

4. Cereals

WHEAT, BARLEY, OAT AND RYE INSECTS

Table 4–1. Control Options for Insects in Cereals (Wheat, Barley and Oats) — Wireworms, European Chafer

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
WIREWORMS (<i>Limonius</i> spp. and others)				
Seed Treatment				
<p>See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>, for sampling methods. 1 wireworm/bait trap may warrant control.</p> <p>Fields at risk include those on sandy and silty soils with a high frequency of grassy crop rotation (cereals, mixed forages and especially following sod), canola or vegetable crops including carrots, potatoes and sweet potatoes.</p>	chlorantraniliprole	Lumivia CPL Insecticides	24–40 mL product (15–25 g a.i.)/ 100 kg seed	<p>For use in commercial and on-farm treating facilities. Do not make a subsequent foliar application of any Group 28 insecticide (e.g., Coragen) for a minimum of 60 days after planting seed treated with Lumivia CPL Insecticide Seed Treatment. If a foliar spray is required during this window it must be made with an insecticide other than Group 28.</p> <p>This product contains no colourant. An appropriate colourant must be added when this product is applied.</p> <p>Toxic to bees. This product is systemic. However, bees are unlikely to be exposed to product residues in pollen and/or nectar resulting from seed treatment applications. When this product is applied and used according to label directions, risk to bees is expected to be negligible. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible.</p>
	clothianidin	Nipsitl INSIDE 600	(17 mL/ 100 kg seed for suppression) 33–100 mL/ 100 kg seed	<p>For use in wheat only. For use in commercial seed treatment facilities or on-farm. Use higher rates on wheat seed to be planted into fields known to have a history of severe wireworm infestations for protection to seed and seedlings.</p> <p>This product contains no colourant. An appropriate colourant must be added when this product is applied.</p> <p>Clothianidin is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the complete guidance “Pollinator Protection and Responsible Use of Treated Seed-Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn seed treated with these insecticides. Carefully follow use directions for this seed flow lubricant. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible.</p>

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Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
WIREWORMS (<i>Limoni</i> spp. and others) (continued)				
Seed Treatment (continued)				
(continued)	clothianidin + metalaxyl + metconazole	NipsIt SUITE Cereals	326 mL/ 100 kg seed	<p>For use in wheat only. Suppression only. The product is formulated for use as an on-farm and commercial seed treatment product.</p> <p>Clothianidin is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the complete guidance “Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn seed treated with these insecticides. Carefully follow use directions for this seed flow lubricant. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible. Left over seed should be sown in headlands or buried away from water sources.</p>
	imidacloprid	Alias 240 SC	42–125 mL/ 100 kg seed	<p>For use in wheat, barley and oats. For use in commercial and on-farm seed treatment equipment. Use higher rates for fields with history of moderate-to-high wireworm pressure.</p> <p>This product contains no colourant. An appropriate colourant must be added when this product is applied to seed.</p> <p>Imidacloprid is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the complete guidance “Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn seed treated with these insecticides. Carefully follow use directions for this seed flow lubricant. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible. Left-over seed should be sown in headlands or buried away from water sources.</p>

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Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
WIREWORMS (<i>Limoni</i> spp. and others) (continued)				
Seed Treatment (continued)				
(continued)	Imidacloprid (continued)	Sombrero 600 FS	17–50 mL/ 100 kg seed	<p>For use in wheat, barley and oats. For use in commercial and on-farm seed treatment equipment. For fields with a history of moderate-to-high wireworm pressure, treat crops at 34–50 mL/100 kg seed. Dilute in sufficient liquid to achieve uniform distribution on the seed. A colourant MUST be added to this product to colour seed in accordance with the PCP Act and the Seeds Act regulations.</p> <p>Imidacloprid is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the complete guidance “Pollinator Protection and Responsible Use of Treated Seed-Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn seed treated with these insecticides. Carefully follow use directions for this seed flow lubricant. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible. Left-over seed should be sown in headlands or buried away from water sources.</p>
		Stress Shield for Cereals	21–63 mL/ 100 kg seed (10–30 g ai/ 100 kg seed)	<p>For use in wheat, barley and oats. For commercial and on-farm or commercial treating. For fields with a history of moderate-to-high wireworm pressure, treat crops at 50 mL/100 kg seed. Stress Shield 600 may be mixed with certain fungicides. Follow all appropriate directions and precautions as specified on the fungicide labels.</p> <p>This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.</p> <p>Imidacloprid is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the complete guidance “Pollinator Protection and Responsible Use of Treated Seed-Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn seed treated with these insecticides. Carefully follow use directions for this seed flow lubricant. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible. Left-over seed should be sown in headlands or buried away from water sources.</p>

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Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
WIREWORMS (<i>Limonius</i> spp. and others) (continued)				
Seed Treatment (continued)				
(continued)	thiamethoxam	Cruiser 5 FS	33–50 mL/ 100 kg seed	<p>For use in wheat, barley and rye. For commercial and on-farm or commercial treating. Use higher rate in fields with a history of high infestations of larvae. Do not graze or feed livestock on treated areas for 45 days after planting.</p> <p>This product contains no colourant. An appropriate colourant must be added when this product is applied to seed.</p> <p>Thiamethoxam is toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. When used according to label directions minimal exposure or risk is expected. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the “Pollinator Protection and Responsible Use of Treated Seed-Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn or soybean seed treated with this insecticide. Carefully follow use directions for the seed flow lubricant. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to fish and aquatic invertebrates. Do not apply directly to water, or to areas where surface water is present.</p>
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	<p>For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting. Additional CRUISER 5FS seed treatment may be needed when wireworm activity is high.</p> <p>Thiamethoxam is toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. When used according to label directions minimal exposure or risk is expected. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the “Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn or soybean seed treated with this insecticide. Carefully follow use directions for the seed flow lubricant. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to fish and aquatic invertebrates. Do not apply directly to water, or to areas where surface water is present.</p>

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Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
GRUB — EUROPEAN CHAFER (<i>Rhizotrogus majalis</i>)				
<p>High-risk areas for chafer within a field include sandy knolls and areas bordering turf, pasture and tree lines. Chafer grub infestations can occur 1 year after soybean crops on sandy soils. Avoid planting winter wheat if chafer grub populations are extreme (more than four grubs per 30 cm x 30 cm (1 ft²)).</p> <p>See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>, for more details.</p>	imidacloprid	Stress Shield 600	17–50 mL/ 100 kg seed (10–30 g ai/ 100 kg seed)	<p>For use in wheat, barley and oats. For commercial and on-farm or commercial treating. Stress Shield 600 may be mixed with certain fungicides. Follow all appropriate directions and precautions as specified on the fungicide labels.</p> <p>This product contains no colourant. Seed treated with this product must be conspicuously coloured. Do not graze or feed livestock on treated areas for 4 weeks after planting.</p> <p>Imidacloprid is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the complete guidance “Pollinator Protection and Responsible Use of Treated Seed-Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn seed treated with these insecticides. Carefully follow use directions for this seed flow lubricant. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible. Left-over seed should be sown in headlands or buried away from water sources.</p>
	thiamethoxam	Cruiser 5 FS	50 mL/ 100 kg seed	<p>For use in wheat and barley. For commercial and on-farm or commercial treating. Do not graze or feed livestock on treated areas for 45 days after planting. This product contains no colourant. An appropriate colourant must be added when this product is applied to seed.</p> <p>Thiamethoxam is toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. When used according to label directions minimal exposure or risk is expected. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the “Pollinator Protection and Responsible Use of Treated Seed-Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn or soybean seed treated with this insecticide. Carefully follow use directions for the seed flow lubricant. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to fish and aquatic invertebrates. Do not apply directly to water, or to areas where surface water is present.</p>

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Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
GRUB — EUROPEAN CHAFER (<i>Rhizotrogus majalis</i>) (continued)				
(continued)	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	<p>For use in wheat and barley. For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting. Additional CRUISER 5FS seed treatment may be needed when European chafer activity is high.</p> <p>Thiamethoxam is toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. When used according to label directions minimal exposure or risk is expected. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the “Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn or soybean seed treated with this insecticide. Carefully follow use directions for the seed flow lubricant. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to fish and aquatic invertebrates. Do not apply directly to water, or to areas where surface water is present.</p>

WHEAT, BARLEY, OAT AND RYE INSECTS

Table 4–2. Control Options for Insects in Cereals (Wheat, Barley and Oats) — Armyworm, Cereal Leaf Beetle

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
ARMYWORM (TRUE – <i>Pseudaletia unipuncta</i>, FALL – <i>Spodoptera frugiperda</i>)					
Chemical control is warranted by 4–5 larvae in a 30-cm-x-30-cm area. Treat if larvae are smaller than 2.0 cm long and threshold has been exceeded. If larvae have white eggs attached to them, they are parasitized and may not require treatment.	chlorantraniliprole	Coragen	250–375 mL/ha (101–151 mL/acre)	1	Ground and aerial application. Maximum of 3 applications/yr. Do not exceed a total of 1.125 L of Coragen per season. Use a minimum 100 L/ha by ground or 50 L/ha aerial. Do not make a foliar application of Coragen insecticide for a minimum of 60 days after planting of seed treated with any Group 28 insecticide (i.e., Fortenza or Lumivia). Toxic to aquatic organisms. Do not apply this product directly to freshwater habitats, estuarine and marine habitats. Observe buffer zones specified. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects to beneficial insects in habitats adjacent to application site.
	lambda-cyhalothrin	Matador 120 E	83 mL/ha (34 mL/acre)	wheat, barley, oat: 28 livestock foraging: 14	Ground and aerial application. Use 100–200 L of water/ha. Allow a 7-day interval between treatments. Maximum 3 applications/yr. Do not apply more than 2 applications by air. 24-hr restricted entry interval. Toxic to aquatic organisms. Observe buffer zones specified on the label. Overspray or drift into aquatic areas must be avoided. Toxic to small wild mammals.
		Silencer 120 EC			
	spinetoram	Delegate WG	100–200 g/ha (40–80 g/acre)	21	Ground and aerial application. Use higher rate for heavy infestations or advanced pest stages. Spray tank solution pH should be between 6 and 8 for optimal control. Minimum 5 days between treatments. Maximum 3 applications/yr. 12-hr restricted entry interval. Toxic to small wild mammals. May be toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site.
CEREAL LEAF BEETLE (<i>Oulema melanopus</i>)					
Control is warranted if an average of 3 larvae per tiller are found before boot stage. One CLB adult or larvae per stem warrants control after boot but prior to heading. If significant feeding is taking place on the flag leaf in the early heading stages, control may be warranted. Natural enemies are highly effective at controlling this pest. For the safety of these natural enemies, chemical control is not recommended unless pest population exceeds the action threshold. See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> , for more information.	malathion	Malathion 500 EC	550–1,100 mL/ha (202–445 mL/acre)	7	Product is less effective at temperatures below 20°C. Toxic to bees exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply this product to flower crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site. Toxic to aquatic organisms. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning equipment. Observe buffer zones specified on the label. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil or clay.

