

EXTENSION AND ADVISORY TEAM

# GUIDE TO PEST MANAGEMENT IN ONION (DRY BULB AND GREEN)

Nova Scotia Vegetable Crop Guide to Pest Management 2021  
[ON1-21]



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## IMPORTANT

This publication was compiled by representatives from Perennia using information from the Pest Management Regulatory Agency of Health Canada, specific pesticide labels, previous Atlantic Provinces Vegetable Pest Guides, and manufacturer's information. **This information is continuously changing and therefore it can cease to be current and accurate. Pesticide labels are the best source of information and should always be consulted prior to using a product.** The label is the best source of information on registered crop uses, rates, days to harvest, compatibility with other pesticides, toxicity, and other special information on its effective and safe use.

By printing this publication, Perennia does not offer any warranty or guarantee, nor do they assume any liability for any crop loss, animal loss, health, safety, or environmental hazard caused by the use of a pesticide mentioned in this publication.

## WARNINGS

**This publication is meant to be used as a reference for possible pest control options.** Where there are multiple brand names of a specific active ingredient registered in Canada, Perennia has only listed a couple for reference purposes and as such does not endorse one brand over another. If you have purchased a generic product not specifically in this guide but has your crop and pest on the label, always follow that product label.

**If any information in this or any other publication conflicts with the information on the label, always use the label recommendation.** You are legally responsible for the safe use of pesticides you purchase. This means the safe transport and storage of these materials, the label rates used on crops, and the safe disposal of container.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
<b>WEEDS:</b>							
<b>Preplant</b>  <i>Perennial weeds including quackgrass</i>	9	Glyphosate	<b>Roundup WeatherMAX</b>	1.67-4.67 L/ha	12 hours	7	Apply in the fall or spring prior to planting. Annual weed control programs will be necessary to control weeds germinating after planting. For quackgrass control, apply to actively growing quackgrass when at least 4 new leaves are present. The low rate (1.67 L/ha) will provide a minimum of one season control, while higher rates (1.67-4.67 L/ha) will provide longer term control. The low rate of Roundup should be applied in 50 to 100 L/ha water. If higher water volumes are used, add a suitable surfactant. Allow 3 or more days after treatment before tillage. Best control of quackgrass is obtained when these herbicides are applied in the fall.
	14	Carfentrazone-ethyl	<b>Aim EC</b>	36.5-117 mL/ha	12 hours	1	Apply in minimum spray volume of 100 L/ha. Refer to label for target weeds, buffer zones and rates. Use high flow rate nozzles to apply the highest spray volume.
<b>Pre-emergence</b>  <i>Stale Seedbed Technique</i>	22	Diquat	<b>Reglone, Dessicash</b>	2.3-4.6 L/ha	24 hours	-	Apply in 300 – 1100L of water/ha to foliage of emerged weeds but before the crop has emerged.
		Paraquat	<b>Gramoxone®</b>	2.75-5.5 L/ha	24 hours	-	
	10	glufosinate ammonium	<b>Ignite SN</b>	2.7-5 L/ha	12 hours	-	For best results, apply to emerged, young actively growing weeds. Weeds that emerge after application will not be controlled.

Germinating annuals	3	Chlorthal dimethyl	<b>Dacthal W-75</b>	9-18 kg/ha	-	-	Apply uniformly over the soil. Dacthal can be sprayed directly over transplants. A layby application can be made on onions up to 14 weeks after planting or transplanting. Max 18 kg/ha/year.
	14	flumioxazin	<b>Chateau WDG</b>	140g/ha	12 hours	45	<b>Dry Bulb only.</b> Do not apply on sands with greater than 90% sand plus gravel. Do not apply on fine textured soils. Do not apply in a tank-mix or with an adjuvant. Apply to transplanted onions between the 2 and 6 leaf stage. On direct seeded onions apply between the 3 and 6 leaf stage prior to emergence of weeds.
	15	Dimethenamid-P	<b>Frontier Max</b>	0.963-1.29 L/ha	24 hours	30	<b>For green onion grown on mineral and muck soils and transplanted leeks.</b> Apply a single application at the loop stage before weed emergence. Use low rate on mineral soils and high rate on muck soils. Avoid applying under cool conditions as stunting may result.
Postemergence <i>Inter-row shielded</i>	22	Diquat	<b>Reglone, Dessicash</b>	2.3-4.6 L/ha	24 hours	-	Do not spray solution on the crop plant since it could be injured or killed. Use gramoxone for best control of grasses.
		Paraquat	<b>Gramoxone®</b>	2.75-5.5 L/ha	24 hours		
	14	Carfentrazone-ethyl	<b>Aim EC</b>	36.5-117 mL/ha	12 hours	1	Apply in minimum spray volume of 100 L/ha. Refer to label for target weeds, buffer zones and rates. Use high flow rate nozzles to apply the highest spray volume.
Emerged broadleaf	6	Bromoxynil	<b>Pardner</b>	0.5 L/ha	24 hours	75	<b>Dry bulb onions only.</b> Apply in 200 L water/ha at a pressure of 170 kPa. Make two applications at an interval of 10-18 days apart. The first application should be made when onions are at the 2-3 leaf stage; make the second application when onions are the 4-5 leaf stage. Severe leaf burn may occur if

