotch ( <i>Pyrenophora teres</i> )	0.12 – 0.24
	Scald ( <i>Rhynchosporium secalis</i> ) Spot blotch ( <i>Cochliobolus sativus</i> ) Stripe rust ( <i>Puccinia striiformis</i> )	0.16 – 0.24
Rye	Leaf rust ( <i>Puccinia recondita</i> )	0.12 – 0.24
	Powdery mildew ( <i>Erysiphe graminis</i> )	0.16 – 0.24
Corn*	Common rust ( <i>Puccinia sorghi</i> )	0.16 – 0.24

\* Ground application only.

### Pulses (Ground and aerial application)

Crop	Diseases controlled:	Rates (L / acre):
Chickpea	Ascochyta blight ( <i>Ascochyta</i> spp.)	0.16 – 0.24
Lentil	Anthracnose ( <i>Colletotrichum truncatum</i> ) Ascochyta blight ( <i>Ascochyta</i> spp.)	0.16
Field pea	Mycosphaerella blight ( <i>Mycosphaerella</i> spp.) Powdery mildew ( <i>Erysiphe</i> spp.)	0.16
Dry beans ( <i>Phaseolus</i> spp.)	Anthracnose ( <i>Colletotrichum</i> spp.) Powdery mildew ( <i>Erysiphe</i> spp.) Rust ( <i>Uromyces</i> spp.)	0.16
Faba bean	Powdery mildew ( <i>Erysiphe</i> spp.) Rust ( <i>Uromyces</i> spp.)	0.16

### Grasses grown for seed (Ground application only)

Crop	Diseases controlled:	Rates (L / acre):
Bluegrass; fescue; ryegrass	Leaf and stem rust ( <i>Puccinia recondita</i> ; <i>P. graminis</i> ) Powdery mildew – suppression ( <i>Erysiphe graminis</i> )	0.16 – 0.27

### Alfalfa grown for seed (Ground application only)

Crop	Diseases controlled:	Rate (L / acre):
Alfalfa for seed production	Common leaf spot ( <i>Pseudopeziza medicaginis</i> )	0.16

**Soybeans (Ground and aerial application only)**

Crop	Diseases controlled:	Rates (L / acre):
Soybeans	Frogeye leaf spot ( <i>Cercospora sojina</i> )	0.16 – 0.24

**Potato (Ground application only)**

Crop	Diseases controlled:	Spray interval:	Rates (L / acre):
Potato	Early blight ( <i>Alternaria solani</i> ) Late blight ( <i>Phytophthora infestans</i> )	7 to 14 days 5 to 7 days	0.18 – 0.27 0.18 – 0.27

**Water Volume:**

**Ground:** Use a minimum water volume of 40 L/acre on cereals, pulses and grasses and 80 L/acre on potatoes. Ensure thorough coverage of foliage.

**Aerial:** Use a minimum water volume of 20 L/acre. Ensure thorough coverage of foliage. Use the highest rate recommended for the disease being controlled.

**Tank Mixes:**

None registered.

**Restrictions:**

**Resistance:** Like any fungicide with a single mode of action, the quinone outside inhibitor fungicides, while highly effective, may result in resistant strains of fungi where they have been overused or misused.

When applying multiple applications in one season, pay close attention to the labelled recommendations for resistance management such as using labelled rates, rotating to fungicides outside group 11 and not exceeding the maximum number of applications per season.

**Grazing:** Do not graze treated corn crops within 6 days of last application. Do not feed alfalfa hay or forage to livestock. All other crops listed can be grazed or fed to livestock.

**Preharvest interval:** Cereals – apply no later than the end of flowering. Corn – 7 days, Pulses – 30 days. Grasses – 14 days. Soybeans – 21 days, Potatoes – 3 days.

**Recropping:** Crops listed on label may be planted immediately following last application. Wait 14 days before planting all other crops.

**Application:** Do not apply during periods of dead calm or when winds are gusty. For late blight control in potatoes, do not make more than one application of Headline before rotating to a different mode of action.

**Environment:** Avoid overspray or drift to sensitive habitats. Maintain specified buffer zones.

**Storage:** Store in a cool, dry, locked, well-ventilated area. Do not freeze.

**Hazard Rating:**

Danger Poison

Danger - Skin and eye irritant

# Kumulus DF

**Fungicide Group – M**  
(Refer to page 230)

## Company:

BASF Canada PCP# 18836

## Formulation:

80% sulphur formulated as a water dispersible granular. Container size - 25 kg bag.

## Crop:

Field peas.

## Disease Controlled:

Powdery mildew.

## Crop Stage:

Spray at first appearance of disease and repeat at 7 to 10 day intervals as necessary.

## How it Works:

The active ingredient sulphur is an inorganic fungicide with contact activity.

## Cost (2005 suggested retail price):

\$1.77/acre.

## Rate:

0.6 kg/acre (one bag treats 41 acres).

## Water Volume:

Minimum of 40 L/acre. Higher water volumes may be required later in the growing season. Use sufficient water volume to thoroughly cover all foliage.

## Effects of Weather:

Do not apply when rain or night frost is expected. Do not apply if temperature is above 27°C (in shade) and high humidity prevails, or if any of the above conditions are expected within 3 days after treatment. Do not apply under intense sunshine. Do not apply when weather favours drift.

## Tank Mixes:

Kumulus DF is miscible and compatible with Polyram DF. Do not mix with dinitro compounds, tetradifon or oils.

## Restrictions:

**Preharvest Interval:** 1 day.

**Application:** Do not apply by air. Avoid drift onto neighbouring crops.

**Storage:** Keep away from heat, fire or sparks. Store in cool, dry, locked, well-ventilated area without floor drain.

**Caution:** Drift to off-target crops may cause leaf burn.

# Lance

**Fungicide Group – 7**  
(Refer to page 230)

## Company:

BASF Canada PCP# 27495

## Crops:

Canola, dry beans, lentils, chickpeas, peas, and potatoes.

## Formulation:

70% boscalid formulated as a water dispersible granular (WDG).

Container size - 2 x 2.83 kg per jug.

## Crops, Diseases Controlled and Rates:

Crop*	Disease	Application Rate (g/acre)	Application Timing
Canola	Sclerotinia stem rot ( <i>Sclerotinia sclerotiorum</i> )	142	Apply at 20-50% flowering. Apply a second time 7-14 days later up to 50% bloom if disease persists, or weather conditions are favourable for disease development.
	Black spot** ( <i>Alternaria brassicae</i> and <i>A. raphani</i> )	142	Apply at late flowering to early green pod to control black spot.
Dry beans	White mold ( <i>Sclerotinia sclerotiorum</i> )	227 – 312	Apply at 20-50% flowering. Apply a second time 7-14 days later if disease persists, or weather conditions are favourable for disease development. Use the higher rate to obtain extended protection and maximum yield benefit.
Chickpeas Lentils	Ascochyta blight ( <i>Ascochyta spp.</i> ) White mold ( <i>Sclerotinia sclerotiorum</i> ) Gray mold ( <i>Botrytis cinerea</i> )	170	Apply at the beginning of flowering. Apply a second time 7-14 days later if disease persists, or weather conditions are favourable for disease development.
Peas***	Ascochyta blight ( <i>Ascochyta spp.</i> ) Mycosphaerella blight ( <i>Mycosphaerella spp.</i> ) Gray mold ( <i>Botrytis cinerea</i> )	170	Apply at the beginning of flowering. Apply a second time 7-14 days later if disease persists, or weather conditions are favourable for disease development.
Potatoes	Early blight	70 – 126	Apply prior to disease development and at 14 day intervals if conditions continue to favour disease development.

\* Refer to the label for crops not detailed above. \*\* Suppression at the 20-50% bloom stage. \*\*\* DO NOT apply by air

**How it Works:**

The active ingredient boscalid is an anilid fungicide. It provides a protective effect because it inhibits spores and spore germination.

**Cost** (2005 suggested retail prices):

\$22.58/acre for canola.  
\$36.10 to \$49.61/acre for beans.

**Water Volume:**

**Aerial Application:** Use a minimum water volume of 16 L/acre. Ensure thorough coverage of foliage.

**Ground Application:** Use a minimum water volume of 40 L/acre and ensure thorough coverage of foliage

**Application:**

The product should be used in a preventative spray program and applied as a protectant. When mixing use vigorous agitation. Do not allow the product to sit more than one hour without further vigorous agitation prior to application.

**Ground or Aerial Application:** Canola, dry beans, chickpeas and lentils.

**Ground Application Only:** Potatoes, peas.

**Crop-Specific Restrictions and Limitations:**

Crop*	Minimum Time from Application to Harvest (PHI)	Maximum Rate Per Acre Per Application (grams)	Maximum Number of Applications per season	Maximum Rate Per Acre Per Season (grams)
Beans, Dry	21 days	312	2	624
Canola	21 days	142	2	284
Chickpeas	21 days	170	2	340
Lentils	21 days	170	2	340
Peas	21 days	170	2	340
Potatoes	30 days	128	4	504

\* Refer to the label for crops not detailed above.

**Rainfall:** If rainfall is imminent, delay application.

**Grazing Restrictions:** All crops can be grazed or fed to livestock.

**Re-Entry Interval:** Do not re-enter treated area for 4 hours after application or until dry.

**Drift:** Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed

**Recropping:** A plant back restriction of 14 days is required for all crops not on the label.

**Effects of Weather:**

Apply under favourable conditions to minimize or avoid the occurrence of drift. Aerial drift is increased under certain meteorological conditions therefore do not apply when wind speed is greater than 16 km/hour at flying height at the site of application

**Tank Mixes:**


None registered.  
Do not tank mix with any other products.

**Restrictions:**

**Resistance:** Like any fungicide with a single mode of action, they are highly effective but may result in resistant strains of fungi where they have been overused or misused. Do not apply more than 2 applications of Lance fungicide before rotating to a different mode of action.

When applying multiple applications in one season, pay close attention to the labelled recommendations for resistance management such as using labelled rates, rotating to fungicides outside group 7 and not exceeding the maximum number of applications per season.

**Hazard Rating:**

 Caution Poison  
Potential Skin Sensitizer  
Warning - Eye Irritant

# Mancozeb-based Fungicides

Fungicide Group – M  
(Refer to page 230)

Dithane DG Rainshield NT/Manzate DF/Penncozeb 75 DF

## Company:

Dow AgroSciences (Dithane DG Rainshield NT – PCP# 20553)

E.I du Pont Canada Company (Manzate DF – PCP# 21057)

Cerexagri; distributed by United Agri Products (Penncozeb 75 DF – PCP# 25397)

## Formulations:

Dithane DG Rainshield NT - 75 % mancozeb formulated as a dispersible granule. Container size - 20 kg.

Manzate DF - 75 % mancozeb formulated as a dry flowable granule. Container sizes - 20 kg, 2.5 kg.

Penncozeb 75 DF - 75 % mancozeb formulated as a dry flowable powder. Container sizes - 20 kg.

## Crops:

Potatoes

Wheat

Lentils (Dithane DG Rainshield NT only)

Seed alfalfa (Dithane DG Rainshield NT only)

## Diseases Controlled:

	DITHANE DG RAINSHIELD NT	MANZATE DF PENNCOZEB 75 DF
Wheat	Tanspot, leaf rust, Septoria leaf blotch	Tanspot, leaf rust, Septoria leaf blotch
Lentils	Anthracnose and ascochyta blight	
Potatoes	Early and late blight	Early and late blight
Seed Alfalfa	Leaf spot and stem spot diseases	

## Crop Stage:

**Potatoes** - Apply when plants are 4 to 6 inches (10 to 15 cm) high; repeat at 7 to 10-day intervals. Start with low rate and increase to maximum as foliage develops. The spray interval may be reduced to 5 to 6 days during periods of wet weather favoring late blight and/or vigorous crop growth.

**Wheat** - May be applied early (when crop is in the 3 leaf to tillering stage) and/or late (when head is fully emerged, but prior to flowering). Do not make more than 2 applications per season.

**Lentils** - Apply the first application before flower when bud formation is evident. A second application should be applied 10 to 14 days after the initial application, but before rows close in to form a dense canopy. If conditions for disease development persist, a third application may be applied 10 to 14 days later. Do not apply more than 3 applications of Dithane DG per season.

**Seed Alfalfa** - Apply first application prior to 50% bloom. Repeat 7 to 10 days after the first application and 10 days after the second application. Do not make more than 3 applications per season.

## How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

## Cost (2005 suggested retail prices):

\$3.64 to \$7.95/acre.

## Rates:

**Potatoes** - 0.45 to 0.90 kg/acre.

**Wheat (early)** - 0.45 kg/acre; **wheat (late)** - 0.9 kg/acre.

**Lentils** - 0.9 kg/acre.

**Alfalfa** - 0.6 kg/acre.

## Nozzles:

Dithane DG Rainshield NT - flat fan.

## Water Volume:

Thorough, uniform coverage is essential for good disease control.

Manzate DF - 80 to 400 L/acre by ground sprayer; 20 to 32 L/acre by air.

Penncozeb 75 DF - 40 L/acre for ground application; 18 L/ac for aerial application

Dithane DG Rainshield NT - 40 to 80 L/acre for ground application; 18 L/acre for aerial application.

### Effects of Weather:

Dithane DG Rainshield NT - must be dry on plant leaf prior to rainfall; approximately 1 hour is required without rainfall at moderate temperatures and humidity.

### Tank Mixes:

None registered.

For Dithane DG Rainshield NT, add other co-applied fungicides, insecticides, growth regulators, micronutrients and spray adjuvants to the tank last. Do not let Dithane DG Rainshield NT settle out in unagitated spray tank.

### Restrictions:

**Grazing:** Do not graze or feed treated straw or plant tops to livestock.

**Preharvest Interval:** Potatoes - 1 day.

Lentils - 35 days.

Wheat - 40 days.

**Storage:** Store in cool, dry, well-ventilated place. Keep away from fire and sparks.

**Environment:** Do not apply if weather favours drift from areas treated. Do not apply to water or wetlands.

### Hazard Rating:



Warning Poison - Eye irritant

## Polyram DF

Fungicide Group - M  
(Refer to page 230)

### Company:

BASF Canada PCP# 20087

### Formulation:

80% metiram formulated as dry flowable.

Container size - 20 kg.

### Crops:

Potatoes.

### Diseases Controlled:

Early blight, late blight

### Crop Stage:

Apply at 7 to 10 day intervals using 0.45 to 0.71 kg/acre until plants cover the row. Then increase the rate to 0.91 kg/acre until tops are killed, or use 0.45 to 0.71 kg/acre at 5 to 7 day intervals starting when plants are 15 cm high and continuing until top killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case.

### How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity.

**Cost** (2005 suggested retail price):

\$3.71 - 7.51/acre.

### Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** Polyram DF can be mixed with liquid fertilizers after a physical compatibility test has been conducted.

**Insecticides:** Mixtures with Diazinon or Malathion should be prepared immediately prior to use and not allowed to stand in the tank.

**Fungicides:** None registered.

### Rates:

0.45 to 0.91 kg/acre

### Water Volumes:

**Ground application:** 40 to 80 L /acre.

**Aerial application:** 22 L /acre.

### Nozzles:

Hollow cones or flat fans recommended.

**Restrictions:**

**Resistance:** Where possible, rotate the use of Polyram DF or other group M fungicides with different modes of action that control the same pathogens.

**Grazing:** Do not use treated crop parts for feed or food.

**Preharvest Interval:** May be applied up to the day before harvest.

**Recropping:** None.

**Storage:** Store in a cool, dry place away from flame or sparks. If product becomes wet or overheated, effectiveness is reduced and flammable vapors may be produced. Do not freeze.

**Environment:** Do not apply when environmental conditions favor drift from treated area. Do not contaminate domestic or irrigation water, lakes, streams or ponds by the cleaning of equipment or otherwise.

**Hazard Rating:**

Caution: Potential skin sensitizer.