WHEAT, BARLEY, OAT AND RYE INSECTS

Table 4–3. Control Options for Insects in Cereals (Wheat, Barley and Oats) — Grasshoppers

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
GRASSHOPPERS (various species)					
Grasshoppers are more abundant in drier years. If populations are high enough, wheat heads may be clipped. Seedling winter wheat is also at risk. Infestations usually begin along field borders. Early-season weed control can help eliminate food source for early-season nymphs, however, late-season weed control in and around the field will actually cause this insect to migrate from the weeds onto the crop and cause damage. If populations are high, spot spray in border areas that are infested before migration into the field occurs.	chlorantraniliprole	Coragen	125–250 mL/ha (50–101 mL/acre)	1	Ground and aerial application. Maximum of 3 applications/yr. Do not exceed a total of 1.125 L of Coragen per season. Use a minimum 100 L/ha by ground or 50 L/ha aerial. Do not make a foliar application of Coragen insecticide for a minimum of 60 days after planting of seed treated with any Group 28 insecticide (i.e., Fortenza or Lumivia). Toxic to aquatic organisms. Do not apply this product directly to freshwater habitats, estuarine and marine habitats. Observe buffer zones specified. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects to beneficial insects in habitats adjacent to application site.
	cypermethrin	Mako	50–70 mL/ha (20–28 mL/acre)	wheat: 30 barley: 45	For use in wheat and barley. Ground application only. Use lower rates for small grasshoppers and when soil temperatures are cool (15°C–20°C). Avoid spraying when temperatures are above 25°C. Repeat treatment as necessary. Do not graze treated crop or cut for hay. Toxic to bees and other beneficial insects. Avoid spraying when bees are foraging. Toxic to aquatic organisms. Observe buffer zones and vegetative filter strips specified on the label.
	dimethoate	Cygon 480 EC	550–1,000 mL/ha (220–404 mL/acre)	35	For use in wheat, barley and oats. Ground and aerial application. For ground application, use sufficient water to obtain good coverage (100–275 L/ha). With aerial application, use 10–30 L of water/ha. Apply when the grasshoppers are in the 2–4 nymphal stage. Use higher rate for adults and later stages of nymphs or when canopy is dense. Maximum 2 applications/yr.
	lambda-cyhalothrin	Matador 120 E Silencer 120 EC	63–83 mL/ha (26–34 mL/acre)	wheat, barley, oat: 28 livestock foraging: 14	Ground and aerial application. Apply the low rate when grasshoppers are up to the 3rd nymph stage (up to 1 cm in length) or when insect numbers are low. Apply the high rate when grasshoppers are larger, up to but not including winged adults (up to 2.5 cm in length) or when insect numbers are high. Allow a 7-day interval between treatments. Maximum 3 applications/yr. Do not apply more than 2 applications by air. 24-hr restricted entry interval. Toxic to aquatic organisms. Observe buffer zones specified on the label. Overspray or drift into aquatic areas must be avoided. Toxic to small wild mammals.
	malathion	Malathion 500 EC	2.25–2.75 L/ha (900–1,100 mL/acre)	7	Product is less effective at temperatures below 20°C. Toxic to bees exposed to direct treatment, drift or residues on flowering crops or weeds. DO NOT apply this product to flower crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site. Toxic to aquatic organisms. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning equipment. Observe buffer zones specified on the label. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil or clay.

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Table 4–4. Control Options for Insects in Cereals (Wheat, Barley and Oats) — Cereal Aphids

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
CEREAL APHIDS (various species)					
Seed Treatment					
Fields planted in late summer or early fall (August/September) are at the highest risk of fall infestations. Volunteer cereals allow aphids to survive until the host crop is planted and can increase the risk of the virus being vectored into the crop.	clothianidin	NipsIt INSIDE 600	50 mL/ 100 kg seed	N/A	<p>For commercial and on-farm treating. For early-season protection of wheat seedlings against aphid feeding. Toxic to birds and small mammals. Cover or incorporate spilled treated seeds.</p> <p>This product contains no colourant. An appropriate colourant must be added when this product is applied.</p> <p>Clothianidin is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the complete guidance “Pollinator Protection and Responsible Use of Treated Seed — Best Management Practices” on the Health Canada webpage on pollinator protection at www.canada.ca/pollinators. When using a seed flow lubricant with this treated seed, only a dust reducing fluency agent is permitted. Talc and graphite are not permitted to be used as a seed flow lubricant for corn seed treated with these insecticides. Carefully follow use directions for this seed flow lubricant. Toxic to birds and small wild mammals. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned-up from the soil surface. Toxic to aquatic organisms. Do not apply where contamination of groundwater or run-off into aquatic sites is possible. Left over seed should be sown in headlands or buried away from water sources.</p>
Foliar Treatment					
Apply once the action threshold has been reached: Prior to the heading stage, 12–15 cereal aphids per stem and up to 50 aphids per head once headed.	dimethoate	Cygon 480 EC	425 mL/ha (170 mL/acre)	35	<p>For use in wheat, barley and oats. Ground and aerial application. For ground application, use sufficient water to obtain good coverage (100–275 L/ha). With aerial application, use 10–30 L of water/ha. Maximum 2 applications/yr.</p> <p>Toxic to bees.</p>
	sulfoxaflor	Transform WG	25–50 g/ha (10–24 g/acre)	14	<p>For use in wheat and barley only. Ground and aerial application. For ground application, use a minimum of 100 L of water/ha. For aerial application, use a minimum of 30 L of water/ha. Maximum 2 applications/yr. Do not apply more than 200 g/ha/yr.</p> <p>Toxic to certain beneficial insects.</p>

Seed Rots and Seed-Borne Diseases

Use good-quality, clean seed. Apply fungicide seed treatment to all wheat seed to control soil-borne and seed-borne diseases such as seed rots and seedling blights, seed-borne septoria, seed-borne fusarium seedling blight, seed-borne dwarf bunt, common bunt and loose smut. The best protection against seedling blights, smut and the bunts can be achieved through the use of a seed treatment that contains a combination of fungicides, since no one fungicide is effective against all these diseases. Good coverage of the seed is essential, otherwise performance will be reduced.

WHEAT DISEASES

Table 4–5. Control Options for Seed Rots and Seed-Borne Diseases in Wheat — Seed-Borne Septoria

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEED-BORNE SEPTORIA (<i>Stagonospora nodorum</i>, formerly <i>Septoria nodorum</i>)				
Seed Treatment				
Infected seed is lightweight and shrivelled. Fungicide seed treatment is very effective against this disease. Other options include the use of tolerant varieties and disease-free seed. Consult with your seed company and the Ontario Cereal Crops Committee Variety Trial Results at www.gocereals.ca for variety profiles. Plant into a well-prepared seed bed under good growing conditions. Use wheat in at least a 3-yr rotation since the disease can survive in wheat residue. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	carbathiin + thiram	Vitaflo 280	330 mL/100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label information for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M	Dividend XL RTA	650 mL/100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed. For control of seed-borne septoria and early-season septoria leaf blotch, use the 360 mL/100 kg seed rate.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.

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Table 4–6. Control Options for Seed Rots and Seed-Borne Diseases in Wheat — *Fusarium*

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEED-BORNE, SEED ROT and SEEDLING BLIGHT (<i>Fusarium</i> spp.)				
Seed Treatment				
<p>Infected seed is lightweight and shrivelled. Fungicide seed treatment is very effective against this disease. Other options include the use of tolerant varieties and disease-free seed. Consult with your seed company and the Ontario Cereal Crops Committee Variety Trial Results at www.gocereals.ca for variety profiles. Plant into a well-prepared seedbed under good growing conditions. Use wheat in at least a 3-yr rotation since the disease can survive in wheat residue. Avoid planting wheat after corn.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label information for information regarding resistant strains of fungus.
	clothianidin + metalaxyl + metconazole	NipsIt SUITE Cereals	326 mL/ 100 kg seed	For commercial and on-farm treating. Not for use in hopper-box, slurry-box or similar seed treatment applications used at planting. This product is to be used in liquid or slurry treaters. Mix thoroughly before use. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with NipsIt SUITE Cereals seed protectant. NipsIt SUITE Cereals seed protectant is a ready-to-use product, which includes red colourant (according to regulations pertaining to the <i>Seeds Act</i>). No additional colourant, dyes, binders, polymers or water are required.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	fludioxonil	Proseed	5.2–10.4 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Use in combination with Dividend XL RTA for broad spectrum control.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.

WHEAT DISEASES

Table 4–6. Control Options for Seed Rots and Seed-Borne Diseases in Wheat — *Fusarium*

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEED-BORNE, SEED ROT and SEEDLING BLIGHT (<i>Fusarium</i> spp.) (continued)				
Seed Treatment (continued)				
(continued)	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder.

WHEAT DISEASES

Table 4–7. Control Options for Seedling Diseases in Wheat — Common Root Rot (Common Blight)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
COMMON ROOT ROT (COMMON BLIGHT) (<i>Cochliobolus sativus</i>)				
Seed Treatment				
<p>Infected plants can be found individually or in irregular patches. These plants are often stunted and yellow (chlorotic) with a dark browning or blackening of the subcrown internodes. Drought and warm temperatures favour root rot. Maintain sound soil health practices and use good 3-yr crop rotation using non-host crops. Avoid soil compaction and deep seeding.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	Provides suppression only. For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label information for information regarding resistant strains of fungus.
	clothianidin + metalaxyl + metconazole	NipsIt SUITE Cereals	326 mL/ 100 kg seed	For commercial and on-farm treating. Not for use in hopper-box, slurry-box or similar seed treatment applications used at planting. This product is to be used in liquid or slurry treaters. Mix thoroughly before use. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with NipsIt SUITE Cereals seed protectant. NipsIt SUITE Cereals seed protectant is a ready-to-use product, which includes red colourant (according to regulations pertaining to the <i>Seeds Act</i>). No additional colourant, dyes, binders, polymers or water are required.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	Provides suppression only. For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/ 100 kg seed	Provides suppression only. For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.

WHEAT DISEASES

Table 4–7. Control Options for Seedling Diseases in Wheat — Common Root Rot (Common Blight)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
COMMON ROOT ROT (COMMON BLIGHT) (<i>Cochliobolus sativus</i>) (continued)				
Seed Treatment (continued)				
(continued)	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 6 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

WHEAT DISEASES

Table 4–8. Control Options for Seedling Diseases in Wheat — Pythium Damping-Off

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
PYTHIUM DAMPING-OFF (<i>Pythium</i> spp.)				
Seed Treatment				
<p>This disease can occur on all soil types but losses are greatest in cold, wet clay soils. Minimize soil compaction and remove excess moisture through increased drainage. Seed treatments containing metalaxyl or metalaxyl-M can reduce infection. Delay planting until conditions will result in a rapid and uniform emergence.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	clothianidin + metalaxyl + metconazole	NipsIt SUITE Cereals	326 mL/ 100 kg seed	<p>For commercial and on-farm treating. Not for use in hopper-box, slurry-box or similar seed treatment applications used at planting. This product is to be used in liquid or slurry treaters. Mix thoroughly before use. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with NipsIt SUITE Cereals seed protectant.</p> <p>NipsIt SUITE Cereals seed protectant is a ready-to-use product that includes red colourant (according to regulations pertaining to the <i>Seeds Act</i>). No additional colourant, dyes, binders, polymers or water are required.</p>
	ethaboxam	INTEGO Solo	13–17 mL/ 100 kg seed	<p>For commercial and on-farm treating. Regulations under the <i>Seeds Act</i> require that an appropriate colourant must be added when this product is applied to seed. A red colourant must be added when this product is applied to grain.</p> <p>For best results, use INTEGO Solo fungicide combined with other oomycete-active seed treatment fungicides, such as metalaxyl, to broaden the spectrum of activity. INTEGO Solo fungicide can also be used in combination with a broad-spectrum registered seed treatment fungicide having activity against <i>Rhizoctonia solani</i> and other fungal pathogens inciting seed and seedling disease.</p> <p>To deliver 5 g ai/100 kg seed, apply 0.44 mL/100,000 seeds (equals 0.0017 mg ai/seed) based on 28,634 seed/kg count.</p>
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	metalaxyl-M	Apron XL LS	20–40 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not use in hopper-box, planter-box, slurry-box or other non-commercial seed treatment applications at or immediately before planting. Read the label for information regarding resistant strains of fungus. Do not graze or feed livestock on seeded area for 4 weeks after planting.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.

