

2016 SUPPLEMENT

Publication 838, *Vegetable Crop Protection Guide 2014–2015*

This supplement contains new product registrations and changes from November 2013 to November 2015. This supplement can be downloaded from the OMAFRA website at ontario.ca/crops. Printed copies are available from OMAFRA Resource Centres. **For complete information, please see the full edition of Publication 838, *Vegetable Crop Protection Guide 2014–2015*.**

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The pest control product label is a legal document. It prescribes how the pest control product can be legally used. Users are responsible for ensuring that they are complying with all directions stipulated on the most current product label. Read the most current pest control product label thoroughly before application. Copies of all pest control product labels are posted online by the PMRA and may be found at: <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>

A crop group is a grouping of plant species based on botany and taxonomy (e.g., plant families), as well as on how the crops are produced. Crop groups are often further divided into smaller and more closely related subgroups. A pest control product may be registered on a subgroup, rather than the entire crop group. Crop groupings are used primarily to set maximum residue limits and establish a common pre-harvest interval (PHI) for a similar set of crops. **It is important to remember that not all products have a crop group registration, and products registered on one crop are not necessarily registered on all members of its crop group.** A complete list of all crops included in both original and revised crop groups can be found at the following link on Health Canada's website: www.hc-sc.gc.ca/cps-spc/pest/part/protect-proteger/food-nourriture/rccg-gcpcr-eng.php.

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A crop group is a grouping of plant species based on botany and taxonomy (e.g., plant families), as well as on how the crops are produced. Crop groups are often further divided into smaller and more closely related subgroups. A pest control product may be registered on a subgroup, rather than the entire crop group. Crop groupings are used primarily to set maximum residue limits and establish a common pre-harvest interval (PHI) for a similar set of crops. **It is important to remember that not all products have a crop group registration, and products registered on one crop are not necessarily registered on all members of its crop group.** A complete list of all crops included in both original and revised crop groups can be found at the following link on Health Canada's website: www.hc-sc.gc.ca/cps-spc/pest/part/protect-proteger/food-nourriture/rccg-gcpcr-eng.php.

Important notice regarding the phase-out of diazinon insecticides

As of 31 December 2013, the Pest Management Regulatory Agency (PMRA) required the implementation of a Diazinon Risk Management Plan.

Implementation by 31 December 2014:

- Use of granular formulations on rutabaga is prohibited. According to the Diazinon 5G label updated as of 11 December 2014, last date of use on carrot, parsnip, onion, radish and turnip was 31 August 2015. Use of liquid formulations that can be applied as a soil drench is permitted on carrot, parsnip and radish during the phase-out period until 31 December 2016. An alternative diazinon soil drench product is already registered for root maggot in onion (applied in-furrow) and turnip/rutabaga (applied to plant and surrounding soil). (Updated January 2015.)

Changes to Current Application Practices Implementation by 31 December 2013:

- Additional new buffer zones are also required for crops listed on the product label.

Important notice regarding the phase-out of endosulfan insecticides

Registrants will cease production and sale of endosulfan pesticide products by 31 December 2014. Sale of endosulfan pesticide products by others is not permitted after 31 December 2015. Use of endosulfan products is not permitted after 31 December 2016.

Consult the amended product label for new mitigation measures to protect human health, including:

- additional protective equipment and precautions to protect mixers/loaders/applicators
- longer restricted-entry interval to protect those entering treated sites
- reduced number of applications per season and limits to the amount handled per person per day
- prohibition from allowing livestock to graze or feed on treated crops or crop refuse

ASPARAGUS

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
asparagus	Table 3–2, page 28	Remove Bravo 500, replace with Bravo ZN.
asparagus	Table 3–3, page 29	Remove Ripcord 400 EC, replace with Mako.

Table 3–2. Asparagus Disease Control (page 28) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
PURPLE SPOT (STEMPHYLIUM)					
chloronitrile (group M5)	chlorothalonil	Bravo ZN	3.4 L/ha (1.4 L/acre)	190	Begin applications following final harvest of spears. Will also provide rust suppression under low disease pressure conditions. 48-hr restricted-entry interval.
RUST					
DMI (group 3)	propiconazole	Bumper 418 EC	150 mL/ha (61 mL/acre)	240	Make the first application as soon as fern growth begins. 12-hr restricted-entry interval.
		Tilt 250E	250 mL/ha (101 mL/acre)		
PHYTOPHTHORA					
microbial (group 44)	Bacillus subtilis	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. See label for in-furrow application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.

Table 3–3. Asparagus Insect Control (page 29) — Additions

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
neonicotinoid (group 4A)	acetamiprid	Assail 70 WP	56–86 g/ha (23–35 g/acre)	1	Begin applications when treatment thresholds have been reached. Do not apply more than once every 10 days. 12-hr restricted-entry interval.
ASPARAGUS BEETLE					
pyrethroid (group 3A)	cypermethrin	Mako	86 mL/ha (35 mL/acre)	1	Apply when beetles or larvae are first observed.
neonicotinoid (group 4A)	acetamiprid	Assail 70 WP	80–160 g/ha (32–65 g/acre)	1	Begin applications when treatment thresholds have been reached. Use higher rates when the plants are larger and under heavy pest pressure. Do not apply more than once every 10 days. 12-hr restricted-entry interval.

This information has been provided as a guideline only. See product labels for complete information. Pest control products listed in these tables are not necessarily registered on all bean crops. See the most up-to-date pest control product labels to ensure the registration on a specific crop. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
beans	Table 3–4, page 31	Remove Agrox B-2 (diazinon/captan). Registration expired 31 December, 2014.
		Remove Agrox CD (diazinon/captan). Registration expired 31 December, 2014.
beans	Table 3–6, page 33	Remove Ranman 400SC.
beans	Table 3–8, page 35; Table 3–9, page 36	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–6. Snap and Lima Bean Disease Control (page 33) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BACTERIAL BLIGHT (HALO AND COMMON)					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Also controls brown spot. Begin treatment 2 weeks before disease normally appears or when weather forecasts predict a long period of wet weather. Re-apply using 5–10 day intervals. 4-hr restricted-entry interval.
WHITE MOLD (SCLEROTINIA)					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only. Make the first application at planting or prior to crop emergence.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Fusarium</i> spp. See label for in-furrow application instructions. For broadcast or banded applications, incorporate into the seedzone with rainfall or overhead irrigation within 24-hrs.
PHYTOPHTHORA BLIGHT					
Qil (group 21)	cyazofamid	Torrent 400SC	200 mL/ha (81 mL/acre)	0	Snap and Lima only. Suppression only. Use with a surfactant as described on label. See label for recropping restrictions. 12-hr re-entry interval.
Qol (group 11)	fenamidone	Reason 500SC	600 mL/ha (243 mL/acre)	3	Suppression only. See label for recropping restrictions. 12-hr restricted-entry interval.
carboxylic acid amide (group 40)	mandipropamid	Revus	600 mL/ha (243 mL/acre)	1	Edible-podded beans only. Use with a surfactant as described on label. See label for recropping restrictions. 12-hr restricted-entry interval.

Table 3–8. Snap and Lima Bean Insect Control — Leafhoppers, Bean Beetles, Aphids (page 35) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFHOPPERS, BEAN BEETLES, APHIDS					
organophosphate (group 1B)	malathion	Malathion 85E	735–1,345 mL/ha (297–544 mL/acre)	3	Less effective below 20°C. Control of aphids with malathion has been inconsistent in many areas. 1-day restricted-entry interval.
pyrethroid/ diamide (group 3A/28)	lambda- cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Aphids and bean leaf beetle. 24-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	750–1,500 mL/ha (304–607 mL/acre)	1	Soybean aphids and suppression of bean leaf beetle. For bean leaf beetle suppression, use minimum 1 L/ha (0.4 L/acre). For aphid control, use a spray adjuvant as stated on the label. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. 12-hr restricted-entry interval.

Table 3–9. Snap and Lima Bean Insect Control — European Corn Borers, Western Bean Cutworms, Cutworms, Slugs, Brown Marmorated Stink Bugs (page 36) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
EUROPEAN CORN BORER					
pyrethroid/diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Also controls armyworm. 24-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	1	Use 500 mL/ha (202 mL/acre) for armyworm control. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. 12-hr restricted-entry interval.
WESTERN BEAN CUTWORM					
pyrethroid/diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Also controls armyworm. 24-hr restricted-entry interval.
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	1	Apply to small plants when no rain is forecast in the next 24 hr. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. 12-hr restricted-entry.
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,345 mL/ha (544 mL/acre)	3	Suppression only. 1-day restricted-entry interval.

BEETS, TABLE

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

Table 3–12. Table Beet Disease Control (page 37) — Additions

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CERCOSPORA LEAF SPOT					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% v/v solution, applied at 470–940 L/ha (190–380 L/acre)	1	4-hr restricted entry interval.
RHIZOCTONIA ROOT AND CROWN ROT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Soil application. See label for application instructions.
POWDERY MILDEW					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–134 mL/acre)	7	See label for rotational crop restrictions. 12-hr re-entry interval.
QoI (group 11)	pyraclostrobin	Cabrio EG	560–840 g/ha (227–339 g/acre)	3	Beet roots. See label for recropping restrictions. 3-day re-entry interval for hand harvesting. 12-hr re-entry interval for all other activities. For beet tops, see label.

Table 3–14. Table Beet Insect Control — Aphids, Cutworms, Flea Beetles (page 39) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
diamide (group 28)	cyantraniliprole	Exirel	500–1,500 mL/ha (202–607 mL/acre)	1	For optimum control of aphids, use a spray adjuvant as stated on Exirel label. See label for tank-mix and crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. 12-hr restricted entry interval.
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	7	See label for tank-mix and crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. 12-hr restricted entry interval.
FLEA BEETLES					
Soil Treatment					
diamide (group 28)	cyantraniliprole	Verimark	6.75–9 mL/100 m of row	21	Early season damage reduction. See label for application instructions and rotational crop restrictions. Do not apply a foliar cyantraniliprole application for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. 12-hr restricted entry interval.
Foliar Treatment					
diamide (group 28)	cyantraniliprole	Exirel	500–1,000 mL/ha (202–404 mL/acre)	7	See label for tank-mix and crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. 12-hr restricted entry interval.

BRASSICA CROPS

broccoli, Brussels sprouts, cabbage, cauliflower, kale, kohlrabi and specialty vegetables, including headed Chinese cabbage (napa), leafy Chinese cabbage (bok choy, pak choy, etc.), Chinese mustard, broccoli raab, collards, mizuna, mustard greens, mustard spinach and rape greens

Pest control products listed in these tables are not necessarily registered on all brassica crops. See the most up-to-date pest control product labels to ensure the registration on a specific crop. This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
brassica transplants	Table 3–18, page 44; Table 3–19, page 45	Remove Ranman 400SC, replace with Torrent 400SC.
broccoli, Brussels sprouts, cabbage, cauliflower	Table 3–19, page 46; Table 3–20, page 47	Remove Bravo 500, replace with Bravo ZN.
brassicas	Table 3–19, page 46; Table 3–20, page 47	Remove Serenade ASO, replace with Serenade MAX.
brassicas	Table 3–19, page 46; Table 3–20, page 47	Replace Serenade MAX with Serenade Opti.
broccoli, Brussels sprouts, cabbage, cauliflower, kale, kohlrabi	Table 3–23, page 50; Table 3–28, page 56	Malathion 85E label was updated 15 April 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use. See tables below.
broccoli, Brussels sprouts, cabbage, cauliflower	Table 3–24, page 52; Table 3–26, page 54; Table 3–27, page 55; Table 3–28, page 57	Remove Ripcord 400 EC, replace with Mako.
brassicas	Table 3–23, page 50; Table 3–24, page 52; Table 3–28, page 56; Table 3–29, page 59; Table 3–30, page 60	In Notes for Exirel, replace “Do not apply a foliar cyantraniliprole application following a soil or seed treatment application of a Group 28 insecticide” with “Do not apply Exirel insecticide for a minimum of 60 days following an in-furrow or soil application with any group 28 insecticide.”

Table 3–16. Brassica Crop Seed Treatments (page 42) — **Additions**

Group Name (Group #)	Common Name	Trade Name	Rate	Pests Controlled	Notes
not classified (group NC)	<i>Streptomyces</i> Strain K61	Mycostop	8 g/1 kg of seed	damping-off (<i>Fusarium</i>)	Suppression only. Seed treatment for greenhouse transplants. See label for application instructions.

Table 3–18. Brassica Crop Disease Control for Transplants (page 44) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
Greenhouse Transplant Disease Control					
Qil (group 21)	cyazofamid	Torrent 400SC	30 mL in 100 L water	60	Brassica transplants. Pythium damping-off and root rot. Make a single application as a soil drench to thoroughly wet the growing medium immediately after seeding. Do not use any surfactant with drench application. 12-hr restricted-entry interval.
not classified (group NC)	<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ of loose planting mix, soil or planting beds	—	Suppression only. Root rots caused by <i>Rhizoctonia</i> spp., <i>Pythium</i> spp. and <i>Fusarium</i> spp. Drench application to potting mix, soil or planting beds. See label for complete list of brassica crops, including specialty brassicas. 4-hr restricted-entry interval.
not classified (group NC)	<i>Gliocladium catenulatum</i> Strain J1446	Prestop	Refer to label for rates and instructions	—	For broccoli and cauliflower greenhouse transplants only. Suppression of <i>Rhizoctonia solani</i> and <i>Pythium</i> spp. Apply as a growing media or soil drench application. Do not tank-mix with any fungicides, insecticides, herbicides or adjuvants.
not classified (group NC)	<i>Streptomyces</i> Strain K61	Mycostop	Refer to label for rates and instructions	—	Suppression of fusarium only. Drench or soil spray application after seedling emergence. Apply first spray after emergence using lower rate.

Table 3–19. Brassica Crop Disease Control — Downy Mildew (page 45) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DOWNY MILDEW					
Qil (group 21)	cyazofamid	Torrent 400SC	200 mL/ha (81 mL/acre)	1	Suppression only. See label for complete list of brassica crops, including specialty brassicas. Begin applications when disease is first seen or when weather conditions are conducive to disease development. Tank-mix with non-ionic or organosilicone surfactant; as per label instructions. Maximum 5 applications/crop/yr. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	2–3 kg/ha (0.8–1.2 kg/acre)	0	Suppression only. See label for complete list of brassica crops, including specialty brassicas.
		Serenade Opti	1.1–1.7 kg/ha (0.4–0.7 kg/acre)	0	Suppression only. See label for complete list of brassica crops, including specialty brassicas. Begin application soon after emergence, or immediately after transplanting. Repeat applications on 10–14 day intervals if conditions for disease development continue.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	2.5–4.8 L/ha (1–1.9 L/acre)	7	Broccoli, Brussels sprouts, cabbage and cauliflower only. 48-hr restricted-entry interval.

Table 3–20. Brassica Crop Disease Control — Alternaria, Sclerotinia (White Mold, White Rot, Watery Soft Rot, Black Rot) (page 47) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ALTERNARIA					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	3	Suppression only. See label for complete list of brassica crops, including specialty brassicas. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
phenylpyrrole/ anilino- pyrimidine (group 9/12)	cyprodinil/ fludioxonil	Switch 62.5 WG	775–975 g/ha (314–394 g/acre)	7	Suppression only. For use on Broccoli raab (rapini), Chinese cabbage (bok choy), collards, kale, mizuna, mustard greens, mustard spinach and rape greens only. See label for re-cropping restrictions. 12-hr restricted-entry interval.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	2.5–4.8 L/ha (1–1.9 L/acre)	7	Broccoli, Brussels sprouts, cabbage and cauliflower only. 48-hr restricted-entry interval.
SCLEROTINIA (WHITE MOLD, WHITE ROT, WATERY SOFT ROT)					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	3	Suppression only. See label for complete list of brassica crops, including specialty brassicas. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
microbial (group 44)	Bacillus subtilis	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only. See label for complete list of brassica crops, including specialty brassicas.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only. See label for complete list of brassica crops, including specialty brassicas. Begin application soon after emergence, or immediately after transplanting. Repeat applications on 10–14 day intervals if conditions for disease development continue.
BLACK ROT					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha	1	Suppression only. For use on bok choy, broccoli, Brussels sprouts, cabbage, cauliflower, kale, kohlrabi, mustard and pak-choi. Rotate with products with a different mode of action when available. Re-apply using 5–10 day intervals. 4-hr restricted-entry interval.

Table 3–21. Brassica Crop Disease Control — Powdery Mildew, Botrytis Gray Mold, Root Rots (page 48) **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. For use on broccoli, Brussels sprouts, cabbage, cauliflower, collards, kale, kohlrabi and mustard greens. Root rots caused by <i>Rhizoctonia solani</i> and <i>Pythium</i> spp. May be applied at planting and/or post-planting. See label for application instructions.

Table 3–23. Brassica Crop Insect Control — Aphids (page 50–51) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
Soil Treatment					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at seeding or transplant depth, or a narrow surface band above seed line during planting. See label for application details. See label for complete list of brassica crops, including specialty brassicas. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
Foliar Treatment					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Broccoli, Brussels sprouts, cabbage and cauliflower only. Control of aphids with malathion has been inconsistent in many areas. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 2-day restricted-entry interval. Kale and kohlrabi only. Control of aphids with malathion has been inconsistent in many areas. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 1-day restricted-entry interval.