Emerged broadleaf							the weather has not been conducive to the development of the outer waxy layer of the onion leaf. <b>Redroot pigweed and common groundsel.</b>
	14	Oxyfluorfen	<b>Goal 2XL</b>	0.25-0.5 L/ha	48 hours	56	Apply in 500 L/ha of water when onions have 2 fully developed leaves. Use only on <b>dry bulb onions</b> and do not apply when crop is under stress. Do not apply in excess of 2.0 L/ha per year.
Emerged grasses	1	Clethodim	<b>Select</b>	0.38 L/ha	12 hours	45	Apply when crop is at the 1-4 leaf stage and weeds are at the 2-6 leaf stage.
		Fenoxaprop-P-ethyl	<b>Excel Super EC</b>	670 ml/ha	-	38	<b>Dry bulb onions only.</b> Apply to actively growing annual grasses at the 1-6 leaf stage.
		Fluazifop-p-butyl and S-isomer	<b>Venture L</b>	1.0-2.0 L/ha	12 hours	Dry bulb: 42 (annual grasses) 60 (annual grasses & quackgrass) Green onion: 14	<b>Dry bulb onions &amp; Green onions.</b> Annual Grasses: A repeat application may be made after a minimum re-treatment interval of 14 days, if required. Apply at the 2-5 leaf stage of the grass. Use the high rate for quack grass and the lower rate for volunteer cereals.
		Sethoxydim	<b>Poast Ultra</b>	0.32-1.1 L/ha	12 hours	50 (bulb onion) 30 (green onion)	<b>Dry bulb and green onions.</b> Most effective control is achieved when application is made at the 2 to 5 leaf stage when annual grasses are small and actively growing, soil moisture is good, and the crop is small enough to permit thorough spray coverage.
Yellow Nutsedge	15	Dimethenamid-P	<b>Frontier Max</b>	1.29 L/ha	24 hours	60	<b>Dry bulb onions grown on muck soils only.</b> Apply a single application at the loop stage before yellow nutsedge emerges.
Emerged crop. (Broadleaves and grasses)	3	Pendimethalin	<b>Prowl H<sub>2</sub>O</b>	2.2-3.3 L/ha	24 hours	-	<b>Mineral Soil</b> Max 2 applications per year. Apply as a foliar spray. Apply in 250 L water /ha. Apply at 2-6 leaf stage.