WHEAT DISEASES

Table 4–8. Control Options for Seedling Diseases in Wheat — Pythium Damping-Off

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
PYTHIUM DAMPING-OFF (<i>Pythium</i> spp.) (continued)				
Seed Treatment (continued)				
(continued)	tebuconazole + metalaxyl-M	Raxil MD	300 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder.

WHEAT DISEASES

Table 4–9. Control Options for Seedling Diseases in Wheat — *Penicillium*, *Aspergillus* Seed Rot

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
PENICILLIUM (<i>Penicillium</i> spp.) and ASPERGILLUS SEED ROT (<i>Aspergillus</i> spp.)				
Seed Treatment				
<p>Both of these diseases are considered storage moulds. Their incidence increases when wheat is stored under warm temperatures and moist conditions. Seed that is damaged is especially susceptible under these conditions. Maintain grain at less than 14% moisture and below 20°C. Avoid damaging seed during harvest or handling.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label information for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

WHEAT DISEASES

Table 4–10. Control Options for Seedling Diseases in Wheat — Loose Smut

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
LOOSE SMUT (<i>Ustilago tritici</i>)				
Seed Treatment				
<p>This fungus infects the embryo at flowering, thus is seed-borne. Light rains or heavy dew and moderate temperature, 15°C–16°C, during flowering, favour infection. Use pedigreed seed that is treated with a fungicide seed treatment. This disease was quite important in Ontario wheat production, but the incidence and hence its impact have been reduced substantially due to the effectiveness of fungicide seed treatments. Good coverage of seed with fungicide seed treatment is important.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflor 280	330 mL/100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information on resistant strains of fungus.
	clothianidin + metalaxyl + metconazole	Nipsit SUITE Cereals	326 mL/100 kg seed	For commercial and on-farm treating. Not for use in hopper-box, slurry-box or similar seed treatment applications used at planting. This product is to be used in liquid or slurry treaters. Mix thoroughly before use. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with Nipsit SUITE Cereals OF seed protectant. Nipsit SUITE Cereals seed protectant is a ready-to-use product, which includes red colourant (according to regulations pertaining to the <i>Seeds Act</i>). No additional colourant, dyes, binders, polymers or water are required.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 55 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provides good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.

WHEAT DISEASES

Table 4–10. Control Options for Seedling Diseases in Wheat — Loose Smut

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
LOOSE SMUT (<i>Ustilago tritici</i>) (continued)				
Seed Treatment (continued)				
(continued)	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder.

WHEAT DISEASES

Table 4–11. Control Options for Seedling Diseases in Wheat — *Fusarium* Crown and Foot Rot, *Rhizoctonia*, Take-All

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
FUSARIUM CROWN and FOOT ROT (<i>Fusarium graminearum</i>, <i>F. culmorum</i>, <i>F. pseudograminearum</i>) — Suppression only				
Seed Treatment				
Cool, dry soils are favourable for disease development. Delay planting until conditions will result in a rapid and uniform emergence. Avoid planting after corn and maintain good soil fertility. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	Provides suppression only. For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/ 100 kg seed	Provides suppression only. For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

WHEAT DISEASES

Table 4–11. Control Options for Seedling Diseases in Wheat — Fusarium Crown and Foot Rot, Rhizoctonia, Take-All

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
RHIZOCTONIA (<i>Rhizoctonia solani</i>)				
Seed Treatment				
<p>Rhizoctonia root rot forms reddish-brown, sunken lesions on the stem and taproot, most frequently near the soil line. The lesion can girdle the entire stem, causing stunting or death of the plant. This lesion is distinctively “brick-red” in colour, noticeable immediately after removing the plant from the soil.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	clothianidin + metalaxyl + metconazole	NipsIt SUITE Cereals	326 mL/ 100 kg seed	<p>For commercial and on-farm treating. Not for use in hopper-box, slurry-box or similar seed treatment applications used at planting. This product is to be used in liquid or slurry treaters. Mix thoroughly before use. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with NipsIt SUITE Cereals OF seed protectant.</p> <p>NipsIt SUITE Cereals seed protectant is a ready-to-use product that includes red colourant (according to regulations pertaining to the <i>Seeds Act</i>). No additional colourant, dyes, binders, polymers or water are required.</p>
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	Ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
TAKE-ALL (<i>Gaeumannomyces graminis</i>) — Suppression only				
Seed Treatment				
<p>Carefully manage your soil fertility to manage this disease. Neutral-to-alkaline and infertile soils are most at risk. Do not apply lime before planting. Potassium and phosphorus deficiencies in the soil cause plants to be more susceptible because of poor root development. Nitrate nitrogen increases disease severity. Control grass weeds and avoid early planting. Use a 3-yr crop rotation and avoid planting wheat after wheat.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	Provides suppression only. For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 55 days of planting.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

WHEAT DISEASES

Table 4–12. Control Options for Seedling Diseases in Wheat — Common Bunt, Dwarf Bunt

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
COMMON BUNT (<i>Tilletia tritici</i> and <i>Tilletia laevis</i>) — SEED AND SOIL-BORNE COMMON BUNT				
Seed Treatment				
Cool soil temperatures after seeding favour these bunt diseases. Common bunt was quite important in Ontario wheat production, but the incidence and hence its impact have been reduced substantially due to the effectiveness of fungicide seed treatments. Dwarf bunt primarily occurs in the counties bordering Georgian Bay and Lake Huron where snow cover is deep and persistent in late winter and early spring. Use seed that is free of bunt spores (black). Infected seed produces a “fishy” smell. See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> for more details.	carbathiin + thiram	Vitaflo 280	230–330 mL/100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	clothianidin + metalaxyl + metconazole	NipsIt SUITE Cereals	326 mL/100 kg seed	For commercial and on-farm treating. Not for use in hopper-box, slurry-box or similar seed treatment applications used at planting. This product is to be used in liquid or slurry treaters. Mix thoroughly before use. Do not make any subsequent application of a Group 4 insecticide (e.g., in-furrow or foliar application) following treatment with NipsIt SUITE Cereals seed protectant. NipsIt SUITE Cereals seed protectant is a ready-to-use product that includes red colourant (according to regulations pertaining to the Seeds Act). No additional colourant, dyes, binders, polymers or water are required.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 55 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/100 kg seed	For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/100 kg seed	For both commercial seed treatment plants and on-farm treatment with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
triticonazole + thiram	Gemini	360 mL/100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder.	

WHEAT DISEASES

Table 4–12. Control Options for Seedling Diseases in Wheat — Common Bunt, Dwarf Bunt

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
DWARF BUNT (<i>Tilletia controversa</i>) — SEED AND SOIL-BORNE DWARF BUNT				
Seed Treatment				
<p>Wheat infected with dwarf bunt will be substantially shorter than healthy plants. Infected seed has a “fishy” smell. Dwarf bunt occurs on winter wheat, primarily in counties bordering Georgian Bay and Lake Huron where snow cover is deep and persistent in late winter and early spring. Plant seed that is free of bunt spores (black). Treat seed when bunt has been observed in the crop. Cut the crop high when harvesting. Raising the header reduces the amount of bunt balls being harvested. Ensure good coverage of fungicide seed treatment on the seed. Avoid planting wheat in fields with soil-borne dwarf bunt for 5–7 years since the fungus is very persistent.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For control of seed-borne dwarf bunt only. For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information on resistant strains of fungus.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	Controls both seed- and soil-borne dwarf bunt. For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 55 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	Controls both seed- and soil-borne dwarf bunt. For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Vibrance Quattro	325 mL/ 100 kg seed	Controls both seed- and soil-borne dwarf bunt. For commercial and on-farm treating. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	Controls both seed- and soil-borne bunts (common and dwarf). For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

WHEAT DISEASES

Table 4–13. Control Options for Foliar, Stem and Head Diseases in Wheat — Early-Season Septoria, Spot Blotch

See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
EARLY-SEASON SEPTORIA (<i>Septoria</i> spp.)					
Seed Treatment					
Early-season septoria control may reduce the risk of later infection. However, if the flag leaf is disease-free at the time of head emergence, a fungicide will not likely be necessary. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	difenoconazole + metalaxyl-M	Dividend XL RTA	650 mL/ 100 kg seed	N/A	Provides control for the first 6 weeks after planting. For full-season control, apply a foliar fungicide. For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeders. Do not graze, feed green forage or cut for hay within 55 days of planting.
SPOT BLOTCH (<i>Cochliobolus sativus</i>)					
Avoid growing wheat after barley, wheat or grasses in a rotation. Removal of residue/straw will lower risk. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.

WHEAT DISEASES

Table 4–14. Control Options for Foliar, Stem and Head Diseases in Wheat — Septoria Leaf Spot
See Appendix H. *Cereal Growth Stages.*

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)	
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>)						
Foliar Treatment						
<p>Wet, windy weather and moderate temperatures favour the development of this disease. Destroying volunteer wheat, reducing crop residue and crop rotation can help reduce risk of infection. Plant less susceptible varieties. Consult with your seed company and the Ontario Cereal Crops Committee Variety Trial Results at www.gocereals.ca for variety profiles.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops.</i></p>	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	For commercial and on-farm treating. Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.	
		Fungtion SC	0.5–1.0 L/ha (202–404 mL/acre)			
		Quilt				
			Topnotch	530 mL/ha (212 mL/acre)		Apply in at least 45 L/ha water by air or 100 L/ha by ground.
		azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok’s 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
		fluoaxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	Provides suppression only. For optimum results, begin applications preventively and repeat if needed after a 14–21-day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok’s 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
		mancozeb	Dithane DG Rainshield NT	early: 1.1 kg/ha (440 g/acre)	40	Ground and aerial application. Use lower rate for applications at Zadok’s 12–21 growth stage, when crop is in 3rd leaf to tillering. Higher rate for applications at Zadok’s 59 growth stage when head is fully emerged but prior to flowering. Do not graze crop or cut for hay. Maximum 2 applications/yr.
	Manzate Pro-Stick		late: 2.25 kg/ha (900 g/acre)			
	Manzate Max		early: 1.72 L/ha (0.7 L/acre) late: 3.52 L/ha (1.4 L/acre)			
	penthiopyrad	Vertisan	1.2–1.75 L/ha (0.48–0.7 L/acre)	Do not apply at boot stage and beyond.	Provides suppression only. Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. To optimize flag leaf protection, apply at “flag leaf out” (Zadok’s 39). Do not apply at boot stage (Zadok’s 47 and beyond). Do not apply more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 3.5 L/ha/yr. 12-hr restricted entry interval.	
	picoxystrobin	Acapela	0.22–0.29 L/ha (89–117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.	

WHEAT DISEASES

Table 4–14. Control Options for Foliar, Stem and Head Diseases in Wheat — Septoria Leaf Spot

See Appendix H. Cereal Growth Stages.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>) (continued)					
Foliar Treatment (continued)					
(continued)	propiconazole	Bumper 432 EC	150–300 mL/ha (60–121 mL/acre)	45	Ground and aerial application. For early-season disease suppression, use the lower rate at Zadok's 12–23 (as early as the two-leaf stage). Use the high rate for fields with a history of disease pressure. For later-season application, apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Apply only the high rate from Zadok's 29–55. Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25EC	250–500 mL/ha (100–200 mL/acre)		
		Tilt 250 E			
	prothioconazole	Proline 480 SC	315 mL/ha (128 mL/acre)	30	Ground and aerial application. Use as a preventive when earliest disease symptoms appear on the leaves and stems. Use with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Minimum 7-day interval between applications. Maximum 2 applications/yr. 24-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha/season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank-mix with herbicides in barley, oats, rye, triticale or millet.