Table 3–24. Brassica Crop Insect Control — Cutworms, Leafhoppers, Slugs (page 52) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	21	Broccoli, Brussels sprouts, cabbage and cauliflower only. Do not use on muck soils. Do not graze treated crops. Do not disturb soil surface for 5 days after application.
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	3	Black cutworm. Mechanically harvested broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese cabbage mustard (gai choy), cauliflower, cavolo broccolo and kohlrabi only. Apply when rain is not expected in next 24 hours. For optimum control, apply to smaller plants or when lower portions of the plant can receive adequate coverage. Do not apply Voliam Xpress following an in-furrow or soil application of any group 28 insecticide. Maximum 3 applications/season. 7-day restricted entry interval for hand weeding and topping. 6-day restricted entry interval for scouting, irrigation, thinning and tying. 24-hr restricted-entry interval for all other activities.
			500 mL/ha (202 mL/acre)	8	Black cutworm. Hand-harvested broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese cabbage mustard (gai choy), cauliflower, cavolo broccolo and kohlrabi only. Apply when rain is not expected in next 24 hours. For optimum control, apply to smaller plants or when lower portions of the plant can receive adequate coverage. Do not apply Voliam Xpress following an in-furrow or soil application of any group 28 insecticide. Maximum 3 applications/season. 7-day restricted entry interval for hand weeding and topping. 6-day restricted entry interval for scouting, irrigation, thinning and tying. 24-hr restricted-entry interval for all other activities.

Table 3–25. Brassica Crop Insect Control — Cabbage Maggot (page 53) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CABBAGE MAGGOT					
Transplant Drench before Planting					
spinosyn (group 5)	spinosad	Entrust	Apply 25 mL of Entrust as a drench in 2 L of water per 1000 plants before transplanting.	—	Broccoli greenhouse transplants only. Immediately after applying, apply 2 L of water/1000 plants. Do not rinse product out of the transplant medium. Maximum 1 application/yr. 3-day re-entry interval for hand harvesting, irrigating, topping, thinning or tying activities. 24-hr restricted-entry interval for greenhouse drench applications.
		Success	Apply 12.5 mL of Success as a drench in 2 L of water per 1000 plants before transplanting.		
Treatment at Planting					
diamide (group 28)	cyantraniliprole	Verimark	10–15 mL/100 m of row or 1,100–1,700 mL/ha (445–687 mL/acre)	—	See label for complete list of brassica crops, including specialty brassicas. Apply as an in-furrow spray or in the transplant water at the time of transplanting. See label for application instructions. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application with Verimark. See label for rotational crop restrictions. Maximum 1 soil application/season. 12-hr restricted-entry interval.

Table 3–26. Brassica Crop Insect Control — Flea Beetles (page 54) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
FLEA BEETLES					
pyrethroid (group 3A)	cypermethrin	Mako	87.5–125 mL/ha (35–50 mL/acre)	3	Broccoli, Brussels sprouts, cabbage and cauliflower only. Maximum 3 applications/season. Do not use on muck soils. Do not graze treated crops.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season suppression only. In-furrow application at seeding or transplant depth, or a narrow surface band above seed line during planting. See label for application details. See label for complete list of brassica crops, including specialty brassicas. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–1,000 mL/ha (202–405 mL/acre)	1	See label for complete list of brassica crops, including specialty brassicas. Do not apply Exirel insecticide for a minimum of 60 days following an in-furrow or soil application with any group 28 insecticide. For optimum control, use a spray adjuvant as stated on the Exirel label. See label for tank-mix, crop tolerance information and rotational crop restrictions. Do not exceed 4.5 L/ha/season. Maximum of 4 applications/season. 12-hr restricted-entry interval.

Table 3–27. Brassica Crop Insect Control — Thrips (page 55) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
THRIPS					
pyrethroid (group 3A)	cypermethrin	Mako	87.5–125 mL/ha (35–50 mL/acre)	3	Broccoli, Brussels sprouts, cabbage and cauliflower only. Maximum 3 applications/season. Do not use on muck soils. Do not graze treated crops.
pyrethroid/diamide (group 3A/28)	lambda- cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	3	Onion thrips. Mechanically harvested broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese cabbage mustard (gai choy), cauliflower, cavolo broccolo and kohlrabi only. Do not apply Voliam Xpress following an in-furrow or soil application of any group 28 insecticide. Maximum 3 applications/season. 7-day restricted-entry interval for hand weeding and topping. 6-day restricted entry interval for scouting, irrigation, thinning and tying. 24-hr restricted-entry interval for all other activities.
			500 mL/ha (202 mL/acre)	8	Onion thrips. Hand-harvested broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese cabbage mustard (gai choy), cauliflower, cavolo broccolo and kohlrabi only. Do not apply Voliam Xpress following an in-furrow or soil application of any group 28 insecticide. Maximum 3 applications/season. 7-day restricted-entry interval for hand weeding and topping. 6-day restricted entry interval for scouting, irrigation, thinning and tying. 24-hr restricted-entry interval for all other activities.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season suppression only. In-furrow application at seeding or transplant depth, or a narrow surface band above seed line during planting. See label for application details. See label for complete list of brassica crops, including specialty brassicas. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
spinosyn (group 5)	spinetoram	Delegate	200–336 g/ha (81–136 g/acre)	1	Suppression of onion thrips only. See label for complete list of brassica crops, including specialty brassicas. Apply when onion thrips first appear before populations build up. Apply in 300–500 L of water/ha (121–202 L water/acre). Heavy infestations will require repeat applications. Use high rate when pest pressure is high and/or insects are in advance growth stages. Maximum 3 applications/yr. 12-hr restricted-entry interval.

Table 3–28. Brassica Crop Insect Control — Imported Cabbageworm, Cabbage Looper, Diamondback Moth Caterpillars (page 56–58) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
IMPORTED CABBAGEWORM, CABBAGE LOOPER, DIAMONDBACK MOTH CATERPILLAR					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Broccoli, Brussels sprouts, cabbage and cauliflower only. Imported cabbageworm and cabbage looper only. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 2-day restricted-entry interval.
					Kale and kohlrabi only. Imported cabbageworm and cabbage looper only. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 1-day restricted-entry interval.
pyrethroid (group 3A)	cypermethrin	Mako	87.5–125 mL/ha (35–50 mL/acre)	3	Broccoli, Brussels sprouts, cabbage and cauliflower only. Maximum 3 applications/season. Do not use on muck soils. Do not graze treated crops.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early season control only. In-furrow application at seeding or transplant depth, or a narrow surface band above seed line during planting. See label for application details. See label for complete list of brassica crops, including specialty brassicas. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–30. Brassica Crop Insect Control — Leafminers (page 60) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFMINERS					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	3	Liriomyza leafminers. Mechanically harvested broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese cabbage mustard (gai choy), cauliflower, cavolo broccolo and kohlrabi only. Do not apply Voliam Xpress following an in-furrow or soil application of any group 28 insecticide. Maximum 3 applications/season. 7-day restricted entry interval for hand weeding and topping. 6-day restricted entry interval for scouting, irrigation, thinning and tying. 24-hr restricted-entry interval for all other activities.
			500 mL/ha (202 mL/acre)	8	Liriomyza leafminers. Hand-harvested broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese cabbage mustard (gai choy), cauliflower, cavolo broccolo and kohlrabi only. Do not apply Voliam Xpress following an in-furrow or soil application of any group 28 insecticide. Maximum 3 applications/season. 7-day restricted entry interval for hand weeding and topping. 6-day restricted entry interval for scouting, irrigation, thinning and tying. 24-hr restricted-entry interval for all other activities.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Dipteran leafminers. In-furrow application at seeding or transplant depth, or a narrow surface band above seed line during planting. See label for application details. See label for complete list of brassica crops, including specialty brassicas. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

CARROTS

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
carrots	Table 3–33, page 63	Remove Bravo 500, replace with Bravo ZN.
carrots	Table 3–34, page 64	Remove Ranman 400SC, replace with Torrent 400SC.
carrots	Table 3–34, page 64	Remove Serenade ASO, replace with Serenade MAX.
carrots	Table 3–34, page 64	Replace Serenade MAX with Serenade Opti.
carrots	Table 3–37, page 67	Remove Ripcord 400 EC, replace with Mako. Registrant: Engage Agro
carrots	not applicable	Last date of use of Diazinon 5G (PCP# 12538, granular formulation) was 31 August, 2015. From 31 December, 2014 to 31 December, 2016, soil drench applications with diazinon liquid formulations are permitted as per label instructions. Last date of use of diazinon is 31 December, 2016.

Table 3–33. Carrot Disease Control — Leaf Blights (page 63) — Additions

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAF BLIGHTS					
chloronitrile (group M5)	chlorothalonil	Bravo ZN	2.4–3.2 L/ha (0.97–1.3 L/acre)	2	Alternaria & Cercospora leaf blight. 48-hr re-entry interval.
SDHI (group 7)	penthiopyrad	Fontelis	1.25–2.25 L/ha (0.5–0.9 L/acre)	0	Alternaria leaf blight only. Also controls powdery mildew. Use higher rates and shorter spray intervals when disease pressure is high. See label for rotational crop restrictions. Apply no more than 4.5 L/ha/season. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Alternaria leaf blight only. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.

Table 3–34. Carrot Disease Control — Damping-Off, Cavity Spot, Rhizoctonia Crown Rot and Root Rot, Sclerotinia White Mold, Fusarium Root Rot, Powdery Mildew (page 64) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CAVITY SPOT (PYTHIUM SPP.)					
Oil (group 21)	cyazofamid	Torrent 400SC	0.44 L/ha (0.18 L/acre)	30	Suppression of cavity spot and root dieback/forking caused by <i>Pythium</i> spp. Post-plant, pre-emergent application applied to soil within 3 days after planting OR broadcast or banded application made 14 days after planting directed at base of plant. See label for application instructions. Apply in sufficient water to obtain full coverage and follow with sprinkler irrigation of 1.25–2.5 cm of water. Maximum 1 application/season. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seedzone with rainfall or overhead irrigation within 24-hrs.
RHIZOCTONIA ROOT ROT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rot caused by <i>Rhizoctonia solani</i> . May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seedzone with rainfall or overhead irrigation within 24-hrs.
SCLEROTINIA WHITE MOLD					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	2–4 kg/ha (0.8–1.6 kg/acre)	0	Suppression only. Begin application soon after emergence and when conditions are conducive to disease development.
		Serenade Opti	1.1–2.2 kg/ha (0.4–0.9 kg/acre)	0	Suppression only. Begin application soon after emergence and when conditions are conducive to disease development. Repeat applications on a 7–10 day interval.
FUSARIUM ROOT ROT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seedzone with rainfall or overhead irrigation within 24-hrs.
POWDERY MILDEW					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Not a common problem in Ontario. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.

Table 3–36. Carrot Insect Control- Leafhoppers, Carrot Weevil, Flea Beetle (page 66) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
FLEA BEETLE					
diamide (group 28)	cyantraniliprole	Verimark	6.75–9 mL/100 m of row or, 750–1,000 mL/ha (304–405 mL/acre)	21	Early season damage reduction. Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
		Exirel	500–1,000 mL/ha (202–405 mL/acre)	7	Will also control Cabbage Looper, Armyworm, Beet Armyworm, Fall Armyworm, European Corn Borer, Corn Earworm and Aphids. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application or planting of seed or seed pieces treated with any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.

Table 3–37. Carrot Insect Control- Carrot Rust Fly, Cutworms, European Chafer Grubs (page 67) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CARROT RUST FLY					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha in 550 L of water (71 mL/acre in 223 L of water)	35	Do not graze treated crops. Maximum 3 applications/season.
CUTWORMS					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha in 550 L of water (71 mL/acre in 223 L of water)	21	Do not graze treated crops. Do not disturb soil surface for 5 days after application.
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	7	Variegated Cutworm. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application or planting of seed or seed pieces treated with any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.

CELERY

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
celery	Table 3–40, page 69	Remove Bravo 500, replace with Bravo ZN.
celery	Table 3–41, page 70	Replace Serenade MAX with Serenade Opti.
celery	Table 3–43, page 73; Table 3–45, page 75	Last date of use of endosulfan (Thionex 50W WSP) is 31 December, 2016.
celery	Table 3–43, page 73; Table 3–45, page 75; Table 3–46, page 76	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of with any group 28 insecticide.”
celery	Table 3–44, page 74	Remove Ripcord 400 EC, replace with Mako.
celery	Table 3–44, page 74; Table 3–46, page 76	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.
celery	Table 3–46, page 76	Remove Agri-mek 1.9% EC, replace with Agri-mek SC.

Table 3–38. Celery Seed Treatments and Transplant Disease Control (page 68) — Additions

Group Name (Group #)	Common Name	Trade Name	Rate	Notes
not classified (group NC)	<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ of loose planting mix, soil or planting beds	Suppression only. Root rots caused by <i>Rhizoctonia</i> spp., <i>Pythium</i> spp. and <i>Fusarium</i> spp. Drench application to potting mix, soil or planting beds. 4-hr restricted-entry interval.

Table 3–40. Celery Disease Control — Leaf Blights, Root Rots (page 69) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> and <i>Pythium</i> spp. May be applied at planting and/or post-planting. See label for application instructions.
LEAF BLIGHTS					
SDHI (group 7)	penthiopyrad	Fontelis	1–1.75 L/ha (0.4–0.7 L/acre)	3	Late blight only. Use higher rate and shorter interval when disease pressure is high. See label for rotational crop restrictions. Maximum seasonal use rate is 5.25 L/ha. 12-hr restricted-entry interval.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Early and late blight. Use higher rate when disease pressure is high. Re-apply using 5–10 day intervals. Maximum 15 application/yr. 4-hr restricted-entry interval.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	1.6–2.4 L/ha (0.6–0.9 L/acre)	7	Early blight. Apply on a 3–5-day schedule. 48-hr restricted-entry interval.
			2.4–4 L/ha (0.9–1.6 L/acre)	7	Late blight. Apply on a 8–10-day schedule. 48-hr restricted-entry interval.

Table 3–41. Celery Disease Control — Pink Rot, Botrytis Gray Mold (page 70) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
PINK ROT (SCLEROTINIA)					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	1	See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only. Make first application 8 weeks before harvest and repeat on a 14-day interval. Apply as a directed spray in sufficient water to ensure thorough coverage of the base of the plants and the surrounding soil surface.

Table 3–43. Celery Insect Control — Aphids (page 72–73) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
Soil Treatments					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplant depth. See label for application details. Also suppresses early-season flea beetles. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–44. Celery Insect Control — Leafhoppers, Carrot Weevil, Tarnished Plant Bug (page 74) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFHOPPERS					
organophosphate (group 1B)	malathion	Malathion 85E	1,100 mL/ha (445 mL/acre)	7	Aster leafhopper. Maximum 1 application/yr. 1-day restricted-entry interval.
pyrethroid (group 3A)	cypermethrin	Mako	86 mL/ha (35 mL/acre)	7	Potato leafhopper. Maximum 3 applications/season.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplant depth. See label for application details. Also suppresses early-season flea beetles. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–45. Celery Insect Control — Cabbage Looper, Cutworms (page 75) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CABBAGE LOOPER					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season control of cabbage looper only. In-furrow application at transplant depth. See label for application details. Also suppresses early-season flea beetles. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–46. Celery Insect Control — Leafminers, Brown Marmorated Stink Bug, Thrips (page 76) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFMINERS					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplant depth. See label for application details. Also suppresses early-season flea beetles. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
avermectin (group 6)	abamectin	Agri-mek SC	135–250 mL/ha (55–101 mL/acre)	14	Pea leafminer only. Use lower rate under low pest pressure. See label for surfactant use details. Do not make sequential applications. Do not apply to transplants. Maximum 4 applications/season. 12-hr restricted-entry interval.
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,100 mL/ha (445 mL/acre)	7	Suppression only. Maximum 1 application/yr. 1-day restricted-entry interval.
THRIPS					
tetronic and tetramic acid derivatives (group 23)	spirotetramat	Movento 240 SC	365 mL/ha (148 mL/acre)	3	Onion thrips. Apply when thrips are first seen. Movento should be used during the first half of the season when adult populations are relatively low or building. Reduction in number of thrips larvae may take 3–4 days after application. Label directions require a tank mix with a specified spray adjuvant/additive. See label for application details and recropping restrictions. Maximum of 730 mL/ha (295 mL/acre) of Movento per crop season. 12-hr restricted-entry interval.
spinosyn (group 5)	spinetoram	Delegate	200–336 g/ha (81–136 g/ha)	1	Suppression of onion thrips only. Use high rate when pest pressure is high and/or insects are in advance growth stages. Apply in 300–500 L of (121–202 L water/acre). Maximum 3 applications/yr. 12-hr restricted-entry interval.