Emerged crop. (Broadleaves and grasses)				6.6 L/ha	24 hours except for direct seeded green onions on muck soil: 4 days scouting, 7 days hand- set irrigation, 15 days hand weeding.	30	<b>Muck Soils (direct seed only):</b> Apply at the loop and 2-leaf stage of crop. Apply in 250 L of water /ha. Destroy existing weeds before applying Prowl H2O. Need adequate rainfall or overhead irrigation within 7 days of application.
<b>Plant Growth Regulator-Sprout Control</b>	-	Maleic hydrazide	<b>Royal MH-30 XTRA</b>	8.36 L in 300 L water/ha	12 hours	10	Should be applied when the bulbs are fully mature, have at least 5 - 8 green leaves, and have necks soft enough for the tops to fall over if they have not already done so. The spray is often applied when 50 percent of the tops have fallen but all tops are still green. This condition usually occurs about 10 days to two weeks before harvest time. Green tops are essential for the absorption of Royal MH-30 XTRA. <b>Caution:</b> Spongy hollow necked bulbs may result if spraying is done earlier than two weeks before maturity. Apply to healthy plants. Max 1 application/year.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
<b>INSECTS:</b>							
<b>Thrips</b>	3	Cypermethrin	<b>Mako</b>	175 ml/ha	12 hours	3	Apply at 10-day intervals. Max 3 applications/season.
			<b>UP-Cyde</b>	280 ml/ha			
	3	Deltamethrin	<b>Decis 5.0 EC</b>	200 ml/ha	12 hours	5	Do not apply more than once per season. Apply in 200-500 L water/ha. Apply as foliar spray mid-season at proper thrips threshold. Do not apply more than once per season.
			<b>Poleci 2.5 EC</b>	400 ml/ha			
	5	Spinetoram	<b>Delegate WG</b>	200-336 g/ha	12 hours	3	<b>Suppression only. Dry bulb onions.</b> Apply in 300-500 L water per hectare, when thrips first appear: targeting egg hatch and small nymphs. Max 3 applications/year at 7–10-day intervals.
	3	Lambda - cyhalothrin	<b>Matador 120 EC or Labamba</b>	188 ml/ha	24 hours	14	Max 3 applications/season. Allow 7 days between treatments
	1B	Malathion	<b>Malathion 85E</b>	1100 mL/ha	12 hours	3	Apply in enough spray volume to ensure thorough spray coverage.
	1B	Naled	<b>Dibrom</b>	530 ml/ha	48 hours	4	<b>Dry bulb onions.</b> Max two applications per season. Do not apply when temperature is over 32°C.
	5	Spinosad	<b>Success 480SC</b>	218-262 ml/ha	When dry	3	Target small nymphs and eggs at hatching. Allow 7-10 days between applications. Max 3 applications per year. Apply in 300-500 L/ha.
			<b>Entrust 80W</b>	131-158 g/ha			
<b>Entrust SC</b>			437-527 ml/ha				
23	Spirotetramat	<b>Movento 240 SC</b>	365 ml/ha	12 hours	3 (dry bulb)	Apply in minimum volume of 200 L water/ha. Maximum 2 applications per crop	

Thrips						7 (green onion)	season with a minimum of 7 days between applications. Maximum allowed per crop season: 730 mL/ha. Apply when thrips are first noticed. Movento should be used during the first half of the season when adult populations are relatively low or building. Reductions in numbers of thrip larvae may take 3-4 days after application.
	28	Cyantraniliprole	<b>Exirel</b>	1000-1500 ml/ha	12 hours	1	<b>Suppression only.</b> Begin applications when thrip populations are low. Thorough coverage is essential for optimum control. For optimum control, apply Hasten NT Spray Adjuvant* at an application rate of 0.25% v/v or MSO Concentrate with Leci-Tech* at an application rate of 0.5% v/v. If thrip populations are high, use a registered insecticide with a different mode of action to reduce thrip populations before applying Exirel. Make no more than 4 applications per season. Do not apply more than once every 5 days.
	6	Abamectin	<b>Agri-Mek 1.9% EC</b>	0.6-1.2 L/ha	12 hours (13 days: hand weeding, 4 days: hand-set irrigation, 1 day: thinning & scouting)	Green onion: 7 Bulb onion: 30	<b>Green onion.</b> Foliar application only. Allow 7 days between applications. Apply when pest populations are building but before damage occurs. Consult local extension specialists, professional consultants, or other qualified authorities to determine appropriate threshold levels in your area. Use the higher application rate under heavy pest pressure. Max 4 applications/season. <b>Bulb onion:</b> should be applied with a non-ionic surfactant to improve wetting of foliage and to smooth out spray deposits. Spreading and penetrating surfactants can improve