# Propiconazole-based Fungicides

Tilt 250E/Bumper 418 EC

**Fungicide Group – 3**  
(Refer to page 230)

**Company:**

Syngenta (Tilt 250E PCP# 19346)

Makhteshim-Agan; distributed by United Agri Products (Bumper 418 EC - PCP #28107)

**Formulations:**

Tilt 250E - 250 g/L propiconazole formulated as an emulsifiable concentrate. Container sizes - 5 L, 4 x 5 L.

Bumper 418 EC - 418 g/L propiconazole formulated as an emulsifiable concentrate. Container size - 10 L

**Crops:**

Winter and spring wheat (including hard red, durum, Canada Prairie, soft white)

Spring Barley

Oats

Canaryseed

Canola

Corn

Beans

Soybeans (grown for seed)

Timothy

**Diseases Controlled:**

CROP	DISEASES CONTROLLED
Wheat	Septoria leaf spot, Tan spot, Septoria glume blotch, Stripe rust, Powdery mildew, Leaf and stem rust
Barley	Spot blotch, Net blotch, Scald, Leaf rust, Stem rust, Septoria leaf spot, Powdery mildew
Oats	Septoria leaf blotch, Crown rust
Corn	Rust, Northern leaf blight
Canola	Blackleg
Beans (kidney, navy and white)	Rust
Soybeans (grown for seed)	Frogeye leaf spot
Timothy	Purple eyespot

## Diseases Suppressed:

Canaryseed – Septoria leaf mottle

## Crop Stage:

**Wheat, barley, oats:** Apply at the very early stage of disease development, anytime from the beginning of stem elongation to before the head is half emerged. Best results have been achieved when applied just when the flag leaf emerges. Tilt 250E last about 3 weeks in the plant. If conditions favourable to disease continue, another application may be necessary. The second application is usually applied at the time of head emergence.

**Canaryseed:** Apply at emergence of flag leaf.

**Canola:** Apply during the rosette stage (after second true leaf and prior to bolting).

**Beans:** Apply at the first detection of disease in the field. A second application may be made 14 to 21 days later.

## How it Works:

The active ingredient propiconazole is a triazole fungicide with broad-spectrum systemic activity.

## Cost (2005 suggested retail price):

Tilt 250E - \$13.97/acre.

Bumper 418 EC - \$7.55/acre.

## Rate:

Tilt 250E - 0.2 L/acre. One 5 L container treats 25 acres.

Bumper 418 EC - 0.12 L/acre.

## Water Volume:

**Ground:** Minimum 80 L/acre.

**Air:** 16 to 20 L/acre.

## Nozzles:

**Ground:** Flat fan.

**Air:** Flat fan or hollow cone.

## Tank Mixes:

**Herbicides:** In wheat and barley only, Tilt 250E or Bumper 418 EC may be applied with: 2,4-D amine, estimine 2,4-D, MCPA amine, estimine MCPA, Bucril-M or Pardner. In wheat only, Tilt 250E or Bumper 418 EC may be applied with Horizon.

To ensure weed and disease control:

1. Weeds and crops must be at correct growth stage.
2. Tank mixes of Tilt 250E or Bumper 418 EC and Bucril-M, Horizon or Pardner can only be applied by ground.
3. 2,4-D and MCPA formulations can be applied by ground or air.

**Fertilizers:** Tilt 250E or Bumper 418 EC may be applied with small amounts of nitrogen. Rate of actual N not to exceed 4 kg/acre (9lb/acre). Add the nitrogen to the spray tank before adding Tilt 250E or Bumper 418 EC. Excessive nitrogen or application during hot weather may result in crop injury. Do not add nitrogen when tank-mixing Tilt 250E or Bumper 418 EC with a herbicide.

**Insecticides:** In field corn, Tilt 250E or Bumper 418 EC can be applied with only one of the following: Matador or Ripcord.

**Fungicides:** None registered.

## Effects of Weather:

If rainfall occurs within 1 hour of application, reapplication is necessary. For aerial application, wind speed should be less than 18 km/hr to avoid drift. High humidity and low temperature (10 to 20°C) allow for better deposition of spray droplets.

## Restrictions:

**Grazing:** Do not graze animals on treated green crops within 3 days of application. Do not feed straw treated with herbicide tank mixes to livestock.

**Preharvest Interval:** Wheat, oats, barley - 45 days. Canola - 60 days. Corn - 14 days if tank-mixed with an insecticide. Beans - 28 days. Soybeans - 50 days.

**Recropping:** None.

**Aerial Application:** On timothy, do not apply by air.

**Storage:** Do not freeze.

**Environment:** Do not contaminate food or feed. This pesticide is toxic to fish. Do not spray any body of water by direct application, drift or by cleaning equipment.

## Hazard Rating:



Caution Poison

# Quadris

## Fungicide Group – 11

(Refer to page 230)

### Company:

Syngenta PCP# 26153

### Formulation:

250 g/L azoxystrobin formulated as a flowable suspension concentrate

Container size – 4 x 3.78 L jugs

### Crops:

Canola, chickpeas, lentils, peas, beans and potatoes

### Diseases Controlled:

**Canola** - Blackleg, Sclerotinia stem rot and Alternaria black spot.

**Chickpeas** - Ascochyta blight.

**Lentils** – Anthracnose and Ascochyta blight.

**Field Peas** – Mycosphaerella blight

**Beans** – Anthracnose

**Potatoes** – Early blight and Late blight; Rhizoctonia stem rot, stolon canker and black scurf

### Crop Stage:

#### Canola

**Blackleg:** Apply at the 2 to 6 leaf stage of canola.

**Sclerotinia stem rot:** Apply at early bloom (prior to 30% bloom). This will also suppress alternaria black spot.

**Alternaria black spot:** Apply at early pod stage (90% petal fall).

#### Chickpeas, Lentils, Field Peas, Beans

Make first application no later than onset of flowering. Second application 10 to 14 days later.

### How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) used as a broad spectrum preventative and curative fungicide.

### Cost (2005 suggested retail price):

\$20.37/acre for control of blackleg and alternaria black spot.

\$28.51 to \$40.73/acre for control of sclerotinia stem rot.

\$20.37/acre per application on legumes.

\$20.37 to \$32.59/acre per application on potatoes.

### Rate:

#### Canola

**Blackleg and alternaria black spot:** Use 0.2 L/acre.

**Sclerotinia stem rot:** Use 0.28 to 0.4 L/acre. Use the higher rate if there is a history of sclerotinia stem rot infection in the area and when conditions favour development (heavy crop canopy, high humidity and/or excessive rain).

#### Chickpeas, Lentils, Field Peas, Beans

For each application use 0.2L/acre.

#### Potatoes

**Early blight:** 0.2 to 0.32 L/acre starting prior to disease development

**Late blight:** 0.32 L/acre starting prior to disease development

**Rhizoctonia stem rot, stolon canker and black scurf:** (in-furrow treatment) 4 to 6 mL/100m of row, applied at planting.

### Water Volume:

**Ground:** Use sufficient water volume to obtain adequate coverage. Use minimum 40 L/acre. In-furrow treatment in 20 to 57 L/acre.

**Aerial:** Use minimum of 18 L/acre. Ensure uniform application.

### Tank Mixes

**Herbicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** On potatoes, Quadris may be applied with Bravo for the control of early blight. Do not apply sequential applications of this tank mix and do not exceed 3 tank mix applications per season. Do not apply to potatoes later than 2 days before harvest.

## Restrictions:

**Resistance:** Like any fungicide with a single mode of action, the quinone outside inhibitor fungicides, while highly effective, may result in resistant strains of fungi where they have been overused or misused.

When applying multiple applications in one season, pay close attention to the labelled recommendations for resistance management such as using labelled rates, rotating to fungicides outside group 11 and not exceeding the maximum number of applications per season.

**Grazing:** Do not feed dried pea vines to livestock.

**Preharvest Interval:** Canola - 30 days. Legumes – 15 days. Potatoes – 1 day; 90 days for in-furrow application

**Recropping:** Do not plant broadleaf or root crops within 30 days of application. Do not plant cereals within 45 days of application.

**Application:** In-furrow application: Mount the spray nozzle so that spray is directed into the furrow as a 15-20 cm band just before the seed is covered. Do not apply through irrigation equipment.

Do not exceed 2 applications or 0.56 L/acre per season on legume crops. Do not exceed 3 applications or 0.96 L/acre per season on potatoes. Do not apply sequential treatments of Quadris to potatoes but apply in alternation with fungicides that have a different mode of action and to which disease resistance has not developed.

Do not apply if rainfall is imminent. Do not apply during periods of dead calm, when winds are gusty or when wind speed is greater than 15 km/hr at 2 m above ground at the site of application.

**Environment:** For ground application maintain a 1 m buffer zone between areas sprayed and aquatic systems.

For aerial application allow a 6 m buffer zone. Quadris can be extremely phytotoxic to certain apple varieties. Do not apply where there is the possibility of spray drift reaching apple or crabapple trees.

**Storage:** Store in a cool, dry, well-ventilated area. Do not store below 0°C

## Hazard Rating:

None.

# Reason 500SC

Fungicide Group – 11  
(Refer to page 230)

## Company:

Bayer CropScience PCP# 27462

## Formulation:

500 g/L fenamidone. Container sizes – 2, 4 or 10 L.

## Crops:

Potatoes.

## Diseases Controlled:

Early and late blight.

## Crop Stage:

Begin application when plants are 15 to 20 cm high or when disease threatens. Apply a fungicide with a different mode of action within 7 to 10 days after each application using the shorter interval when conditions favor disease development. Ensure even application.

## How it Works:

The active ingredient fenamidone is a member of the strobilurin class of chemistry and has preventative and protectant activity, inhibiting spore germination and sporulation.

## Cost (2005 suggested retail price):

\$7.92/acre.

## Rate:

Apply at 80 mL per acre as a tank mix with either Dithane DG\* at 500 g/ac or Bravo 500 at 500 mL/ac. \*When using other formulations of mancozeb, adjust application rates to apply 375 g active ingredient per acre.

## Tank Mixes:

**Herbicides:** None registered.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** To be applied ONLY as a tank mix with mancozeb-based fungicides or Bravo 500. Follow mixing instructions provided on the label.

## Restrictions:

**Application:** Do not apply by air or through any type of irrigation system. Do not exceed 6 applications or 0.48 L/ac in a year. Alternate with fungicides having a different mode of action.

**Resistance:** The strobilurin fungicides, while highly effective, have quickly led to resistant strains of fungi where they have been overused or misused. Especially where multiple applications in one season are considered, pay close attention to the labeled recommendations for resistance management.

**Rainfall:** Reason is rainfast within 2 hours of application.

**Preharvest Interval:** 14 days.

**Recropping:** A 30 day plantback interval is required for potatoes and all other crops.

**Environment:** Maintain an 8 m buffer zone between areas sprayed and aquatic systems. Toxic to fish and other aquatic organisms; do not apply where runoff is likely to occur.

**Storage:** Do not allow product to freeze. If stored more than 1 year, shake well before using. Keep away from fire, open flame or other sources of heat. Store in tightly closed container away from fertilizer, seeds, feed or food.

## Hazard Rating:

Caution: Eye Irritant.

# Ridomil Gold/Bravo

**Fungicide Group – 4, M**  
(Refer to page 230)

## Company:

Syngenta PCP# 26443

## Formulation:

500 g/L chlorothalonil and 480 g/L metalaxyl-M in a Twin-Pak Jug. Container size - 8.83 L.

## Crops:

Potatoes.

## Diseases Controlled:

Early blight, late blight, late blight tuber rot, Botrytis vine rot. Suppression of Pythium leak and Pink rot.

## Crop Stage:

Begin preventive applications, early in the season when conditions are favorable for disease, (before infection), but no later than when the plant foliage meets within the row uniformly across the field. Apply a second and third application at 14-day intervals. The labelled rate of a registered contact fungicide should be applied 7 days after each application. Do not make more than three applications per season.

## How it Works:

The metalaxyl component is an acylalanine fungicide with systemic activity.

The chlorothalonil component is a chloronitrile fungicide with contact activity.

**Cost** (2005 suggested retail price):  
\$30.43/acre.

**Rate:**

One 8.83 L jug treats 10 acres. The entire contents of the jug must be added to the spray tank or an improper mixture will result.

**Water Volume:**

**Ground:** use sufficient water to ensure thorough coverage of foliage. Use a water volume of 90 to 640 L/acre.

**Aerial:** use a minimum water volume of 20 L/acre.

**Tank Mixes:**

None registered.

**Restrictions:**

**Resistance:** Strains of late blight resistant to metalaxyl may develop especially when applied after disease is present. If late blight develops in the field, contact government Potato Specialist or Plant Disease Specialist.

**Application:** Do not make more than 3 applications per season.

**Storage:** Protect from excessive heat.

**Environment:** Do not apply where runoff is likely to occur. Do not use on coarse textured gravelly soils, soils with less than 2% organic matter or in areas where the water table may be high. Avoid application when weather favors drift. Avoid application by ground or air near or around bodies of water. Do not contaminate streams or ponds by spray drift, by cleaning equipment, or disposal of wastes. A buffer zone of 100 m for aerial application and 15 m for ground application should be observed to protect water bodies.

**Hazard Rating:**



Warning Poison

Warning, causes severe eye damage.

# Ronilan EG

**Fungicide Group – 2**  
(Refer to page 230)

**Company:**

BASF Canada PCP# 24894

**Formulation:**

50% vinclozolin formulated as an extruded granular fungicide.

Container size - 12 kg (1.2 kg/PVC bag, 2 x 1.2 kg/pouch, 5 x 2.4 kg/pouch per box).

**Crops:**

Canola, beans.

**Disease Controlled:**

**Canola** - Sclerotinia stem rot.

**Beans** - Sclerotinia (white mold) and Botrytis (grey mold).

**Crop Stage:**

**Canola** - Apply once at 20 to 50% bloom, usually 4 to 8 days after first blooms appear in field. For two applications, apply first at early bloom (20 to 30%) with a second application 7 days later at late bloom (50%) if the disease persists or weather conditions are favourable for disease development.

**Beans** - Apply at early to mid bloom (30 to 50%). Apply a second time 7 to 14 days later at full bloom if disease persists, or weather conditions are favourable for

**How it Works:**

The active ingredient vinclozolin is an dicarboximide fungicide with contact activity.

**Cost** (2005 suggested retail prices):

**Canola** - \$13.67 to \$27.33/acre

**Beans** - \$27.33 to \$41.00/acre

**Rate:**

**Canola** - For one application, 0.30 to 0.40 kg/acre. The high rate is used when conditions favor sclerotinia development (heavy crop canopy, high humidity, and/or excessive rain).

For split applications, 0.2 kg/acre per treatment at early bloom (20 to 30%) and again 7 days later at late bloom (50%).

**Beans** - 0.4 kg/acre if using 2 applications/year, 0.6 kg/acre if using 1 application/year. Do not apply more than 0.8 kg/acre per season.

**Water Volume:**

**Canola (by ground)** - 45 to 90 L/acre.

**Canola (by air)** - Use minimum 16 L/acre.

**Beans (by ground only)** - Use sufficient spray volume to obtain thorough coverage of foliage. Use 10 to 20 gallons/acre (45 to 90 L/acre).

**Pressure:**

Minimum 275 kPa (40 psi).

**Effects of Weather:**

Do not apply if rain or frost is expected. If rainfall is imminent, delay spraying. Do not treat plants at very low temperatures. Do not apply to any crops that have been stressed due to conditions such as flooding, drought, etc. For aerial application, apply when wind is less than 8 km/hr.

**Tank Mixes:**

**Herbicides:** None registered.

**Fertilizers:** Do not tank mix products that may contain boron.

**Insecticides:** Lorsban and Pyrinex. See label for details on rates. Ronilan EG must be added first to mix.

**Fungicides:** None registered.

**Restrictions:**

**Grazing:** Do not allow livestock to graze on treated crop.

**Preharvest Interval:** 45 days for beans, 40 days for canola.

**Storage:** Store in original, tightly closed container in cool, dry, locked, well ventilated area without floor drain. Ronilan may be frozen.

**Environment:** For ground application, maintain 15 m buffer zone between area sprayed and aquatic systems, for aerial application allow a 100 m buffer zone.