CUCURBITS

cucumber, melons (including cantaloupe, muskmelon, watermelon and bittermelon), pumpkin, squash and gourds

This information is provided as a guideline only. See product labels for complete information. Pest control products listed in these tables are not necessarily registered on all cucurbit crops. See the most up-to-date pest control product labels to ensure the registration on a specific crop. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
cucumbers	Table 3–47, page 77	Remove RootShield Granules. Replace with RootShield HC.
		Remove Ranman 400SC, replace with Torrent 400SC.
	Table 3–48, page 78	Remove Ranman 400SC, replace with Torrent 400SC.
		Remove Bravo 500, replace with Bravo ZN.
cucurbits	Table 3–49, page 79	Remove Bravo 500 from the Broadspectrum Preventative Fungicides section, replace with Bravo ZN.
		Remove Ranman 400SC from the Downy Mildew–Targeted Preventive Fungicides section, replace with Torrent 400SC.
		Remove Serenade ASO from the Downy Mildew–Targeted Preventive Fungicides section, replace with Serenade Opti.
	Table 3-50, page 80; Table 3-51, page 81	Remove Bravo 500, replace with Bravo ZN.
cucumbers, melons, pumpkins, squash	Table 3-53, page 83	Last date of use of endosulfan (Thionex 50W WSP) on cucumbers, melons, pumpkins and squash is 31 December, 2016.
cucumbers, melons, pumpkins, squash	Table 3–53, page 83; Table 3–54, page 84	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of any group 28 insecticide.”
cucumbers, squash, pumpkins, melons	Table 3–54, page 84	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–47. Cucurbit Seed and Planting Treatments (page 77) — Additions**LEGEND:** C = control

S = suppression

— = not registered for control of this pest, or activity on this pest has not been documented

Active Ingredient(s)	Trade Name	Rate	Damping-off and early-season root rots caused by:			Notes
			Fusarium	Rhizoctonia	Pythium	
cyazofamid	Torrent 400SC	30 mL in 100 L water	—	—	C	Cucumber transplants only. Make a single application as a soil drench to thoroughly wet the growing medium immediately after seeding. Do not use any surfactant with drench application. 60-day pre-harvest interval. 12-hr restricted-entry interval.
<i>Streptomyces</i> Strain K61	Mycostop	Refer to label for rates and application instructions.	S	—	S	Cucumber greenhouse transplants only. Suppression only. Drench or soil spray application after seedling emergence. Apply first spray after emergence using lower rate.
<i>Streptomyces</i> Strain K61	Mycostop	5 g/1 kg of seed	S	—	—	Suppression only. Seed treatment. See label for application instructions.
<i>Gliocladium catenulatum</i> Strain J1446	Prestop	Refer to label for rates and application instructions.	—	S	S	For cucumber greenhouse transplants only. Apply as a growing media or soil drench application. Suppression only. Do not tank-mix with any fungicides, insecticides, herbicides or adjuvants.
<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ of loose planting mix, soil or planting beds	S	S	S	Drench application to potting soil or mix. 4-hr restricted-entry interval.

Table 3–49. Cucurbit Downy Mildew Fungicides (page 79) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BROADSPECTRUM PREVENTATIVE FUNGICIDES					
Begin applications no later than vine development. Begin earlier if weather conditions are favourable for downy mildew infections.					
chloronitrile (group M5)	chlorothalonil	Bravo ZN	4.8 L/ha (1.9 L/acre)	2	48-hr restricted-entry interval.
DOWNY MILDEW–TARGETED PREVENTIVE FUNGICIDES					
Begin applications when weather conditions favour downy mildew or if downy mildew is identified anywhere in the Great Lakes region.					
Qil (group 21)	cyazofamid	Torrent 400SC	150–200 mL/ha (61–81 mL/acre)	1	Do not make sequential applications. Do not exceed 1 spray of a Group 21 fungicide out of every 3 fungicide applications. 30-day plant-back interval. Tank-mix with an NIS or organosilicone surfactant, as per label instructions. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	1–3 kg/ha (0.4–1.2 kg/acre)	0	Suppression only. Begin application after emergence or transplant, when conditions are conducive for disease development. Use in a rotational program with other registered fungicides.
		Serenade Opti	0.6–1.7 kg/ha (0.2–0.7 kg/acre)	0	Suppression only. Begin application soon after emergence or transplant, when conditions are conducive for disease development. Use in a rotational program with other registered fungicides.

Table 3–50. Cucurbit Disease Control — Angular Leaf Spot, Powdery Mildew (page 80) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ANGULAR LEAF SPOT					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Re-apply using 5–10 day intervals. 4-hr restricted-entry interval.
POWDERY MILDEW					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	1	Begin applications prior to disease establishment. If disease pressure is high, use the highest rate. See label for recropping restrictions. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	0	Do not apply to any cucurbit crops as a tank-mix with anything other than water. See label for rotational crop restrictions. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only. Begin application after emergence or transplant, when conditions are conducive to disease development. Use in a rotational program with other registered fungicides.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/ha)	0	Suppression only. Begin application soon after emergence or transplant, when conditions are conducive to disease development. Use in a rotational program with other registered fungicides.
	<i>Bacillus amyloliquifaciens</i> strain D747	Double Nickel 55	0.5–2.5 kg/ha (0.2–1 kg/acre)	0	Suppression only. Apply from fruit formation to maturity. See label for details on choosing a rate. Re-entry permitted once spray deposit has dried.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Suppression only. 4-hr restricted-entry interval.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	4.8 L/ha (1.9 L/acre)	2	Begin applications prior to disease development. 48-hr restricted-entry interval.
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. Begin applications when conditions are favourable for disease development and/or when first symptoms appear. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.
aryl-phenyl- ketone (group U8)	metrafenone	Vivando SC	0.75–1.12 L/ha (0.3–0.45 L/acre)	0	A non-ionic Surfactant (NIS) may be added to improve performance. Use according to the adjuvant label. Do not apply more than 2 sequential applications before alternating to at least one application of a fungicide with a different mode of action. See label for re-cropping restrictions. 12-hr restricted-entry interval.

Table 3–51. Cucurbit Disease Control — Alternaria, Anthracnose, Gummy Stem Blight, Scab, Phytophthora Blight, Fusarium Wilt (page 81) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ALTERNARIA, ANTHRACNOSE, GUMMY STEM BLIGHT, SCAB					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	1	Alternaria, anthracnose, gummy stem blight. Use high rate for anthracnose and gummy stem blight. Apply prior to disease establishment. See label for re-cropping restrictions. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	333 mL/ha (135 mL/acre)	0	Suppression of gummy stem blight. Do not apply to any cucurbit crops as a tank-mix with anything other than water. See label for rotational crop restrictions. 12-hr restricted-entry interval.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	4.8 L/ha (1.9 L/acre)	2	Anthracnose and scab. Begin applications prior to disease development. 48-hr restricted-entry interval.
PHYTOPHTHORA BLIGHT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Also suppresses fusarium, pythium and rhizoctonia root rots. See label for in-furrow application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs, if required.
	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.2–0.5 kg/ha (0.1–0.2 kg/acre)	0	Partial suppression only. Refer to label for transplant and at-planting application instruction. Follow up applications can be made at 2–4 week intervals. Re-entry permitted once spray deposit has dried.

Table 3–53. Cucurbit Insect Control — Cucumber Beetles, Aphids (page 83) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUCUMBER BEETLES, APHIDS					
Planting (Soil) Treatment					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season suppression of cucumber beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. 12-hr restricted entry interval.
Foliar Treatment					
neonicotinoid (group 4A)	clothianidin	Clutch 50 WDG	140 g/ha (57 g/acre)	7	Suppression of cucumber beetles. Will also suppress squash bug nymphs. Apply when target pest(s) threshold populations are observed. Do not apply foliar group 4 (neonicotinoid) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. 12-hr restricted-entry interval.
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	1	Will also control squash bugs. Do not apply following an in-furrow or soil application of any group 28 (diamide) insecticides. 24-hr restricted-entry interval.

Table 3–54. Cucurbit Insect Control — Two-Spotted Spider Mite, Cutworms, Brown Marmorated Stink Bug (page 84) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
TWO-SPOTTED SPIDER MITE					
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. Begin applications when mites appear. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.
CUTWORMS					
pyrethroid/ diamide (group 3A/28)	lambda- cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	For black cutworm. Apply to foliage when rain is not expected in the next 24 hrs. For optimum control, make application to smaller plants or when lower portion of the plant can receive adequate coverage. Do not apply following an in-furrow or soil application of any group 28 (diamide) insecticide. 24-hr restricted-entry interval.
BROWN MARMORATED STINK BUG See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
neonicotinoid (group 4A)	clothianidin	Clutch 50 WDG	210 g/ha (85 g/acre)	7	Suppression only. Apply when target pest(s) threshold populations are observed. Do not apply foliar group 4 (neonicotinoid) insecticides in the same season as an in-furrow or soil application. 12-hr restricted-entry interval.
organophosphate (group 1B)	malathion	Malathion 85E	880 mL/ha (356 mL/acre)	3	Suppression only. Cucumbers, squash and pumpkins only. Do not apply to cucurbits unless the plants are dry. 1-day restricted-entry interval.
			1,345 mL/ha (544 mL/acre)	3	Suppression only. Melons only. Do not apply to cucurbits unless the plants are dry. 1-day restricted-entry interval.

EGGPLANT

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
eggplant	Table 3–57, page 87	Remove Serenade ASO, replace with Serenade MAX.
eggplant	Table 3–57, page 87	Replace Serenade MAX with Serenade Opti.
eggplant	Table 3–59, page 89 Table 3–60, page 90 Table 3–61, page 91	Last date of use of endosulfan (Thionex 50W WSP, Thionex EC) on eggplant is 31 December, 2016.
eggplant	Table 3–62, page 92	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the most recent label for directions for use.
eggplant	Table 3–59, page 89 Table 3–60, page 90 Table 3–61, page 91	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of any group 28 insecticide.”

Table 3–55. Eggplant Seed Treatment and Transplant Production Disease and Insect Control (page 85) —
Additions

Group Name (Group #)	Common Name	Trade Name	Rate	Notes
SEED AND SEEDLING DISEASE				
Seed Treatments				
not classified (group NC)	<i>Streptomyces</i> Strain K61	Mycostop	5 g/1 kg of seed	Suppression of Fusarium damping-off only. Seed treatment. See label for application instructions.
Soil Treatments				
carboxylic acid amide (group 40)	mandipropamid	Revus	600 mL/ha (243 mL/acre)	Suppression only. Phytophthora blight. Make one application as a drench, immediately before transplanting. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus</i> <i>amyloliquefaciens</i> strain D747	Double Nickel 55	25–250 g/100 L of water	Partial suppression only. For Phytophthora capsici in soil. Make preventative applications to transplants in the greenhouse before transplanting. See product label for application instructions. Follow up applications of 0.1–0.5 kg/ha (40–202 g/acre) can be made at 2–4 week intervals after transplanting. Re-entry permitted once spray deposit has dried.
not classified (group NC)	<i>Trichoderma</i> <i>harzianum</i>	RootShield HC	55–110 g/m ³ of loose planting mix, soil or planting beds	Suppression only. Root diseases caused by Pythium, Rhizoctonia, Fusarium. Potting mix application or drench. 4-hr restricted-entry interval for greenhouse applications.
Foliar Treatment				
not classified (group NC)	<i>Trichoderma</i> <i>harzianum</i>	RootShield HC	10 g/L of water.	Suppression only. Botrytis gray mold. Foliar application. 4-hr restricted-entry interval for greenhouse applications. Spray to wet, but avoid runoff. Use quantity of spray solution to thoroughly cover foliage.

Table 3–57. Eggplant Disease Control (page 87) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ANTHRACNOSE, ALTERNARIA (EARLY BLIGHT)					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	1	Alternaria, anthracnose. See label for recropping restrictions. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	167–333 mL/ha (68–135 mL/acre)	7	Alternaria. Use high rate to target black mold (<i>Alternaria alternata</i>) of ripe fruit. Follow label instructions regarding use of a non-ionic surfactant. See label for rotational crop restrictions. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.5–2 kg/ha (0.2–0.8 kg/acre)	0	Alternaria. Suppression only. Re-entry permitted once spray deposit has dried.
	<i>Bacillus subtilis</i>	Serenade MAX	4.5 kg/ha (1.82 kg/acre)	0	Alternaria. Suppression only.
		Serenade Opti	2.5 kg/ha (1 kg/ha)	0	Alternaria. Suppression only.
PHYTOPHTHORA BLIGHT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Phytophthora blight. Suppression only. Soil application. See label for application instructions.
BOTRYTIS (GRAY MOLD)					
microbial (group 44)	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.9–1 kg/ha; or, 1.25–3.6 kg/ha (0.39–0.4 kg/acre; or, 0.5–1.46 kg/acre)	0	Suppression only. See label for details on choosing a rate. Re-entry permitted once spray deposit has dried.
	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only.
not classified (group NC)	<i>Trichoderma harzianum</i>	RootShield HC	3.75–7.5 g/L	—	Suppression only. Foliar application. Spray to wet, but avoid runoff. Use quantity of spray solution to thoroughly cover foliage.
POWDERY MILDEW					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	1	See label for re-cropping restrictions. 12-hr restricted-entry interval.
QoI/DMI (group 11/3)	azoxystrobin/ difenoconazole	Quadris Top	625 mL/ha (253 mL/acre)	1	Do not apply until 21 days after transplanting or 35 days after seeding. See label for re-cropping restrictions. 12-hr restricted-entry interval.
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.

Table 3–57. Eggplant Disease Control (page 87) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
aryl-phenyl- ketone (group U8)	metrafenone	Vivando SC	0.75–1.12 L/ha (0.3–0.45 L/acre)	7	See label for re-cropping restrictions. 12-hr restricted-entry interval.

Table 3–59. Eggplant Insect Control — Aphids (page 89) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
Soil Treatment					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplanting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–60. Eggplant Insect Control — Colorado Potato Beetle (page 90) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
COLORADO POTATO BEETLE					
Transplant or Soil Treatments					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplanting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–61. Eggplant Insect Control — Cutworms, Flea Beetles, Mites (page 91) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
pyrethroid/ diamide (group 3A/28)	lambda- cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	—	For black cutworm. Apply to foliage when rain is not expected in the next 24 hrs. Do not apply Voliam Xpress following a soil application of any group 28 insecticide. 24-hr restricted-entry interval.

Table 3–61. Eggplant Insect Control — Cutworms, Flea Beetles, Mites (page 91) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
FLEA BEETLES					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Suppression only. In-furrow application at transplanting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
MITES					
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.

Table 3–62. Eggplant Insect Control — Stink Bug, Brown Marmorated Stink Bug, Tarnished Plant Bug (page 92) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,345 mL/ha (544 mL/acre)	3	Suppression only. Maximum 4 applications/yr. 12-hr restricted-entry interval.

GARLIC

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
garlic	Table 3–64, page 94; Table 3–65, page 95	Replace Serenade MAX with Serenade Opti.
garlic	Table 3–68, page 98	Remove Agri-mek 1.9% EC, replace with Agri-mek SC.
garlic	Table 3–67, page 97; Table 3–68, page 98	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–64. Garlic Disease Control — Allium White Rot, Penicillium, Downy Mildew, Root Rots, Pink Root (page 94) — **Additions**

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DOWNY MILDEW					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Re-apply using 5–10 day intervals. Maximum 15 application/yr. 4-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only. Begin applications at first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10 day interval.
ROOT ROTS, PINK ROOT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> and <i>Pythium</i> spp. Efficacy of this product has not been assessed in all areas under all conditions, therefore, limit first use of this product to a small area prior to adoption as a general field practice. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seedzone with rainfall or overhead irrigation within 24 hrs.

Table 3–65. Garlic Disease Control — Botrytis Leaf Blight, Purple Blotch, Stemphylium Leaf Blight (page 95) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BOTRYTIS LEAF BLIGHT					
SDHI (group 7)	fluxapyroxad	Sercadis	333–666 mL/ha (135–269 mL/acre)	7	See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
phenylpyrrole/ anilino- pyrimidine (group 9/12)	ciprodinil/ fludioxonil	Switch 62.5 WG	775–975 g/ha (314–394 g/acre)	7	Begin applications when conditions become favourable for disease but before infection. See label for recropping restrictions. Maximum 3 applications/yr. 3-day restricted entry interval for hand weeding. 12-hr restricted entry interval for all other activities.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.7–2.5 kg/ha (0.7–1 kg/acre)	0	Suppression only. Also suppresses botrytis neck rot (<i>Botrytis allii</i>). Begin applications at first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10 day interval.
PURPLE BLOTCH					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
	penthiopyrad	Fontelis	1.25–1.75 L/ha (0.5–0.7 L/acre)	3	Also suppresses botrytis fleck caused by <i>Botrytis cinerea</i> ¹ . Use higher rate and shorter interval when disease pressure is high. See label for rotational crop restrictions. Do not apply more than 5.25 L/ha (2.1 L/acre)/season. 12-hr restricted-entry interval.
phenylpyrrole/ anilino- pyrimidine (group 9/12)	ciprodinil/ fludioxonil	Switch 62.5 WG	775–975 g/ha (314–394 g/acre)	7	Suppression only. Begin applications when conditions become favourable for disease but before infection. See label for re-cropping restrictions. Maximum 3 applications/yr. 3-day restricted entry interval for hand weeding. 12-hr restricted entry interval for all other activities.
STEMPHYLIUM LEAF BLIGHT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Suppression only. Avoid application of consecutive sprays of Sercadis. Do not apply more than two sequential applications of Sercadis Fungicide before alternating to a labeled fungicide with a different mode of action. See label for rotational crop restrictions. 12-hr restricted-entry interval.