Thrips			Agri-Mek SC	135-270 mL/ha 0.25-0.5% v/v non-ionic surfactant (NIS)			insect control. Do not use binder or sticker-type surfactants. Max 3 applications/season. <b>Green onion:</b> Apply by foliar application when pest populations are building but before damage occurs. Consult local extension agents, professional consultants, or other qualified authorities to determine appropriate threshold levels in your area. Use the higher application rate under heavy pest pressure. Max 4 applications/season. <b>Bulb onion:</b> Apply when onion thrips or signs of onion thrips feeding first appear. Should be applied with a non-ionic surfactant to improve wetting of foliage and to smooth out spray deposits. Spreading and penetrating surfactants can improve insect control. Do not use binder or sticker-type surfactants. Max 3 applications/season.
	Onion Maggot	1B <sup>1</sup>	Chlorpyrifos	Lorsban 15 G  FINAL SALE 2022, FINAL USE 2023	7.9-15.7 kg/ha	24 hours	109
	3	Cypermethrin	Mako	175 ml/ha	12 hours	3	Spray for onion maggot <b>flies</b> . Apply when flies become numerous and repeat at 7-10-day intervals. Max 3 applications/season.
			UP-Cyde	280 ml/ha	12 hours	3	
	1B	Naled	Dibrom	530 ml/ha	48 hours	4	
Leek Moth	3	Lambda - cyhalothrin	Matador 120 EC or Labamba	188 ml/ha	24 hours	14	Max 3 applications/season. Allow 7 days between treatments
	5	Spinosad	Success 480 SC	218-262 ml/ha	When dry	3	<b>Suppression only.</b> Apply in high water volume to ensure spray solution penetrates leaf axils. Reapply at 7-10-day intervals. Do not apply more than 2 sequential
			Entrust 80W	131-158 g/ha			
Entrust SC	437-527 ml/ha						

Leek Moth							applications. Max 3 applications per year. Target eggs at hatch or small larvae.
	5	spinetoram	<b>Delegate WG</b>	200-336 g/ha	12 hours	3	<b>Suppression.</b> Recommended water volume of 300-500 L water/ha with sufficient pressure to ensure spray solution penetrates leaf axils. Apply one week after peak pheromone trap capture targeting eggs at hatch or small larvae. Use higher applications when insect pressure is high, or insects are at advanced stage of growth. Max 3 applications /year at 7-10 days intervals. Do not apply more than 2 consecutive applications of group 5 insecticides. Rotate to another class of insecticide for at least one application.
	28	chlorantraniliprole	<b>Coragen</b>	250-375 ml/ha	12 hours	1	<b>Green onion. Suppression.</b> Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Max 4 applications/season. Do not apply more than once every 5 days.
	11	<i>Bacillus thuringiensis</i> , subsp. <i>aizawai</i> ,	<b>XenTari WG</b>	500-1000 g/ha	4 hours	0	Apply sufficient spray volume to ensure uniform deposition on all plant surfaces; recommend 1000 L per ha.
<b>Cutworms</b>	1B	Chlorpyrifos	<b>Warhawk 480 EC</b>  <b>FINAL SALE 2022, FINAL USE 2023</b>	2.4-4.8 L/ha	24 hours	60	<b>Bulb onion. Soil treatment:</b> Apply once per season before planting or transplanting. Application is also permitted on a 15 m strip adjacent to fence rows. Use the low rate except under conditions of low soil moisture. Use the high rate if the top 1 cm of soil is dry. When preplant soil applications are being made to muck soil, do not incorporate. Incorporation on mineral soils should be no deeper than 5 cm.

<b>Cutworms</b>							<u>Seedling treatment:</u> Apply as a broadcast spray at the 2- to 5-leaf stage. Use the low rate except under conditions of low soil moisture. Use the high rate if the top 1 cm of soil is dry.
	3	Cypermethrin	<b>Mako</b>	175 ml/ha	12 hours	21	Spray under warm moist conditions and do not disturb the soil surface for at least 5 days. Applications may be made to adjacent fence rows, but do not allow drift to contaminate adjacent crops.
	28	chlorantraniliprole	<b>Coragen</b>	250-375 ml/ha	12 hours	1	<b>Green onion.</b> Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Max 4 applications/season. Do not apply more than once every 5 days.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
<b>DISEASES:</b>							
<b>Pythium</b>	4	Metalaxyl-M and S-isomer	<b>Apron XL LS</b>	20 ml / 100kg of seed	-	-	One application as a seed treatment.
<b>Purple Blotch</b>	7	Boscalid	<b>Cantus WDG</b>	475 g/ha	12 hours	7	Apply at 7–14-day intervals. Max 6 applications/yr. Do not apply more than 2 sprays in succession before alternating to another fungicide family.
	7-3	Pydiflumetofen & Difenoconazole	<b>A20259 Fungicide</b> <i>NEW 2021</i>	1.0 L/ha	12 hours	7	Green Onions and Bulb Onions. Apply on a 7-14-day interval, starting prior to disease establishment. Apply as a broadcast spray in sufficient water (minimum of 150 L/ha) for thorough coverage. Maximum amount of