**Hazard Rating:**

Caution Poison

# Rovral Flo

**Fungicide Group – 2**

*(Refer to page 230)*

**Company:**

Bayer CropScience PCP# 24378

**Formulation:**

240 g/L iprodione formulated as a liquid flowable.  
Container size - 8.4 L.

**Crop:**

Canola.

**Diseases Controlled:**

Sclerotinia stem rot and Alternaria black spot.

**Crop Stage:**

**Sclerotinia stem rot:** Apply when the canola crop is in the 20 to 50% bloom stage. This will be approximately 4 to 8 days after the canola crop begins to flower. Best protection will be achieved when the fungicide is applied at the 20 to 30% bloom stage - prior to petals beginning to fall. Rovral Flo fungicide can be applied until the 50% bloom stage - when the canola crop is at its maximum yellow color, and prior to significant petal fall.

**Alternaria black spot:** Apply as a single spray at early green pod, or as split application: the first at full bloom, followed by a second application at early green pod stage. Early green pod stage occurs when almost all canola pods are fully formed and still green with only a few flowers or undeveloped pods remaining at the top of the plant. Good coverage of plants is essential.

### How it Works:

The active ingredient iprodione is a dicarboximide fungicide with protective and eradicant activity.

### Cost (2005 suggested retail price):

\$16.46, \$22.21 or \$32.66/acre.

### Rate:

**Sclerotinia stem rot (white mold):** 0.63, 0.85 or 1.25 L/acre. The 0.85 L/acre rate is the recommended for most canola crops, however, use of the higher rate is recommended for fields with a history of severe disease pressure. Split applications: 0.42 to 0.63 L/ac at 20 percent bloom stage followed by 0.42 L/ac at 50 percent bloom stage.

**Alternaria black spot:** A single application of 0.85 L/acre at early green pod. Split applications: 0.42 L/acre at full bloom followed by 0.42 L/acre at early green pod stage of canola.

### Water Volume:

**Ground:** 40 L/acre

**Air:** Not less than 18 L/acre

### Nozzles:

Flat fan or hollow cone for ground and properly calibrated aerial equipment.

### Tank Mixes:

None registered.

Rovral should not be mixed with other pesticides, adjuvants or fertilizers except where stated.

### Effects of Weather:

Do not spray in heavy dew or when rain is imminent within one hour. Spraying should be carried out in crosswind where possible. Avoid spraying in a dead calm and when wind speeds exceed 20 km/hr.

### Restrictions:

**Application:** Do not make more than 2 applications per season

**Preharvest Interval:** 38 days

**Storage:** Protect from frost.

### Hazard Rating:



Caution Poison

# Senator 70WP

Fungicide Group – 1

(Refer to page 230)

### Company:

Engage Agro Corporation PCP# 25343

### Formulation:

70% thiophanate-methyl formulated as wettable powder.

Container size - 2 kg.

### Crop:

White beans.

### Diseases Controlled:

Sclerotinia (white mold).

### Crop Stage:

Apply when conditions favour disease development (i.e., warm, humid weather and heavy, dense foliage). This usually occurs during early bloom stage, prior to rows closing in. If conditions favouring disease persist, repeat applications may be warranted.

**How it Works:**

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

**Cost:** (2005 suggested retail price)  
\$57.65 to \$74.09/acre.

**Rate:**

0.7 to 0.9 kg/acre (one container treats 2.14 to 1.67 acres).

**Water Volume:**

40 to 90 L/acre (by ground).  
20 to 24 L/acre (by air).

**Nozzles:**

Ground - Flat fan.  
Air - Hollow cone.

**Tank Mixes:**

None registered.  
Senator 70WP is compatible with most pesticides.  
Do not mix with lime or other alkaline materials.

**Restrictions:**

**Resistance:** Experience has shown that strains of fungi resistant to thiophanate-methyl may develop in treated crops.

**Grazing:** Do not feed or allow livestock to graze on treated crops.

**Storage:** Store in a dry place.

# Stratego 250EC

**Fungicide Group – 3, 11**  
(Refer to page 230)

**Company:**

Bayer CropScience PCP# 27528

**Formulation:**

125 g/L propiconazole and 125 g/L trifloxystrobin formulated as an emulsifiable concentrate. Container size - 2 x 8 L case

**Crops:**

Spring Wheat (including Hard Red, Durum, Canada Prairie, Soft White) and Winter Wheat

**Diseases Controlled:**

Septoria leaf blotch, Tan spot, Powdery mildew, Leaf and Stem rust, Stripe rust

**Crop Stage:**

Single application – 4-leaf stage up to early heading (GS 14 to 55).

Two applications – First at 4-leaf to flag leaf stage. Second before early heading but not within 14 days of first application.

Apply at the very early stages of disease development. Typically, one application from tillering up to flag leaf emergence is required.

**How it Works:**

The active ingredient propiconazole is a triazole fungicide with broad spectrum systemic activity.

The active ingredient trifloxystrobin is a strobilurin fungicide with broad spectrum preventative activity.

**Cost** (2005 suggested retail price):  
\$10.81/acre.

**Rate:**

0.2 L/acre.

**Water Volume:**

**Ground:** 40 to 80 L/acre)

**Air:** Not less than 20 L/acre

**Effects of Weather:**

If rain occurs within one hour of application, reapplication may be necessary.

Avoid spraying in a dead calm or when winds are gusty.

**Tank Mixes:****Herbicides:**

**Crop:** In wheat (winter, spring, durum) Stratego 250EC may be applied with Buctril M at 0.4 L/acre when plants are at the 4-leaf stage up to the early flag leaf stage. In spring wheat and durum only, Stratego 250 EC may be applied with Buctril M at 0.4 L/acre plus Puma<sup>120</sup> Super at 0.155 or 0.310 L/acre when plants are at the 4-leaf stage up to the 3rd tiller stage. Do not apply Stratego 250EC mixed with Puma<sup>120</sup> Super 2-3 days prior to or following cold temperatures (3°C or lower) as crop injury may occur.

**Fertilizers:** None registered.

**Insecticides:** None registered.

**Fungicides:** None registered.

**Restrictions:**

**Application:** Do not make more than 2 applications per season.

**Grazing:** Do not graze or harvest as forage if 2 applications made in one season. If a single application is made, do not allow livestock to graze or harvest as forage within 30 days after application.

**Preharvest Interval:** 45 days

**Recropping:** A plant back restriction of 14 days is required for all crops not on the label

**Environment:** Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed.

**Hazard Rating:**

Danger – Eye irritant, potential skin sensitizer

# Tanos 50 DF

**Fungicide Group – 11, U**  
(Refer to page 230)

**Company:**

E.I. duPont Canada Company PCP# 27435

**Formulation:**

25% famoxadone and 25% cymoxanil as a dry flowable.

**Crops:**

Potatoes.

**Diseases Controlled:**

Early and late blight.

**Crop Stage:**

Make the first application following one or two applications of a preventative broad spectrum fungicide such as chlorothalonil or mancozeb. Tanos may be applied on a 7-day interval, but it is recommended to alternate with a fungicide having a different mode of action to prevent resistance.

**How it Works:**

The active ingredient cymoxanil is a highly active, locally systemic fungicide. It works at several levels of preventative, curative and inhibitive (against sporulation) activity. The active ingredient famoxadone is a member of the strobilurin class of chemistry used as a broad spectrum preventative and curative fungicide.

**Cost** (2005 suggested retail price):

N/A

**Rate:**

Apply at 225 to 340 g/ acre.

**Water Volume:**

Use sufficient water to obtain thorough coverage. With a conventional sprayer use no less than 100 to 120 L/ acre. With an air-assisted sprayer use no less than 44 L/ acre. Ground application only.

**Effects of Weather:**

Do not apply during periods of dead calm or when winds are gusty. Tanos Fungicide must not be applied to any crop suffering from stress as a result of drought, water logging, low temperatures, insect attacks, nutrient or lime deficiency or other factors reducing crop growth.

**Tank Mixes:**

None registered.

**Restrictions:**

**Application:** Do not apply Tanos to more than 500 acres per day. Do not apply by air. Do not make more than 6 applications per year. Tank mix solutions containing boron may affect product solubility. When using boron containing solutions, add the correct amount of Tanos first and boron containing solution last.

**Resistance:** Plant diseases can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecast and recommendations.

**Rainfall:** Rainfast within 12 hours of application.

**Preharvest Interval:** 14 days.

**Recropping:** Crops that are on the product label (potatoes and field tomatoes) may be planted back at any time. A 30-day plantback interval is required for cereal grains. All other crops may be planted following a 1 year interval.

**Re-entry:** Do not re-enter treated areas within 24 hours of application.

**Environment:** Toxic to fish and aquatic organisms. Observe prescribed buffer zones. Toxic to birds, mammals and harmful to beneficial arthropods. Minimize off-target drift to reduce the effects on wildlife at the field boundary. Do not apply to areas prone to run-off and delay spraying if rainfall is imminent.

**Hazard Rating:**



Warning Poison

Eye Irritant.

# Tattoo C

**Fungicide Group – 28, M**  
(Refer to page 230)

**Company:**

Bayer CropScience PCP# 24544

**Crops:**

Potatoes.

**Formulation:**

375 g/L propamocarb HCl and 375 g/L chlorothalonil formulated as a suspension. Container size - 10 L.

**Disease Controlled:**

Late blight.

**Crop Stage:**

Begin applications when conditions are favorable for disease, but before infection, and continue on 7 to 14-day intervals until threat of disease is over. Use the 7-day interval when the risk and conditions for disease are high. To avoid resistance, rotating and alternating applications with fungicides having different modes of action is recommended if multiple fungicide applications are required. Make no more than 3 applications per season.

**How it Works:**

The active ingredient propamocarb HCl is a carbamate fungicide with systemic activity. Chlorothalonil is a chloronitrile fungicide with contact activity.

**Cost** (2005 suggested retail price):

\$27.14/acre

**Rate:**

1.09 L per acre.

**Water Volume:**

80 to 120 L/acre.

**Tank Mixes:**

None registered.

**Restrictions:**

**Application:** Do not apply by air. Treatment with any product containing chlorothalonil must be separated by a minimum of 7 days.

**Resistance:** Plant disease fungi can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecasts and recommendations.

**Grazing:** Do not feed treated crops to livestock.

**Preharvest Interval:** 7 days.

**Recropping:** Do not plant a new crop in the treated area within 120 days of the last application.

**Re-entry:** Do not re-enter treated areas within 48 hours after treatment. If required, individuals may re-enter treated areas within 48 hours for short tasks not involving hand labour, provided that 4 hours have passed since application and that long pants and a long-sleeve shirt are worn.

**Storage:** Keep away from fire, open flame or other sources of heat. Do not store below freezing. Store the tightly closed container away from seeds, fertilizers, plants and food-stuffs.

**Environment:** Do not apply directly to water or areas where surface water is present. Do not apply where runoff is likely to occur. Do not contaminate water when disposing of equipment wash waters. Allow a buffer zone of 15 m around bodies of water when applying.

**Hazard Rating:**

Danger – Corrosive to eyes

Potential skin sensitizer

**Tilt 250E**

See Propiconazole-based Fungicides



# Agrox B-2/Agrox CD

Fungicide Group – M  
(Refer to page 230)

## Company:

Norac Concepts Inc.  
(Agrox B-2 – PCP# 26956; Agrox CD – PCP# 26957)

## Formulation:

**Agrox B-2:** 33.5% captan, 11% diazinon.  
**Agrox CD:** 15% captan, 15% diazinon.  
Products formulated as wettable powders.  
Container sizes: Agrox B-2 - 2.0 kg; Agrox CD - 0.6 kg

## Crops and Staging:

Corn, beans, soybeans, peas. Seed treatment.

## Diseases Controlled:

**Agrox B-2:** Seedling blight and seed rot.  
**Agrox CD:** To supplement previous fungicide treatment for seedling blight and seed rot.

## Insects Controlled:

Seed corn maggot.

## Cost (2005 suggested retail prices):

**Agrox B-2:** \$3.46 per 25 kg seed (\$3.68 for corn);  
\$13.84 per 100 kg seed (\$14.72 for corn)  
**Agrox CD:** \$1.69 per 25 kg seed; \$6.76 per 100 kg seed

## Rate:

**Agrox B-2:**  
*Dry application:* 320 g (340 g for corn) per 100 kg of seed.  
*Slurry machines:* adjust to apply 1240 mL (1260 mL for corn) of slurry per 100 kg of seed and use 250 g of seed treatment per L of water.  
*Mixing in bucket (25 kg of seed):* 84 g seed treatment per 500 mL of water per 25 kg of seed.  
**Agrox CD:** 200 g per 100 kg of seed

## How it Works:

The active ingredient captan is a phthalimide fungicide with contact activity. The diazinon component is an organophosphate insecticide with contact and stomach activity.

## Registered Mixes:

Use Agrox CD only on seed previously treated with captan or thiram; do not use on seed already treated with an insecticide (other than methoxychlor or malathion). Do not use Agrox B-2 on seed already treated with an insecticide.

## Restrictions:

**Use:** Seed within one month of treatment.

**Storage:** Store in a cool, dry place. Treated seed must be labelled as follows: "Poisonous to man and animals. This seed has been treated with diazinon for the control of insects, and captan for disease control. Do not use for food or feed purposes. Do not sell to oil mills."

**Environment:** Do not contaminate food, feed, or any body of water.

**Resistance:** Any insect or fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate these products with insecticides/ fungicides with a different mode of action.

## Precautions:

Keep out of reach of children. Do not mix with unprotected hands; use rubber gloves. Wash hands, face and arms thoroughly after handling. Do not breathe in mist or dust. When treating or handling treated seed, work in a well-ventilated area and wear a suitable respirator, goggles, clothing and gloves.

## Hazard Rating:



Danger Poison

Warning, Agrox B-2 contains the allergen soy.

# Apron FL/Allegiance FL

Fungicide Group – 4  
(Refer to page 230)

## Company:

Bayer CropScience  
(Apron FL – PCP# 24262; Allegiance FL – PCP# 26674)

## Formulation:

317 g/L metalaxyl formulated as a liquid seed treatment.  
Container size: 3.79 L.

## Crops and Staging:

Alfalfa, beans, chickpeas, canola, clover, corn, grasses, low tannin lentils, peas, sainfoin, soybeans, sunflowers, and vetch. Crops for export only - wheat, barley, oats, rye, bird's-foot trefoil and sorghum.

Seed treatment.

## Diseases Controlled:

Seed rots and seedling blights caused by *Pythium* spp., early season *Phytophthora* of soybeans, and downy mildew of sunflowers. Also (for export purposes only) downy mildew of peas, corn, and sorghum.

## Cost (2005 suggested retail price):

\$195.88 per L.

## Rates and Water Volumes:

Use the high rate if planting into cold, wet soils.

## Rates for crops processed in Canada:

CROP	APRON FL or ALLEGIANCE FL (L per 100 kg seed treated)	WATER (L required to make up a total volume of 0.5 L)	KG SEED TREATED PER 3.79 L JUG
Chickpeas*, dry peas*	0.016 - 0.11	0.484 - 0.39	23,625 - 3,436
Canola (rapeseed)*, processing peas	0.032 - 0.11	0.468 - 0.39	11,812 - 3,436
Sainfoin, vetch, alfalfa, beans, clover, corn	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436
Grasses (forage), soybeans	0.046 - 0.093	0.454 - 0.407	8,217 - 4,064
Grasses (turf)	0.093	0.407	4,064
Sunflowers (high rate is for downy mildew control)	0.11 - 0.189	0.39 - 0.311	3,436 - 2,000
Low tannin lentils	0.016	0.484	23,625

\*low rate provides good *Pythium* protection for 2 to 3 weeks.