WHEAT DISEASES

Table 4–14. Control Options for Foliar, Stem and Head Diseases in Wheat — Septoria Leaf Spot
See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin	Headline EC	300–600 mL/ha (120–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply to leaf foliage at very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required, as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of wheat leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

WHEAT DISEASES

Table 4–15. Control Options for Foliar, Stem and Head Diseases in Wheat — Powdery Mildew

See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
POWDERY MILDEW (<i>Erysiphe graminis</i> f. sp. <i>tritici</i>)					
Seed Treatment					
The fungus is very susceptible to weather conditions that promote drying of the crop environment, such as hot, dry, sunny weather. Management includes the use of tolerant varieties, crop rotation, tillage and fungicides. Consult with your seed company and the Ontario Cereal Crops Committee Variety Trial Results at www.gocereals.ca for variety profiles.					
See OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> , for thresholds and more information.					
Foliar Treatment					
Foliar fungicide applications may be necessary if disease levels will result in yield losses and/or a susceptible variety has been used. Consult with your seed company and the Ontario Cereal Crops Committee Variety Trial Results at www.gocereals.ca for variety profiles. Thresholds for fungicide applications differ, depending on the age of the crop. If 5%–10% of the lower leaves are infested early in the season, control is warranted. This may limit later infection. Later in the season, powdery mildew symptoms on the flag leaf (1% of the leaf) and the second leaf (3%–5% of the leaf) require immediate attention, especially if prolonged wet, humid weather is forecast.	fluoxastrobin	Evito	183–292 mL/ha (74–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day Interval. Use the higher rates and shorter Interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.44–0.88 L/ha (180–350 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Use high rate and shorter interval when disease pressure is high. Optimum protection of flag leaf is provided when applied at “flag leaf out” (Zadok's 39). Do not apply after boot stage (Zadok's 47). Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha per season. 12-hr restricted entry interval.
	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	Ground and aerial application. For early-season disease suppression, use the lower rate at Zadok's 12–23 (as early as the two-leaf stage). Use the high rate for fields with a history of disease pressure. For later-season application, apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Apply only the high rate from Zadok's 29–55. Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25 EC	250–500 mL/ha (100–200 mL/acre)		
Tilt 250 E	500 mL/ha (200 mL/acre)				
prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha/season (2 applications). Do not graze treated area and do not harvest for forage or hay.	

WHEAT DISEASES

Table 4–15. Control Options for Foliar, Stem and Head Diseases in Wheat — Powdery Mildew
See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
POWDERY MILDEW (<i>Erysiphe graminis</i> f. sp. <i>tritici</i>) (continued)					
Foliar Treatment (continued)					
(continued)	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, one application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.
	pyraclostrobin	Headline EC	400–600 mL/ha (160–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
	tebuconazole	Folicur 250 EW	500 mL/ha (200 mL/acre)	36	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of wheat leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

WHEAT DISEASES

Table 4–16. Control Options for Foliar, Stem and Head Diseases in Wheat — Leaf Rust, Stem Rust

See Appendix H. Cereal Growth Stages.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
RUST (LEAF — <i>Puccinia triticina</i> and STEM — <i>P. graminis</i> f. sp. <i>tritici</i>)					
<p>Leaf rust blows in from the southern U.S. late in the season. Minimize stem rust by removing its alternate host, common barberry. Use tolerant or resistant varieties to reduce risk of disease. There are many different phenotypes (races), and wheat varieties vary in their resistance/tolerance. The development of new races could result in a once-resistant variety becoming susceptible over time. Consult with your seed company and the Ontario Cereal Crops Committee Variety Trial Results at www.gocereals.ca for variety profiles. Use foliar treatments when flag leaf has 5–10 pustules (1% leaf area).</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	For commercial and on-farm treating. Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.
		Quilt	0.75–1.0 L/ha (303–404 mL/acre)		Ground and aerial application. Do not apply at boot stage (Zadok's 47 and beyond). Maximum 1 application/yr. Do not harvest for forage. 12-hr restricted entry interval.
		Topnotch	530 mL/ha (212 mL/acre)		Apply in at least 45 L/ha water by air or 100 L/ha by ground.
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Do not apply at boot stage (Zadok's 47 and beyond). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	fluoxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day Interval. Use the higher rates and shorter Interval when disease pressure is high. Do not apply after boot stage (Zadok's 47). Ground and aerial application. 12-hr restricted entry interval.
	mancozeb	Dithane DG Rainshield NT Manzate Pro-Stick Manzate Max	early: 1.1 kg/ha (440 g/acre) late: 2.25 kg/ha (900 g/acre) early: 1.72 L/ha (0.7 L/acre) late: 3.52 L/ha (1.4 L/acre)	40	For leaf rust control only. Ground and aerial application. Use lower rate for applications at Zadok's 12–21 growth stage, when crop is in 3rd leaf to tillering. Higher rate for applications at Zadok's 59 growth stage when head is fully emerged but prior to flowering. Do not graze crop or cut for hay. Maximum 2 applications/yr.
	penthiopyrad	Vertisan	1.2–1.75 L/ha (0.48–0.7 L/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. To optimize flag leaf protection, apply at “flag leaf out” (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Do not apply more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 3.5 L/ha/yr. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.22–0.29 L/ha (89–117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval

WHEAT DISEASES

Table 4–16. Control Options for Foliar, Stem and Head Diseases in Wheat — Leaf Rust, Stem Rust

See Appendix H. Cereal Growth Stages.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
RUST (LEAF — <i>Puccinia triticina</i> and STEM — <i>P. graminis</i> f. sp. <i>tritici</i>) (continued)					
(continued)	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	Ground and aerial application. For early-season disease suppression, use the lower rate at Zadok's 12–23 (as early as the two-leaf stage). Use the high rate for fields with a history of disease pressure. For later-season application, apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Apply only the high rate from Zadok's 29–55. Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25 EC	250–500 mL/ha (100–200 mL/acre)		
		Tilt 250 E	500 mL/ha (200 mL/acre)		
	prothioconazole	Proline 480 SC	315 mL/ha (128 mL/acre)	30	Ground and aerial application. Use as a preventive when earliest disease symptoms appear on the leaves and stems. Use with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Minimum 7-day interval between applications. Maximum 2 applications/yr. 24-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank-mix with herbicides in barley, oats, rye, triticale or millet.
	pyraclostrobin	Headline EC	300–600 mL/ha (121–240 mL/acre)	Do not apply at boot stage and beyond.	For leaf rust control only. Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.

WHEAT DISEASES

Table 4–16. Control Options for Foliar, Stem and Head Diseases in Wheat — Leaf Rust, Stem Rust

See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
RUST (LEAF — <i>Puccinia triticina</i> and STEM — <i>P. graminis</i> f. sp. <i>tritici</i>) (continued)					
(continued)	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for wheat leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

WHEAT DISEASES

Table 4–17. Control Options for Foliar, Stem and Head Diseases in Wheat — Tan Spot
See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)	
TAN SPOT (<i>Pyrenophora tritici-repentis</i>)						
Foliar Treatment						
<p>Reduced tillage and cool, cloudy, humid weather promote this disease. Tan spot survives in crop residues. Avoid planting wheat in conservation tillage fields in which wheat was grown during the preceding 2 years.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	For commercial and on-farm treating. Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.	
		Fungtion SC	0.75–1.0 L/ha (303–404 mL/acre)		Ground and aerial application. Do not apply at boot stage and beyond. Maximum 1 application/yr. Do not harvest for forage. 12-hr restricted entry interval.	
		Quilt				
		Topnotch	530 mL/ha (212 mL/acre)		Apply in at least 45 L/ha water by air or 100 L/ha by ground.	
		azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
		flouxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
		mancozeb	Dithane DG Rainshield NT	early: 1.1 kg/ha (440 g/acre) late: 2.25 kg/ha (900 g/acre)	40	Ground and aerial application. Use lower rate for applications at Zadok's 12–21 growth stage, when crop is in 3rd leaf to tillering. Higher rate for applications at Zadok's 59 growth stage when head is fully emerged but prior to flowering. Do not graze crop or cut for hay. Maximum 2 applications/yr.
	Manzate Pro-Stick					
	Manzate Max		early: 1.72 L/ha (0.7 L/acre) late: 3.52 L/ha (1.4 L/acre)			
	picoxystrobin	Acapela	0.22–0.29 L/ha (89–117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval	

WHEAT DISEASES

Table 4–17. Control Options for Foliar, Stem and Head Diseases in Wheat — Tan Spot

See Appendix H. Cereal Growth Stages.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
TAN SPOT (<i>Pyrenophora tritici-repentis</i>) (continued)					
Foliar Treatment (continued)					
(continued)	propiconazole	Bumper 432 EC	150–300 mL/ha (60–121 mL/acre)	45	Ground and aerial application. For early-season disease suppression, use the lower rate at Zadok's 12–23 (as early as the two-leaf stage). Use the high rate for fields with a history of disease pressure. For later-season application, apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Apply only the high rate from Zadok's 29–55. Maximum 2 applications/yr.
		Nufarm Propiconazole			
	Propi Super 25EC	250–500 mL/ha (100–200 mL/acre)			
	Tilt 250 E				
prothioconazole	Proline 480 SC	315 mL/ha (128 mL/acre)	30	Ground and aerial application. Use as a preventive when earliest disease symptoms appear on the leaves and stems. Use with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Minimum 7-day interval between applications. Maximum 2 applications/yr. 24-hr restricted entry interval.	
prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.	
prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank-mix with herbicides in barley, oats, rye, triticale or millet.	

WHEAT DISEASES

Table 4–17. Control Options for Foliar, Stem and Head Diseases in Wheat — Tan Spot
See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
TAN SPOT (<i>Pyrenophora tritici-repentis</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin	Headline EC	300–600 mL/ha (121–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok’s 39). Do not apply at boot stage (Zadok’s 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for wheat leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

WHEAT DISEASES

Table 4–18. Control Options for Foliar, Stem and Head Diseases in Wheat — Fusarium Head Blight

See Appendix H. Cereal Growth Stages.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
FUSARIUM HEAD BLIGHT (<i>Fusarium graminearum</i>)					
<p>Warm and prolonged wet conditions during flowering are necessary for infection to occur. Avoid planting into corn stubble, since the fungus also causes gibberella stalk rot in corn. Follow soybeans with wheat in the rotation. See the <i>Fusarium</i> forecasting web page at www.weathercentral.ca/register.cfm to determine the fusarium head blight risk for your area and for current recommendations. Consult your local crop advisor for forecast information.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	metconazole	Caramba	0.5–1 L/ha (200–404 mL/acre)	30	Provides suppression only. Ground and aerial application. For foliar diseases apply to leaf foliage at the first sign or very early stage of disease up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. Use highest rate (1.0 L/ha (404 mL/acre)) at flowering when targeting FHB (suppression only) and leaf disease control. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	prothioconazole	Proline 480 SC	315–420 mL/ha (128–170 mL/acre)	30	Provides suppression only. Ground and aerial application. Timing of application is critical. Apply from when at least 75% of the wheat heads on main stem are fully emerged (Zadok's 59) to when 50% of the heads on the main stem are in flower (Zadok's 65). Use with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Maximum 2 applications/yr (735 mL/ha) with a minimum 7-day interval between applications. 24-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Provides suppression only. Ground and aerial application. Timing of application is critical. Apply as a preventive spray within the time period from when at least 75% of the wheat head on the main stem is fully emerged (Zadok's 59) to when 50% of the heads on the main stem are in flower (Zadok's 65). Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval.
	tebuconazole	Folicur 250 EW	500 mL/ha (200 mL/acre)	36	Provides suppression only. Ground and aerial application. Timing of application is critical. The optimum window for application is 1–4 days after 75% of the heads have emerged or cleared the head (Day 0). Apply at the very early stages of disease development. Use higher rate when disease pressure is severe. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval.