<b>Purple Blotch</b>							product per season: 3.0 L/ha green onions, 4.0 L/ha bulb onions.
	7-11	Boscalid and Pyraclostrobin	<b>Pristine WG</b>	1.0-1.3 kg/ha	3 days (thinning) When dry (general)	7	Max 6 applications/yr. Apply at 7–14-day intervals.
	7-11	Pyraclostrobin & Fluxapyroxad	<b>Merivon</b> <i>NEW 2021</i>	0.4 – 0.6 L/ha	12 hours, 7 days (Hand harvesting, mechanical harvesting)	7	Begin applications prior to onset of disease development. Use the shorter interval and/or the higher rate, where applicable, when disease pressure is high. Apply subsequent applications (7–14-day interval) if disease persists or weather conditions are favourable for disease development.
	7-12	Pydiflumetofen & Fludioxonil	<b>A20560 Fungicide</b> <i>NEW 2021</i>	0.8 L/ha	12 hours	7	Apply on a 7-14-day interval, starting prior to disease establishment. Within the stated range, use the shorter interval under conditions favouring high disease pressure. Apply as a broadcast spray in sufficient water (minimum of 150 L/ha) for thorough coverage.
	9-12	Cyprodinil and Fludioxinil	<b>Switch 62.5 WG</b>	775-975 g/ha	12 hours (general) 3 days (hand weeding)	7	<b>Suppression only.</b> Begin when conditions are favorable for disease but before infection. Max 3 applications/yr. Apply at 7-14-day intervals.
	33	Fosetyl-al	<b>Aliette WDG</b>	2.8 kg	12 hours	7	Max 5 applications/yr.
	M	Mancozeb	<b>Manzate Pro-Stick</b>	2.25-3.25 kg/ha	24 hours	10	<b>Dry bulb onions only.</b> Repeat applications on 7–10-day intervals.
	11	Pyraclostrobin	<b>Cabrio EG</b>	0.56-0.84 kg/ha	12 hours	7	Max 3 applications/yr. Do not apply more than 2 sprays in succession before alternating to another fungicide family. Use on a 7–14-day schedule.
	7	Penthiopyrad	<b>Fontelis</b>	1.25-1.75 L/ha	12 hours	3	<b>Begin applications prior to disease development, continue on a 7–10-day interval.</b> Use higher rate and shorter interval

Purple Blotch							when disease pressure is high. Max seasonal rate is 5.25 L/ha. Do not make more than 2 sequential applications before switching to another mode of action.
	29	Fluazinam	<b>Allegro 500 F</b>	1.16 L/ha	3 days (hand weeding)	7	<b>Bulb onion. Suppression only.</b> Begin applications when conditions are favourable for disease development or when first disease symptoms appear. Max 5 applications per year. No more than 3 sequential applications before alternating to a fungicide belonging to a different chemical family. Application interval: 7-10 days.
	7-9	Fluopyram & pyrimethanil	<b>Luna Tranquility</b>	1200 ml/ha	12 hours	7	Begin fungicide applications preventatively. Continue as needed, on a 7-12-day interval.
	7	Benzovindiflupyr	<b>Aprovia</b>	750 ml/ha	12 hours	7	Begin applications when the plants are 5-10 centimeters high or when conditions become favourable for disease development. Make applications on a 7 – 14 days interval. Use the shorter interval when conditions are more conducive to disease. <b>Also controls garlic rust (<i>Puccinia allii</i>).</b>
Botrytis & Stemphylium leaf blights and Botrytis Neck Rot	44	<i>Bacillus subtilis</i>	<b>Serenade Opti</b>	1.7-2.5 Kg/ha	-	0	<b>Biopesticide that will only suppress the indicated diseases.</b> Begin applications at the first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10-day interval.
	7	Boscalid	<b>Cantus WDG</b>	475 g/ha	12 hours	7	Apply at 7–14-day intervals. Do not apply more than 2 sprays in succession before alternating to another fungicide family.
		Fluxapyroxad	<b>Sercadis</b>	333-666 mL/ha			
		Penthiopyrad	<b>Fontelis</b>	1.25-1.75 L/ha			