## Rates for crops to be exported:

CROP	APRON FL or ALLEGIANCE FL (L per 100 kg seed treated)	WATER (L required to make up a total volume of 0.5 - 0.62 L)	KG SEED TREATED PER JUG
Corn (downy mildew)	0.189 - 0.62	0.311 - 0	2,000 - 609
Peas (downy mildew)	0.146	0.354	2,589
Sunflowers (downy mildew)	0.62	0	609
Cereals ( <i>Pythium</i> )	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436
Sorghum ( <i>Pythium</i> )	0.093 - 0.11	0.407 - 0.39	4,064 - 3,436
Sorghum (downy mildew)	0.189	0.311	2,000
Bird's-foot trefoil	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436

## Registered Mixes:

Compatible on the seed with the following products:

Alfalfa, Peas	Thiram 75WP
Beans	Vitaflo 280
Low tannin lentil	Crown

## Application Information:

Apron FL and Allegiance FL should be mixed with water to form a slurry seed treatment. Apron FL and Allegiance FL contain no colourant. An appropriate colourant such as Prolzed Colourant must be added to slurry before treating seed.

When preparing the slurry the following procedure should be used:

1. Partially fill the mixing tank with water.
2. Add the required quantity of Apron FL or Allegiance FL onto the water surface.
3. Allow products to disperse and switch on agitation.
4. Top up with extra water to required volume and maintain agitation during use.
5. Add colourant last.

Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and/or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test prior to treating.

## How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity.

## Restrictions:

### Use:

1. Treated seed must not be used for food, feed or oil processing.
2. Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure that treated seed is properly incorporated at planting.
3. Treated seed must be labelled as follows; **“This seed has been treated with Apron FL or Allegiance FL seed protectant which contains metalaxyl. Do not use for feed, food or oil processing.”**

**Storage:** Do not store above 35°C or below 0°C. Store in original container, away from pesticides, food or feed. All bags containing seed for export must be labelled “FOR EXPORT ONLY.”

**Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

**Resistance:** Experience has shown that strains of fungus resistant to metalaxyl may develop. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate Apron FL and Allegiance FL with fungicides with a different mode of action in your disease control program.

## Hazard Rating:

Warning – Skin and eye irritant.

# Apron Maxx RTA

Fungicide Group – 4, 12  
(Refer to page 230)

## Company:

Syngenta – PCP# 27577

## Formulation:

0.73% fludioxonil plus 1.10% metalaxyl-M formulated as a liquid seed treatment.

## Crops and Staging:

Chickpea, lentil, dry beans, dry peas, and soybeans. Seed treatment.

## Diseases Controlled:

CROP	DISEASES CONTROLLED
Chickpea	Seedling blights (damping-off) and seed rots caused by <i>Pythium</i> , <i>Fusarium</i> and <i>Rhizoctonia</i> species. Seed-borne ascochyta blight ( <i>Ascochyta rabiei</i> ) Seed rot and seedling blight caused by seed-borne <i>Botrytis</i> spp.
Lentil	Seedling blights (damping-off) and seed rots caused by <i>Pythium</i> , <i>Fusarium</i> and <i>Rhizoctonia</i> species. Seed-borne ascochyta blight ( <i>Ascochyta lentis</i> ) Seed rot and seedling blight caused by seed-borne <i>Botrytis</i> spp.
Dry beans	Seedling blights (damping-off) and seed rots caused by <i>Pythium</i> , <i>Fusarium</i> and <i>Rhizoctonia</i> species. Seed-borne anthracnose ( <i>Colletotrichum</i> sp.)
Dry peas	Seedling blights (damping-off) and seed rots caused by <i>Pythium</i> , <i>Fusarium</i> and <i>Rhizoctonia</i> species.
Soybeans	Seedling blights (damping-off) and seed rots caused by <i>Pythium</i> , <i>Fusarium</i> and <i>Rhizoctonia</i> species. Seed rot and seedling blight caused by seed-borne <i>Phomopsis</i> spp.

**Cost** (2005 suggested retail price):

\$39.90 per L; \$3.24 per 25 kg of seed

## Rate:

325 mL per 100 kg of seed

## Compatibility with Rhizobia-based Inoculants:

Apron Maxx RTA is compatible with Rhizobia-based inoculant. Check with inoculant manufacturer for details prior to use. Mixing with inoculants may increase drying time while treating. Recalibrate the seed drill before planting treated seed.

## Application Information:

Apron Maxx RTA is a ready-to-apply seed treatment formulation for use in commercial seed treatment plants and for on-farm treatment using standard gravity flow or mist type seed treatment equipment. Also used in treat-on-the-go air seeders. Ensure uniform coverage of the seed, as uneven seed coverage may not give the desired level of disease control. Treatment of highly damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Allow the seed to dry before bagging, storing or seeding.

## How it Works:

Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including *Pythium* damping-off.

## Restrictions:

**Use:** All treated seed must be labelled “**This seed has been treated with fludioxonil and metalaxyl-M fungicides**”. Do not use for food, feed or oil purposes.

**Storage:** Store away from feeds and feedstuffs. Store between 0 and 30°C.

**Environment:** This product is toxic to fish and other aquatic organisms. Do not apply directly to aquatic habitats and estuarine-marine habitats. Do not contaminate water by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up.

**Re-planting:** Do not plant any crop other than soybeans, dry beans, chickpea, lentils or dry peas within 30 days to fields in which treated seed was planted.

**Resistance:** Experience has shown that strains of fungus resistant to metalaxyl-M may develop. A gradual or total loss of pest control may occur over time if this active ingredient is used repeatedly in the same fields. Rotate Apron Maxx RTA with fungicides with a different mode of action in your disease control program.

### Precautions:

Keep out of reach of children. Harmful if swallowed. Avoid contact with eyes or prolonged contact with skin. Avoid inhalation of vapours or spray mist. When handling product, contaminated equipment or treated seed, wear long pants, a long-sleeved shirt and chemical resistant gloves. Wear a dust mask or respirator to minimize exposure to dust.

# Baytan 30

**Fungicide Group – 3**  
(Refer to page 230)

### Company:

Bayer CropScience PCP# 24677

### Cost (2005 suggested retail price):

\$12.40 to \$24.80 per 100 kg seed

### Formulation:

317 g/L triadimenol formulated as a liquid seed treatment.  
Container size: 3.78 L.

### Rates and Water Volumes:

#### 50 mL per 100 kg seed will control:

Barley - smuts, leaf stripe and suppression of common root rot and scald  
Spring wheat - smuts, powdery mildew  
Winter wheat - smuts

#### 100 mL per 100 kg of seed will control:

Barley - suppression of net blotch  
Winter wheat - powdery mildew and suppression of take-all

### Crops and Staging:

Wheat, barley. Seed treatment.

### Diseases Controlled:

**Wheat and Winter Wheat:** Loose smut, common bunt, powdery mildew (early season control), and suppression of take-all.

**Barley:** True loose smut, covered smut, false loose smut, leaf stripe, suppression of net blotch, scald and common root rot.

BAYTAN 30 (mL per 100 kg seed)	WATER REQUIRED (mL)	SLURRY RATE (mL)	KG SEED TREATED BY 10 L
50	200 – 450	250 – 500	20,000
100	150 - 400	250 - 500	10,000

### Registered Mix:

Baytan 30 can be applied on seed treated with Vitaflo 280.

### Application Information:

Baytan 30 must be diluted with water prior to treatment of seed to ensure uniform distribution and coverage. The higher slurry rate is recommended for hulled barley varieties.

Seed treated with this product will sometimes emerge at a slower rate than untreated seed. Avoid late planting of treated winter wheat. Germination and seed vigour may also be reduced under adverse environmental conditions such as cool, wet soil or seed planted deeper than 4 cm.

Baytan 30 contains no colourant. An appropriate colourant such as ProLized Colourant must be added before treating seed. No colourant is required if applying over seed treated with Vitaflo 280.

## How it Works:

The active ingredient triadimenol is a triazole fungicide with systemic activity.

## Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Baytan 30 containing triadimenol. Do not use for feed, food or oil processing."

**Storage:** Do not store treated seed. Store product in original container only and away from other pesticides, fertilizer, food or feed. Keep container closed. Protect from freezing.

**Grazing:** Do not graze livestock on treated areas for 40 days after planting.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance:** Baytan 30 contains a triazole fungicide. Some loss of disease control may occur over time if Baytan 30 or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Baytan 30 with fungicides with a different mode of action in your disease control program.

## Precautions:

Keep out of reach of children. Do not get into eyes. Do not get onto skin. Avoid breathing vapours. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear a suitable dust mask, gloves and goggles.

## Hazard Rating:

Caution – Eye irritant; potential skin sensitizer.

# Captan Flowable

Fungicide Group – M  
(Refer to page 230)

## Company:

Norac Concepts Inc. PCP# 12028

## Formulation:

30% captan formulated as a flowable seed treatment.

Container sizes: 20 L; 1000 L returnable container

## Crops and Staging:

Corn, beans, pea, soybean. Also registered for oat destined for export and not to be planted in Canada. Prior to storage or as a seed treatment.

## Diseases Controlled:

Storage rot, seed decay, root rot, damping off, seedling blight.

## Rates and Costs:

CROP	CAPTAN FLOWABLE (mL per 100 kg seed)	COST PER 100 KG SEED (2005 suggested retail price)
Beans	280	\$3.16
Corn (field)	120* - 200	\$1.36 to \$2.24
Pea	280	\$3.16
Soybean	280	\$3.16
Oat	200	\$2.24

\*At this rate product is to be applied only by a professional applicator using equipment which will assure complete and uniform coverage.

## Application Information:

Mix the recommended amount of Captan with the amount of water required for the slurry treater equipment to be used. Seed treated by the slurry method should not be bagged or stacked until it has dried.

## How it Works:

Captan is a phthalimide fungicide with protective activity.

## Restrictions:

**Storage:** Do not freeze. Product must be stored at ambient temperatures above 0°C and must not be stored with herbicides, feed, food or fertilizer. All treated seed must be labelled, "Poisonous to man and animals. Do not use for food or feed. Do not sell to oil mills. This seed has been treated with Captan."

**Environment:** Do not contaminate food, feed, or any body of water.

**Resistance:** Any fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if Group M fungicides are used repeatedly in the same fields. Rotate Captan Flowable with fungicides with a different mode of action.

## Precautions:

Keep out of reach of children. Never handle material with bare hands. When treating, auguring or handling, work in a well-ventilated area and wear a respirator, goggles, rubber gloves and clothing that completely covers arms and legs. Wash hands, face and arms thoroughly after handling this product and before drinking, eating or smoking.

# Charter

Fungicide Group – 3  
(Refer to page 230)

## Company:

BASF Canada PCP# 26455

## Crops and Staging:

Wheat, barley and oats. Seed treatment.

## Formulation:

25 g/L triticonazole formulated as a liquid flowable seed treatment. Container size: 10 L (containing 3.1 L Charter); 200 L (containing 66.7 L Charter).

## Rates and Diseases Controlled:

CROP	CONCENTRATE USE RATE PER 100 KG SEED*	DISEASES CONTROLLED	DISEASES SUPPRESSED
Wheat	100 mL	Seed rot caused by <i>Fusarium</i> spp.; Seedling blight caused by seed-borne <i>Fusarium</i> spp.; Loose smut; Common bunt	Fusarium crown and root rot; Common root rot (caused by <i>Cochliobolus</i> )
Barley	100 mL	Seed rot caused by <i>Fusarium</i> spp.; Seedling blight caused by seed-borne <i>Fusarium</i> spp.; True loose smut; Covered smut; False loose smut	Fusarium crown and root rot; Common root rot (caused by <i>Cochliobolus</i> )
Oats	100 mL	Loose smut; Covered smut	

\*Final volume of 300 mL diluted product per 100 kg of seed.

**Cost** (2005 suggested retail price):  
\$6.32 per 100 kg of seed

### Application Information:

Charter is a concentrate seed treatment formulation for use in commercial seed plants, in on-farm standard gravity flow or mist type treatment machines, and in on-the-go air seeder treatment systems. Agitate or shake well prior to usage. Uneven seed coverage may result in poor levels of disease control. Seed should be well conditioned and cleaned before treating. Treated seed should not require drying after treatment.

**Water Volume:** Concentrate requires the addition of water. For best results, mix 2 parts water with 1 part Charter for wheat, barley and oats. Consult the seed treatment application equipment manufacturer for specific application instructions for use of various seed treatment application machines. When using the Flexi-Coil on-the-go Seed Treatment Unit, Charter should be diluted with 5 parts water (15.5 L) to 1 part Charter (3.1 L) to reach 60 mL per 10 kg of seed. One 40 L tank will hold 1 case (2 x 3.1 L jugs) in a 5:1 dilution.

### How it Works:

The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed and soil-borne diseases.

### Restrictions:

**Storage:** Store product in the original container. Keep container closed. Store in an area that is out of reach of children and animals, away from food, feedstuffs, fertil-

izer and seed. Protect from frost and freezing. Store treated seed under cool, dry conditions. Do not store treated seed for more than 18 months as it may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before use. Treated seed should be labelled "This seed has been treated with Charter, do not use for food, feed or oil processing"

**Environment:** Do not feed or otherwise expose wildlife or birds to treated seed. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic, irrigation or natural bodies of water.

**Resistance:** Charter contains a triazole fungicide. Some loss of disease control may occur over time if Charter or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, because of the development of resistant strains of pathogens. Alternate use of Charter with fungicides with a different mode of action in your disease control program.

### Precautions:

When handling Charter or treated seed wear chemical resistant gloves and coveralls. Avoid inhaling or breathing dust. Work in a well-ventilated area or wear a dust filtering respirator in non-ventilated areas. Wash hands and exposed skin thoroughly after handling the concentrate and after application.

### Hazard Rating:



Caution Poison.

## Crown

**Fungicide Group – 1, 7**  
(Refer to page 230)

### Company:

Bayer CropScience PCP# 23430

### Formulation:

92 g/L carbathiin and 58 g/L thiabendazole, formulated as a liquid seed treatment. Container size: 10 L, 200 L, 1000 L.

### Crops and Staging:

Lentil and chickpea. Seed treatment.

### Diseases Controlled:

**Lentil:** Seed-borne ascochyta caused by *Ascochyta lentis*; Seed rots and post-emergence damping off caused by *Botrytis*, *Fusarium* and *Rhizoctonia* fungi.

**Chickpea:** Seed-borne ascochyta caused by *Ascochyta rabiei*.

**Cost** (2005 suggested retail price):  
\$15.80 to \$31.60 per 100 kg of seed

### Rates:

**Lentil:** 300 to 600 mL per 100 kg of seed. Use the higher rate to control seed-borne ascochyta.

**Chickpea:** 300 mL to 600 mL per 100 kg of seed. The lower rate will provide sufficient control of ascochyta in most cases. Use the higher rate for smaller seed size varieties.

### Compatibility with Rhizobia-based Inoculants:

Crown is compatible with Rhizobia and performs as a sticker for peat and granular inoculants. Crown and Rhizobia can be applied simultaneously to seed through separate systems or applied sequentially. Read inoculant label before use.

### Application Information:

#### Commercial Treaters and On-Farm Auger Treating:

Crown is a ready to use formulation designed for commercial treaters and on-farm auger treating. Crown is added directly to the seed as it enters a mixing chamber or auger. It is important that the seed and chemical be mixed quickly and uniformly. See instructions supplied with the applicable treater system for information on proper application techniques. When a grain auger is used for treating, running the auger less than full is the key to adequate mixing. Augers used for handling treated seed should not be used to move seed for food, feed or oil processing.

#### Applications to Seed in a Hopper Box or Seed Drill:

Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the seed surface. **DO NOT** pour in one area. Mix with a paddle until all seed is of a uniform red colour, indicating adequate coverage. **DO NOT MIX WITH HANDS.** Repeat this procedure until the hopper box or seed drill is filled. Seed can be planted immediately after treatment without drying. Stir Crown-treated seed rigorously if the seeding operation has been interrupted for several hours or overnight.

### How it Works:

The active ingredient carbathiin is a systemic fungicide and the active ingredient thiabendazole is a benzimidazole fungicide with both contact and systemic activity.

### Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Crown seed protectant, which contains carbathiin and thiabendazole. Do not use for food, feed or oil processing."