¹ Botrytis fleck is caused by *Botrytis cinerea*, which is different from botrytis leaf blight (*Botrytis squamosa*).

Table 3–67. Garlic Insect Control — Onion Maggot, Aphids, Leek Moth (page 97) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Maximum 1 application/yr. 12-hr restricted-entry interval.
LEEK MOTH					
spinosyn (group 5)	spinosad	Entrust	437–527 mL/ha (177–213 mL/acre)	3	Suppression only. Apply 1 week after peak pheromone trap capture. Use higher rates when pressure is high and/or insects are in advanced growth stages. Maximum 3 applications/yr. Re-entry permitted once spray deposit has dried.

Table 3–68. Garlic Insect Control — Thrips (page 98) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
THRIPS					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Maximum 1 application/yr. 12-hr restricted-entry interval.
spinosyn (group 5)	spinosad	Entrust	437–527 mL/ha (177–213 mL/acre)	3	Suppression of onion thrips only. Apply according to monitoring when onion thrips first appear. Use high rate when pressure is high and/or insects are in advanced growth stages. Maximum 3 applications/yr. Re-entry permitted once spray deposit has dried.
avermectin (group 6)	abamectin	Agri-mek SC	135–270 mL/ha (55–109 mL/acre)	30	Apply when onion thrips or signs of feeding first appear. Non-ionic spreading and penetrating surfactants used at a rate of 0.25–0.5% v/v may improve control. Do not use binder or sticker-type surfactants. Follow surfactant label carefully and test a small number of plants before treating a large area ¹ . Maximum 3 applications/season. 12-hr restricted-entry interval.

¹ This product has been tested in combination with a non-ionic surfactant for safety to some varieties of bulb onions, however, testing has not been conducted on all crops and varieties in the bulb onion sub-group under the range of conditions that may cause crop injury.

HERBS

angelica, basil, cilantro, chervil (dried), chives, dillweed, lavender, lemon balm, marjoram (sweet), oregano, parsley, rosemary, sage, savory (summer and winter), tarragon and thyme

This information has been provided as a guideline only. See product labels for complete information. Pest control products listed in these tables are not necessarily registered on all herb crops. See the most up-to-date pest control product labels to ensure the registration on a specific crop. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide* 2014–2015.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
basil	Table 3–70, page 100	Ranman 400SC - name change to Torrent 400SC.
basil, chevril, dill, lavender, lemon balm, rosemary, sage, savory, thyme	Table 3–70, page 100	Replace Serenade MAX with Serenade Opti.
parsley, fresh	Table 3–73, page 102	Replace Serenade MAX with Serenade Opti.
chives, fresh leaves	Table 3–77, page 106	Replace Serenade MAX with Serenade Opti.
parsley	Table 3–74, page 103; Table 3–75, page 104; Table 3–76, page 105	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of any group 28 insecticide.”

Herb Crop Subgroup 19A

Crop Subgroup 19A, the Herb subgroup of Crop Group 19, *Herbs and Spices*, includes many, but not all, common culinary herbs, including:

- balm (lemon balm)
- basil
- cilantro
- dillweed
- lavender
- marjoram (*Origanum* spp., including sweet marjoram and oregano)
- dried parsley
- rosemary
- sage
- savory (summer and winter)
- tarragon
- thyme

This partial list of the crops included in Crop Subgroup 19A is current as of November 2015. This list does not include fresh parsley, which has always been in Crop Group 4, Leafy Vegetables (except Brassica).

Furthermore, the Pest Management Regulatory Agency is currently reviewing and revising all crop groups, and this process has involved moving some herbs to different crop groups. In 2008, fresh chives were added to the revised Crop Group 3-07, *Bulb Vegetables* Group. In 2014, fresh cilantro and dill were added to the revised crop group, 4-13, *Leafy Vegetables*. These changes will apply to new registrations on the new crop groups only - products registered on the old Crop Group 4 cannot be applied to fresh dill or cilantro and products registered on the old Crop Group 3 cannot be applied to fresh chives. The Herb Crop Subgroup 19A is currently being revised and an updated crop group is expected in the near future.

For a current, complete list of crops included in these crop groups, see the PMRA website at www.hc-sc.gc.ca/cps-spc/pest/part/protect-proteger/food-nourriture/rccg-gcpcr-eng.php.

Table 3-69A, on the next page, outlines which products are registered on commonly-grown fresh market herbs in Ontario. Products listed here are not always registered for the same pest or use site (e.g., greenhouse or field) on each herb crop. Always refer to product labels for specific instructions for each product. This table lists only those herbs commonly grown in Ontario. Products included in the table may be listed on additional herbs (see labels for full list of registered crops).

Table 3–69A. Products registered on herbs grown in Ontario.

LEGEND: R = registered
— = not registered

Product (PCP No.)	Balm (lemon)	Basil	Cilantro	Chive (fresh)	Dillweed (fresh)	Lavender	Marjoram/oregano	Mint	Parsley (fresh)	Rosemary	Sage	Savory	Tarragon	Thyme
INSECTICIDES AND MITICIDES														
Actara 25 WG	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Actara 240 SC	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Admire 240	R	R	R	R	R	R	R	—	R	R	R	R	R	R
Assail 70 WP	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Beleaf 50 SG	—	—	—	—	—	—	—	R	R	—	—	—	—	—
Bioprotec CAF	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Botanigard ES	R	R	R	R	R	R	R	—	R	R	R	R	R	R
Citation 75 WP	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Closer	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Coragen	—	—	—	R	—	—	—	R	R	—	—	—	—	—
Delegate	—	R	—	—	—	—	—	—	R	—	—	—	—	—
Dipel 2X DF	—	R	—	—	R	—	—	R	R	—	—	—	—	—
Entrust	—	R	—	R	—	—	—	—	R	—	—	—	—	—
Exirel	—	—	—	R	—	—	—	—	R	—	—	—	—	—
Fulfill 50WG	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Intrepid	R	R	R	—	R	R	R	—	R	R	R	R	R	R
Malathion 85E	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Minecto Duo 40WG	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Movento 240 SC	—	—	—	R	—	—	—	—	R	—	—	—	—	—
Opal	R	R	R	R	R	R	R	—	R	R	R	R	R	R
Sevin XLR	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Success	—	R	—	R	—	—	—	—	R	—	—	—	—	—
Surround WP	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Trounce	R	R	R	R	R	R	R	—	R	R	R	R	R	R

Table 3–69A. Products registered on herbs grown in Ontario.

LEGEND: R = registered
— = not registered

Product (PCP No.)	Balm (lemon)	Basil	Cilantro	Chive (fresh)	Dillweed (fresh)	Lavender	Marjoram/oregano	Mint	Parsley (fresh)	Rosemary	Sage	Savory	Tarragon	Thyme
FUNGICIDES														
Apron XL	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Cease	R	R	—	R	R	R	—	—	R	R	R	R	—	R
Confine	—	R	—	—	—	—	—	—	—	—	—	—	—	—
Cueva	—	—	—	R	—	—	—	—	R	—	—	—	—	—
DADS	—	—	—	R	—	—	—	—	—	—	—	—	—	—
Dynasty 100 FS	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Fontelis	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Maxim 480 FS	—	R	R	R	R	R	R	—	R	R	R	—	R	R
MilStop	R	R	R	R	R	R	R	—	—	R	R	R	R	R
Mycostop	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Prestop	—	R	—	—	R	—	R	—	R	—	—	—	—	R
Pristine WG	—	—	—	R	—	—	—	—	—	—	—	—	—	—
Quadris Top	—	—	—	R	—	—	—	—	—	—	—	—	—	—
Quilt	—	—	—	—	—	—	—	R	—	—	—	—	—	—
Revus	—	R	—	—	—	—	—	—	—	—	—	—	—	—
RootShield HC	R	R	R	R	R	R	R	—	R	R	R	R	R	R
Scala SC	—	—	—	R	—	—	—	—	—	—	—	—	—	—
Sercadis	—	—	—	R	—	—	—	—	R	—	—	—	—	—
Serenade Opti	R	R	—	R	R	R	—	—	R	R	R	R	—	R
Serenade SOIL	—	—	—	—	—	—	—	—	R	—	—	—	—	—
Sirocco	R	R	R	R	R	R	R	—	—	R	R	R	R	R
Switch 62.5 WG	—	—	—	R	—	—	—	—	—	—	—	—	—	—
Torrent 400SC	—	R	—	—	—	—	—	—	—	—	—	—	—	—

Table 3–69. Herb Crop Subgroup 19A Seed Treatments (page 99) — **Additions**

Trade Name	Active ingredients	Rate	Pests Controlled	Notes
Mycostop	<i>Streptomyces</i> Strain K61	8 g/kg seed	Fusarium damping off	Greenhouse use only. Do not apply on seed to be planted directly in the field. Suppression only. See label for application instructions.

Table 3–70. Herb Crop Subgroup 19A Disease Control (page 100) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
GREENHOUSE TRANSPLANT DISEASE CONTROL					
not classified (group NC)	<i>Gliocladium catenulatum</i> strain J1446	Prestop	Refer to label for rates and application instructions.	—	Basil, dill, oregano and thyme only. Suppresses damping-off caused by <i>Pythium</i> spp. and <i>Rhizoctonia solani</i>. Greenhouse use only as a growing media or soil drench application. Do not tank mix with any fungicides, insecticides, herbicides or adjuvants. 4-hr restricted-entry for foliar applications.
microbial (group 44)	<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ soil	—	Suppression of root rot caused by <i>Pythium</i> spp., <i>Rhizoctonia</i> spp. and <i>Fusarium</i> spp. Greenhouse use only. Suspend in sufficient water (e.g., 30–45 g/100L) to achieve uniform application and apply to potting mix, soil or planting beds. Agitate to maintain suspension. 4-hr restricted-entry interval.
not classified (group NC)	potassium bicarbonate	Millstop	0.28–0.56 kg/1,000 m ²	0	Suppression of powdery mildew. Not all herbs or herb varieties have been tested for phytotoxicity. Start at first sign of disease. Use higher rate when disease pressure is moderate to high. Maximum 10 applications/season. 4-hr restricted-entry interval.
		Sirocco			
carboxylic acid amide (group 40)	mandipropamid	Revus	583 mL/ha (236 mL/acre)	1	Basil only. Tank mix with a non-ionic surfactant, as per label instructions. Maximum 4 applications/year. Do not make sequential applications. 12-hr restricted-entry interval.
Qil (group 21)	cyazofamid	Torrent 400SC	0.2–0.22 L/ha (0.08–0.09 L/acre)	0	For control of downy mildew on basil only. Tank mix with a non-ionic surfactant, as per label instructions. Maximum 4 applications/year. Do not make sequential applications. 12-hr restricted-entry interval.
POWDERY MILDEW					
not classified	potassium bicarbonate	MilStop	2.8–5.6 kg/ha (1.1–2.3 kg/acre)	0	Suppression of powdery mildew. Not all herbs or herb varieties have been tested for phytotoxicity. Start at first sign of disease. Use higher rate when disease pressure is moderate to high. Maximum 10 applications/season. 4-hr restricted-entry interval.
		Sirocco			
SCLEROTINIA WHITE MOLD AND BOTRYTIS GRAY MOLD					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Basil, chervil, dill, lavender, lemon balm, rosemary, sage, savory and thyme only. Suppression only. Begin applications at the first sign of disease or when conditions favour disease development.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	
BASIL DOWNY MILDEW					
Qil (group 21)	cyazofamid	Torrent 400SC	0.2–0.22 L/ha (0.08–0.09 L/acre)	0	Basil only. Use higher rate and shorter spray interval when disease pressure is moderate to high. Tank-mix with a surfactant, as per label instructions. Do not make sequential applications. Maximum 4 applications/season. 12-hr restricted-entry interval.

Table 3–70. Herb Crop Subgroup 19A Disease Control (page 100) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BASIL DOWNY MILDEW					
carboxylic acid amide (group 40)	mandipropamid	Revus	583 mL/ha (236 mL/acre)	1	Basil only. Tank-mix with a non-ionic surfactant, as per label instructions. Maximum 4 applications/year. Do not make sequential applications. 12-hr restricted-entry interval.

Table 3–71. Herb Crop Subgroup 19A Insect Control (page 101) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
THRIPS					
spinosyn (group 5)	spinosad	Entrust	364 mL/ha (147 mL/acre)	1	Basil only. Suppression only. Apply when larvae are small. Maximum 3 applications/year. Allow 7–10 days between applications. Re-entry permitted once spray deposit has dried.
		Success	182 mL/ha (73 mL/acre)	1	
	spinetoram	Delegate	200–280 g/ha (81–113 g/acre)	1	Basil only. Suppression only. Apply when larvae are small. Use higher rate for heavy infestations. Maximum 3 applications/year. 12-hr restricted-entry interval.
CABBAGE LOOPER					
spinosyn (group 5)	spinosad	Entrust	364 mL/ha (147 mL/acre)	1	Basil only. Apply when larvae are small. Maximum 3 applications/year. Allow 7–10 days between applications. Re-entry permitted once spray deposit has dried.
		Success	182 mL/ha (73 mL/acre)	1	
	spinetoram	Delegate	140–200 g/ha (56–81 g/acre)	1	Basil only. Apply when larvae are small. Use higher rate for heavy infestations. Maximum 3 applications/year. 12-hr re-entry interval.
diacylhydrazine (group 18)	methoxyfenozide	Intrepid	0.58–1.16 L/ha (0.2–0.5 L/acre)	1	Apply in 200–500 L water/ha (81–202 L water/acre) when larvae are small and actively feeding. Also controls armyworm and garden webworm. Maximum 2 L of product/ha/yr (0.8 L/acre) in a maximum 3 applications/yr. 12-hr re-entry interval.
biological (group 11)	<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i>	Dipel 2X DF	275–550 g/ha (111–222 g/acre)	0	Refer to Table 3–69A, page 44 for registered herb crops. Apply to small larvae. Use higher rate for higher infestations or larger plants. Maximum 5 applications/yr.
		Bioprotec CAF	1.4–2.8 L/ha (0.56–1.1 L/acre)	0	

Parsley (fresh)

Fresh parsley falls under the old Crop Group 4, *Leafy Vegetables (Except Brassica) Group*, and subgroup 4A, *Leafy Greens Subgroup* and the new Crop Group 4–13, *Leafy Vegetables Crop Group* and subgroup 4–13A: *Leafy Greens Subgroup*.

Table 3–72. Fresh Parsley Seed Treatments (page 102) — Additions

Trade Name	Active ingredients	Rate	Pests Controlled	Notes
Mycostop	<i>Streptomyces</i> Strain K61	8 g/kg seed	Fusarium damping off	Suppression only. Greenhouse use only. Do not apply on seed to be planted directly in the field. See label for application instructions.

Table 3–73. Fresh Parsley Disease Control (page 102) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
GREENHOUSE TRANSPLANT DISEASE CONTROL					
microbial (group 44)	<i>Gliocladium catenulatum</i> strain J1446	Prestop	Refer to label for rates and application instructions.	—	Greenhouse use only. Suppression only of damping-off caused by <i>Pythium</i> spp. and <i>Rhizoctonia solani</i>. Growing media or soil drench application. Mix and apply according to product label. Do not tank mix with any fungicides, insecticides, herbicides or adjuvants. 4-hr restricted-entry interval for foliar applications.
microbial (group 44)	<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ soil	—	Greenhouse use only. Suppression of root rot caused by <i>Pythium</i> spp., <i>Rhizoctonia</i> spp. and <i>Fusarium</i> spp. Suspend in sufficient water (e.g., 30–45 g/100L) to achieve uniform application and apply to potting mix, soil or planting beds. Agitate to maintain suspension.
DAMPING-OFF					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rot caused by <i>Pythium</i> spp. and <i>Rhizoctonia solani</i> . Apply as an in-furrow spray to seed and surrounding soil before covering the seed, or as a transplant drench in sufficient water to soak the root zone.
SEPTORIA LEAF SPOT					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L water/ha (190–380 L water/acre)	1	May cause leaf spots during excessive moisture and cold. If concerned about sensitivity of plants, apply first to small areas. Maximum 15 applications/year. 4-hr restricted-entry interval.
BOTRYTIS GRAY MOLD, SCLEROTINIA WHITE MOLD					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	1	Sclerotinia only. Begin applications prior to onset of disease. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	1–3 kg/ha (0.4–1.2 kg/acre)	0	Suppression only. Begin applications at the first sign of disease or when conditions favour disease development.
		Serenade Opti	0.6–1.7 kg/ha (0.2–0.7 kg/acre)	0	

Table 3–74. Fresh Parsley Insect Control — Aphids (page 103) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
Soil or Transplant Treatments					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Soil application at planting. Also suppresses early season flea beetles. Use sufficient water volume to ensure coverage at least 5 cm into the soil. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as a soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
Foliar Treatments					
organophosphate (group 1B)	malathion	Malathion 85E	1,000–1,345 mL/ha (445–544 mL/acre)	20	Control of aphids with malathion has been inconsistent in many areas. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 1-day restricted-entry interval.
pymetrozine (group 9B)	pymetrozine	Fulfill 50WG	193 g/ha (78 g/acre)	14	Do not apply through irrigation equipment. Apply with an adjuvant for optimum control under drought stress, as per label instructions. See label for re-cropping restrictions. Maximum 2 applications/season. 12-hr restricted-entry interval.