<b>Botrytis &amp; Stemphylium leaf blights and Botrytis Neck Rot</b>	7-3	Pydiflumetofen & Difenconazole	<b>A20259 Fungicide</b>  <i>NEW 2021</i>	1.0 L/ha	12 hours	7	Bulb Onions, Botrytis and Stemphylium leaf blights. Apply on a 7-14-day interval, starting prior to disease establishment. Apply as a broadcast spray in sufficient water (minimum of 150 L/ha) for thorough coverage. Maximum amount of product per season: 4.0 L/ha.
	7-11	Boscalid and Pyraclostrobin	<b>Pristine WG</b>	1.0-1.3 kg/ha	3 days (thinning) When dry (general)	7	Max 6 applications/yr. Apply at 7–14-day intervals.
	7-11	Pyraclostrobin & Fluxapyroxad	<b>Merivon</b>  <i>NEW 2021</i>	0.4 – 0.6 L/ha	12 hours, 7 days (Hand harvesting, mechanical harvesting)	7	<b>Suppression only for Stemphylium.</b> Begin applications prior to onset of disease development. Use the shorter interval and/or the higher rate, where applicable, when disease pressure is high. Apply subsequent applications (7–14-day interval) if disease persists or weather conditions are favourable for disease development. Use higher rate for botrytis leaf blight.
	7-12	Pydiflumetofen & Fludioxonil	<b>A20560 Fungicide</b>  <i>NEW 2021</i>	0.8 L/ha	12 hours	7	<b>Suppression only for Stemphylium.</b> Apply on a 7–14-day interval, starting prior to disease establishment. Within the stated range, use the shorter interval under conditions favouring high disease pressure. Apply as a broadcast spray in sufficient water (minimum of 150 L/ha) for thorough coverage.
	M5	Chlorothalonil	<b>Bravo ZN</b>	2.4-4.8 L/ha	12 hours (general)	7 (dry bulb) 14 (green bunching)	Begin applications when conditions favor disease. Repeat applications every 7-10 days to obtain control. DO NOT exceed 2 applications per season.
			<b>Echo 90DF</b>	1.4-2.6 kg/ha	6 days (hand weeding)		
<b>Echo 720</b>			1.7-3.3 L/ha	1 day (scouting)			

<b>Botrytis &amp; Stemphylium leaf blights and Botrytis Neck Rot</b>	9-12	Cyprodinil and Fludioxinil	<b>Switch 62.5 WG</b>	775-975 g/ha	12 hours	7	Max 3 applications/yr. Begin when conditions are favorable for disease but before infection. Apply at 7–14-day intervals; no more than 2 sequential applications.
	11, 3	Azoxystrobin, difenoconazole	<b>Quadris Top</b>	710-1000 mL/ha	12 hours	7	Apply as a broadcast foliar spray in sufficient water for thorough coverage. A minimum spray volume of 150 L/ha is recommended. Apply on a 7-14-day interval, starting prior to disease onset when conditions are conducive to disease.
	M	Mancozeb	<b>Manzate Pro-Stick</b>	2.25-3.25 kg/ha	24 hours	10	<b>Dry bulb onions only.</b> Apply at 7–10-day intervals beginning when disease is reported in the area. Do not use on exposed bulbs.
			<b>Dithane DG Rainshield</b>	2.25-3.25 kg/ha			
	29	Fluazinam	<b>Allegro 500 F</b>	1.16 L/ha	3 days (hand weeding), 24 hours (general)	7	<b>Suppression only. Bulb onion.</b> Initiate applications when conditions are favourable for disease development or when first disease symptoms appear. Maximum of 5 applications per year. No more than 3 sequential applications before alternating to another fungicide belonging to a different chemical family. Application interval: 7-10 days.
	M1	Copper	<b>Cueva</b>	0.5% to 2% solution, applied at 470-940 L/ha	4 hours	1	Re-apply using 5–10-day intervals.
	M3-22	Mancozeb-Zoxamide	<b>Gavel DF</b>	1.7-2.25 kg/ha	48 hours	10	<b>Neck rot in Bulb Onion:</b> Apply preventatively when diseases are first reported in the area and repeat at 7-day intervals throughout the season as required. Use the high rate under moderate to high disease pressure. Do not allow spray or drift to contact bulbs after lifting from soil. Maximum 8 applications/season.