**Storage:** Do not store product above 35°C or below 0°C or in direct sunlight. Store in original container only, away from other pesticides, fertilizers, food or feed. Mix product prior to use by shaking the 10 L container.

**Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

**Environment:** Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure treated seed is properly incorporated at planting.

**Resistance:** Crown contains Group 1 and 7 fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate the use of Crown (and other Group 1 and 7 fungicides) with products with a different mode of action to prevent resistant pathogens populations from developing.

### Precautions:

When handling Crown or treated seed, work in a well-ventilated area; wear a long sleeved shirt, long pants, chemical resistant gloves and protective eyewear. Wash exposed skin after use.

### Hazard Rating:

Caution – Eye Irritant.

# Cruiser 5FS/Cruiser 350FS

Contains insecticide only. Available to commercial seed treaters only.

## Company:

Syngenta (Cruiser 5FS - PCP# 27045; Cruiser 350FS - PCP# 27986)

## Formulation:

**Cruiser 5FS:** 47.6% thiamethoxam.  
**Cruiser 350FS:** 29.9% thiamethoxam.  
**Container size:** 1000L, 1050L, Bulk

## Crops, Insects Controlled and Rates:

CROPS:	INSECTS CONTROLLED:	RATE PER 100 KG OF SEED*:	
		CRUISER 5FS	CRUISER 350 FS
Wheat; Barley	Wireworms	33 to 50 mL	57 to 86 mL
Corn	Seed corn maggot	83 to 166 mL	–
	Wireworms	–	143 mL
Soybean	Seed corn maggot	–	86 to 143 mL
	Wireworms	–	143 mL
Dry bean	Potato leafhopper**; Seed corn maggot	–	86 to 143 mL
	Wireworms	–	143 mL

\* Use the higher rate for fields that have a history of moderate to severe insect pressure.

\*\*Use the higher rate to replace one application of a foliar insecticide spray.

## Cost:

Not available.

## Application Information:

For use only in commercial seed treatment facilities with closed transfer systems that provide uniform seed coverage. Cruiser 5FS contains no colourant. A red colourant must be added when Cruiser 5FS is applied to grain. Cruiser 350FS contains a colourant. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour. Allow the seed to dry before bagging or storing in bulk containers.

## How it Works:

Thiamethoxam is a seed treatment insecticide in the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity.

## Registered Mixes:

For control of seed and soil-borne diseases, Cruiser 5FS can be mixed with fungicide seed treatments in a closed transfer system. Refer to label for details.

## Restrictions:

**Use:** Treated seed must not be used for food, feed or oil processing. All seed must be labelled “Seed treated with thiamethoxam insecticide.”

**Storage:** Store away from food and feed. Ideal storage temperature is above freezing and below 30°C. If product should freeze, bring to room temperature, then ensure the contents are mixed well prior to application.

**Grazing:** Do not graze or feed livestock on treated areas for 45 days after planting.

**Environment:** This product is toxic to fish and aquatic vertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and

ponds. If treated seed is spilled outdoors or accessible to birds, promptly clean up or bury to prevent ingestion.

### Precautions:

Keep out of reach of children, unauthorized personnel and domestic animals. Harmful if swallowed, inhaled, or absorbed through skin. Do not get into eyes. Avoid prolonged contact with skin. Avoid inhalation of vapours, spray mist or treated seed dust. Treat seed in a well-ventilated

area. Workers involved in treating, cleanup or maintenance of seed equipment must wear chemical-resistant coveralls over long sleeved shirt and long pants, chemical-resistant gloves, head gear and respiratory protection.

### Hazard Rating:



Caution Poison.

## DB-Red L

Fungicide Group – M  
(Refer to page 230)

### Company:

Agsco Inc., distributed by United Agri Products –  
PCP# 27144

### Formulation:

323 g/L maneb. Container size: 2 x 10 L; 57 L returnable container

### Crops and Staging:

Wheat, barley, oats, rye. Seed treatment.

### Diseases Controlled and Rates:

CROP	DISEASES CONTROLLED	RATE PER 100 KG SEED
Wheat	Common bunt Root rot Seedling blight (including <i>Fusarium</i> )	312 mL
Barley	Covered smut False loose smut Root rot Seedling blight	396 mL
Oats	Covered smut Root rot Seedling blight	552 mL
Rye	Common bunt Root rot Seedling blight	260 mL

### Cost (2005 suggested retail prices):

**Wheat:** \$5.85 per 100 kg seed

**Barley:** \$7.43 per 100 kg seed

**Oats:** \$10.36 per 100 kg seed

**Rye:** \$4.88 per 100 kg seed

### How it Works:

The ingredient maneb is a dithiocarbamate fungicide with contact activity.

### Restrictions:

**Use:** Use only recommended rates; lower amounts may not give the desired control and higher amounts may cause seed injury. Uneven treating of seed may cause over-treatment of some seed and under-treatment on other seed. Seed should be well-cured, dry and cleaned before treatment.

**Storage:** Store away from heat source and in a cool, dry area. If product becomes frozen, thaw and shake or agitate. If treated seed is stored, label container, **“This seed has been treated with DB-Red L seed treatment. Do not use for food, feed or processing.”** Excess treated seed should not be stored past planting time. Do not contaminate feed or food stuffs.

**Grazing:** Do not graze or feed livestock on treated areas.

**Environment:** Do not contaminate ponds, lakes or streams.

### Hazard Rating:



Danger Poison

# DCT

## Fungicide Group – 1, M

(Refer to page 230)

### Company:

Norac Concepts Inc. PCP# 14986

### Formulation:

6% diazinon, 18% captan, and 14% thiophanate-methyl formulated as a seed treatment powder. Container size: 10 kg.

### Crops and Staging:

Field beans. Seed treatment.

### Diseases Controlled:

Seedling blight, root rot, seed-borne anthracnose. This product will not control anthracnose if seed is severely infected.

### Insects Controlled:

Root maggots.

### Cost (2005 suggested retail price):

\$16.40 per 100 kg of seed

### Rates:

For slurry machines: 520 g per 1 L water. Use 1 L of slurry per 100 kg of seed.

For mixing in bucket: 130 g per 0.35 L water. Use 0.35 L of slurry per 25 kg of seed.

### How it Works:

The active ingredient captan is a phthalimide fungicide with protective activity. The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity. The diazinon component is an organophosphate insecticide with contact and stomach activity.

### Restrictions:

**Storage:** Do not store treated seed for more than one month. Treated seed should be coloured and labelled "**Poisonous to man and animals. This seed has been treated with diazinon, captan and thiophanate-methyl for control of insects and seed-borne diseases. Do not use for food or feed purposes.**"

**Environment:** Do not contaminate any body of water.

**Resistance:** DCT contains Group M and Group 1 fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Where possible, rotate the use of DCT (or other fungicides in this class) with different fungicides that control the same pathogens.

### Precautions:

May be fatal if swallowed. Never handle material with bare hands. Do not breathe dust. When treating, auguring, or handling, work in a well-ventilated area and wear a respirator, goggles, rubber gloves and clothing that completely covers arms and legs.

### Hazard Rating:



Danger Poison

Warning - contains the allergen soy.

# Dividend XL RTA

Fungicide Group – 3, 4  
(Refer to page 230)

## Company:

Syngenta PCP# 25777

## Crops and Staging:

Spring Wheat, Durum, Winter Wheat and Barley.  
Seed treatment.

## Formulation:

3.37% difenoconazole, 0.27% metalaxyl-M formulated as a flowable seed treatment.

Container size: 2 x 10 L jugs; 115 L returnable tote.

## Rates and Diseases Controlled:

CROP	USE RATE PER 100 KG SEED <sup>1</sup>	DISEASES CONTROLLED	DISEASES SUPPRESSED <sup>2</sup>
Barley	325-650 mL	General seed rots <sup>2</sup> ; Seedling blight caused by seed- and soil-borne <i>Fusarium</i> ; <i>Pythium</i> and <i>Fusarium</i> Damping-off; Seed-borne <i>Septoria</i> <sup>3</sup> ; False Loose Smut; Covered Smut	Common Root Rot ( <i>Cochliobolus</i> spp.); <i>Fusarium</i> crown and foot rot; Take-all
Corn	325-650 mL	General seed rots <sup>2</sup> ; Seedling blight caused by seed- and soil-borne <i>Fusarium</i> ; <i>Pythium</i> Damping-off	
Corn	325 mL	Penicillium three leaf dieback	
Oats	325-650 mL	General seed rots <sup>2</sup> ; Seedling blight caused by seed- and soil-borne <i>Fusarium</i> ; <i>Pythium</i> Damping-off; Covered Smut; Loose Smut	Common Root Rot ( <i>Cochliobolus</i> spp.)
Rye	325-650 mL	General seed rots <sup>2</sup> ; Seedling blight caused by seed- and soil-borne <i>Fusarium</i> ; <i>Pythium</i> Damping-off; Seed-borne <i>Septoria</i> <sup>3</sup> ; Common Bunt <sup>6</sup> , Dwarf Bunt <sup>6</sup>	Common Root Rot ( <i>Cochliobolus</i> spp.); <i>Fusarium</i> crown and foot rot; Take-all
Triticale	325-650 mL	General seed rots <sup>2</sup> ; <i>Pythium</i> Damping-off; Loose Smut	Common Root Rot ( <i>Cochliobolus</i> spp.); <i>Fusarium</i> crown and foot rot; Take-all
Spring Wheat	325-650 mL	General seed rots <sup>2</sup> ; Seedling blight caused by seed- and soil-borne <i>Fusarium</i> ; <i>Pythium</i> and <i>Fusarium</i> Damping-off; Seed-borne <i>Septoria</i> <sup>3</sup> ; Common Bunt <sup>6</sup> , Loose Smut	Common Root Rot ( <i>Cochliobolus</i> spp.); <i>Fusarium</i> crown and foot rot; Take-all

See footnotes on following page.

CROP	USE RATE PER 100 KG SEED <sup>1</sup>	DISEASES CONTROLLED	DISEASES SUPPRESSED <sup>2</sup>
Winter Wheat	325-650 mL	General seed rots <sup>2</sup> ; Seedling blight caused by seed- and soil-borne <i>Fusarium</i> ; <i>Pythium</i> and <i>Fusarium</i> Damping-off; Seed-borne <i>Septoria</i> <sup>3</sup> ; <i>Septoria</i> Leaf Blotch <sup>3,5</sup> ; Common Bunt <sup>6</sup> ; Dwarf Bunt <sup>6</sup> ; Loose Smut	Common Root Rot ( <i>Cochliobolus</i> spp.); <i>Fusarium</i> crown and foot rot; Take-all

<sup>1</sup> Use the higher rate where conditions favour seed- or soil-borne pathogens.

<sup>2</sup> General seed rots controlled include those caused by saprophytic organisms such as *Penicillium*, *Aspergillus*, *Fusarium*, and *Pythium*. Use the 325 mL rate for control of these diseases.

<sup>3</sup> Use the 650 mL rate for control of these diseases.

<sup>4</sup> Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

<sup>5</sup> Early season foliar disease control for first 4 weeks after planting. For full season control apply a foliar fungicide according to label directions.

<sup>6</sup> Dividend XL RTA controls both seed and soil-borne bunts (common, dwarf).

### Cost (2005 suggested retail price):

\$25.25 per L; \$2.05 to \$4.10 per 25 kg of seed (\$8.20 to \$16.40 per 100 kg of seed)

### Application Information:

Dividend XL RTA is a ready-to-apply formulation for use in commercial seed treatment plants, and for on-farm treatment using standard gravity flow or mist-type seed treatment equipment which accurately meters and mixes a flowable seed treatment. Dividend XL RTA may also be used in a treat-on-the-go air seeder. The equipment must provide uniform coverage of Dividend XL RTA on the seed. Uneven seed coverage may not give the desired level of disease control.

Consult the manufacturer of the application equipment for suitability for this application and for instructions on operation and calibration of the equipment.

**Water Volume:** Dividend XL RTA does not require addition of water for application. However, when using the Flexi-Coil Seed Treatment Unit, Dividend XL RTA must be diluted with water to reach 99 mL/10 kg of seed. The recommended dilution rate is 1 part Dividend XL RTA to 2 parts water. This is equal to 33 ml of Dividend plus 66 ml of water in order to achieve the total liquid volume requirement of 99 ml/10 kg seed.

### How it Works:

The active ingredient difenoconazole is a systemic fungicide from the triazole fungicide class that provides broad-spectrum protection against seed and soil-borne diseases. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including *Pythium* damping-off.

### Registered Mixes:

For the control of true loose smut (*Ustilago nuda*) in barley, tank mix Dividend XL RTA with Charter, Raxil 250FL or Baytan 30. Read the label directions for each product and follow the more restrictive label precautions and limitations.

### Restrictions:

**Use:** Treated seed should be labelled "This seed has been treated with Dividend XL RTA; do NOT use for food, feed, or oil purposes."

**Storage:** Keep in heated storage. Product will freeze at -18°C. Store away from feeds and food stuffs.

**Grazing:** Do not graze, feed green forage or cut for hay within 35 days of planting treated cereal grain seeds.

**Re-cropping:** Do not plant any crop other than cereal grains listed on this label within 30 days to fields in which treated seeds were planted.

**Environment:** Do not apply directly to water or to areas where surface water is present. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

**Resistance:** Dividend XL RTA contains a triazole fungicide. Some loss of disease control may occur over time if Dividend XL RTA or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Dividend XL RTA with fungicides with a different mode of action in your disease control program.

**Precautions:**

Keep out of reach of children. When handling Dividend XL RTA, contaminated equipment or seed treated with Dividend XL RTA, wear long pants, a long-sleeved shirt and chemical resistant gloves. In addition, wear a suitable dust mask when bagging or sewing bags of treated seed or when transferring seed to a storage bin.

**Hazard Rating:**

None.

**Foundation Lite**

**Fungicide Group – 2, M**  
(Refer to page 230)

**Company:**

Bayer CropScience PCP# 25592

**Formulation:**

132 g/L iprodione and 88 g/L thiram.  
Container size: 100 L, 200 L, 1000 L.

**Crop and Staging:**

Canola, mustard. Seed treatment.

**Diseases Controlled:**

Damping off and root rot caused by *Rhizoctonia solani*, seed-borne blackleg and seed-borne *Alternaria* black spot.

**Cost** (2005 suggested retail price):

\$77.68 per 100 kg of seed

**Rate:**

2252 mL per 100 kg seed; 100 L container treats 4,444 kg of seed

**Application Information:**

Roll drum or stir well before using. Foundation Lite treated seed should not require drying after treatment and can be stored or bagged immediately. Add product to seed slowly and mix well for 3-5 minutes in treating equipment. Thorough seed coverage is required.

**How it Works:**

The active ingredient iprodione is a dicarboximide fungicide with contact and eradicant activity. The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

**Restrictions:**

**Use:** Treated seed must be labelled "This seed has been treated with Foundation Lite containing iprodione and thiram. Do not use for feed, food or oil processing." Date of treatment must also be included.

**Storage:** Protect product from frost. Store treated seed in cool dry conditions. Do not store treated seed for more than 6 months. Treated seed stored for periods in excess of 6 months may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before planting.

**Environment:** Do not contaminate domestic or irrigation waters. Do not contaminate feed or food stuffs.

**Precautions:**

Keep out of reach of children; avoid contact with skin and eyes. When handling product or treated seed work in a well-ventilated area, wear chemical resistant gloves, coveralls and wear a suitable respirator. Do not consume alcoholic beverages 24 hours before or after working with Foundation Lite.

**Hazard Rating:**

 Caution Poison

Caution - Eye and skin irritant.

# Gaicho CS FL/ Gaicho 480 FL

Fungicide Group – 7, M  
(Refer to page 230)

Gaicho CS FL and Gaicho 480 FL are available to commercial seed treaters only.

## Company:

Bayer CropScience (Gaicho CS FL – PCP# 27174;  
Gaicho 480 FL – PCP# 26124)

## Crops and Staging:

Canola, rapeseed and mustard. Seed treatment.