Table 3–75. Fresh Parsley Insect Control — Cutworms, Tarnished Plant Bug, Leafhoppers (page 104) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFHOPPERS					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Soil application at planting. Also suppresses early season flea beetles. Use sufficient water volume to ensure coverage at least 5 cm into the soil. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as a soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–76. Fresh Parsley Insect Control — Dipteran Leafminers, Cabbage Looper, Thrips (page 105) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DIPTERAN LEAFMINERS					
neonicotinoid/diamide (group 4A/28)	thiamethoxam/cytraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Soil application at planting. Also suppresses early season flea beetles. Use sufficient water volume to ensure coverage at least 5 cm into the soil. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as a soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
CABBAGE LOOPER					
spinosyn (group 5)	spinosad	Success	182 mL/ha (73 mL/acre)	1	Maximum 3 applications/yr. Re-entry permitted when residues are dry.
		Entrust	364 mL/ha (147 mL/acre)	1	Maximum 3 applications/yr. Re-entry permitted when residues are dry.
	spinetoram	Delegate	140–200 g/ha (56–81 g/acre)	1	Use high rate for heavy infestations or large larvae. Maximum 3 applications/yr. 12-hr restricted-entry interval.
neonicotinoid/diamide (group 4A/28)	thiamethoxam/cytraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season control only. Soil application at planting. Also suppresses early season flea beetles. Use sufficient water volume to ensure coverage at least 5 cm into the soil. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as a soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
THRIPS					
tetronic and tetramic acid derivatives (group 23)	spirotetramat	Movento 240 SC	365 mL/ha (147 mL/acre)	3	Onion thrips only. Use early in season, when adult populations are relatively low. Reductions in numbers of thrips larvae may take 3–4 days. Label directions require a tank mix with a specified spray adjuvant/additive. See label for recropping restrictions. Do not apply more than 730 mL/ha/season (295 mL/acre/season). 12-hr restricted-entry interval.
spinosyn (group 5)	spinetoram	Delegate	200–336 g/ha (81–135 g/acre)	1	Suppression only. Apply in 300–500 L water/ha (121–202 L water/acre). Use high rate when pest pressure is high or insects are in advanced growth stages. Maximum 3 applications/yr. 12-hr restricted-entry interval.

Chives

Fresh chives were originally in the Herb Group but have recently been transferred to Crop Group 3-07, *Bulb Vegetables Group*, and subgroup 3-07B, *Green Onion Subgroup*. Note that Group 3-07 is a new group and that products registered only on the old Crop Group 3 cannot be applied to chives.

Table 3–77A. Fresh Chive Seed Treatments

Trade Name	Active ingredients	Rate	Pests Controlled	Notes
Mycostop	<i>Streptomyces</i> Strain K61	8 g/kg seed	Fusarium damping off	Suppression only. Greenhouse use only. Do not apply on seed to be planted directly in the field. See label for application instructions.

Table 3-77. Fresh Chive Leaves Disease Control (page 106) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
GREENHOUSE TRANSPLANT DISEASE CONTROL					
not classified (group NC)	<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ soil	—	Greenhouse use only. Suppression of root rot caused by <i>Pythium</i> spp., <i>Rhizoctonia</i> spp. and <i>Fusarium</i> spp. Suspend in sufficient water (e.g., 30–45 g/100L) to achieve uniform application and apply to potting mix, soil or planting beds. Agitate to maintain suspension. 4-hr restricted-entry interval.
DOWNY MILDEW					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Max	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only. Begin applications at the first sign of disease or when conditions favour disease development.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	
QoI/SDHI (group 11/7)	<i>pyraclostrobin/ boscalid</i>	Pristine WG	1.3 kg/ha (0.5 kg/acre)	7	Suppression only. Do not make sequential applications for downy mildew. See label for re-cropping restrictions. Maximum 6 applications/season. 3-day restricted-entry interval for thinning. For all other activities, re-entry permitted when residues are dry.
inorganic (M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L water/ha (190–380 L/acre)	1	May cause leaf spots during excessive moisture and cold. If concerned about sensitivity of plants, apply first to small areas. Maximum 15 applications/year. 4-hr restricted-entry interval.
BOTRYTIS LEAF BLIGHT					
SDHI (group 7)	fluxapyroxad	Sercadis	333–666 mL/ha (135–269 mL/acre)	7	Begin applications prior to onset of disease. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
anilino- pyrimidine/ phenylpyrrole (group 9/12)	cyprodinil/ fludioxonil	Switch 62.5 WG	775–975 g/ha (314–394 g/acre)	7	Begin applications when conditions favour disease development. See label for recropping restrictions. Maximum 3 applications/yr. 3-day restricted entry interval for hand weeding. 12-hr restricted-entry interval for all other activities.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–4.5 kg/ha (1.2–1.8 kg/acre)	0	Suppression only. Begin applications at the first sign of disease or when conditions favour disease development.
		Serenade Opti	1.7–2.5 kg/ha (0.68–1 kg/acre)	0	
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L water/ha (180–390 L/acre)	1	May cause leaf spots during excessive moisture and cold. If concerned about sensitivity of plants, apply first to small areas. Maximum 15 applications/year. 4-hr restricted-entry interval.
PURPLE BLOTCH					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Begin applications prior to onset of disease. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
anilino- pyrimidine/ phenylpyrrole (group 9/12)	cyprodinil/ fludioxonil	Switch 62.5 WG	775–975 g/ha (314–394 g/acre)	7	Suppression only. Begin applications when conditions favour disease development. See label for recropping restrictions. Maximum 3 applications/yr. 3-day restricted entry interval for hand weeding. 12-hr restricted-entry interval for all other activities.

Table 3–77. Fresh Chive Leaves Disease Control (page 106) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
STEMPHYLIUM LEAF BLIGHT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Suppression only. Begin applications prior to onset of disease. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.

Table 3–78. Fresh Chive Leaves Insect Control (page 107) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
THRIPS					
spinosyn (group 5)	spinosad	Success	218–262 mL/ha (88–106 mL/acre)	3	Suppression only. Apply when onion thrips first appear and at sufficient pressure and water volume to ensure spray solution penetrates the leaf axils. Use high rate when pressure is high. Maximum 3 applications/yr. Re-entry permitted when residues are dry.
		Entrust	437–527 mL/ha (177–213 mL/acre)		
LEEK MOTH					
spinosyn (group 5)	spinosad	Success	218–262 mL/ha (88–106 mL/acre)	3	Suppression only. Apply 1 week after peak pheromone trap capture. Use higher rates when pressure is high and/or insects are in advanced growth stages. Maximum 3 applications/yr. Re-entry permitted when residues are dry.
		Entrust	437–527 mL/ha (177–213 mL/acre)		
diamide (group 28)	chlorantraniliprole	Coragen	250–375 mL/ha (101–151 mL/acre)	1	Suppression only. Maximum 4 applications/season. 12-hr restricted-entry interval.
CUTWORMS					
diamide (group 28)	chlorantraniliprole	Coragen	250–375 mL/ha (101–151 mL/acre)	1	Maximum 4 applications/season. 12-hr restricted-entry interval.

Mint

Mint is not currently included in any crop group. Only use pest control products registered on mint directly.

Table 3–79. Mint Disease and Insect Control (page 107) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
flonicamid (group 9C)	flonicamid	Beleaf 50SG	120–160 g/ha (48–65 g/acre)	7	Peppermint and spearmint only. Apply early in infestation. Allow at least 14 days between applications. Maximum 3 applications/yr. 12-hr restricted-entry interval.
CABBAGE LOOPER					
diamide (group 28)	chlorantraniliprole	Coragen	250 mL/ha (101 mL/acre)	3	Maximum 4 applications/season. Allow at least 14 days between applications. 12-hr restricted-entry interval.

HORSERADISH

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide* 2014–2015.

Table 3–81. Horseradish Disease Control (page 109) — **Additions**

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Fusarium</i> spp. For in-furrow applications, spray in a narrow band with the spray directed at the seed and surrounding soil before covering the seed piece. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.
ALTERNARIA LEAF SPOT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Suppression only. Also controls powdery mildew. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.

Table 3–82. Horseradish Insect Control — Aphids, Flea Beetles (page 110) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
diamide (group 28)	cyantraniliprole	Exirel	500–1,500 mL/ha (202–607 mL/acre)	7	For optimum control of aphids, use a spray adjuvant as stated on Exirel label. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
FLEA BEETLES					
diamide (group 28)	cyantraniliprole	Exirel	500–1,000 mL/ha (202–405 mL/acre)	7	Foliar application. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Verimark	6.75–9 mL/100 m of row; or 750–1,000 mL/ha (304–405 mL/acre)	21	Early season damage reduction. Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticides for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–83. Horseradish Insect Control — Leaf-Eating Caterpillars, Cutworms, Swede midge, European Chafer Grubs, Cabbage Maggot (page 111) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–306 mL/acre)	7	Variegated Cutworm only. Not a pest of economic importance in Ontario. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
LEAF-EATING CATERPILLARS (IMPORTED CABBAGE WORM, CABBAGE LOOPER, DIAMONDBACK MOTH)					
diamide (group 28)	cyantraniliprole	Exirel	250–500 mL/ha (101–202 mL/acre)	7	Cabbage looper only. Not a pest of economic importance in Ontario. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
CABBAGE MAGGOT					
diamide (group 28)	cyantraniliprole	Verimark	10–15 mL/100 m of row	21	Apply as a narrow band in-furrow. Thorough coverage is important to obtain optimum control. Do not make a subsequent foliar application of any group 28 insecticides for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

LETTUCE AND ENDIVE

This information has been provided as a guideline only. See product labels for complete information. Listed products are not necessarily registered on head lettuce, leaf lettuce and/or endive. See the most up-to-date product label to ensure registration on a specific crop. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide* 2014–2015.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
lettuce, head and leaf	Table 3–86, page 114; Table 3–87, page 115	Remove Ranman 400SC, replace with Torrent 400SC.
lettuce, endive	Table 3–86, page 114	Remove Serenade ASO, replace with Serenade MAX.
lettuce, endive	Table 3–86, page 114	Replace Serenade MAX with Serenade Opti.
lettuce	Table 3–87, page 115	Replace Serenade MAX with Serenade Opti.
lettuce, head	Table 3–89, page 118; Table 3–93, page 121	Last date of use of endosulfan (Thionex 50W WSP) is 31 December, 2016.
lettuce	Table 3–90, page 119; Table 3–91, page 120	Remove Ripcord 400 EC, replace with Mako.
lettuce, head and leaf	Table 3–91, page 120; Table 3–93, page 122	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated in the applicable section below. Read the label for directions for use.
lettuce, head and leaf; endive	Table 3–89, page 118; Table 3–90, page 119; Table 3–92, page 121; Table 3–93, page 122	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of any group 28 insecticide.”

Table 3–86. Lettuce and Endive Disease Control — Damping-Off, Root Rots/Diseases, Botrytis Gray Mold, Lettuce Drop (page 114) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DAMPING-OFF, ROOT ROTS/DISEASES					
Field application					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Lettuce only. Suppression only. Damping-off caused by <i>Rhizoctonia solani</i> . Root rots caused by <i>Rhizoctonia solani</i> and <i>Pythium</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.
Greenhouse application					
Qil (group 21)	cyazofamid	Torrent 400SC	30 mL/100 L water	40	For use on greenhouse lettuce transplants for field production. Damping-off and root rot caused by <i>Pythium</i> spp. Make a single application as a soil drench to thoroughly wet the growing medium immediately after seeding. Do not use any surfactant with drench applications. 12-hr restricted-entry interval.
not classified (group NC)	<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ of loose planting mix, soil or planting beds	—	Head and leaf lettuce and endive. Suppression only. Root diseases caused by <i>Rhizoctonia</i> spp., <i>Pythium</i> spp. and <i>Fusarium</i> spp. Drench application to potting mix, soil or planting beds. 4-hr restricted-entry interval.
not classified (group NC)	<i>Gliocladium catenulatum</i> strain J1446	Prestop	Refer to label for rates and application instructions.	—	For lettuce greenhouse transplants only. Suppression only. Damping-off caused by <i>Rhizotonia</i> spp. and <i>Pythium</i> spp. Do not tank mix with any fungicides, insecticides, herbicides or adjuvants. Apply as a growing media or soil drench application.
BOTRYTIS GRAY MOLD					
Field application					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	1–3 kg/ha (0.4–1.2 kg/acre)	0	Lettuce and endive. Suppression only.
		Serenade Opti	0.6–1.7 kg/ha (0.2–0.7 kg/acre)	0	Lettuce and endive. Suppression only. Begin applications soon after emergence or transplant and continue as necessary on a 7–10 day interval.

Table 3–86. Lettuce and Endive Disease Control — Damping-Off, Root Rots/Diseases, Botrytis Gray Mold, Lettuce Drop (page 114) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LETTUCE DROP (SCLEROTINIA WHITE MOLD)					
SDHI (group 7)	sofetamid	Kenja 400SC	0.9 L/ha (0.36 L/acre)	14	Head and leaf lettuce only. On direct seeded lettuce make the first application after emergence, thinning or prior to onset of disease development. On transplanted lettuce make the first application immediately after transplanting or prior to the onset of disease development. Make a second application 14 days later if conditions continue to favour disease development. Do not make more than 2 sequential applications of Group 7 containing fungicides before rotating to a fungicide with a different mode of action. See label for recropping restrictions. Maximum 2 applications/yr. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	1	Head and leaf lettuce and endive. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	0.6–1.7 kg/ha (0.2–0.7 kg/acre)	0	Lettuce and endive. Suppression only. See label for application instructions.
	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	1–2.5 kg/ha (0.4–1 kg/acre); or, 0.2–1 kg/ha (0.08–0.4 kg/acre)	0	Suppression only. Foliar application to head and leaf lettuce. See label for details on choosing rate. Apply from plant emergence to maturity or head formation. Repeat applications every 3–10 days as long as conditions favour disease development. Re-entry permitted once spray deposit has dried.
			0.2–0.5 kg/ha (0.08–0.2 kg/acre)	0	Suppression only. Soil application to head and leaf lettuce. See label for application instructions and timing. Re-entry permitted once spray deposit has dried.

Table 3–87. Lettuce and Endive Disease Control — Downy Mildew (page 115) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DOWNY MILDEW					
Qil (group 21)	cyazofamid	Torrent 400SC	200 mL/ha (81 mL/acre)	0	Head and leaf lettuce only. Suppression only. Make first application after seeding/transplanting and the second application when disease appears or when conditions are conducive for disease development. Tank-mix with non-ionic or organosilicone surfactant, as per label instructions. See label for recropping restrictions. Maximum 6 applications/crop/yr. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Lettuce only. Suppression only. Begin applications at first sign of disease or when conditions become conducive for disease development. Repeat on a 7–10 day interval.
	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	1–2.5 kg/ha (0.4–1 kg/acre)	0	Suppression only. Begin preventive applications when conditions favour disease onset. Repeat every 7–10 days as long as conditions favour disease development. Re-entry permitted once spray deposit has dried.

Table 3–89. Lettuce and Endive Insect Control — Aphids (page 117) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
At-Planting Treatments					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Head and leaf lettuce and endive (escarole). Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–90. Lettuce and Endive Insect Control — Cutworms, Tarnished Plant Bug (page 119) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	21	Lettuce only. Do not graze treated crops. Do not disturb soil surface for 5 days after application.

Table 3–91. Lettuce and Endive Insect Control — Leafhoppers (page 120) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFHOPPERS					
organophosphate (group 1B)	malathion	Malathion 85E	735–1,345 mL/ha (297–544 mL/acre)	14	Leaf lettuce only. Aster leafhoppers. Maximum 1 application/yr. 1-day restricted-entry interval.
				3	Head lettuce only. Aster leafhoppers. Maximum 1 application/yr. 1-day restricted-entry interval.
pyrethroid (group 3A)	cypermethrin	Mako	125 mL/ha (51 mL/acre)	14	Lettuce only. Aster leafhoppers. Do not graze treated crops. Maximum 4 applications/season.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Head and leaf lettuce and endive (escarole). Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–92. Lettuce and Endive Insect Control — Leafminers (page 121) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFMINERS					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Head and leaf lettuce and endive (escarole). Dipteran leafminers. Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–93. Lettuce and Endive Insect Control — Cabbage Looper, Brown Marmorated Stink Bug (page 122) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CABBAGE LOOPER					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Head and leaf lettuce and endive (escarole). Early-season control. Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
BROWN MARMORATED STINK BUG See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,345 mL/ha (544 mL/acre)	14	Suppression only. Leaf lettuce only. Maximum 1 application/yr. 1-day restricted-entry interval.
				3	Suppression only. Head lettuce only. Maximum 1 application/yr. 1-day restricted-entry interval.