WHEAT DISEASES

Table 4–19. Control Options for Foliar, Stem and Head Diseases in Wheat — *Stagonospora Glume Blotch*
See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
STAGONOSPORA GLUME BLOTCH (<i>Stagonospora nodorum</i>)					
Foliar Treatment					
<p>Prolonged wet periods in May and early June result in increased disease incidence. Rotate with crops other than cereals, plow down cereal residues and remove volunteer wheat to reduce survivability of the fungi.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	chlorothalonil	Bravo 500	1.5–2.5 mL/ha (0.6–1.0 L/acre)	30	Ground and aerial application. Apply at Zadok's growth stage 37 (flag leaf emergence) and repeat 10–14 days later at growth stage 51–55 (visible ear). A 3rd application at growth stage 59–69 (ear fully emerged) may be necessary if conditions favour disease spread. Maximum 3 applications/yr.
	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Can be tank-mixed with several cereal herbicides. Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Tilt 250 E	500 mL/ha (200 mL/acre)		
	prothioconazole	Proline 480 SC	315–420 mL/ha (128–170 mL/acre)	30	Ground and aerial application. Timing of application is critical. Apply from when at least 75% of the wheat heads on the main stem are fully emerged (Zadok's 59) to when 50% of the heads on the main stem are in flower (Zadok's 65). Use higher rate when expecting high disease pressure. Use with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Maximum 2 applications/yr (735 mL/ha) with a minimum 7-day interval between applications. 24-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14 day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
tebuconazole	Folicur 250 EW	500 mL/ha (200 mL/acre)	36	Ground and aerial application. Apply from when at least 75% of the wheat heads on the main stem are fully emerged (Zadok's 59) to when 50% of the heads on the main stem are in flower (Zadok's 65). The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for wheat leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.	

WHEAT DISEASES

Table 4–20. Control Options for Foliar, Stem and Head Diseases in Wheat — Stripe Rust

See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)	
STRIPE RUST (<i>Puccinia striiformis</i>)						
Foliar Treatment						
<p>Stripe rust can be confused with cephalosporium stripe since both will produce a yellow striping (interveinal) that can extend the entire length of the leaf. If rust is the cause, orange-yellow pustules (blisters) can be found, whereas no blistering is found in cephalosporium stripe. This disease is most noticeable in seasons with a prolonged cool spring (3°C–15°C). Symptoms often disappear as temperatures increase.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	For commercial and on-farm treating. Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.	
		Fungtion SC	0.75–1.0 L/ha (303–404 mL/acre)			
		Quilt				
			Topnotch	530 mL/ha (212 mL/acre)		Apply in at least 45 L/ha water by air or 100 L/ha by ground.
		azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
		flouxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day Interval. Use the higher rates and shorter Interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
		picoxystrobin	Acapela	0.44–0.88 L/ha (178–356 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Use high rate and shorter interval when disease pressure is high. Optimum protection of flag leaf is provided when applied at "flag leaf out" (Zadok's 39). Do not apply after boot stage (Zadok's 47). Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha per season. 12-hr restricted entry interval.
		propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	Ground and aerial application. For early-season disease suppression, use the lower rate at Zadok's 12–23 (as early as the two-leaf stage). Use the high rate for fields with a history of disease pressure. For later-season application, apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Apply only the high rate from Zadok's 29–55. Maximum 2 applications/yr.
	Nufarm Propiconazole					
	Propi Super 25 EC		250–500 mL/ha (100–200 mL/acre)			
Tilt 250 E	500 mL/ha (200 mL/acre)					

WHEAT DISEASES

Table 4–20. Control Options for Foliar, Stem and Head Diseases in Wheat — Stripe Rust
See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
STRIPE RUST (<i>Puccinia striiformis</i>) (continued)					
Foliar Treatment (continued)					
(continued)	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha/season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank-mix with herbicides in barley, oats, rye, triticale or millet.
	pyraclostrobin	Headline EC	400–600 mL/ha (160–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval. No later than end of flowering.

WHEAT DISEASES

Table 4–20. Control Options for Foliar, Stem and Head Diseases in Wheat — Stripe Rust

See Appendix H. *Cereal Growth Stages*.

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
STRIPE RUST (<i>Puccinia striiformis</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for wheat leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

BARLEY DISEASES

Table 4–21. Control Options for Seed and Seedling Diseases in Barley — Seed Rot and Seedling Blight

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEED ROT and SEEDLING BLIGHT				
Seed Treatment				
<p>Ensure good coverage of seed treatment on the seeds. Rotation with non-host crops for at least 2 years will reduce risk of disease. Avoid deep seeding.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.

BARLEY DISEASES

Table 4–22. Control Options for Seed and Seedling Diseases in Barley — Rhizoctonia, Common Seedling Blight

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
RHIZOCTONIA (<i>Rhizoctonia solani</i>)				
Seed Treatment				
<p>Sow into a well-prepared seedbed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment and ensure good coverage of seed treatment on seeds.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but refer to the label of the tank-mix partner for application rates, precautions and directions.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

BARLEY DISEASES

Table 4–22. Control Options for Seed and Seedling Diseases in Barley — Rhizoctonia, Common Seedling Blight

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
COMMON SEEDLING BLIGHT (<i>Cochliobolus sativus</i>)				
Seed Treatment				
<p>Avoid frequent or continuous barley crops in a rotation. Avoid deep seeding. Turn under crop stubble to help reduce infection levels. Plant resistant varieties. Consult with your seed company for variety profiles.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	Provides suppression only. For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

BARLEY DISEASES

Table 4–23. Control Options for Seed and Seedling Diseases in Barley — Covered Smut (Common Bunt)

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
COVERED SMUT (COMMON BUNT) (<i>Ustilago hordei</i>)				
Seed Treatment				
<p>This disease is spread from year to year primarily through infected seed. Wind-blown spores will infect florets within season. Use pedigreed seed that is treated with a fungicide seed treatment.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder.	

BARLEY DISEASES

Table 4–24. Control Options for Seed and Seedling Diseases in Barley — True Loose Smut

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
TRUE LOOSE SMUT (<i>Ustilago nuda</i>)				
Seed Treatment				
<p>Infection occurs during flowering. Conditions that promote the disease are wet, cloudy weather and moderate temperatures 16°C–22°C. Sow pedigreed seed to ensure that seed is not infected. Moist weather at flowering promotes this disease. Disease incidence has been increasing in Ontario where no seed treatment has been used. Seed treatments are beneficial in reducing loose smut infection.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	VitaFlo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325–433 mL/ 100 kg seed	For commercial and on-farm treating. Use higher rate for highly infected seed lots only. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For both commercial seed treatment plants and on-farm treating. May also be used in treat-on-the-go seeder.

BARLEY DISEASES

Table 4–25. Control Options for Seed and Seedling Diseases in Barley — Pythium

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
PYTHIUM (<i>Pythium</i> spp.)				
Seed Treatment				
<p>This disease can occur on all soil types, but losses are greatest in cold, wet clay soils. Minimize soil compaction and remove excess moisture through improved drainage. Seed treatments containing metalaxyl and metalaxyl-M can reduce infection. Delay planting until conditions will result in a rapid and uniform emergence.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	VitaFlo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 6 weeks after planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325–433 mL/ 100 kg seed	For commercial and on-farm treating. Use higher rate for highly infected seed lots only. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.

BARLEY DISEASES

Table 4–26. Control Options for Seed and Seedling Diseases in Barley — False Loose Smut

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
FALSE LOOSE SMUT (<i>Ustilago nigra</i>)				
Seed Treatment				
<p>Infection occurs during flowering. Conditions that promote the disease are wet, cloudy weather and moderate temperatures 16°C–22°C. Sow pedigreed seed to ensure that seed is not infected. Moist weather at flowering promotes this disease. Disease incidence has been increasing in Ontario where no seed treatment has been used. Seed treatments are beneficial in reducing loose smut infection.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325–433 mL/ 100 kg seed	For commercial and on-farm treating. Use higher rate for highly infected seed lots only. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provides good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.

BARLEY DISEASES

Table 4–27. Control Options for Seed and Seedling Diseases in Barley — Fusarium

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
FUSARIUM spp. (seed and soil borne, damping off and seedling blight)				
Seed Treatment				
<p>Ensure good coverage of seed treatment on seeds. Rotation with non-host crops for at least 2 years will reduce risk. Use disease-free seed and avoid deep seeding.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	VitaFlo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325–433 mL/ 100 kg seed	For commercial and on-farm treating. Use higher rate for highly infected seed lots only. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provides good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.	

BARLEY DISEASES

Table 4–28. Control Options for Seed and Seedling Diseases in Barley — Aspergillus

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
ASPERGILLUS				
Seed Treatment				
<p>Sow into a well-prepared seed bed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment and ensure good coverage of seed treatment on seeds.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325–433 mL/ 100 kg seed	For commercial and on-farm treating. Use higher rate for highly infected seed lots only. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. May be tank-mixed, but see the registered label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provides good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.

BARLEY DISEASES

Table 4–29. Control Options for Seed and Seedling Diseases in Barley — Barley Leaf Stripe

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
BARLEY LEAF STRIPE (<i>Pyrenophora graminea</i>)				
Seed Treatment				
<p>The disease is seed-borne and causes long brown stripes on the leaves, usually around heading. Use good-quality seed and a fungicide seed treatment.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325–433 mL/ 100 kg seed	For commercial and on-farm treating. Use higher rate for highly infected seed lots only. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.

BARLEY DISEASES

Table 4–30. Control Options for Foliar, Stem and Head Diseases in Barley — Net Blotch

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
NET BLOTCH (<i>Pyrenophora teres</i>)					
Foliar Treatment					
<p>Avoid growing barley after barley, wheat or grasses in a rotation. Plow down stubble and straw, and plant early to avoid serious disease in July.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	<p>Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.</p> <p>Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 1 application/yr. Do not harvest for forage. 12-hr restricted entry interval.</p> <p>Apply in at least 45 L/ha water by air or 100 L/ha by ground.</p>
		Fungtion SC	750 mL/ha (305 mL/acre)		
		Quilt	530 mL/ha (212 mL/acre)		
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A +	1 L/ha (404 mL/acre)	Do not apply at boot stage and beyond.	<p>Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.</p>
		Trivapro B (sold as co-pack: Trivapro)	300 mL/ha (120 mL/acre)		
	flouxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	<p>For optimum results, begin applications preventively and repeat if needed after a 14–21-day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.</p>
metconazole	Caramba	500–700 mL/ha (200–280 mL/acre)	30	<p>Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease up to the end of the flowering stage. Use the higher leaf disease rate when weather conditions are conducive to heavy disease development. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry.</p>	
picoxystrobin	Acapela	0.29 L/ha (117 mL/acre)	Do not apply at boot stage and beyond.	<p>Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Do not apply early-season rate after flowering (Feekes 10.5.1 or Zadoks 60). Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.</p>	

BARLEY DISEASES

Table 4–30. Control Options for Foliar, Stem and Head Diseases in Barley — Net Blotch

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
NET BLOTCH (<i>Pyrenophora teres</i>) (continued)					
Foliar Treatment (continued)					
(continued)	propiconazole	Bumper 432 EC	150–300 mL/ha (60–121 mL/acre)	45	For use in spring barley only. Ground and aerial application. For early-season disease suppression , use the lower rate at Zadok's 12–23 (as early as the two-leaf stage). Use the high rate on fields with a history of disease pressure. For later-season application, apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Apply only the high rate from Zadok's 29–55. Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25 EC	250–500 mL/ha (100–200 mL/acre)		
		Tilt 250 E			
	prothioconazole	Proline 480 SC	210–315 mL/ha (85–128 mL/acre)	30	
prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.	
prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.	