## Formulation:

**Gaicho CS FL:** 285.7 g/L imidacloprid; 47.6 g/L carbathiin; 95.3 g/L thiram.

**Gaicho 480 FL:** 480 g/L imidacloprid.

Container sizes: 10, 100, 1000 L.

## Rates, Insects and Diseases Controlled:

PRODUCT	RATE (ML) PER 100 KG SEED <sup>2</sup>	INSECTS CONTROLLED <sup>3</sup>	DISEASES CONTROLLED
<b>Gaicho CS FL<sup>1</sup>:</b>	1400 - 2100	Early season control of flea beetles.	Seed rot, damping off, seedling blight and early season root rot caused by <i>Rhizoctonia</i> , <i>Pythium</i> and <i>Alternaria</i> spp.;  Seed-borne blackleg ( <i>Leptosphaeria maculans</i> ) <sup>4</sup>
<b>Gaicho 480 FL:</b>	833 - 1667	Early season control of flea beetles.	—

<sup>1</sup> For areas where flea beetle populations are often high, tank mix Gaicho CS FL with Gaicho 480 FL according to label directions.

<sup>2</sup> In areas where flea beetle populations are often high, use the higher rates.

<sup>3</sup> Under high insect pressure, a foliar insecticide may be required, therefore monitor crop regularly for insect infestation levels.

<sup>4</sup> In canola and rapeseed only.

## Cost:

Not available.

to oilseeds. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

## Application Information:

For use in commercial seed treaters only. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. Keep above 10°C prior to and during application. Do not apply direct heat to container. These products do not contain colourant. A blue colourant must be added when products are applied

## How it Works:

Imidacloprid is a chloronicotinyl insecticide with systemic activity. The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed must be labelled as follows: "This seed has been treated with imidacloprid and/or carbathiin and thiram. Do not use for food, feed or oil processing. Store away from feeds and other foodstuffs."

**Storage:** Protect products from freezing. Do not store Gaucho 480 FL in direct sunlight or above 35°C. Treated seed stored for periods in excess of 9 months should be tested for germination before planting. Do not store treated seed above 25°C or in direct sunlight.

**Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

**Environment:** These products are highly toxic to birds and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment wash water. Cover

or incorporate spilled treated seeds. Leftover treated seed should be double sown around the headlands, or buried away from water sources.

## Precautions:

Keep out of reach of children. Harmful if swallowed, absorbed through skin or inhaled. When handling Gaucho products or treated seed, work in a well-ventilated area and wear chemical resistant gloves, protective eyewear and a suitable mask.

## Hazard Rating:



Caution Poison

# Gemini

**Fungicide Group – 3, M**  
(Refer to page 230)

## Company:

BASF Canada Inc. PCP# 27826)

## Crops and Staging:

Wheat, barley and oats. Seed treatment.

## Formulation:

1.25% triticonazole and 12.5% thiram formulated as a liquid flowable seed treatment. Container size: 2 x 6 L; 200 L.

## Rates and Diseases Controlled:

CROP	USE RATE PER 100 KG SEED	DISEASES CONTROLLED	DISEASES SUPPRESSED
Wheat	360 mL	Seed rot caused by <i>Fusarium</i> spp.; Seedling blights caused by seed and soil-borne <i>Fusarium</i> spp.; Loose smut; Common Bunt; <i>Pythium</i> Damping off	<i>Fusarium</i> crown and Root rot; Seedling blight and Common root rot caused by <i>Cochliobolus</i> sp.
Barley	360 mL	Seed rot caused by <i>Fusarium</i> spp.; Seedling blights caused by seed and soil-borne <i>Fusarium</i> spp.; True loose smut; Covered smut; False loose smut; <i>Pythium</i> damping off	<i>Fusarium</i> crown and Root rot; Seedling blight and Common root rot caused by <i>Cochliobolus</i> sp.
Oats	360 mL	Loose smut Covered smut	

**Cost:** (2005 suggested retail price)  
\$7.12 per 100 kg of seed

### Application Information:

Gemini is a ready-to-use seed treatment for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. Gemini can also be used in on-the-go air seeder treatment systems. Agitate or shake well prior to usage.

**Water volume:** Gemini does not require the addition of water for application. When using the Flexi-Coil on-the-go Seed Treatment Unit, Gemini should be diluted with water to reach 108 mL per 10 kg of seed. The recommended dilution rate is 1 part Gemini to 2 parts water, which equals 36 mL of Gemini plus 72 mL of water in order to achieve a total volume of 108 mL per 10 kg of seed.

### How it Works:

The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed and soil-borne diseases. Thiram is a dithiocarbamate fungicide with contact activity.

### Restrictions:

**Use:** Treated seed must be labelled "This seed is treated with Gemini seed treatment containing triticonazole and thiram. Do not use for food, feed or oil processing". Do not store treated seed for more than 18 months. Store treated seed in cool, dry conditions.

**Storage:** Store product in original container with the lid tightly closed. Store in an area that is out of reach of children and animals, away from food, feed stuffs, fertilizers and seed. Protect from frost and freezing.

**Environment:** Do not feed treated seed to, or otherwise expose, wildlife or domestic birds. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water with the chemical, used containers, treated seed or bags. Do not contaminate water by cleaning of equipment or disposal of wastes.

**Resistance:** Any fungal population may contain individuals naturally resistant to Gemini and other Group 3 and Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate the use of Gemini or other Group 3 and M fungicides with different groups that control the same pathogens.

### Precautions:

Keep out of reach of children. Avoid contact with skin, eyes or clothing. Wear chemical resistant gloves, chemical resistant coveralls and a NIOSH approved dust filtering respirator when handling the product or treated seed. Work in a well-ventilated area. Wash hands and exposed skin thoroughly after handling the concentrate and after application.

### Hazard Rating:



Caution Poison.

## Genesis 240/Admire SPT

See Imidacloprid-based Insecticide Potato Seed Treatments on page 280.

# Helix/Helix XTra

Fungicide Group – 3, 4, 12  
(Refer to page 230)

Helix and Helix XTra are available to commercial seed treaters only.

## Company:

Syngenta (Helix – PCP# 26637; Helix XTra – PCP# 26638)

## Formulation:

**Helix:** 10.3% thiamethoxam, 1.24% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil.

**Helix XTra:** 20.7% thiamethoxam, 1.25% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil.

Formulated as a liquid seed treatment.  
Container size: 1000 L returnable tote

## Crops and Staging:

Canola, mustard. Seed treatment.

## Diseases Controlled:

Seed-borne blackleg, seed-borne *Alternaria*, and the seedling disease complex (damping off, seedling blight, seed rot, root rot) caused by *Pythium*, *Fusarium* and *Rhizoctonia* spp.

## Insects Controlled:

Early season control of flea beetles.

**Helix:** 14 to 21 days

**Helix XTra:** 28 to 35 days

## Cost:

Not available.

## Rate:

1.5 L per 100 kg seed (375 mL per 25 kg seed).

## Application Information:

For use only in commercial seed treatment facilities with closed transfer systems. Helix and Helix XTra are ready to use liquid products and contain an appropriate colourant. Apply using standard commercial seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of insect or disease control. Consult the manufacturer of the

seed treating equipment for advice on the operation and calibration of the equipment. Maintain constant agitation during the seed treatment process. Allow the seed to dry before bagging.

## How it Works:

The active ingredient thiamethoxam is a systemic insecticide from the neonicotinoid chemical class. The active ingredient difenoconazole is a systemic fungicide from the triazole chemical class that provides broad-spectrum protection against seed and soil-borne diseases. The active ingredient metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including *Pythium* damping off. The active ingredient fludioxonil is a phenylpyrrole chemistry and has contact and local penetrant properties.

## Restrictions:

Use: All treated seed must be labelled “This seed has been treated with Helix which contains insecticide (thiamethoxam) and fungicides (difenoconazole, metalaxyl-M and fludioxonil). Wear long-sleeve shirt, long pants, and chemical resistant-gloves when handling treated seed. Do not use for food, feed or oil processing. Store away from food and feed.”

**Storage:** Store in a well-ventilated, secure area.

**Environment:** Do not apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, do not contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

## Precautions:

Keep out of reach of children. Treat seed in a well-ventilated area. All seed treaters and handlers must wear chemical-resistant coveralls over long sleeve shirt and long pants, chemical-resistant gloves, head gear, and respiratory protection (i.e. half-mask respirator with suitable dust filter or fresh air hood).

## Hazard Rating:



Caution Poison

# Imidacloprid-based Insecticide Potato Seed Treatments

Includes Admire SPT and Genesis 240. Contain insecticide only.

## Company:

Bayer CropScience  
(Admire SPT – PCP# 27702; Genesis 240 – PCP# 27349)

## Formulation:

240 g/L imidacloprid. Container size: 1 L, 3.78 L

## Crops and Staging:

Potato. Seed treatment.

## Insects Controlled:

Control of Colorado potato beetle, potato flea beetle, potato leafhopper and aphids (including green peach, buckthorn, foxglove and potato aphid).

## Cost (2005 suggested retail price):

**Genesis 240:** \$6.72 to \$10.09 per 100 kg of potato seed tubers

**Admire SPT:** not available

## Rate:

26 to 39 ml per 100 kg of potato seed tubers. The higher rate is recommended when extended length of control is needed.

## Application Information:

May be applied when potato pieces are being cut. Apply specified dosage as a diluted spray onto seed-pieces using a shielded spray system that is well contained and will prevent the loss of any liquid. Do not dilute with any more than 3 parts water to 1 part Genesis 240 or Admire SPT Insecticide. Agitate or stir spray solution as needed. Complete coverage of the seed piece is required for optimal insect control. As part of the seed cutting and treating process, application of a fungicide registered for potato seed treatment or an inert absorbent ingredient is recommended.

## How it Works:

Imidacloprid is a chloronicotiny insecticide with systemic activity.

## Restrictions:

**Use:** Do not apply more than 0.47 L per acre per year. Plant seed pieces as soon as possible after cutting and treating. Avoid prolonged exposure of treated seed to sunlight. Do not use treated seed pieces for food, feed or fodder.

**Storage:** Store product in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of reach of children.

**Re-planting:** Use a minimum plant-back interval of 30 days for cereals, 9 months for peas and beans, and 12 months for all other food and feed crops. Green manure and other cover crops not intended for human or animal consumption do not require a plant-back interval following treatment. Do not graze or harvest cover crops for food or feed. It is not recommended that this product be used in fields treated with imidacloprid during the previous season.

**Environment:** Do not plant treated seed pieces when rainfall is forecast for next 48 hours. Do not plant treated seed pieces within 15 metres of well-head or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. This product is toxic to wildlife. Keep out of lakes, streams, ponds, or other aquatic systems. Do not contaminate water when disposing of equipment wash waters. Leftover treated seed should be double sown around the headland, or buried away from water sources such as lakes, streams, ponds or other aquatic systems.

## Precautions:

Keep out of reach of children. Harmful if swallowed or absorbed through skin. Applicators and other handlers must wear long-sleeved shirt and long pants, water-proof gloves and shoes plus socks. Apply only in areas with adequate ventilation or in areas that are equipped to remove spray mist.

## Hazard Rating:



Caution Poison

# Mancozeb-based Fungicides

Fungicide Group – M  
(Refer to page 230)

Includes Potato ST 16, MancoPlus, and Tuberseal

## Company:

Norac Concepts Inc. (MancoPlus – PCP# 26157; Tuberseal – PCP# 17042)

United Agri Products (Potato ST 16 – PCP# 24734)

## Formulations:

16% mancozeb formulated as a dust. Container size: 10 kg (MancoPlus; Tuberseal); 20 kg (Potato ST 16).

## Crops and Staging:

Potatoes. Seed treatment

## Diseases Controlled:

*Fusarium* seed piece decay in potatoes.

## Cost (2005 suggested retail prices):

Per 100 kg of seed: \$2.20 (MancoPlus); \$2.53 (Potato ST 16); \$2.40 (Tuberseal)

## Rates:

500 g per 100 kg seed.

## Application Information:

Apply product before planting. If treated whole seed is cut, make a second application to protect cut surfaces. Plant as soon as possible after treating. If cut seed is not planted immediately, store in a ventilated location to allow cut surfaces to dry.

## How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed pieces should be labelled “**Poisonous to man and animals. This seed has been treated with mancozeb for control of *Fusarium* decay. Do not use for food or feed.**”

**Storage:** Store product in a cool, dry, well-ventilated place. Keep away from fire and sparks.

**Environment:** Do not contaminate feed or food. Do not contaminate any body of water.

**Resistance:** Any fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate these products with fungicides with a different mode of action.

## Precautions:

Keep out of reach of children. May be harmful if swallowed or inhaled. May cause irritation of eyes, nose, throat and skin. Wash thoroughly after handling and before eating, drinking or smoking. When treating or handling treated seed, work in a well-ventilated area and wear a suitable dust mask, goggles and gloves.

# Maxim 480FS

Fungicide Group – 12  
(Refer to page 230)

This product is available to commercial seed treaters only.

## Company:

Syngenta PCP # 27001

## Formulation:

40.3% fludioxonil, as a water-based slurry.  
Container size: 55 L.

## Crops and Diseases Controlled

Seed treatment.

CROPS:	DISEASES CONTROLLED:
<b>Cereals:</b> Barley, corn, buckwheat, millet, oats, rye, triticale, wild rice, wheat.	Seed- and soil-borne diseases caused by <i>Fusarium</i> spp. (including <i>F. graminearum</i> ) and <i>Rhizoctonia</i> spp.
<b>Legumes:</b> Bean, pea, soybean, chickpea, lentil.	Seed- and soil-borne diseases caused by <i>Fusarium</i> spp. (including <i>F. graminearum</i> ) and <i>Rhizoctonia</i> spp. Seedling diseases due to <i>Aspergillus</i> and <i>Penicillium</i> spp. in soybean Seed rot and seedling blight caused by seed-borne <i>Phomopsis</i> spp. in soybean
<b>Oilseeds:</b> Flax, canola, mustard, rapeseed, safflower, sunflower.	Seed- and soil-borne diseases caused by <i>Fusarium</i> spp. (including <i>F. graminearum</i> ) and <i>Rhizoctonia</i> spp. Seedling diseases due to <i>Aspergillus</i> and <i>Penicillium</i> spp. on canola and mustard.
<b>Herbs and Spices:</b> Anise, borage, caraway, coriander, dill, others.	Seed- and soil-borne diseases caused by <i>Fusarium</i> spp. (including <i>F. graminearum</i> ) and <i>Rhizoctonia</i> spp.
<b>Grasses:</b> All grasses including turfgrass, bermudagrass, bluegrass, fescue, bromegrass. All pasture and grasses grown for hay or silage.	Seed- and soil-borne diseases caused by <i>Fusarium</i> spp. (including <i>F. graminearum</i> ) and <i>Rhizoctonia</i> spp.
<b>Non-grass Forages:</b> Alfalfa, clover, sainfoin, trefoil, vetch, others	Seed decay and damping off caused by <i>Fusarium avenaceum</i>

## Rates:

5.2 to 10.4 mL to treat 100 kg of seed. Use the higher rate for crops that are expected to be more susceptible to pathogens or when high disease pressure is expected.

## Cost:

Not available.

## Application Information:

For use by commercial seed treaters only. This product contains no colorant. An appropriate colourant must be added when this product is applied. Shake or mix well

before using. Use standard slurry seed treatment equipment which provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Thoroughly mix the recommended amount of product into the required amount of water for the slurry treater and dilution rate to be used. Follow the manufacturer's application instructions for the seed treatment equipment being used. Maintain constant agitation of slurry during treatment. Allow the seed to dry before bagging.

## How it Works:

The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity.

## Registered Mixes:

Maxim 480FS will not control seed rots or blights caused by *Pythium* or *Phytophthora* species and can be mixed with a labelled seed treatment product with activity against these diseases. Consult each label for registered use rates and instructions.

## Restrictions:

**Use:** All treated seed must be labelled "This seed has been treated with fludioxonil fungicide. Do not use for food, feed, or oil purposes. Store away from feed and foodstuffs. Do not graze treated crops, or cut for forage within 30 days of planting."