ONIONS, LEEKS AND SHALLOTS

Pest control products listed in these tables are not necessarily registered on all allium crops. This information is provided as a guideline only. See product labels for complete information. See the most up-to-date product label to ensure registration on a specific crop. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
onion, bulb; onion, green	Table 3–96, page 125	Remove Bravo 500, replace with Bravo ZN.
onions (all types), leeks, shallot	Table 3–96, page 125; Table 3–97, page 126	Replace Serenade MAX with Serenade Opti.
onions	Table 3–101, page 130; Table 3–102, page 131; Table 3–103, page 133	Remove Ripcord 400 EC, replace with Mako.
onion, bulb; pearl onion, shallot	Table 3–102, page 131	Remove Agri-mek 1.9%EC, replace with Agri-mek SC.
onions	—	Last date of use of Diazinon 5G (PCP# 12538, granular formulation) was 31 August, 2015. Soil drench applications with liquid diazinon formulations are permissible as per label instructions. Last date of use of diazinon is 31 December, 2016.

Table 3–94. Onion, Leek and Shallot Seed Treatments (page 123) — Additions

LEGEND: RP = registered pest

— = not registered for control of this pest or activity on this pest has not been documented.

Active Ingredient	Trade Name	Rate	Insects and Diseases			Notes
			Onion Maggot	Damping-Off	Onion Smut	
<i>Streptomyces</i> Strain K61	Mycostop	8 g/1 kg of seed	—	RP	—	Suppression of Fusarium damping-off. See label for application instructions.

Table 3–96. Onion, Leek and Shallot Disease Control — Botrytis Leaf Blight (page 125) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BOTRYTIS LEAF BLIGHT					
SDHI (group 7)	fluxapyroxad	Sercadis	333–666 mL/ha (135–259 mL/acre)	7	Bulb onion, green onion, leek and shallot. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
phenylpyrrole/ anilino- pyrimidine (group 9/12)	cyprodinil/ fludioxonil	Switch 62.5 WG	775–975 g/ha (314–394 g/acre)	7	Bulb onion, green onion, leek and shallot. Begin applications when conditions become favourable for disease but before infection. See label for recropping restrictions. Maximum 3 applications/yr. 3-day restricted entry interval for hand weeding. 12-hr restricted-entry interval for all other activities.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.7–2.5 kg/ha (0.7–1 kg/acre)	0	Suppression only. Onions (all types), leeks and shallots. Also suppresses botrytis neck rot (<i>Botrytis allii</i>). Begin applications at first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10 day interval.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Onion, leek and shallot. Field experience with this product in Ontario is limited. Re-apply using 5–10 day intervals. Maximum 15 application/yr. 4-hr restricted-entry interval.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	2.4–4.8 L/ha (1–1.9 L/acre)	7	Bulb onion only. Maximum 3 applications/yr. 48-hr restricted-entry interval.
			2.4–4.8 L/ha (1–1.9 L/acre)	14	Green onion only. Maximum 5 applications/yr. 48-hr restricted-entry interval.

Table 3–97. Onion, Leek and Shallot Disease Control — Downy Mildew (page 126) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DOWNY MILDEW					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L per hectare (190–380 L/acre)	1	Onion, leek and shallot. Re-apply using 5–10 day intervals. Maximum 15 application/yr. 4-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only. Onions (all types), leeks and shallots. Begin applications at first sign of disease, or when conditions become conducive for disease development. Repeat as necessary on a 7–10 day interval.

Table 3–98. Onion, Leek and Shallot Disease Control — Purple Blotch (page 127) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
PURPLE BLOTCH					
SDHI (group 7)	penthiopyrad	Fontelis	1.25–1.75 L/ha (0.5–0.7 L/acre)	3	Bulb onions, green onions, leeks and shallots. Also suppresses botrytis fleck caused by <i>Botrytis cinerea</i> ¹ . Use higher rate and shorter interval when disease pressure is high. See label for rotational crop restrictions. Do not apply more than 5.25 L/ha/season (2.1 L/acre/season). 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Bulb onion, green onion, leek and shallot. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
phenylpyrrole/ anilino- pyrimidine (group 9/12)	cyprodinil/ fludioxonil	Switch 62.5 WG	775–975 g/ha (314–394 g/acre)	7	Suppression only. Bulb onion, green onion, leek and shallot. Begin applications when conditions become favourable for disease but before infection. See label for recropping restrictions. Maximum 3 applications/yr. 3-day restricted-entry interval for hand weeding. 12-hr restricted-entry interval for all other activities.

¹ Botrytis fleck is caused by *Botrytis cinerea*, which is different from botrytis leaf blight (*Botrytis squamosa*).

Table 3–99. Onion, Leek and Shallot Disease Control — Stemphylium Leaf Blight, Allium White Rot, Smut, Root Rots/Diseases, Pink Root and Soft Rot (page 128) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS/DISEASES					
Greenhouse transplants					
not classified (group NC)	<i>Trichoderma harzianum</i>	RootShield HC	55–110 g/m ³ of loose planting mix, soil or planting beds	—	Bulb onions, green onions, leeks and shallots. Suppression only. Root diseases caused by <i>Rhizoctonia</i> spp., <i>Pythium</i> spp. and <i>Fusarium</i> spp. Drench application to potting mix, soil or planting beds. 4-hr restricted-entry interval for greenhouse applications.
Field application					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Onion, leek and shallot. Suppression only. Root rots caused by <i>Rhizoctonia solani</i> and <i>Pythium</i> spp. Also suppresses damping-off caused by <i>Rhizoctonia solani</i> . May be applied at planting and/or post-planting. See label for application instructions.
STEMPHYLIUM LEAF BLIGHT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Suppression only. Bulb onion, green onion, leek and shallot. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
PINK ROOT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Onion, leek and shallot. Suppression only. May be applied at planting and/or post-planting. See label for application instructions.
SOFT ROT					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Onion, leek and shallot. Re-apply using 5-10 day intervals. Rotate with products with a different mode of action when available. Maximum 15 application/yr. 4-hr restricted-entry interval.

Table 3–101. Onion, Leek and Shallot Insect Control — Onion Maggot (page 130) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ONION MAGGOT					
Foliar Sprays for Onion Maggot Flies					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	3	Onions only. Do not graze treated crops. Maximum 3 applications/season.

Table 3–102. Onion, Leek and Shallot Insect Control — Thrips (page 131) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
THRIPS					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	3	Onions only. Do not graze treated crops. Maximum 3 applications/season.
spinosyn (group 5)	spinosad	Entrust	437–527 mL/ha (177–213 mL/acre)	3	Dry bulb onions, green onions, leeks and shallots. Suppression of onion thrips only. Apply according to monitoring (when onion thrips first appear or threshold of 1 thrips/leaf for dry bulb onions) at sufficient pressure and water volume to ensure spray solution penetrates into the leaf axils. Use high rate when pest pressure is high and/or insects are in advanced growth stages. Maximum 3 applications/yr. Re-entry permitted once spray deposit has dried.
avermectin (group 6)	abamectin	Agri-mek SC ¹	135–270 mL/ha (55–109 mL/acre)	30	Bulb onion, pearl onion and shallot only. Apply when onion thrips are at a threshold of 1 thrips/leaf for dry bulb onions. Non-ionic, spreading and penetrating surfactants used at a rate of 0.25–0.5% v/v may improve control. Do not use binder or sticker-type surfactants. Follow surfactant label carefully and test a small number of plants before treating a large area. ¹ Maximum 3 applications/season. 12-hr restricted-entry interval.

¹ This product has been tested in combination with a non-ionic surfactant for safety to some varieties of bulb onions; however, testing has not been conducted on all crops and varieties in the bulb onion sub-group under the range of conditions that may cause crop injury.

Table 3–103. Onion, Leek and Shallot Insect Control — Leek Moth, Cutworms (page 133) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEEK MOTH					
spinosyn (group 5)	spinosad	Entrust	437–527 mL/ha (177–213 mL/acre)	3	Dry bulb onions, green onions, leeks and shallots. Suppression only. Apply 1 week after peak pheromone trap capture. Use higher rates when pest pressure is high and/or insects are in advanced growth stages. Maximum 3 applications/yr. Re-entry permitted once spray deposit has dried.
diamide (group 28)	chlorantraniliprole	Coragen	250–375 mL/ha (101–152 mL/acre)	1	Green onion and leek only. Suppression only. Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Maximum 4 applications/season. 12-hr restricted-entry interval.
CUTWORMS					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	21	Onions only. Do not graze treated crops. Do not disturb soil surface for 5 days after application.
diamide (group 28)	chlorantraniliprole	Coragen	250–375 mL/ha (101–152 mL/acre)	1	Green onion and leek only. Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Maximum 4 applications/season. 12-hr restricted-entry interval.

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
parsnips	Table 3–106, page 135	Remove Bravo 500, replace with Bravo ZN.
parsnips	not applicable	Last date of use of Diazinon 5G (PCP# 12538, granular formulation) was 31 August, 2015. From 31 December, 2014 to 31 December, 2016, soil drench applications with diazinon liquid formulations are permitted as per label instructions. Last date of use of diazinon is 31 December, 2016.
parsnips	Table 3–108, page 136	Malathion 85E label was updated 15 April 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–106. Parsnip Disease Control (page 135) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Fusarium</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.
PHOMA CANKER					
chloronitrile (group M5)	chlorothalonil	Bravo ZN	2.8 L/ha (1.1 L/acre)	7	Foliar application. Maximum 7 applications/yr. 48-hr restricted-entry interval.
BOTRYTIS GRAY MOLD					
SDHI (group 7)	penthiopyrad	Fontelis	1–1.75 L/ha (0.4–0.7 L/acre)	0	Also controls powdery mildew. Use higher rates and shorter spray interval when disease pressure is high. See label for rotational crop restrictions. Apply no more than 4.5 L/ha/season (1.8 L/acre/season). 12-hr restricted-entry interval.
ALTERNARIA LEAF BLIGHT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Foliar application. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.

Table 3–108. Parsnip Insect Control — Carrot Rust Fly, Aphids (page 136) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	7	Control of aphids with malathion has been inconsistent in many areas. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 1-day restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–1,500 mL/ha (202–607 mL/acre)	7	For optimum control of aphids, use a spray adjuvant as stated on Exirel label. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.

Table 3–109. Parsnip Insect Control — Leafhoppers, Cutworms, European Chafer Grubs, Flea Beetles (page 137) Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	7	Variegated cutworm. Not a pest of economic importance in Ontario. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
FLEA BEETLES					
diamide (group 28)	cyantraniliprole	Verimark	6.75–9 mL/100 m of row; or 750–1,000 mL/ha (304–405 mL/acre)	21	Early season damage reduction. Apply as a narrow band in-furrow. See label for rotational crop restrictions. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. Maximum 1 application/season. 12-hr restricted-entry interval.
		Exirel	500–1,000 mL/ha (202–405 mL/acre)	7	See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. Maximum 4 applications/season. 12-hr restricted-entry interval.

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
peas	Table 3–110, page 138	Remove Agrox B-2 (diazinon/captan). Registration expired 31 December, 2014.
		Remove Agrox CD (diazinon/captan). Registration expired 31 December, 2014.
peas	Table 3–113, page 141	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–112. Pea Disease Control (page 140) — Additions

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Fusarium</i> spp. See label for in-furrow application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs, if required.
ASCOCHYTA (MYCOSPHAERELLA) BLIGHT					
QoI (group 11)	azoxystrobin	Quadris	500 mL/ha (202 mL/acre)	15	See label for recropping restrictions. 12-hr restricted-entry interval.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	4-hr restricted-entry interval.

Table 3–112. Pea Disease Control (page 140) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
WHITE MOLD (SCLEROTINIA), POWDERY MILDEW					
Qol (group 11)	azoxystrobin	Quadris	500 mL/ha (202 mL/acre)	15	Powdery Mildew. See label for recropping restrictions. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	White mold. Suppression only. Make the first application at planting (or immediately following planting but prior to crop emergence). Repeat applications on 7–14-day intervals if conditions for disease development persist.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	White mold. Suppression only. Make the first application at planting (or immediately following planting but prior to crop emergence). Repeat applications on 7–14-day intervals if conditions for disease development persist.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Powdery mildew. 4-hr restricted-entry interval.

Table 3–113. Pea Insect Control (page 141) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	24-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	750–1,500 mL/ha (304–607 mL/acre)	1	Soybean aphid. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. 12-hr restricted-entry interval.
WESTERN BEAN CUTWORM					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	24-hr restricted-entry interval.
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	1	See label for tank-mix directions, crop tolerance information and rotational crop restrictions. 12-hr restricted-entry interval.
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,100 mL/ha (445 mL/acre)	3	Suppression only. 1-day restricted-entry interval.

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
pepper	Table 3–114, page 143	Remove Ranman 400SC.
pepper	Table 3–116, page 145	Kasumin 2L rate should specify: 100 ppm using sufficient volume to provide good coverage of treated foliage. Do not apply more than 1.2 L/ha (0.5 L/acre) of product or 240 L/ha (97 L/acre) carrier volume per application.
pepper	Table 3–116, page 145; Table 3–117, page 146	Remove Serenade ASO, replace with Serenade MAX.
pepper	Table 3–116, page 145; Table 3–117, page 146	Replace Serenade MAX with Serenade Opti.
pepper	Table 3–119, page 149 Table 3–121, page 151	Last date of use of endosulfan (Thionex 50W WSP, Thionex EC) on peppers is 31 December, 2016.
pepper	Table 3–122, page 152	Malathion 85E label was updated 15 April, 2014, including updated restricted entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.
pepper	Table 3–119, page 149; Table 3–120, page 150	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of any Group 28 insecticide.”

Table 3–114. Pepper Transplant Production Disease and Insect Control (Greenhouse) (page 143) — Additions

Group Name (Group #)	Common Name	Trade Name	Rate	Notes
Soil Treatments				
Qil (group 21)	cyazofamid	Torrent 400SC	30 mL in 100 L of water	Pythium damping-off and root rot. Apply as a soil drench to thoroughly wet the growing medium immediately after seeding. 60-day PHI. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	25–250 g/100 L of water	Partial suppression only. For <i>Phytophthora capsici</i> in soil. Make preventative applications to transplants in the greenhouse before transplanting. See product label for application instructions. Follow up applications of 0.1–0.5 kg/ha (40–202 g/acre) can be made at 2–4 week intervals after transplanting. Re-entry permitted once spray deposit has dried.
not classified (group NC)	<i>Streptomyces</i> Strain K61	Mycostop	Refer to label for rates and application instructions.	Suppression only. Fusarium, Phytophthora. Drench or soil spray application after seedling emergence. Apply first spray after emergence using lower rate.
not classified (group NC)	<i>Gliocladium catenulatum</i> Strain J1446	Prestop	Refer to label for rates and application instructions.	Suppression only. Pythium spp., Rhizoctonia solani. Do not tank-mix with any fungicides, insecticides, herbicides or adjuvants.
Foliar Treatments				
not classified (group NC)	<i>Gliocladium catenulatum</i> Strain J1446	Prestop	Refer to label for rates and application instructions.	Suppression only. Botrytis stem canker. Do not tank-mix with any fungicides, insecticides, herbicides or adjuvants.

Table 3–116. Pepper Disease Control — Bacterial Spot, Alternaria, Anthracnose (page 145) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BACTERIAL SPOT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	1–3 kg/ha (0.4–1.2 kg/acre)	0	Suppression only. Begin applications soon after transplant. Repeat as necessary on a 7–10-day interval. When conditions are conducive to rapid disease development, use in a rotational program with other bactericides.
		Serenade Opti	0.6–1.7 kg/ha (0.24–0.69 kg/ha)	0	Suppression only.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L of solution/ha (190–380 L/acre)	1	4-hr restricted-entry interval.
ALTERNARIA, ANTHRACNOSE					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	1	Alternaria, anthracnose. See label for recropping restrictions. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	167–333 mL/ha (68–135 mL/acre)	7	Alternaria. Use high rate to target black mold (<i>Alternaria alternata</i>) of ripe fruit. Follow label instructions regarding use of a non-ionic surfactant. See label for rotational crop restrictions. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.5–2 kg/ha (0.2–0.8 kg/acre)	0	Alternaria. Suppression only. See label for details on choosing a rate. Re-entry permitted once spray deposit has dried.
	<i>Bacillus subtilis</i>	Serenade MAX	4.5 kg/ha (1.8 kg/acre)	0	Alternaria. Suppression only.
		Serenade Opti	2.5 kg/ha (1 kg/acre)	0	Alternaria. Suppression only.

Table 3–117. Pepper Disease Control — Botrytis Gray Mold, Phytophthora Blight, Powdery Mildew (page 146) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BOTRYTIS GRAY MOLD					
microbial (group 44)	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.9–1 kg/ha; or 1.25–3.6 kg/ha (0.39–0.4 kg/ac; or 0.5–1.46 kg/ac)	0	Suppression only. Re-entry permitted once spray deposit has dried. See label for details on choosing a rate.
	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only.
not classified	<i>Trichoderma harzianum</i>	RootShield HC	3.75–7.5 g/L water	—	Suppression only. Spray to wet, but avoid runoff.
PHYTOPHTHORA BLIGHT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Soil application. See label for application instructions.
POWDERY MILDEW					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	1	See label for recropping restrictions. 12-hr re-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only.
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.
aryl-phenyl- ketone (group U8)	metrafenone	Vivando SC	0.75–1.12 L/ha (0.3–0.45 L/acre)	7	See label for re-cropping restrictions. 12-hr restricted-entry interval.