<b>Botrytis &amp; Stemphylium leaf blights and Botrytis Neck Rot</b>	7-9	Fluopyram & pyrimethanil	<b>Luna Tranquility</b>	1200 ml/ha	12 hours	7	Begin fungicide applications preventatively. Continue as needed, on a 7-12-day interval. Apply maximum of 2 applications per season for Botrytis.
	7	Benzovindiflupyr	<b>Aprovia</b>	750 ml/ha	12 hours	7	<b>Suppression of Leaf blight</b> ( <i>Stemphylium vesicarium</i> ). Begin applications when the plants are 5-10 centimeters high or when conditions become favourable for disease development. Make applications on a 7-14-day interval. Use the shorter interval when conditions are more conducive to disease.
<b>Downy Mildew</b>	44	<i>Bacillus subtilis</i>	<b>Serenade Opti</b>	1.7-3.3 Kg/ha	-	0	<b>Biopesticide that will only suppress the indicated diseases.</b> Begin applications at the first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10-day interval.
	7-11	Boscalid and Pyraclostrobin	<b>Pristine WG</b>	1.3 kg/ha	3 days (thinning) When dry (general)	7	To suppress downy mildew, apply when disease first appears. Follow up 5-7 days later with a fungicide of a different chemistry that is also effective against downy mildew. Do not make sequential applications of Pristine when downy mildew occurs.
	7-11	Pyraclostrobin & Fluxapyroxad	<b>Merivon</b> <i>NEW 2021</i>	0.6 L/ha	12 hours, 7 days (Hand harvesting, mechanical harvesting)	7	<b>Suppression only.</b> Begin applications prior to onset of disease development. Use the shorter interval and/or the higher rate, where applicable, when disease pressure is high. Apply subsequent applications (7–14-day interval) if disease persists or weather conditions are favourable for disease development.
	11	Fenamidone	<b>Reason 500 SC</b>	400 ml/ha	When dry	7	<b>Suppression only.</b> Begin application as soon as crop and/or environmental conditions become favourable for disease development. Apply in 300-600 L/ha on a 5–10-day interval. Maximum 4 applications per year.



<b>Downy Mildew</b>							Plant back interval of 30 days. Do not apply more than 2 sequential applications of Reason 500 SC or any other Group 11 fungicide before alternating with a fungicide from a different Group.
	U	Fosetyl-al	<b>Aliette WDG</b>	2.8 kg	12 hours	7	Max 5 applications/yr.
	M	Mancozeb	<b>Manzate Pro-Stick</b>	2.25-3.25 kg/ha	24 hours	10	<b>Dry onions only.</b> Repeat applications on 7–10-day intervals.
	40	Mandipropamid	<b>Revus</b> plus <b>Non-ionic adjuvant</b>	400 ml/ha plus 0.25% v/v	12 hours	7	Applications should begin prior to disease development and continue throughout the season on a 7–10-day schedule of fungicides, following resistance management guidelines. Maximum four applications per year. <b>May be tank mixed with Bravo 500 Agricultural Fungicide on all dry bulb and green bunching onions. Follow the most restrictive use directions of either label.</b>
	11	Pyraclostrobin	<b>Cabrio EG</b>	0.56-0.84 kg/ha	12 hours	7	Max 3 applications/yr. Do not apply more than 2 sprays in succession before alternating to another fungicide family. Use on a 10-day schedule ( <b>suppression only</b> ).
	40	Dimethomorph	<b>Acrobat 50 WP</b>	450 g/ha	2 days (hand harvesting – thinning)  12 hours (no entry)	0	<b>Must be applied as a tank mix with another fungicide active against downy mildew.</b> Begin applications when conditions favour disease development. Continue applications on a 5–7-day spray schedule as needed until weather conditions favouring infection and sporulation decrease. <b>DO NOT</b> use less than 200 L water /hectare for ground applications. Max 5 applications per year.
	40,45	Ametoctradin, dimethomorph	<b>Zampro</b>	1.0 L/ha	Hand harvesting – 1 day	0	To reduce the risk of the development of fungicide resistance <b>Zampro</b> must be used in rotation with other fungicides having a different mode of action active against