**Storage:** Store above freezing and below 30°C.

**Environment:** This product is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. In cleaning of equipment

or disposing of wastes, do not contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

**Resistance:** Maxim 480FS contains a Group 12 fungicide. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Alternate the use of Maxim 480FS (and other Group 12 fungicides) with products with a different mode of action.

## Precautions:

Keep out of reach of children. May be harmful if swallowed. Avoid inhalation of vapour, spray mist or treated seed dust. Treat seed in a well-ventilated area. When handling product or seed, wear long-sleeved coveralls and chemical-resistant gloves. When bagging or sewing bags of treated seed, wear a dust mask.

# Maxim PSP

Fungicide Group – 12  
(Refer to page 230)

## Company:

Syngenta PCP# 26647

## Formulation:

0.5% fludioxonil formulated as a dry powder.  
Container size: 10kg

## Crops and Staging:

Potatoes. Seed piece treatment.

## Diseases Controlled:

Black scurf (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*), and fusarium dry rot (*Fusarium* spp.)

## Cost (2005 suggested retail price):

\$5.85 per 100 kg of cut seed.

## Rate:

Use 500 g per 100 kg of cut seed. One 10 kg bag treats 2000 kg of seed.

## Application Information:

Apply using appropriate treater designed for treating potatoes or by dust attachment over belt. Cut pieces should be treated immediately after cutting. If treated seed pieces are bagged, they should be stored for 2-3 days in open crates before bagging. For optimum protection against silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential.

## How it Works:

The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity.

## Restrictions:

**Storage:** Store in a dry place. Avoid contamination of feed and foodstuffs.

**Environment:** Do not contaminate domestic or irrigation water supplies, lakes, streams and ponds.

**Resistance:** Any fungal population may contain individuals naturally resistant to fludioxonil or strains of some fungi may develop tolerance to fungicides after prolonged use. It is important to follow label rate and directions and to observe all practices that minimize occurrence of resistance. Whenever possible, alternate with products from different chemical families. In order to minimize the potential for the development of resistance among labelled disease organisms do not use Maxim PSP in any two consecutive seed generations.

### Precautions:

Avoid inhalation of dust. Wear two layers of clothing, work boots, mask, and chemical-resistant gloves when handling product and treated seed. Wash hands and face after handling. May be harmful if swallowed. Keep out of reach of children.

### Hazard Rating:



Caution Poison

## Mertect SC

**Fungicide Group – 1**  
(Refer to page 230)

### Company:

Syngenta PCP# 13975

### Formulation:

500 g/L thiabendazole formulated as a water dispersible suspension. Container size: 4 x 5 L.

### Crops and Staging:

Potato. Post-harvest treatment.

### Diseases Controlled:

Fusarium dry rot (*Fusarium* spp.), skin spot, silver scurf (*Helminthosporium* spp.), black scurf (*Rhizoctonia* spp.), and pocket rot (*Phoma* spp.)

### Cost (2005 suggested retail price):

\$80.69 per L

### Rate and Water Volume:

7.5 L per 170 L of water. Spray 2 L of this suspension per 1 metric tonne of potatoes.

### Application Information:

Shake well before using. Do not allow suspension to stand without continuous agitation. Potatoes must rotate along conveyor line to ensure complete coverage. Prior to treat-

ing potatoes destined for export, confirm with authorities that treated potatoes will be allowed to enter importing country.

### How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with systemic activity.

### Restrictions:

**Storage:** Minimum storage temperature 0°C.

**Resistance:** Thiabendazole-resistant strains of silver scurf and fusarium dry rot can develop.

Strains of some fungi may develop tolerance to Mertect SC or other products in the same class of chemistry after prolonged usage. When using Mertect SC, use full rates and ensure thorough coverage. If potatoes are going to be treated with Mertect SC prior to storage in the fall, do not use any product containing thiophanate-methyl at planting. Do not use any product containing thiophanate-methyl if Mertect SC was used as the storage treatment on seed. Use seed treatment with a different mode of action on Mertect SC treated seed potatoes.

### Precautions:

Wear chemical-resistant gloves when handling product. May cause eye irritation. Avoid contact with eyes, skin and clothing. Keep out of reach of children. Harmful if swallowed.

# Polyram 16D

Fungicide Group – M  
(Refer to page 230)

## Company:

BASF Canada PCP# 25867

## Formulation:

16% metiram formulated as dust. Container size: 10 kg.

## Crops and Staging:

Potatoes. Seed treatment.

## Diseases Controlled:

*Fusarium* seed piece decay; seed-borne common scab (*Streptomyces* spp.)

## Cost (2005 suggested retail price):

\$53.77 per 10 kg bag; \$2.42 to \$3.50 per 100 kg cut seed

## Rates:

450 to 650 g per 100 kg seed. One container treats 2,222 to 1,538 kg of seed.

## How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity.

## Application Information:

Apply to entire surface of seed pieces after cutting. Treated potato seed should not be allowed to stand in hot sun or drying wind. Seed should not be planted into hot, dry soil or in cold, wet soil. Plant as soon as possible after treating. If not planted immediately, provide sufficient ventilation to allow cut surface to dry. If not cutting seed, treat at same rate for control of seed-borne common scab, apply a second application to control fusarium seed piece decay.

## Restrictions:

**Storage:** Store product in cool, dry, locked, well-ventilated area without floor drain. Keep away from heat, fire or sparks. Do not allow product to become wet or overheated as this will reduce its effectiveness and may create flammable vapours. Protect from freezing. Do not ship or store near food, feed, seed or fertilizers.

**Environment:** Do not contaminate domestic or irrigation water, lakes, streams or ponds by the cleaning of equipment or the disposal of wastes.

**Resistance:** Any fungal population may contain individuals naturally resistance to Group M fungicides. A gradual or total loss of pest control may occur over time if Polyram 16D is used repeatedly in the same field. Rotate Group M fungicides with fungicides with a different mode of action.

## Precautions:

Keep out of reach of children. May cause irritation to eyes, nose, throat and skin. Avoid inhalation and contact with eyes, skin or clothes. Wear protective equipment and clothing including goggles or face shield, rubber gloves, hat, long-sleeved shirt, trousers and rubber boots.

# Potato ST 16/MancoPlus/Tuberseal

See Mancozeb-based Fungicides on page 281.

# Prosper FL/ Poncho 600 FS/Poncho 600

Fungicide Group – 4, 7, M  
(Refer to page 230)

Products available to commercial seed treaters only. Poncho 600 FS and Poncho 600 contain insecticide only.

## Company:

Bayer CropScience (Prosper FL – PCP# 27564;  
Poncho 600 FS – PCP# 27453;  
Poncho 600 – PCP# 27449)

## Crops and Staging:

All products: Canola.  
Poncho 600 FS/Poncho 600 only: Corn.  
Seed treatment.

## Formulation:

**Prosper FL:** 120 g/L clothianidin; 56 g/L carbathiin;  
120 g/L thiram; 4 g/L metalaxyl.  
Container sizes: 3.8L, 10L, 100L, 1000L, Bulk

**Poncho 600 FS / Poncho 600:** 600 g/L clothianidin.  
Container sizes: 3.8L, 10L, 100L, 200L

## Rates, Insects and Diseases Controlled:

PRODUCT	CROP	RATE (ML) PER 100 KG OF SEED	INSECTS CONTROLLED	DISEASES CONTROLLED
Prosper FL <sup>1</sup>	Canola, Rapeseed	1250 mL	Flea beetles	Seed rot, damping off, seedling blight and early season root rot caused by <i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> , and seed-borne <i>Alternaria</i> spp.; Seed-borne blackleg ( <i>Leptosphaeria maculans</i> ).
Poncho 600 FS; Poncho 600	Canola, Rapeseed	250, 333 or 666 mL <sup>2</sup>	Flea beetles	—
	Corn	33.3 to 66.6 mL of product per 80,000 units of seed (0.25 to 0.5 mg a.i. per kernel)	Wireworm; Seed corn maggot; Black cutworms; Corn flea beetle; White grubs	—

<sup>1</sup> Use Prosper FL for low to moderate flea beetle pressure only; OR, mix with Poncho 600 FS to provide longer season control of flea beetles and for areas where flea beetle populations are high. Refer to labels for rates and mixing instructions.

<sup>2</sup> Use increasing rates for low, moderate and severe flea beetle pressure.

**Cost:**

Not available.

**Application Information:**

These products are for use in commercial seed treatment facilities with closed transfer systems only. Products do not contain a colourant. An appropriate colour must be added when this product is applied. Seed treatment must be thoroughly agitated to ensure uniform mixing of product prior to and during application. Keep Prosper FL above 10°C prior to and during application. Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigour and poor quality may result in reduced germination and/or reduction of seed and seedling vigour.

**How it Works:**

Clothianidin is a chloronicotinyl insecticide with systemic activity. Carbathiin is a carboximide fungicide with systemic activity; thiram is a dithiocarbamate fungicide with contact activity; and metalaxyl is an acylalanine fungicide with systemic activity.

**Restrictions:**

**Use:** Treated seed must be labelled as follows: **“This seed has been treated with clothianidin and/or carbathiin, thiram and metalaxyl. Do not use for food, feed or oil processing. Store away from feeds and other foodstuffs.”**

**Storage:** Protect seed treatments from freezing. Do not store Prosper FL above 35°C. Do not store treated seed above 25°C or in direct sunlight. Treated seed stored for periods in excess of 9 months should be tested for germination before planting.

**Re-planting:** Corn and canola may be replanted at any time. A 1-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back is required for cereals, grasses, nongrass animal feeds, soybeans and dry beans.

**Environment:** These products are toxic to aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment wash waters. These products are toxic to birds and mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface.

**Precautions:**

Keep out of reach of children. Harmful if swallowed or absorbed through skin. Do not get Prosper FL into eyes. Work in a well-ventilated area when handling products or treated seed. Workers involved in treating or handling treated seed must wear coveralls over long-sleeved shirt and long pants, chemical-resistant gloves, head gear and respiratory protection.

**Hazard Rating:**

Warning Poison

**Raxil 250 FL**

**Fungicide Group – 3**  
(Refer to page 230)

**Company:**

Bayer CropScience PCP# 26138

**Crops and Staging:**

Wheat, barley and oats. Seed treatment.

**Formulation:**

6 g/L tebuconazole formulated as a flowable seed treatment. Container size: 2 x10 L, 200 L.

## Rates and Diseases Controlled:

CROP	UNDILUTED USE RATE (ML) PER 100 KG OF SEED*	KG SEED TREATED BY 10L OF CONCENTRATE	DISEASES CONTROLLED	DISEASES SUPPRESSED**
Wheat	252 - 332	4000 - 3000	Seed rot and Seedling blights caused by <i>Fusarium</i> spp.; Loose smut; Stinking smut (bunt)	Root rot caused by <i>Cochliobolus sativus</i> ; Crown and root rot caused by <i>Fusarium</i> spp.
Barley	252 - 332	4000 - 3000	Seed rot and Seedling blights caused by <i>Fusarium</i> spp.; Barley leaf stripe; False loose smut; Covered smut; True loose smut	Crown and root rot caused by <i>Fusarium</i> spp.
Oats	332 - 500	3000 - 2000	Loose smut	

\* For dilution information, see "triple rinse instructions" on product label.

\*\* For the suppression of common root rot of wheat, use the higher rate. Use higher rates where disease levels are likely to be high or on highly susceptible varieties.

### Cost (2005 suggested retail price):

**Wheat, barley:** \$7.18 to \$9.46 per 100 kg of seed

**Oat:** \$9.46 to \$14.25 per 100 kg seed

### Application Information:

Raxil 250 FL is a ready to use formulation designed for commercial or on-farm treatment with conventional seed treating equipment which can accurately control application rates and provide a good distribution of chemical onto seed. It is important that the seed and chemical are mixed quickly and uniformly. See manufacturer's instructions supplied with the treater system for information on proper application technique.

Uniform coverage at the correct rate is important for satisfactory results. Under-treatment may lead to loss of efficacy and over-treatment could reduce germination. Seed may be planted immediately after treating.

### How it Works:

The active ingredient tebuconazole is a systemic triazole fungicide that provides broad-spectrum protection against seed and soil-borne diseases.

### Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Raxil 250 FL (tebuconazole); do not use for food, feed or oil processing. Wear a long sleeved shirt and long pants (or coveralls) and chemical resistant gloves when handling treated seed."

**Storage:** Store product in original container, away from other pesticides, fertilizer, food or feed. Grazing: Do not feed or graze livestock on treated areas for 4 weeks after planting.

**Environment:** Do not contaminate pods, lakes or streams.

**Resistance:** Raxil 250 FL contain a triazole fungicide. Some loss of disease control may occur over time due to the development of resistant strains of pathogens if Raxil 250 FL or other Group 3 fungicides are used repeatedly or consecutively in successive years on same fields, Alternate use of Raxil 250 FL with fungicides with a different mode of action in your disease control program.

### Precautions:

Keep out of reach of children. Do not get into eyes or onto skin. Work in a well ventilated area. Wear coveralls, chemical resistant gloves, a dust mask or respirator fitted to exclude dust, and goggles when treating seed or while handling treated seed.

### Hazard Rating:

Danger skin irritant.

# Raxil T

Fungicide Group – 3, M  
(Refer to page 230)

## Company:

Bayer CropScience PCP# 27566

## Crops and Staging:

Wheat, barley and oats. Seed treatment.

## Formulation:

6.7 g/L tebuconazole plus 222 g/L thiram. Formulated as a flowable seed treatment. Container size: 10 L, 100 L, 200 L, 1000L.

## Rates and Diseases Controlled:

CROP	USE RATE (ML) PER 100 KG SEED	DISEASES CONTROLLED	DISEASES SUPPRESSED
Wheat	225	Seed-borne seed rot and seedling blight caused by <i>Fusarium</i> ; Seed rot and seedling blight caused by <i>Cochliobolus sativus</i> ; Seed rot caused by saprophytic fungi <i>Penicillium</i> , <i>Aspergillus</i> and <i>Alternaria</i> ; Seed-borne <i>Septoria</i> ; Stinking smut (bunt); Loose smut; <i>Pythium</i> seed rot	<i>Fusarium</i> root and crown rot; Common root rot caused by <i>Cochliobolus sativus</i>
Barley	225	Seed-borne seed rot and seedling blight caused by <i>Fusarium</i> ; Seed rot and seedling blight caused by <i>Cochliobolus sativus</i> ; Seed rot caused by saprophytic fungi <i>Penicillium</i> , <i>Aspergillus</i> and <i>Alternaria</i> ; False loose smut; Covered smut; Loose smut; <i>Pythium</i> seed rot	<i>Fusarium</i> root and crown rot; Common root rot caused by <i>Cochliobolus sativus</i>
Oats	225	Seed-borne seed rot and seedling blight caused by <i>Fusarium</i> ; Seed rot and seedling blight caused by <i>Cochliobolus sativus</i> ; Loose smut; <i>Pythium</i> seed rot	Common root rot caused by <i>Cochliobolus sativus</i>

**Cost** (2005 suggested retail price):  
Not available

Germination will not be affected by treatment as long as over-application does not occur and seed is properly stored. Seed may be planted immediately after treating.

## Application Information:

Raxil T is a ready to use formulation designed for commercial or on-farm treating with conventional seed treating equipment which can accurately control application rates and provide good distribution of chemical. Uniform coverage at the correct rate is important for satisfactory results.

## How it Works:

The active ingredient tebuconazole is a systemic triazole fungicide that provides broad-spectrum protection against seed and soil-borne diseases. The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed must be labelled "This seed has been treated with Raxil T which contains the fungicides tebuconazole and thiram". Do not use for food, feed or oil processing.

**Storage:** Store product in original container, away from other pesticides, fertilizer, feed and food. Store in a cool, dry place and avoid heat.

**Grazing:** Do not feed or graze livestock on treated areas for 4 weeks after planting.

**Environment:** Do not contaminate water, food, or feed by storage, disposal, or by cleaning of equipment. Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed.