BARLEY DISEASES

Table 4–30. Control Options for Foliar, Stem and Head Diseases in Barley — Net Blotch

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
NET BLOTCH (<i>Pyrenophora teres</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin	Headline EC	300–600 mL/ha (121–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply at the very early stages of disease development. Use higher rate when disease pressure is severe. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

BARLEY DISEASES

Table 4–31. Control Options for Foliar, Stem and Head Diseases in Barley — Spot Blotch

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SPOT BLOTCH (<i>Cochliobolus sativus</i>)					
Foliar Treatment					
<p>Avoid growing barley after barley, wheat or grasses in a rotation. Plow down stubble and straw, and plant early to avoid serious disease in July.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	For use in spring barley only. Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25 EC	500 mL/ha (200 mL/acre)		
		Tilt 250 E			
	prothioconazole	Proline 480 SC	210–315 mL/ha (85–128 mL/acre)	30	Ground and aerial application. Use as a preventive treatment when earliest disease symptoms appear on the leaves and stems. Use with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Maximum 2 applications/yr with a minimum 7-day interval between applications. 24-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.
pyraclostrobin	Headline EC	400–600 mL/ha (160–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.	
pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.	

BARLEY DISEASES

Table 4–31. Control Options for Foliar, Stem and Head Diseases in Barley — Spot Blotch

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SPOT BLOTCH (<i>Cochliobolus sativus</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply at the very early stages of disease development. Use higher rate when disease pressure is severe. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

BARLEY DISEASES

Table 4–32. Control Options for Foliar, Stem and Head Diseases in Barley — Scald

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SCALD (<i>Rhynchosporium secalis</i>)					
Foliar Treatment					
Avoid growing barley after barley, wheat or grasses in a rotation. Plow down stubble and straw, and plant early to avoid serious disease in July. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.
		Fungtion SC	750 mL/ha (305 mL/acre)		Ground and aerial application. Do not apply at boot stage and beyond. Maximum 1 application/yr. Do not harvest for forage. 12-hr restricted entry interval.
		Quilt			
		Topnotch	530 mL/ha (212 mL/acre)	Apply in at least 45 L/ha water by air or 100 L/ha by ground.	
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47) head half emerged. Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	metconazole	Caramba	500–700 mL/ha (200–280 mL/acre)	30	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry.
picoxystrobin	Acapela	0.29 L/ha (117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Do not apply early-season rate after flowering (Feekes 10.5.1 or Zadoks 60). Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.	
propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	For use in spring barley only. Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Maximum 2 applications/yr.	
	Nufarm Propiconazole				
	Propi Super 25 EC	500 mL/ha (200 mL/acre)			
	Tilt 250 E				

BARLEY DISEASES

Table 4–32. Control Options for Foliar, Stem and Head Diseases in Barley — Scald

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SCALD (<i>Rhynchosporium secalis</i>) (continued)					
Foliar Treatment (continued)					
(continued)	prothioconazole	Proline 480 SC	210–315 mL/ha (85–128 mL/acre)	30	Ground and aerial application only. Use as a preventive when earliest disease symptoms appear on the leaves and stems. Use with the registered non-ionic surfactant, Agral 90 or AgSurf at 0.125% vol/vol. Maximum 2 applications/yr with a minimum 7-day interval between applications. 24-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha/season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.
	pyraclostrobin	Headline EC	400–600 mL/ha (160–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to flag leaf fully emerged stage (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.

BARLEY DISEASES

Table 4–32. Control Options for Foliar, Stem and Head Diseases in Barley — Scald

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SCALD (<i>Rhynchosporium secalis</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin + metconazole	Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
		Twinline	380–500 mL/ha (150–200 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply at the very early stages of disease development. Use higher rate when disease pressure is severe. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

BARLEY DISEASES

Table 4–33. Control Options for Foliar, Stem and Head Diseases in Barley — Septoria Leaf Spot

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>)					
Foliar Treatment					
Avoid growing barley after barley, wheat or grasses in a rotation. Plow-down stubble and straw, and plant early to avoid serious disease in July. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.
		Fungtion SC	750 mL/ha (305 mL/acre)		Ground and aerial application. Do not apply at boot stage and beyond. Maximum 1 application/yr. Do not harvest for forage. 12-hr restricted entry interval.
		Quilt			
		Topnotch	530 mL/ha (212 mL/acre)		Apply in at least 45 L/ha water by air or 100 L/ha by ground.
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47) head half emerged. Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.29 L/ha (117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Do not apply early-season rate after flowering (Feekes 10.5.1 or Zadoks 60). Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.
	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	For use in spring barley only. Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Maximum 2 applications/yr.
Nufarm Propiconazole					
Propi Super 25 EC		500 mL/ha (200 mL/acre)			
Tilt 250 E					
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.

BARLEY DISEASES

Table 4–33. Control Options for Foliar, Stem and Head Diseases in Barley — Septoria Leaf Spot

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin + metconazole	Twinline	380–500 mL/ha (150–200 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply at the very early stages of disease development. Use higher rate when disease pressure is severe. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required, as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

BARLEY DISEASES

Table 4–34. Control Options for Foliar, Stem and Head Diseases in Barley — Leaf Rust, Stem Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
RUST (LEAF — <i>Puccinia hordei</i>, STEM — <i>Puccinia graminis</i> f. sp. <i>tritici</i>)					
Foliar Treatment					
<p>Leaf rust spores are blown in from the south, and in most years, late-planted fields are most likely to show the disease. The alternate host is barberry. Remove or destroy alternate host from fence rows, etc. Plant early to reduce risk of disease incidence.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole	Blanket AP	200–300 mL (80–120 mL/acre)	Do not apply at boot stage and beyond.	Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.
		Fungtion SC	750 mL/ha (305 mL/acre)		
		Quilt	1.0 L/ha (404 mL/acre)		
		Topnotch	530 mL/ha (212 mL/acre)		
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	fluoxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
metconazole	Caramba	1 L/ha (0.4 L/acre)	30	Provides suppression only. Ground and aerial application. Timing of application is critical. Apply at 20% flowering (Zadok's 61–63) using sprayer nozzles configured to provide excellent coverage of the cereal head. Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.	
penthiopyrad	Vertisan	1.2–1.75 L/ha (0.48–0.7 L/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. To optimize flag leaf protection, apply at “flag leaf out” (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Do not apply more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 3.5 L/ha/yr. 12-hr restricted entry interval.	

BARLEY DISEASES

Table 4–34. Control Options for Foliar, Stem and Head Diseases in Barley — Leaf Rust, Stem Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
RUST (LEAF — <i>Puccinia hordei</i>, STEM — <i>Puccinia graminis</i> f. sp. <i>tritici</i>) (continued)					
Foliar Treatment (continued)					
(continued)	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	For use in spring barley only. Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25 EC	500 mL/ha (200 mL/acre)		
		Tilt 250 E			
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	Ground and aerial application. Apply at the very early stages of disease development. Use higher rate when disease pressure is severe. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

BARLEY DISEASES

Table 4–35. Control Options for Foliar, Stem and Head Diseases in Barley — Stripe Rust, Fusarium Head Blight

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
STRIPE RUST (<i>Puccinia striiformis</i> f. sp. <i>hordei</i>)					
Foliar Treatment					
<p>This disease is most noticeable in seasons with a prolonged cool spring (3°C–15°C). Symptoms often disappear as temperatures increase.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole	Blanket AP	200–300 mL/ha (80–120 mL/acre)	Do not apply at boot stage and beyond.	Apply once up to boot stage. Good spray coverage and canopy penetration are important for best results.
		Quilt	0.75–1.0 L/ha (303–404 mL/acre)		Ground and aerial application. Do not apply at boot stage and beyond. Maximum 1 application/yr. Do not harvest for forage. 12-hr restricted entry interval.
		Topnotch	530 mL/ha (212 mL/acre)		Apply in at least 45 L/ha water by air or 100 L/ha by ground.
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	fluoxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.44–0.88 L/ha (178–356 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Use high rate and shorter interval when disease pressure is high. Optimum protection of flag leaf is provided when applied at "flag leaf out" (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha per season. 12-hr restricted entry interval.
prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.	

BARLEY DISEASES

Table 4–35. Control Options for Foliar, Stem and Head Diseases in Barley — Stripe Rust, Fusarium Head Blight

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
STRIPE RUST (<i>Puccinia striiformis</i> f. sp. <i>hordei</i>) (continued)					
Foliar Treatment (continued)					
(continued)	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Twinline	380–500 mL/ha (150–200 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
		Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.

BARLEY DISEASES

Table 4–35. Control Options for Foliar, Stem and Head Diseases in Barley — Stripe Rust, Fusarium Head Blight

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
FUSARIUM HEAD BLIGHT (<i>Fusarium graminearum</i>)					
<p>Fusarium head blight infection in barley is often not as noticeable as in wheat, so examine developing heads carefully for bleached or tan spikelets. Avoid planting barley into corn residue.</p> <p>For information on this disease, see Table 4–18. <i>Control Options for Foliar, Stem and Head Diseases in Wheat — Fusarium Head Blight</i>, as well as OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	metconazole	Caramba	1 L/ha (0.4 L/acre)	30	Provides suppression only. Ground and aerial application. Timing of application is critical. Apply at 20% flowering (Zadok's 61–63) using sprayer nozzles configured to provide excellent coverage of the cereal head. Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	prothioconazole	Proline 480 SC	315–420 mL/ha (128–170 mL/acre)	30	Provides suppression only. Ground and aerial application. Timing is critical. For optimum suppression, apply as a preventive spray from when 70%–100% of the barley main stem heads are fully emerged to 3 days after full head emergence. Maximum 2 applications/yr (735 mL/ha) with a minimum 7-day interval between applications. 24-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Provides suppression only. Ground and aerial application. Timing of application is critical. For optimum suppression, apply as a preventive spray from when 70%–100% of the barley main stem heads are fully emerged to 3 days after full head emergence. Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval.

BARLEY DISEASES

Table 4–36. Control Options for Foliar, Stem and Head Diseases in Barley — Powdery Mildew

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
POWDERY MILDEW (<i>Erysiphe graminis</i>)					
<p>Foliar fungicide applications may be necessary if disease levels will result in yield losses and a susceptible variety has been used. Consult with your seed company for variety profiles.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	fluoxtrobin	Evito	183–292 mL/ha (74–118 mL/acre)	grain: 40 hay, forage: 7	For optimum results, begin applications preventively and repeat if needed after a 14–21-day Interval. Use the higher rates and shorter interval when disease pressure is high. Apply prior to disease development from Feekes 5 up to late head emergence, Feekes 10.5. Ground and aerial application. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.44–0.88 L/ha (180–350 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Use high rate and shorter interval when disease pressure is high. Optimum protection of flag leaf is provided when applied at “flag leaf out” (Zadok’s 39). Do not apply at boot stage (Zadok’s 47 and beyond). Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha per season. 12-hr restricted entry interval.
	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	For use in spring barley only. Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok’s 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok’s 49–55). Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25 EC			
	Tilt 250 E	500 mL/ha (200 mL/acre)			
prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed, on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.	