Table 3–119. Pepper Insect Control — Aphids (page 148) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
Soil Treatment					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplanting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–120. Pepper Insect Control — Cutworms, European Corn Borer (page 150) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
organophosphate (group 1B)	chlorpyrifos	Pyrinex 480 EC	1.2–2.4 L/ha (0.5–1 L/acre)	40	Green pepper only. See label for re-cropping restrictions. 24-hr restricted-entry interval.
			2.4 L/ha (1 L/acre)		Green pepper only. Apply as a soil treatment 3–7 days before transplanting. See label for re-cropping restrictions. 24-hr restricted-entry interval.
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	For black cutworm. Apply to foliage when rain is not expected in the next 24 hrs. Do not apply Voliam Xpress following a soil application of any group 28 insecticide. 24-hr restricted-entry interval.
EUROPEAN CORN BORER					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Do not apply Voliam Xpress following a soil application of any group 28 insecticide. 24-hr restricted-entry interval.

Table 3–121. Pepper Insect Control — Mites, Pepper Maggot, Pepper Weevil (page 151) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
MITES					
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.

Table 3–122. Pepper Insect Control — Stink Bug, Brown Marmorated Stink Bug, Tarnished Plant Bug (page 152) Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,345 mL/ha (544 mL/acre)	3	Suppression only. Maximum 4 applications/yr. 12-hr restricted-entry interval.

POTATOES

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
potato	Table 3–124, page 156	Quadris Flowable: Pre-harvest interval (PHI) changed from 90 days to no PHI because it is an at-planting treatment.
potato	Table 3–124, page 157	Serenade ASO name changed to Serenade SOIL. Serenade SOIL may be acceptable for organic growers. Check with your certification body.
potato	Table 3–125, page 158	Remove Bravo 500, from the Broad Spectrum Protectant Fungicides, replace with Bravo ZN. Updated pre-harvest interval.
potato	Table 3–127, page 161	In notes for Tattoo C, add for aerial applications, “apply Tattoo C Suspension Concentrate Fungicide in 45 L of water/ha (18 L water/acre).”
potato	Table 3–128, page 164; Table 3–129, page 165; Table 3–130, page 166	Remove Ripcord 400 EC, replace with Mako.
potato	Table 3–129, page 165	Last date of use of endosulfan (Thionex 50W WSP) on potatoes is 31 December, 2016.
potato	Table 3–128, page 164	In Notes for Exirel for Colorado potato beetle, remove the “Do not apply a foliar cyantraniliprole application following a soil or seed treatment application of a group 28 insecticide.” statement and replace with “Do not apply Exirel for Colorado potato beetle control if any Group 28 insecticide was used at planting as an in-furrow, soil or seed-piece treatment.”
potato	Table 3–130, page 166; Table 3–131, page 167; Table 3–132, page 168	In Notes for Exirel, remove the “Do not apply a foliar cyantraniliprole application following a soil or seed treatment application of a Group 28 insecticide.” statement and replace with “Do not make a foliar application of Exirel for a minimum of 60 days following an in-furrow or soil application or planting of seed pieces treated with any group 28 insecticide.”
potato	Table 3–130, page 166	Phase-out schedule for Thimet 15-G (phorate): Last date of sale of Thimet 15-G by registrant was 31 December, 2014. Last date of sale of Thimet 15-G by retailers and distributors was 1 May, 2015. Last date of use of Thimet 15-G by growers & users was 1 August, 2015.
potato	Table 3–132, page 168	Remove Agri-mek 1.9% EC, replace with Agri-mek SC. See label for rates and application instructions.

Table 3–123. Potato Seed Treatments (page 154–155) — **Additions**

Group Name (Group #)	Common Name	Trade Name	Rate	Diseases or Insects Controlled
Fungicides				
QoI (group 11)	fenamidone	Reason 500SC	10 mL/100 kg of seed	Seed-borne late blight.
Insecticide + Fungicide				
neonicotinoid (group 4A) + DMI/ phenylpyrroles (group 3/12)	thiamethoxam + difenoconazole/ fludioxonil	Cruiser Maxx Potato Extreme	20 mL/100 kg seed	Insects — Colorado potato beetle, aphids, potato leafhopper Diseases — Stem and stolon canker (<i>Rhizoctonia solani</i>), fusarium dry rot, silver scurf (<i>Helminthosporium solani</i>). Suppression of black scurf. Do not apply foliar group 4 insecticides (neonicotinoid) in the same season as an in-furrow or soil application.

Table 3–124. Potato Disease Control — Pythium Leak, Pink Rot, Rhizoctonia, Silver Scurf, Fusarium Dry Rot, White Mold (page 156–157) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); N/A = not applicable; — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
PYTHIUM LEAK, PINK ROT, RHIZOCTONIA, SILVER SCURF, FUSARIUM DRY ROT					
In-Furrow					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only of Rhizoctonia black scurf and stem canker, pink rot, Pythium leak and Fusarium dry rot. For in-furrow applications, spray in a narrow band with the spray directed at the seed and surrounding soil before covering the seed or seed piece. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs. Serenade SOIL may be acceptable for organic growers. Check with your certification body.
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	—	Suppression of Rhizoctonia stem canker, stolon canker and black scurf. Apply at planting to the furrow in 50–150 L of water/ha (20–61 L of water/acre). See label for rotational crop restrictions. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	333 mL/ha (135 mL/acre). See label for rate/1000 m of row.	7	Control of Rhizoctonia canker. In-furrow application. The spray pattern should be a 10–20 cm (4–8 inch) band that is applied to the seed piece prior to being covered with soil. Use a minimum volume of 50 L of water/ha (20 L of water/acre). See label for rotational crop restrictions. 12-hr restricted-entry interval.
Post-Harvest					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	7–14 g/tonne of potatoes	0	Silver scurf only. For post-harvest application to aid in the control of silver scurf. Sanitation and other cultural practices should also be employed to aid in control and minimize the potential for disease. See product label for details.
		Serenade SOIL	85–175 mL/tonne of potatoes	N/A	Aids in the control of silver scurf only. See product label for details.

Table 3–124. Potato Disease Control — Pythium Leak, Pink Rot, Rhizoctonia, Silver Scurf, Fusarium Dry Rot, White Mold (page 156–157) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); N/A = not applicable; — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
WHITE MOLD					
QoI/DMI (group 11/3)	azoxystrobin/ difenoconazole	Quadris Top	1 L/ha (0.4 L/acre)	14	Suppression only. Do not apply sequential applications of any QoI fungicide or of any tank mix containing a QoI fungicide. Rotate with fungicides with a different mode of action. See label for re-cropping restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
SDHI (group 7)	fluxapyroxad	Sercadis	333 mL/ha (135 mL/acre)	7	Follow label instructions regarding use of a non-ionic surfactant. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.1–2.2 kg/ha (0.45–0.9 kg/acre)	0	Suppression only. Begin application soon after emergence and when conditions are conducive to disease development. Repeat applications on a 7–10 day interval.
	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.2–2.5 kg/ha (0.08–1 kg/acre)	0	Suppression only. Begin preventive applications when conditions favour disease onset. See label for details on choosing rate. Repeat every 3–10 days as long as conditions favour disease development. Re-entry permitted once spray deposit has dried.

Table 3–125. Potato — Broad Spectrum Protectant Fungicides (page 158) — **Additions**

Start spraying prior to row closure. For resistance management, rotate between fungicides from different chemical groups.

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
chloronitrile (group M5)	chlorothalonil	Bravo ZN	1.2–2.4 L/ha (0.5–0.97 L/acre)	2	Late blight control. Use high rate under severe disease pressure. Use higher rates as the crop canopy closes. 48-hr restricted-entry interval.
			1.6–2.4 L/ha (0.64–0.97 L/acre)	2	Early blight, botrytis vine rot control.

Table 3–126. Potato — Early Blight and Late Blight Protectant Fungicides (page 159–160) — **Additions**

Begin applications prior to disease development.

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
EARLY BLIGHT ONLY					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	2–4 kg/ha (0.8–1.6 kg/acre)	0	Suppression only. At the same rate, it will suppress white mold. Begin applications soon after emergence and when conditions are conducive to disease development.
		Serenade Opti	1.1–2.2 kg/ha (0.45–0.9 kg/acre)	0	Suppression only. Begin application soon after emergence and when conditions are conducive to disease development. Repeat applications on a 7–10 day interval.
	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.5–2 kg/ha (0.2–0.8 kg/acre)	0	Suppression only. Begin applications just before row closure. Repeat application every 3–10 days as long as conditions favour disease development. Re-entry permitted once spray deposit has dried.
SDHI (group 7)	fluxapyroxad	Sercadis	167–333 mL/ha (68–135 mL/acre)	7	Ground and aerial applications. Follow label instructions regarding use of a non-ionic surfactant. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
EARLY AND LATE BLIGHT					
benzamide/ dithiocarbamate (group 22/M3)	zoxamide/ mancozeb	Gavel 75DF	1.7–2.25 kg/ha (0.7–0.9 kg/acre)	3	Use higher rates under severe disease pressure. Maximum 6 applications/yr. Plant-back restrictions apply, see label for details. 48-hr re-entry interval.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied at 470–940 L/ha (190–380 L/acre)	1	Re-apply using 5–10 day intervals. Maximum 15 applications/yr. 4-hr restricted-entry interval.

Table 3–127. Potato — Late Blight Targeted Protectant Fungicides (page 161–162) — **Additions**

Begin applications when weather conditions favour late blight or if late blight is identified in the local area.

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
carbamate/ chloronitrile (group 28/M5)	propamocarb/ chlorothalonil	Tattoo C	2.7 L/ha (1.1 L/acre) For aerial application, apply in 45 L of water/ha (18 L water/acre)	7	Begin applications when conditions are favourable for disease, but before infection, and continue on 7–14-day intervals until the threat of disease is over. Maximum 3 applications/yr. 48-hr restricted-entry interval.
phosphonate (group 33)	mono- and dipotassium salts of phosphorous acid	Rampart	3–8 L in 1000 L of water/ha (1.2–3.2 L in 405 L water/acre)	—	Suppression only. Will also suppress pink rot. Use higher rate when disease pressure is moderate to high. Do not apply at less than 3-day intervals. Do not apply to plants that are dormant or heat or moisture stressed. Maximum 5 application/season. 4-hr restricted-entry interval.

Table 3–128. Potato Insect Control — Colorado Potato Beetle (page 163–164) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
COLORADO POTATO BEETLE					
In-Furrow					
neonicotinoid (group 4A)	imidacloprid	Alias 240 SC	7.5–12 mL/100 m of row; or 0.85–1.3 L/ha (0.34–0.5 L/acre) (based on 90 cm row spacing)	—	Control of Colorado potato beetle. Apply as a narrow band in-furrow. For best results, direct spray on the seed pieces or seed potatoes in the furrow. Do not apply a foliar neonicotinoid spray in fields where a neonicotinoid was used either in-furrow or as a seed treatment.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	440–700 g/ha (178–283 g/acre)	—	Control of Colorado potato beetle. In-furrow application at the seeding depth, or a narrow surface band above the seed during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. 12-hr restricted-entry interval.
Foliar Sprays					
neonicotinoid (group 4A)	imidacloprid	Alias 240 SC	200 mL/ha (81 mL/acre)	7	Do not apply a foliar neonicotinoid spray in fields where a neonicotinoid was used either in-furrow or as a seed treatment. Maximum 2 foliar applications/season. 24-hr restricted-entry interval.
sulfoxaflor/ spinosyn (group 4C/5)	sulfoxaflor/ spinetoram	TwinGuard	200–300 g/ha (81–121 g/acre)	7	Control of small larvae of the Colorado potato beetle. Do not apply this product during crop flowering period or when flowering weeds are present in the treatment areas. Apply early in the morning or late in the evening when bees are not active. Maximum 2 applications/season. Do not apply by air. 12-hr restricted-entry interval or re-entry permitted once spray deposit has dried.
pyrethroid (group 3A)	cypermethrin	Mako	62.5–125 mL/ha (25–50 mL/acre)	7	Apply when insects or signs of insect feeding appear. Repeat at 10–12 day intervals if needed. Use the high rate for severe infestations.

Table 3–129. Potato Insect Control — Potato Leafhopper, Flea Beetle, Tarnished Plant Bug (page 165) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
POTATO LEAFHOPPER, FLEA BEETLE, TARNISHED PLANT BUG					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	440–700 g/ha (178–283 g/acre)	—	Control of potato leafhopper. Early-season suppression of flea beetles. In-furrow application at the seeding depth, or a narrow surface band above the seed during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. 12-hr restricted-entry interval.
pyrethroid (group 3A)	cypermethrin	Mako	62.5–125 mL/ha (25–50 mL/acre)	7	Use high rate on tarnished plant bug.
spinosyn (group 5)	spinosad	Entrust	334 mL/ha (135 mL/acre)	7	Suppression of tuber flea beetle. Apply in sufficient water to ensure complete coverage of foliage. For crawling samples (overwintered tuber flea beetles), apply when one adult beetle is seen per field edge. For sweep net samples (second and third generation tuber flea beetles), apply when eight adult beetles are seen per field edge. Maximum seasonal rate of 500 mL/ha (202 mL/acre). 12-hr restricted-entry interval.

Table 3–130. Potato Insect Control — Late-Season Cutworms, Spider Mites, Wireworms, European Chafer Grubs (page 166) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
WIREWORMS					
organophosphate (group 1B)	chlorpyrifos	Pyrinex 480 EC	21.6 mL in 5 L water/100 m of row; or 2.4 L/ha (1 L/acre) ¹	70	Caution: No Pyrinex residue is allowed on potatoes exported to the U.S.A. Apply in-furrow at planting. Efficacy of wireworm insecticides depends on the wireworm species infesting the soil. The species of wireworms found in Ontario might not be susceptible to Pyrinex. 24-hr restricted-entry interval.
CUTWORMS					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	21	Do not disturb soil surface for 5 days after application.
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Black cutworm and Variegated cutworm. For black cutworm, apply when rain is not expected in next 24 hours. For optimum control, apply to smaller plants or when lower portions of the plant can receive adequate coverage. Do not apply Voliam Xpress following a seed piece, in-furrow, or soil application of any Group 28 insecticide. Maximum 2 applications/yr. 24-hr restricted-entry interval.
SPIDERMITES					
avermectin (group 6)	abamectin	Agri-mek SC	225 mL/ha (91 mL/acre)	14	Spider mites are a potential pest in Ontario. Apply when spider mites first appear. Apply with a non-ionic surfactant at 0.1%–0.5% v/v, as per label instructions. Maximum 2 applications/yr. 12-hr restricted-entry interval.

¹ Row spacing: 90-cm (36-in.)

Table 3–131. Potato Insect Control — European Corn Borer, Cabbage Looper, Armyworms, Tomato Hornworm (page 167) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
EUROPEAN CORN BORER					
sulfoxaflor/ spinosyn (group 4C/5)	sulfoxaflor/ spinetoram	TwinGuard	200 g/ha (81 g/acre)	7	Control of small larvae of the European Corn Borer (ECB). Monitor egg laying and egg hatch to determine application timing. Time the application to coincide with peak egg hatch. Do not apply this product during crop flowering period or when flowering weeds are present in the treatment areas. Apply early in the morning or late in the evening when bees are not active. Maximum 2 applications/season. Do not apply by air. 12-hr restricted-entry interval or re-entry permitted once spray deposit has dried.
CABBAGE LOOPER					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Not a pest in Ontario. Do not apply Voliam Xpress following a seed piece, in-furrow, or soil application of any Group 28 insecticide. Maximum 2 applications/yr. 24-hr restricted-entry interval.
spinosyn (group 5)	spinosad	Entrust	334 mL/ha (135 mL/acre)	7	Not a pest in Ontario. Apply in sufficient water to ensure complete coverage of foliage. Maximum seasonal rate of 500 mL/ha (202 mL/acre). 12-hr restricted-entry interval.
ARMYWORMS					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Fall armyworm and Beet armyworm control. Do not apply Voliam Xpress, following a seed piece, in-furrow, or soil application of any Group 28 insecticide. Maximum 2 applications/yr. 24-hr restricted-entry interval.
TOMATO HORNWORM					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Do not apply Voliam Xpress following a seed piece, in-furrow, or soil application of any Group 28 insecticide. Maximum 2 applications/yr. 24-hr restricted-entry interval.

Table 3–132. Potato Insect Control — Aphids, Potato Psyllids (page 168) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days): — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
Soil Application					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	440–700 g/ha (178–283 g/acre)	—	In-furrow application at the seeding depth, or a narrow surface band above the seed during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. 12-hr restricted-entry interval.
Foliar Application					
sulfoxaflor/ spinosyn (group 4C/5)	sulfoxaflor/ spinetoram	TwinGuard	200 g/ha (81 g/acre)	7	Do not apply this product during crop flowering period or when flowering weeds are present in the treatment areas. Apply early in the morning or late in the evening when bees are not active. Maximum 2 applications/season. Do not apply by air. 12-hr restricted-entry interval or re-entry permitted once spray deposit has dried.
POTATO PSYLLID (POTENTIAL PEST IN ONTARIO)					
Foliar Application					
pyrethroid/ diamide (group 3A/28)	lambda- cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Do not apply Voliam Xpress following a seed piece, in-furrow, or soil application of any group 28 insecticide. Maximum 2 applications/yr. 24-hr restricted-entry interval.
avermectin (group 6)	abamectin	Agri-mek SC	225 mL/ha (91 mL/acre)	14	Apply in 185 L of water/ha or 74 L of water/acre. Apply with a non-ionic surfactant at 0.1%–0.5% v/v, as per label instructions. Maximum 2 applications/yr. 12-hr restricted-entry interval.