<b>Downy Mildew</b>					All other activities – 12 hours		downy mildew. Begin applications of <b>Zampro</b> prior to disease development and continue on a 5-7-day interval. Max 3 applications.
	49,40	Oxathiapiprolin & Mandipropamid	<b>Orondis Ultra</b> <i>NEW 2021</i>	0.4 L/ha	12 hours	7	Begin applications prior to disease development and continue on a 7-10-day interval. Use shorter interval when disease pressure is high. The use of a penetrating surfactant is recommended.
	M1	Copper	<b>Cueva</b>	0.5% to 2% solution, applied at 470-940 L/ha	4 hours	1	Re-apply using 5–10-day intervals.
	33	Mono- and dibasic sodium, potassium, and ammonium phosphites	<b>Phostrol</b>	2.9-4.3 L/ha	12 hours	0	<b>Suppression only.</b> Begin foliar applications when conditions favouring disease development exist and continue on a 7–14-day interval. Do not apply more than 7 applications per year.
	M3-22	Mancozeb-Zoxamide	<b>Gavel DF</b>	1.7-2.25 kg/ha	48 hours	10	<b>Suppression only.</b> Apply preventatively when diseases are first reported in the area and repeat at 7-day intervals throughout the season as required. Use the high rate under moderate to high disease pressure. Do not allow spray or drift to contact bulbs after lifting from soil. Maximum 8 applications/season.
	U15	Oxathiapiprolin	<b>Zorvec Enicade</b>	0.0875-0.35 L/ha	12 hours	0	Begin applications prior to disease development and continue on a 5-10-day interval. Use higher rate and shorter interval when disease pressure is high.

Use the following web link to search for any pesticide label mentioned in this guide, or any other pesticide registered in Canada: <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>

## PESTICIDE EMERGENCY CONTACT INFORMATION

<b>Poison Control Centres</b>		
Nova Scotia	800.565.8161 or 902.428.8161	IWK, Halifax, NS
New Brunswick	911	Ask for Poison Information
Prince Edward Island	800.565.8161 or 902.428.8161	IWK, Halifax, NS
Newfoundland	709.722.1110	Dr. Charles A. Janeway Child Health Care Centre, St. John's, NF

<b>Environmental Emergencies (Pesticide Spills)</b>	
Transport Canada Regional Operations Centre (24 hours)	
Nova Scotia	800.565.1633
New Brunswick	800.565.1633
Prince Edward Island	800.565.1633
Newfoundland	800.563.9089

## ABBREVIATIONS & CONVERSIONS

<b>Formulation and Measurement Abbreviations</b>			
FORMULATIONS		MEASUREMENTS	
DF	Dry flowable	mL	millilitre
EC, E	Emulsifiable concentrate	kPa	kilopascal
L	Liquid	kg	kilogram
Sn / Su	Suspension	g	gram
WP/W	Wettable powder	L	litre
		BIU	Billions of International Units
		ppm	parts per million (1000 ppb)
		ppb	parts per billion (1/1000 ppm)

<b>Helpful Conversions<sup>1</sup></b>	
kPa X 0.14 = pounds per square inch (psi)	millilitres X 0.035 = fluid ounces
hectares X 2.47 = acres	litres X 35 = fluid ounces
kilograms X 2.2 = pounds	litres X 0.22 = imperial gallons
kilograms per hectare X 0.89 = pounds per acre	litres per hectare X 14.17 = fluid ounces per acre
kilograms per hectare X 0.40 = kilograms per acre	litres per hectare X 0.40 = litres per acre
	degree-days C X 1.8 = degree-days F

<sup>1</sup> **Pesticide Units of Measurement**

It is not recommended to convert label rates to imperial units because there is a high probability of mathematical and rounding errors. Present day pesticides are formulated to be more effective in smaller amounts. Therefore, even small conversion errors can lead to the use of incorrect rates (either too high or too low). Use metric – you will be glad you did!