BARLEY DISEASES

Table 4–36. Control Options for Foliar, Stem and Head Diseases in Barley — Powdery Mildew

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
POWDERY MILDEW (<i>Erysiphe graminis</i>) (continued)					
(continued)	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)		<p>Do not apply at boot stage and beyond.</p> <p>Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed.</p> <p>DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions.</p> <p>DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.</p>
	tebuconazole	Folicur 250 EW	375–500 mL/ha (152–200 mL/acre)	36	<p>Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required, as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval.</p> <p>Before using Folicur for control of leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.</p>

BARLEY DISEASES

Table 4–37. Control Options for Seed and Seedling Diseases in Barley — Seed-Borne Septoria

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEED-BORNE SEPTORIA				
Seed Treatment				
Sow into a well-prepared seedbed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 6 weeks after planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + metalaxyl	Rancona Pinnacle	325–433 mL/ 100 kg seed	For commercial and on-farm treating. Use higher rate for highly infected seed lots only. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.

OAT DISEASES

Table 4–38. Control Options for Seed and Seedling Diseases in Oat — Seed Rot, Seedling Blight

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEED ROT and SEEDLING BLIGHT (<i>Pyrenopora avenae</i>, <i>Fusarium</i> spp. and others)				
Seed Treatment				
<p>Ensure good coverage of seed treatment on seeds. Rotation with non-host crops for at least 2 yr will reduce risk. Use disease-free seed and avoid deep seeding.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus and specific causal agents controlled.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. May be tank-mixed but see the registered label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

OAT DISEASES

Table 4–39. Control Options for Seed and Seedling Diseases in Oat — Covered Smut (Common Bunt), Loose Smut, Aspergillus

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
COVERED SMUT (COMMON BUNT) (<i>Ustilago koleri</i>), LOOSE SMUT (<i>Ustilago avenae</i>)				
Seed Treatment				
<p>This disease is spread from year to year primarily through infected seed. Wind-blown spores will infect florets within season. Use pedigreed seed that is treated with a fungicide seed treatment.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities Do not graze or feed livestock on treated areas for 6 weeks after planting.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus and specific causal agents controlled.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. For loose smut control only. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
triticonazole + thiram	Gemini	360 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder.	

OAT DISEASES

Table 4–39. Control Options for Seed and Seedling Diseases in Oat — Covered Smut (Common Bunt), Loose Smut, Aspergillus

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
ASPERGILLUS (<i>Aspergillus</i> spp.)				
Sow into a well-prepared seed bed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment and ensure good coverage of seed treatment on seeds. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus and specific causal agents controlled.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

OAT DISEASES

Table 4–40. Control Options for Seed and Seedling Diseases in Oat — Common Root Rot, Rhizoctonia, Pythium Damping-Off

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
COMMON ROOT ROT (<i>Cochliobolus</i>)				
Sow into a well-prepared seed bed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment and ensure good coverage of seed treatment on seeds. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	carbathiin + thiram	Vitaflo 280	230–330 mL/100 kg seed	Provides suppression only. For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus and specific causal agents controlled.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/100 kg seed	Provides suppression only. For commercial and on-farm treating. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/100 kg seed	Provides suppression only. For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
RHIZOCTONIA (<i>Rhizoctonia solani</i>)				
Sow into a well-prepared seed bed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment and ensure good coverage of seed treatment on seeds. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	carbathiin + thiram	Vitaflo 280	230–330 mL/100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.

OAT DISEASES

Table 4–40. Control Options for Seed and Seedling Diseases in Oat — Common Root Rot, Rhizoctonia, Pythium Damping-Off

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
PYTHIUM DAMPING-OFF (<i>Pythium</i> spp.)				
<p>This disease can occur on all soil types but losses are greatest in cold, wet clay soils. Minimize soil compaction and remove excess moisture through improved drainage. Seed treatments containing metalaxyl-M can reduce infection. Delay planting until conditions will result in a rapid and uniform emergence.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	difenoconazole + metalaxyl-M + sedaxane	Vibrance XL	180–360 mL/ 100 kg seed	For use in commercial seed treatment facilities only. For seed treated with Vibrance XL seed treatment, do not graze or feed livestock on treated areas for 45 days after planting. For seed treated with Vibrance XL fungicide seed treatment alone, a seed colourant must be added when this product is applied to seed.
	Ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	penflufen + prothioconazole + metalaxyl	EverGol Energy	65 mL/ 100 kg seed	For commercial and on-farm treating. Uniform application is necessary for optimum product performance. This product contains no dye. An appropriate seed colourant must be applied. May be tank-mixed but see the label of the tank-mix partner for application rates, precautions and directions.
	tebuconazole + metalaxyl-M	Raxil MD	300 mL/ 100 kg seed	For commercial and on-farm treating with conventional seed-treating equipment that can accurately control application rates and provide good distribution of chemical onto the seed in the mixing chamber. Uniform application is necessary to ensure seed safety and best disease control. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + prothioconazole + metalaxyl	Raxil Pro MD	325 mL/ 100 kg seed	Use only in treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform application to seed is necessary to ensure best disease protection and seed safety. Do not graze or feed livestock on treated areas for 4 weeks after planting.
	tebuconazole + thiram	Raxil T	225 mL/ 100 kg seed	For commercial and on-farm treating. Do not graze or feed livestock on treated areas for 4 weeks after planting.
thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.	

OAT DISEASES

Table 4–41. Control Options for Foliar, Stem and Head Diseases in Oat — Crown (Leaf) Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
CROWN (LEAF) RUST (<i>Puccinia coronata</i> var. <i>avenae</i>)					
Foliar Treatment					
<p>European buckthorn is the alternate host for this disease. Remove or destroy buckthorn where possible. Crown rust can be a problem in central and eastern Ontario. Use resistant oat varieties. Consult with your seed company and the Ontario Cereal Crops Committee Variety Trial Results at www.gocereals.ca for variety profiles. Plant oat early to allow plants to mature before inoculum levels are high. Observe fields closely for early disease symptoms, particularly when susceptible varieties are planted and/or under prolonged conditions that favour disease development. These conditions include mild-to-warm temperatures (20°C–25°C) during the day and mild temperatures at nights (15°C–20°C) with adequate moisture (rains, frequent dews).</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin	Topnotch	530 mL/ha (212 mL/acre)	Do not apply at boot stage and beyond.	Apply in at least 45 L/ha water by air and in at least 100 L/ha water by ground.
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/ha) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	metconazole	Caramba	500–700 mL/ha (200–280 mL/acre)	30	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	fluoxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.44–0.88 L/ha (178–356 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Use high rate and shorter interval when disease pressure is high. Optimum protection of flag leaf is provided when applied at "flag leaf out" (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha per season. 12-hr restricted entry interval.
	propiconazole	Bumper 432 EC Nufarm Propiconazole Propi Super 25 EC Tilt 250 E	300 mL/ha (121 mL/acre) 500 mL/ha (200 mL/acre)	45	Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, if necessary, before head is half emerged (Zadok's 49–55). Maximum 2 applications/yr.
	prothioconazole	Proline 480 SC	260 mL/ha (105 mL/acre)	30	Ground and aerial application. Apply as a preventive treatment when the earliest disease symptoms appear on the leaves and stems. Apply with a non-ionic surfactant such as Agral 90 or Agsurf at 0.125% vol/vol. Minimum of 7 days application interval. Maximum 2 applications/yr. 24-hr restricted entry interval.

OAT DISEASES

Table 4–41. Control Options for Foliar, Stem and Head Diseases in Oat — Crown (Leaf) Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
CROWN (LEAF) RUST (<i>Puccinia coronata</i> var. <i>avenae</i>) (continued)					
Foliar Treatment (continued)					
(continued)	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use a higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur at any time during tillering or stem elongation. Typically, 1 application from the tillering to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.
	pyraclostrobin	Headline EC	300–400 mL/ha (121–160 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, apply immediately after flag leaf emergence (Zadok's 37). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.

OAT DISEASES

Table 4–41. Control Options for Foliar, Stem and Head Diseases in Oat — Crown (Leaf) Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
CROWN (LEAF) RUST (<i>Puccinia coronata</i> var. <i>avenae</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin + metconazole	Twinline	380–500 mL/ha (150–200 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
		Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	tebuconazole	Folicur 250 EW	375 mL/ha (152 mL/acre)	36	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. The use of a non-ionic surfactant (Agral 90 or Agsurf) is NOT required as it is built into the formulation. Use a minimum of 100 L/ha of water for ground application, 47 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval. Before using Folicur for control of leaf diseases, consider that Folicur can only be applied once per year and has been traditionally used for <i>Fusarium</i> control, where applications are targeted at head emergence.

OAT DISEASES

Table 4–42. Control Options for Foliar, Stem and Head Diseases in Oat — Septoria Leaf Spot, Septoria Leaf Blotch, Fusarium Head Blight, Stem Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>) and SEPTORIA LEAF BLOTCH (<i>Stagonospora avenae</i> f. sp. <i>avenaria</i> (<i>Septoria avenae</i>))					
Foliar Treatment					
<p>Avoid planting oat after oat or mixed grains. Humid, wet, windy weather promotes this disease.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole	Topnotch	530 mL/ha (212 mL/acre)	Do not apply at boot stage or beyond.	Apply in at least 45 L/ha water by air or 100 L/ha by ground.
	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage or beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	flouxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21 day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
	metconazole	Caramba	500–700 mL/ha (200–280 mL/acre)	30	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	propiconazole	Bumper 432 EC	300 mL/ha (121 mL/acre)	45	Ground and aerial application. Apply at early signs of disease from the beginning of stem elongation (Zadok's 29–37). If conditions favourable to disease continue, apply again, before head is half emerged (Zadok's 49–55). Can be tank-mixed with several cereal herbicides. Maximum 2 applications/yr.
		Nufarm Propiconazole			
		Propi Super 25 EC Tilt 250 E			
prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	For septoria leaf blotch only. Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.	

OAT DISEASES

Table 4–42. Control Options for Foliar, Stem and Head Diseases in Oat — Septoria Leaf Spot, Septoria Leaf Blotch, Fusarium Head Blight, Stem Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>) and SEPTORIA LEAF BLOTCH (<i>Stagonospora avenae</i> f. sp. <i>avenaria</i> (<i>Septoria avenae</i>)) (continued)					
Foliar Treatment (continued)					
(continued)	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.
	pyraclostrobin + metconazole	Twinline	380–500 mL/ha (150–200 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
FUSARIUM HEAD BLIGHT (<i>Fusarium graminearum</i>)					
For information on this disease, see Table 4–18. <i>Control Options for Foliar, Stem and Head Diseases in Wheat — Fusarium Head Blight</i> , as well as OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	metconazole	Caramba	1 L/ha (404 mL/acre)	30	Provides suppression only. Ground and aerial application. Timing of application is critical. Apply at 20% flowering (Zadok's 61–63) using sprayer nozzles configured to provide excellent coverage of the cereal head. Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Provides suppression only. Ground and aerial application. Timing of application is critical. Apply as a preventive spray when the earliest disease symptoms appear on the leaves and stems. Fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted and/or under prolonged conditions favourable for disease development. Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval.