**Resistance:** Raxil T contains Group 3 and Group M fungicides. Some loss of disease control may occur over time due to the development of resistant strains of pathogens if Raxil T or other fungicides of these groups are used repeatedly or consecutively in successive years on same fields. Alternate use of Raxil T with fungicides with a different mode of action in your disease control program.

## Precautions:

Keep out of reach of children. Harmful if inhaled. May irritate the skin. Work in a well ventilated area when treating seed or while augering or handling treated seed. Applicators and handlers must wear coveralls over long-sleeved shirt and pants, chemical resistant gloves, protective eyewear and a NIOSH approved respirator.

## Hazard Rating:

Caution - Skin irritant.



Caution Poison.

# Senator PSPT

## Fungicide Group – 1

(Refer to page 230)

### Company:

Engage Agro Corporation PCP# 26236

### Formulation:

10% thiophanate-methyl formulated as dust.  
Container size: 10 kg.

### Crops and Staging:

Potatoes. Seed piece treatment.

### Diseases Controlled:

*Fusarium* rot, *Verticillium* wilt, silver scurf (*Helminthosporium solani*). Also aids in control of seed piece decay and blackleg infections.

### Cost (2005 suggested retail price):

\$9.98 per kg; \$4.99 to treat 100 kg cut seed.

### Rate:

Use 500 g per 100 kg cut seed (one bag treats 2,000 kg seed).

### Application Information:

Apply in a convenient container or by dust attachment over belt. Cut pieces should be treated within 6 hours of cutting. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential. Cut pieces should be treated within 6 hours of cutting. If planting is to be delayed more than 1 to 2 days, the treated pieces should be stored for 2 to 3 days in open crates before bagging. This product contains no colourant; an appropriate colourant must be added when this product is applied.

### How it Works:

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

### Restrictions:

**Storage:** Store product in a dry place. Avoid contamination of feed or food stuffs.

**Environment:** Do not contaminate domestic or irrigation water supplies, lakes, streams and ponds.

**Resistance:** Strains of fungi may develop tolerance to Senator PSPT or other Group 1 fungicides after prolonged use. Use full label rates of Senator PSPT and ensure thorough coverage. When possible, alternate with products from different chemical families. If potatoes are going to be treated with Mertect prior to storage in the fall, do not use Senator PSPT or any other product containing thiophanate-methyl at planting. Do not use Senator PSPT or any other product containing thiophanate-methyl if Mertect was used as the storage treatment on the seed.

### Precautions:

Keep out of reach of children. May be harmful if swallowed. Avoid inhalation of dust. Wash hands and face after handling.

# Thiram 75WP

Fungicide Group – M  
(Refer to page 230)

## Company:

Bayer Crop Science PCP# 27556

## Formulation:

75% thiram formulated as wettable powder. Container sizes: 5 kg, 25 kg.

## Crops and Staging:

Mustard, grasses, dry beans, peas, soybeans, safflower, corn, and alfalfa. Seed treatment.

## Diseases Controlled:

Seed decay, seedling blight, damping off.

## Cost (2005 suggested retail prices):

**Mustard, grasses, alfalfa:** \$14.36 per 100 kg seed

**Dry bean, pea, soybean:** \$4.00 to \$5.60 per 100 kg seed

**Corn:** \$4.80 per 100 kg of seed

**Safflower:** \$8.00 per 100 kg of seed

## Rates:

CROP	GRAMS THIRAM/ 100 KG SEED	AMOUNT OF SEED (KG) ONE 5 KG PACKAGE TREATS
Mustard, grasses, alfalfa	360	1,389
Dry beans, peas, soybeans	100 - 140	3,571 - 5,000
Field corn	120	4,166
Safflower	200	2,500

## Compatibility with Rhizobia-based Inoculants:

Thiram is compatible with Rhizobia, however, some restrictions may apply in storage length with Thiram-treated seed inoculated with Rhizobia. Contact Rhizobia manufacturer on use patterns with their Rhizobia strain.

## How it Works:

The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Restrictions:

**Use:** Treated seed should be labelled “Do not use for food or feed. This seed has been treated with thiram”

**Storage:** Store in a cool, dry, ventilated place, away from feeds and foods. Keep away from flame, sparks and heat.

**Grazing:** Do not graze treated areas or feed clippings from treated areas to livestock.

## Precautions:

Do not consume alcohol 24 hours before or after working with thiram. Avoid breathing dust or spray mist. When treating, augering or handling treated seed, work in a well-ventilated area and wear a suitable dust mask, goggles and gloves.

## Hazard Rating:



Warning Poison

# Vitaflo 280

**Fungicide Group – 7, M**  
(Refer to page 230)

## Company:

Bayer CropScience PCP# 11423

## Formulation:

**Vitaflo 280:** 15.59% carbathiin and 13.95% thiram formulated as a liquid suspension.

Container sizes: 10 L, 100 L, 200 L, 1000 L.

## Crops, Rates and Diseases Controlled:

CROP	USE RATE (ML) PER 100 KG SEED	DISEASES CONTROLLED	DISEASES SUPPRESSED
Barley	230 - 330 <sup>1</sup>	False loose smut; True loose smut; Covered smut; Leaf stripe; Seed rot and seedling blight caused by <i>Cochliobolus sativus</i> , <i>Fusarium</i> , <i>Pythium</i> , <i>Aspergillus</i> , <i>Penicillium</i> and <i>Alternaria</i> spp.	Suppression of root rot caused by <i>Cochliobolus sativus</i> and <i>Fusarium</i> spp.; Suppression of net blotch
Wheat	230 - 330 <sup>1</sup>	Loose smut; Stinking smut (bunt); Seed-borne dwarf bunt; Seed-borne <i>Septoria</i> ; Seed rot and seedling blight caused by <i>Cochliobolus sativus</i> , <i>Fusarium</i> , <i>Pythium</i> , <i>Aspergillus</i> , <i>Penicillium</i> and <i>Alternaria</i> spp.	Suppression of root rot caused by <i>Cochliobolus sativus</i> and <i>Fusarium</i> spp.
Oats	330	Loose smut; Covered smut; Seed rot and seedling blight caused by <i>Fusarium</i> , <i>Pythium</i> , <i>Aspergillus</i> , <i>Penicillium</i> and <i>Alternaria</i> spp.	Suppression of root rot caused by <i>Cochliobolus sativus</i>
Rye	230 - 330 <sup>1</sup>	Stem smut; Seed rot and seedling blight caused by <i>Fusarium</i> , <i>Pythium</i> , <i>Aspergillus</i> , <i>Penicillium</i> and <i>Alternaria</i> spp.	Suppression of root rot caused by <i>Cochliobolus sativus</i> and <i>Fusarium</i> spp.
Triticale	200	Seed rot, damping off and seedling blight	
Dry beans	260 <sup>2</sup>	Seed rot, seedling blight, and root rot caused by <i>Rhizoctonia solani</i> ; Seed-borne anthracnose ( <i>Colletotrichum lindemuthianum</i> )	
Corn	280 560 - 748 <sup>3</sup>	Seed rot and damping off Seed-borne head smut	
Flax, Linola	525	Seed rot, root rot and seedling blight caused by <i>Rhizoctonia solani</i> and <i>Fusarium</i> spp.	
Lentils	330	Seed rot, seedling blight, and early season root rot caused by <i>Botrytis cinerea</i> , <i>Rhizoctonia solani</i> , <i>Fusarium</i> and <i>Pythium</i> spp.	
Peas	260 - 330 <sup>4</sup>	Seed rot and seedling blight caused by ascochyta ( <i>Mycosphaerella</i> ), <i>Rhizoctonia solani</i> , <i>Fusarium</i> and <i>Pythium</i> spp.	
Soybeans	260	Seed rot and seedling blight caused by <i>Rhizoctonia solani</i> , <i>Phomopsis</i> and <i>Fusarium</i> spp.	

(see footnotes on following page)

- <sup>1</sup> The low rate will give partial control of true loose smut in wheat/barley and stem smut in rye. Use the high rate for septoria, seed rot and seedling blight, and suppression of root rot.
- <sup>2</sup> Vitaflo 280 will not protect against wind-borne anthracnose spores. This product will not control anthracnose if seed is severely infected.
- <sup>3</sup> Use 140-187 mL per 25 kg seed to control head smut of corn.
- <sup>4</sup> Use high rate on peas to control ascochyta (*Mycosphaerella pinodes*)

### Cost (2005 suggested retail price):

**Barley, wheat, rye:** \$5.45 to \$7.82 per 100 kg seed

**Triticale:** \$4.74 per 100 kg seed

**Peas:** \$6.16 to \$7.82 per 100 kg of seed

**Lentils, oats:** \$7.82 per 100 kg seed

**Flax:** \$12.44 per 100 kg seed

**Beans, soybeans:** \$6.16 per 100 kg seed

**Corn:** \$6.64 to \$17.77 per 100 kg seed

### Application Information:

Vitaflo 280 is designed to be used undiluted in commercial seed treaters, but can be diluted with water for use in slurry treaters. Undiluted Vitaflo 280 can be used at temperatures down to -30°C. Centrifugal pumps are not recommended for pumping Vitaflo 280. Use of a Vitaflo Pump is recommended. If containers have been in storage, some settling may occur and require agitation.

### How it Works:

The active ingredient carbathiin is carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

### Tank Mixes:

Mixing of Vitaflo 280 with solvent based products may result in gelling or sedimentation. Seed treater lines and reservoirs should be thoroughly cleaned before use of Vitaflo 280.

### Compatibility with Rhizobia-based Inoculants:

Vitaflo 280 is compatible with Rhizobia. Do not tank mix Vitaflo 280 and Rhizobia. Always check with Rhizobia manufacturers on any restrictions that may exist with seed treatments.

### Restrictions:

**Use:** Seed treated with Vitaflo 280 must be labelled as follows "This seed has been treated with Vitaflo 280 liquid seed protectant containing carbathiin and thiram. Do not use for feed, food, or oil processing. When augering or handling treated seed work in well-ventilated area and wear suitable mask, goggles and gloves." Do not use treated seed for feed, food or oil processing.

**Storage:** Do not store Vitaflo 280 in direct sunlight or above 35°C. Vitaflo 280 will not freeze even at extreme temperatures. Do not store dry beans or soybeans treated with Vitaflo 280. Wheat, barley, rye, oats, triticale and flax seed treated with Vitaflo 280 can be stored up to 18 months without reduction in germination. Corn seed treated with Vitaflo 280 can be stored up to one year without reduction in germination.

**Grazing:** Do not graze or feed livestock on treated area for four weeks after planting except for the following crops: Soybeans - do not graze or feed livestock on forage and hay on treated areas; Bean - Do not graze or feed on bean forage for 60 days; Barley, oats, wheat - Do not graze or feed on treated area for 6 weeks.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance:** Vitaflo 280 contains Group 7 and Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate Vitaflo 280 and other Group 7 and M fungicides with different groups that control the same pathogen.

### Precautions:

Keep out of reach of children. Harmful if swallowed, inhaled or absorbed through skin. Do not get into eyes. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear long sleeved coveralls, a suitable dust mask, goggles and chemical resistant gloves.

### Hazard Rating:

Warning Eye Irritant

Caution Skin Irritant

# Vitavax rs Fungicide

Fungicide Group – 7, M  
(Refer to page 230)

This seed treatment is available to commercial seed treaters only.

## Company:

Bayer CropScience PCP# 25862

## Formulation:

5.97% carbathiin and 11.94% thiram as a liquid seed treatment. Container size: 10 L, 100 L, 200 L, 1000 L

## Crops and Staging:

Canola, rapeseed and mustard. Seed treatment.

## Diseases Controlled:

**Canola, rapeseed and mustard:** Seed rot, seedling blight, damping off and early season root rot caused by species of *Rhizoctonia*, *Pythium* and *Alternaria*.

**Canola and rapeseed:** Seed-borne blackleg.

## Cost:

Not available.

## Rate:

833 to 1250 mL per 100 kg of seed. 100 L will treat 8,000 to 12,000 kg of seed

## Application Information:

Prior to and during application, Vitavax rs Fungicide must be thoroughly agitated to ensure uniform mixing of product. Vitavax rs Fungicide treated seed does not require drying after treatment. Refer to label for rinsate instructions.

## How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

## Registered Mixes:

Can be co-applied on the seed with Apron FL (Allegiance FL) and Gaucho 480 FL.

## Restrictions:

**Use:** Treated seed must be labelled “This seed has been treated with Vitavax rs Fungicide, containing carbathiin and thiram, do not use for food, feed or oil processing.” Do not reuse container for any purpose. Augers used for handling treated seed should not be used to move seed for feed, food or oil processing. Do not reuse bags from treated seed to handle food or feed products. Do not contaminate feed or food-stuffs with treated seed.

**Storage:** Store product in original container only, away from other pesticides, fertilizer, food or feed. Treated canola or rapeseed stored for periods more than 9 months should be tested for germination before planting. Storage of Vitavax rs Fungicide at low temperatures is not recommended. Keep product above 10°C prior to and during application. Do not store treated seed above 25°C or in direct sunlight. Protect from freezing.

**Grazing:** Do not feed or graze livestock on treated areas for four weeks after planting.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance:** Vitavax rs Fungicide contains Group 7 and Group M fungicides. A gradual or total loss of pest control may occur over time if these fungicides are used repeatedly in the same fields. Rotate this product and other Group 7 and M fungicides with different groups that control the same pathogen.

## Precautions:

Keep out of reach of children. Do not get into eyes. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear chemical resistant gloves when handling product or treated seed and goggles to protect eyes from possible splashing.

## Hazard Rating:



Caution Poison.

Caution Eye Irritant.

# Vitavax Single Solution

Fungicide Group – 7  
(Refer to page 230)

## Company:

Bayer CropScience PCP# 14069

## Crops and Staging:

Barley, wheat, oats, rye, flax. Seed treatment.

## Formulation:

230 g/L carbathiin formulated as a solution.  
Container sizes: 10 L, 200 L.

## Cost

Not Available

## Diseases Controlled:

BARLEY	WHEAT	OATS	RYE	FLAX
Covered smut True loose smut False loose smut Seed rot Seedling blight *Suppression of net blotch, leaf stripe, common root rot	Loose smut Stinking smut (bunt) Seed rot Seedling blight *Suppression of common root rot	Covered smut Loose smut Seed rot Seedling blight *Suppression of common root rot	Stem smut Seed rot Seedling blight *Suppression of common root rot	Seed rot Seedling blight

\* will not protect plants from infection beyond the first leaf stage

## Rates:

CROP	ML/100 KG SEED	KG SEED TREATED/ 10 L CONTAINER
Wheat**	240 - 300	4,167 - 3,333
Barley**	240 - 300	4,167 - 3,333
Oats	240	4,167
Rye	240	4,167
Flax	400	2,500

\*\* For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 300 mL rate will give increased disease control.

## Application Information:

Vitavax Single Solution is a ready to use formulation designed for commercial treaters and on-farm auger treating. Do not dilute with water. It is important that the seed and chemical are mixed quickly and uniformly. See instructions supplied with the applicable treater system.

## How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity.

## Restrictions:

**Use:** Treated seed must be labelled as followed: "This seed has been treated with Vitavax Single Solution Seed Protectant. Contains carbathiin; do not use for food, feed or oil processing." Do not contaminate feed or foodstuffs.

**Storage:** Do not store below 0°C. Product is flammable. Keep away from flame and sparks.

**Grazing:** Do not graze or feed livestock on treated areas for four weeks after planting.

**Environment:** Do not contaminate ponds, lakes or streams.

**Resistance:** Vitavax Single Solution contains a Group 7 fungicide. A gradual or total loss of pest control may occur over time if this fungicide is used repeatedly in the same fields. Rotate this product and other Group 7 fungicides with different groups that control the same pathogen.

## Precautions:

Keep out of reach of children. Work in a well-ventilated area when treating or handling treated seed. Wear a suitable mask, gloves and goggles. Product may damage painted surfaces by removing paint or leaving stain. Do not use rubber or PVC hose.