OAT DISEASES

Table 4–42. Control Options for Foliar, Stem and Head Diseases in Oat — Septoria Leaf Spot, Septoria Leaf Blotch, Fusarium Head Blight, Stem Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
STEM RUST (<i>Puccinia graminis</i>)					
<p>Stem rust begins as dark, reddish-brown spots on both sides of the leaves, stems and heads. When developed, spots will rupture through the surface, releasing spores into the air. The surface of the tissue appears ragged and torn. Removal of alternate host, barberry, and the use of resistant varieties can reduce risk.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	fluoxastrobin	Evito	146–292 mL/ha (59–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21 day interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	prothioconazole + trifloxystrobin	Stratego PRO	440 mL/ha (178 mL/acre)	Do not apply at boot stage and beyond.	Should be applied as a preventive disease control measure or at the very early stages of disease development. This could occur anytime during tillering or stem elongation. Typically, 1 application from the tillering up to flag leaf emergence is required. A second application may be made if needed. DO NOT apply within 14 days of the first treatment and must be applied prior to head emergence. Do not apply more than 2 applications per season. Refer to label for grazing restrictions. DO NOT tank mix with herbicides in barley, oats, rye, triticale or millet.

RYE DISEASES

Table 4–43. Control Options for Diseases in Rye — Seedling Blight, Pythium Damping-Off, Seed-Borne Septoria, Common Bunt, Dwarf Bunt

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEEDLING BLIGHT (<i>Pythium</i> spp., <i>Rhizoctonia</i> spp., <i>Fusarium</i> spp.)				
Seed Treatment				
<p>Sow into a well-prepared seedbed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.
PYTHIUM DAMPING-OFF (<i>Pythium</i> spp.)				
Seed Treatment				
<p>Sow into a well-prepared seedbed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	carbathiin + thiram	Vitaflo 280	230–330 mL/ 100 kg seed	For use in commercial seed treatment facilities only. Do not graze or feed livestock on treated areas for 42 days after planting. Read label for information regarding resistant strains of fungus.
	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/ 100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	ipconazole + carbathiin + metalaxyl	Rancona Trio	300 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 6 weeks after planting. Read label for information regarding resistant strains of fungus.
	ipconazole + metalaxyl	Rancona Pinnacle	325 mL/ 100 kg seed	For commercial and on-farm treatment. Do not graze or cut for forage within 30 days after planting. Read label for information regarding resistant strains of fungus.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/ 100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

RYE DISEASES

Table 4–43. Control Options for Diseases in Rye — Seedling Blight, Pythium Damping-Off, Seed-Borne Septoria, Common Bunt, Dwarf Bunt

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	Comments (label precautions, restricted entry intervals, etc.)
SEED-BORNE SEPTORIA (<i>Septoria</i> spp.)				
Seed Treatment				
Sow into a well-prepared seedbed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
COMMON BUNT (<i>Tilletia caries</i>), DWARF BUNT (<i>Tilletia controversa</i>)				
Seed Treatment				
Sow into a well-prepared seedbed under good growing conditions. Avoid cool, wet conditions that will reduce emergence and increase seed rots and blights. Treat seed with a fungicide seed treatment. For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	difenoconazole + metalaxyl-M	Dividend XL RTA	325–650 mL/100 kg seed	For commercial and on-farm treating. May also be used in treat-on-the-go seeder. Do not graze, feed green forage or cut for hay within 35 days of planting.
	thiamethoxam + difenoconazole + metalaxyl-M + sedaxane + fludioxonil	Cruiser Vibrance Quattro	325 mL/100 kg seed	For commercial and on-farm treating. This product contains colourant. Apply this product utilizing seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control. Do not graze or feed livestock on treated areas for 45 days after planting.

RYE DISEASES

Table 4–44. Control Options for Diseases in Rye — Leaf Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
LEAF RUST (<i>Puccinia recondita</i> f. sp. <i>recondita</i>)					
Foliar Treatment					
<p>Leaf rust in rye is caused by the same fungus that infects wheat.</p> <p>See Table 4–16. <i>Control Options for Foliar, Stem and Head Diseases in Wheat — Leaf Rust, Stem Rust</i>, for management options and details.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	azoxystrobin + propiconazole + benzovindiflupyr	Trivapro A + Trivapro B (sold as co-pack: Trivapro)	1 L/ha (404 mL/acre) + 300 mL/ha (120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply only up to boot stage (Zadok's 47). Use a minimum water volume of 100 L/ha for ground application. Maximum 2 applications/yr. 12-hr restricted entry interval.
	metconazole	Caramba	500–700 mL/ha (200–280 mL/acre)	30	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	penthiopyrad	Vertisan	1.2–1.75 L/ha (0.48–0.7 L/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. To optimize flag leaf protection, apply at “flag leaf out” (Zadok's 39). Do not apply after flowering (Zadok's 59). Do not apply more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 3.5 L/ha/yr. 12-hr restricted entry interval.
	picoxystrobin	Acapela	0.29 L/ha (117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Do not apply early-season rate after flowering (Feekes 10.5.1 or Zadoks 60). Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.

RYE DISEASES

Table 4–44. Control Options for Diseases in Rye — Leaf Rust

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
LEAF RUST (<i>Puccinia recondita</i> f. sp. <i>recondita</i>) (continued)					
Foliar Treatment (continued)					
(continued)	pyraclostrobin	Headline EC	300–600 mL/ha (120–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, apply immediately after flag leaf emergence (Zadok's 37). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Twinline	380–500 mL/ha (150–200 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
		Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.

RYE DISEASES

Table 4–45. Control Options for Diseases in Rye — Powdery Mildew

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
POWDERY MILDEW (<i>Erysiphe graminis</i> f. sp. <i>secalis</i>)					
Foliar Treatment					
<p>In most cases, powdery mildew has little impact on rye since the crop is very resistant to the disease.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	fluoxastrobin	Evito	183–292 mL/ha (74–118 mL/acre)	Do not apply at boot stage and beyond.	For optimum results, begin applications preventively and repeat if needed after a 14–21-day Interval. Use the higher rates and shorter interval when disease pressure is high. Do not apply at boot stage (Zadok's 47 and beyond). Ground and aerial application. 12-hr restricted entry interval.
	metconazole	Caramba	500–700 mL/ha (200–280 mL/acre)	30	Ground and aerial application. Apply to leaf foliage at the first sign or very early stage of disease up to the end of the flowering stage. Use the higher rate when weather conditions are conducive to heavy disease development. Use a minimum of 100 L/ha of water for ground application and 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Ground application only. Begin application preventively. When disease pressure is high, or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7–14-day interval. Use shorter intervals in this range for best protection. When conditions for heavy infestation exist or when growing a less resistant cultivar, use the higher rate. Ensure good canopy penetration for optimum results. Do not exceed 1.5 L/ha per season (2 applications). Do not graze treated area and do not harvest for forage or hay.
	pyraclostrobin	Headline EC	400–600 mL/ha (160–240 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, apply immediately after flag leaf emergence (Zadok's 37). Do not apply at boot stage (Zadok's 47 and beyond). Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + fluxapyroxad	Priaxor	0.225–0.3 L/ha (90–120 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development at the onset of disease symptoms. Applications should be made prior to head emergence. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.
	pyraclostrobin + metconazole	Twinline	380–500 mL/ha (150–200 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 6-day restricted entry interval.
		Headline AMP	0.75–1.0 L/ha (303–404 mL/acre)		Ground and aerial application. For optimal disease control, begin applications prior to disease development. Use a minimum water volume of 100 L/ha for ground application. Ensure thorough coverage of foliage. Use the higher rate and shorter interval when disease pressure is high. Maximum 2 applications/yr. 12-hr restricted entry interval.

RYE DISEASES

Table 4–46. Control Options for Diseases in Rye — Fusarium Head Blight

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
FUSARIUM HEAD BLIGHT (<i>Fusarium graminearum</i>)					
Foliar Treatment					
For more information, see Table 4–18. <i>Control Options for Foliar, Stem and Head Diseases in Wheat — Fusarium Head Blight</i> , as well as OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i> .	metconazole	Caramba	1 L/ha (0.4 L/acre)	30	Provides suppression only. Ground and aerial application. Timing of application is critical. Apply at 20% flowering (Zadok's 61–63) using sprayer nozzles configured to provide excellent coverage of the cereal head. Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 5-day restricted entry interval.
	picoxystrobin	Acapela	0.44–0.88 L/ha (178–356 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Apply prior to disease development and continue on a 7–14-day interval. Use high rate and shorter interval when disease pressure is high. Optimum protection of flag leaf is provided when applied at “flag leaf out” (Zadok's 39). Do not apply at boot stage (Zadok's 47 and beyond). Apply no more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 2.64 L/ha per season. 12-hr restricted entry interval.
	prothioconazole + tebuconazole	Prosaro XTR	800 mL/ha (324 mL/acre)	36	Provides suppression only. Ground and aerial application. Timing of application is critical. For optimum suppression, apply as a preventive spray from when 75% of the heads on the mains stem are fully emerged to when 50% of the heads on the mains steam are in flower. Use a minimum of 100 L/ha of water for ground application, 50 L/ha of water for aerial application. Maximum 1 application/yr. 12-hr restricted entry interval.

RYE DISEASES

Table 4–47. Control Options for Diseases in Rye — Septoria Leaf Spot, Scald

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
SEPTORIA LEAF SPOT (<i>Septoria tritici</i>)					
Foliar Treatment					
<p>Wet, windy weather and moderate temperatures favour the development of this disease. Reducing crop residue and crop rotation can help reduce risk of infection. Plant less susceptible varieties. Consult with your seed company for variety profiles.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	picoxystrobin	Acapela	0.29 L/ha (117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Do not apply early-season rate after flowering (Feekes 10.5.1 or Zadoks 60). Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.
SCALD (<i>Rhynchosporium secalis</i>)					
<p>Net blotch and scald occur especially in cool, humid seasons. Two-rowed cultivars are usually more susceptible to net blotch and scald than six-rowed cultivars. To help prevent the build-up of these diseases, avoid growing barley after barley; plow down stubble and straw as completely as possible, and treat seed with fungicide.</p> <p>For more information, please refer to <i>Septoria leaf spot</i> in wheat in OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	picoxystrobin	Acapela	0.29 L/ha (117 mL/acre)	Do not apply at boot stage and beyond.	Ground and aerial application. Begin applications prior to disease development and continue on a 7–14-day interval. Use higher rate and shorter interval when disease pressure is high. Make no more than 2 sequential applications of a strobilurin fungicide, such as Acapela before switching to a fungicide with a different mode of action. Do not apply early-season rate after flowering (Feekes 10.5.1 or Zadoks 60). Maximum seasonal use rate is 2.64 L/ha. Maximum 2 applications/yr. 12-hr restricted entry interval.

CEREAL GROWTH REGULATORS

Table 4–48. Growth Regulators for Lodging Reduction in Cereals

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

Integrated Pest Management Options	Active Ingredient	Trade Name	Rate	PHI	Comments (label precautions, restricted entry intervals, etc.)
<p>Visit the Ontario Cereal Crops Committee website at www.gocereals.ca for performance trial information. High-risk factors for lodging include fields with a history of manure applications and legume hay.</p> <p>For more information, see OMAFRA Publication 811, <i>Agronomy Guide for Field Crops</i>.</p>	ethephon	Ethrel	<p>Spring barley: 1.0–1.5 L/ha (0.4–0.6 L/acre) <i>2-row cultivar</i></p> <p>1.0–2.0 L/ha (0.4–0.8 L/acre) <i>6-row cultivar</i></p> <p>Spring wheat: 1.0–1.5 L/ha (0.4–0.6 L/acre)</p> <p>Winter wheat: 1.25–2.5 L/ha (0.5–1.0 L/acre)</p>	35	<p>Ground and aerial application. Timing of application is critical. Use lower rate unless expecting severe lodging conditions. Apply when most of the tillers are between early flag leaf emergence to swollen boot stage (Zadok's 37–45). Do not apply after more than 10% of the awns have emerged (Zadok's 49). Use higher rates on crops that are heavily fertilized (more than 100 kg/ha of total available nitrogen) and have ample moisture (more than 25 cm of precipitation) and are prone to lodging.</p>