RADISHES

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
radish	not applicable	Last date of use of Diazinon 5G (PCP# 12538, granular formulation) was 31 August, 2015. From 31 December, 2014 to 31 December, 2016, soil drench applications with diazinon liquid formulations are permitted as per label instructions. Last date of use of diazinon is 31 December, 2016.
radish	Table 3–138, page 173	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–135. Radish Disease Control (page 170) — Additions

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Radish and Oriental radish. Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Fusarium</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or irrigation within 24-hrs.
ALTERNARIA LEAF SPOT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Radish and Oriental radish. Suppression only. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
POWDERY MILDEW					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Radish and Oriental radish. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
DOWNY MILDEW					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.4 kg/ha (0.57 kg/acre)	0	Radish only. Suppression only. Begin applications when environmental conditions are conducive to disease development and repeat on a 7–10 day interval.

Table 3–137. Radish Insect Control — Cabbage Maggot, Flea Beetles, Cabbage Looper, Imported Cabbageworm, Diamondback Moth, Cutworms (page 172) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CABBAGE MAGGOT					
diamide (group 28)	cyantraniliprole	Verimark	10–15 mL/100 m of row; or 1,100–1,700 mL/ha (445–687 mL/acre)	21	Radish and Oriental radish. Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
FLEA BEETLES					
diamide (group 28)	cyantraniliprole	Verimark	6.75–9 mL/100 m of row; or 750–1,000 mL/ha (304–405 mL/acre)	21	Radish and Oriental radish. Early season damage reduction. Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
		Exirel	500–1,000 mL/ha (202–405 mL/acre)	7	Radish and Oriental radish. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
CABBAGE LOOPER					
diamide (group 28)	cyantraniliprole	Exirel	250–500 mL/ha (101–202 mL/acre)	7	Radish and Oriental radish. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	7	Radish and Oriental radish. Variegated cutworm. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted entry interval.

Table 3–138. Radish Insect Control — Swede Midge, Aphids, European Chafer Grubs (page 173) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	7	Radish only. Control of aphids with this product has been inconsistent in many areas. Maximum 1 application/yr. 12-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–1,500 mL/ha (202–607 mL/acre)	7	Radish and Oriental radish. For optimum control of aphids, use a spray adjuvant as stated on Exirel label. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

Table 3–140. Rhubarb Disease and Insect Control (page 175) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and phytophthora. See label for in-furrow application instructions. For broadcast or banded application, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.
APHIDS					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (304 g/acre)	—	In-furrow application at planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. 12-hr restricted-entry interval.
POTATO STEM BORER, CABBAGE LOOPER					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (304 g/acre)	—	Cabbage looper. In-furrow application at planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. 12-hr restricted-entry interval.

RUTABAGAS

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
rutabagas	Table 3–143, page 177	Replace Mission 418 EC with Bumper 418 EC.
rutabagas	Table 3–143, page 177	Replace Topas with Tilt 250E.
rutabagas	not applicable	Last date of use of Diazinon 5G (PCP# 12538, granular formulation) was 31 December, 2014. Soil drench applications with diazinon liquid formulations are permissible as per label instructions. Last date of use of diazinon is 31 December, 2016.
rutabagas	Table 3–145, page 179	Remove Ripcord 400 EC, replace with Mako.
rutabagas	Table 3–145, page 179; Table 3–146, page 180	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–143. Rutabaga Disease Control (page 177) — Additions

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
POWDERY MILDEW					
DMI (group 3)	propiconazole	Bumper 418 EC	240 mL/ha (97 mL/acre)	21	Make 2 applications/yr: the first application 50 days after planting and the second application 20 days later. 12-hr restricted-entry interval.
		Tilt 250E	400 mL/ha (162 mL/acre)	21	A second application may be made 20 days after the first. Maximum 2 applications/season. Do not graze livestock on treated crop. 12-hr restricted-entry interval.
SDHI (group 7)	penthiopyrad	Fontelis	1–1.75 L/ha (0.4–0.7 L/acre)	0	Use higher rates and shorter spray interval when disease pressure is high. See label for rotational crop restrictions. Apply no more than 4.5 L/ha (1.8 L/acre)/season. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
MOSAIC VIRUS					
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 550–1,100 L of water/ha (4 L in 223–445 L of water/acre)	21	Deters feeding of aphids. Thorough coverage is essential. Application should be made at 2500 kPa with hollow cone nozzles. Spray at one week intervals beginning in mid-June or at the first appearance of aphids in the local area. Do not apply in direct sunlight. After application, allow at least 24-hrs to elapse before applying other insecticides. See label for crop safety precautions. 12-hr restricted-entry interval.

Table 3–143. Rutabaga Disease Control (page 177) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DOWNY MILDEW					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.4 kg/ha (0.56 kg/acre)	0	Suppression only. Also suppresses white mold. Begin applications when environmental conditions are conducive to disease development and repeat on a 7–10 day interval.
ALTERNARIA LEAF SPOT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Suppression only. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
BLACK LEG					
DMI (group 3)	propiconazole	Tilt 250E	400 mL/ha (162 mL/ha)	21	Suppression only. Make two applications/season; the first 50 days after planting and the second 20 days later. Do not graze livestock on treated crop. 12-hr restricted-entry interval.
ROOT ROT (<i>Rhizoctonia solani</i>, <i>Pythium</i> spp. and <i>Fusarium</i> spp.)					
Microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Fusarium</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seedzone with rainfall or overhead irrigation within 24-hrs.

Table 3–145. Rutabaga Insect Control — Cabbage Root Maggot, Flea Beetles, Leaf-Eating Caterpillars (page 179) Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CABBAGE MAGGOT					
Treatment at planting					
diamide (group 28)	cyantraniliprole	Verimark	10–15 mL/100 m of row; or 1,100–1,700 mL/ha (445–687 mL/acre)	21	Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–145. Rutabaga Insect Control — Cabbage Root Maggot, Flea Beetles, Leaf-Eating Caterpillars (page 179)
Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
FLEA BEETLES					
diamide (group 28)	cyantraniliprole	Verimark	6.75–9 mL/100 m of row; or 750–1,000 mL/ha (304–405 mL/acre)	21	Early season damage reduction. Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
		Exirel	500–1,000 mL/ha (202–405 mL/acre)	7	See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application with any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
pyrethroid (group 3A)	cypermethrin	Mako	123 mL/ha (50 mL/acre)	21	Crucifer flea beetle control.
LEAF-EATING CATERPILLARS (CABBAGE LOOPER, DIAMONDBACK MOTH, IMPORTED CABBAGEWORM)					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Imported cabbageworm and cabbage loopers only. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 12-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	250–500 mL/ha (101–202 mL/acre)	7	Cabbage looper only. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application with any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted entry interval.

Table 3–146. Rutabaga Insect Control — Cutworms, Aphids (page 180) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	7	Variegated cutworm. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application with any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
APHIDS					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Control of aphids with malathion has been inconsistent in many areas. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 12-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–1,500 mL/ha (202–607 mL/acre)	7	For optimum control of aphids, use a spray adjuvant as stated on the Exirel label. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow or soil application with any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.

SPINACH AND SWISS CHARD

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
spinach	Table 3–150, page 184	Remove Serenade ASO, replace with Serenade MAX.
spinach, Swiss chard	Table 3–150, page 184; Table 3–157, page 191	Replace Serenade MAX with Serenade Opti.
spinach	Table 3–150, page 184	Remove Ranman 400SC.
spinach, Swiss chard	Table 3–155, page 190; Table 3–158, page 192; Table 3–159, page 193	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.
spinach, Swiss chard	Table 3–153, page 188; Table 3–154, page 189; Table 3–155, page 190; Table 3–158, page 192; Table 3–159, page 193	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of any Group 28 insecticide.”

Table 3–150. Spinach Disease Control — Downy Mildew, White Rust (page 184) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
WHITE RUST					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	1–2 kg/ha (0.4–0.8 kg/acre)	0	Suppression only. Begin applications when conditions become conducive for disease development. Repeat at 7–10 day intervals.
		Serenade Opti	0.6–1.1 kg/ha (0.2–0.4 kg/acre)	0	Suppression only. Begin applications at first sign of disease or when conditions become conducive for disease development. Repeat at 7–10 day intervals.

Table 3–151. Spinach Disease Control — Anthracnose, Botrytis Gray Mold, Root Rots (page 185) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
DAMPING-OFF/ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Damping-off caused by <i>Rhizoctonia solani</i> . Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Phytophthora</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.

Table 3–153. Spinach Insect Control — Aphids (page 187) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–154. Spinach Insect Control — Leafminers, Cutworms (page 189) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFMINERS					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Diptean leafminers. Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–155. Spinach Insect Control — Cabbage Looper, Brown Marmorated Stink Bug, Thrips (page 190) Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CABBAGE LOOPER					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season control. Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,345 mL/ha (544 mL/acre)	7	Suppression only. Maximum 1 application/yr. 1-day restricted-entry interval.

Table 3–155. Spinach Insect Control — Cabbage Looper, Brown Marmorated Stink Bug, Thrips (page 190)**Additions****LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
THRIPS					
tetronic and tetramic acid derivatives (group 23)	spirotetramat	Movento 240 SC	365 mL/ha (148 mL/acre)	3	Onion thrips. Apply when thrips are first seen. Movento should be used during the first half of the season when adult populations are relatively low or building. Reduction in number of thrips larvae may take 3–4 days after application. Label directions require a tank-mix with a specified spray adjuvant/additive. See label for application details and re-cropping restrictions. Maximum of 730 mL/ha (295 mL/acre) of Movento per crop season. 12-hr restricted-entry interval.
spinosyn (group 5)	spinetoram	Delegate	200–336 g in 300–500 L water/ha (81–136 g in 120–200 L water/acre)	1	Suppression of onion thrips only. Use high rate when pest pressure is high and/or insects are in advance growth stages. Maximum 3 applications/yr. 12-hr restricted-entry interval.

Table 3–157. Swiss Chard Disease Control — Botrytis Gray Mold, Root Rots (page 191) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BOTRYTIS GRAY MOLD					
microbial (group 44)	Bacillus subtilis	Serenade MAX	1–3 kg/ha (0.4–1.2 L/acre)	0	Suppression only. When environmental conditions and plant stage are conducive to rapid disease development, use in a rotational program with other registered fungicides.
		Serenade Opti	0.6–1.7 kg/ha (0.2–0.7 kg/acre)	0	Suppression only. Begin applications soon after emergence or transplant and continue as necessary on a 7–10 day interval.
ROOT ROTS, DAMPING-OFF					
not classified	Trichoderma harzianum	RootShield HC	55–110 g/m ³ of loose planting mix, soil or planting beds	—	Suppression only. Root rots caused by <i>Rhizoctonia</i> spp., <i>Pythium</i> spp. and <i>Fusarium</i> spp. Drench application to potting mix, soil or planting beds for greenhouse transplants. 4-hr restricted-entry interval.
microbial (group 44)	Bacillus subtilis	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Damping-off caused by <i>Rhizoctonia solani</i> . Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Phytophthora</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded application, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.

Table 3–158. Swiss Chard Insect Control — Aphids (page 192) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
organophosphate (group 1B)	malathion	Malathion 85E	1,100 mL/ha (445 mL/acre)	7	Ensure thorough coverage. Control of aphids with malathion has been inconsistent in many areas. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 1-day restricted-entry interval.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.

Table 3–159. Swiss Chard Insect Control — Leafminers, Cutworms, Cabbage Looper, Brown Marmorated Stink Bug (page 193) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAFMINERS					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Dipteran leafminers. Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
CABBAGE LOOPER					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season control. Also suppresses early-season flea beetles. In-furrow application at seeding or transplant depth, or a narrow surface band above the seed line during planting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	1,100 mL/ha (445 mL/acre)	7	Suppression only. Maximum 1 application/yr. 1-day restricted-entry interval.

SUGARBEETS

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
sugarbeet	Table 3-164, page 198	Last date of use of endosulfan (Thionex 50W WSP, Thionex EC) on sugarbeet is 31 December, 2016.
sugarbeet	Table 3-165, page 198	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3-162. Sugarbeet Disease Control — Cercospora Leafspot (page 196) — **Additions**

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CERCOSPORA LEAFSPOT					
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% solution, applied in 470–940 L water/ha (190–380 L/acre)	1	4-hr restricted-entry interval.

Table 3-163. Sugarbeet Disease Control — Powdery Mildew, Rhizoctonia Root and Crown Rot (page 197) **Additions**

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

RHIZOCTONIA ROOT AND CROWN ROT					
Soil Application					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Soil application. See label for application details.

Table 3-165. Sugarbeet Insect Control (page 198) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
FLEA BEETLES, LEAFHOPPERS, SPIDER MITE					
organophosphate (group 1B)	malathion	Malathion 85E	535 mL/ha (217 mL/acre)	—	Flea beetles. Less effective at temperatures below 20°C. Maximum 1 application/yr. 12-hr restricted-entry interval.

SWEET CORN

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
sweet corn	Table 3–166, page 200	Remove Agrox B-2 (diazinon/captan). Registration expired 31 December, 2014.
		Remove Agrox CD (diazinon/captan). Registration expired 31 December, 2014.
		Remove DCT (diazinon/captan/thiophanate-methyl). Registration expired 31 December, 2014.
	Table 3–168, page 201	Remove Bravo 500, replace with Bravo ZN
	Table 3–170, page 203; Table 3–171, page 204; Table 3–172, page 205	Remove Ripcord 400 EC, replace with Mako.

Table 3–168. Sweet Corn Disease Control (page 201) — **Additions**

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
RUST, NORTHERN CORN LEAF BLIGHT					
DMI (group 3)	prothioconazole	Proline 480 SC	315 mL/ha (127 mL/acre)	14	Apply when the earliest disease symptoms appear on the leaves and stems. Under high disease pressure, use a non-ionic surfactant, as per label instructions (do not apply a non-ionic surfactant prior to tassel emergence as crop injury may occur). 20-day restricted entry interval for hand-harvesting sweet corn. 24-hr restricted-entry interval for all other activities.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	3.2 L/ha (1.3 L/acre)	14	Rust only. 48-hr restricted-entry interval.

Table 3–170. Sweet Corn Insect Control — Corn Rootworm, Cutworms, Slugs (page 203) — **Additions**

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CUTWORMS					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	21	Apply to moist soils up to 5-leaf stage. Do not disturb the soil for 5 days after application.

Table 3–171. Sweet Corn Insect Control — European Corn Borer (page 204) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
EUROPEAN CORN BORER					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	5	Apply when egg masses begin to hatch, but no later than when the first pinhole feeding is seen on the leaves.
spinosyn (group 5)	spinetoram	Delegate	120–210 g/ha (48–85 g/acre)	1	Applications should be timed at egg hatch or to small larvae. Use high rate when pest pressure is high and/or insects are in advanced growth stages. 28 day PHI for stover harvest. 7 day PHI for forage harvest. 12-hr restricted-entry interval.

Table 3–172. Sweet Corn Insect Control — Corn Earworm, Western Bean Cutworm, Fall Armyworm, Armyworm (page 205) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CORN EARWORM					
pyrethroid (group 3A)	cypermethrin	Mako	175 mL/ha (71 mL/acre)	5	Ensure good coverage of ears and silks.
WESTERN BEAN CUTWORM					
spinosyn (group 5)	spinetoram	Delegate	120–210 g/ha (48–85 g/acre)	1	Applications should be timed at egg hatch or to small larvae. Use high rate when pest pressure is high and/or insects are in advanced growth stages. 28 day PHI for stover harvest. 7 day PHI for forage harvest. 12-hr restricted-entry interval.

SWEET POTATOES

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
sweet potato	Table 3-174, page 207	Replace Serenade MAX with Serenade OPTI
sweet potato	Table 3-176, page 209	Change variegated cutworm to cutworms.

Table 3–174. Sweet Potato Disease Control — Damping-Off, Stem Rot, Scurf, Sclerotinia Rot, Leaf Blights (page 207) — **Additions**

LEGEND: PHI = Pre-Harvest Interval (in days); N/A = not applicable					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
STEM ROT, SCURF					
SDHI (group 7)	penthiopyrad	Vertisan	15.5 mL/100 m of row applied in 1.4–1.75 L water/100 m of row.	7	Stem rots caused by <i>Rhizoctonia solani</i>. Suppression only. Apply in-furrow at planting. Do not exceed 1.75 L/ha (0.7 L/acre). See label for rotational crop restrictions. 12-hr restricted-entry interval.
dithiocarbamate (group M3)	thiram	Thiram 75 WP	1.75 kg/1,000 L of water	N/A	Apply to roots to be used for slip production. Not for greenhouse use. Dip roots of sprouts for 30 seconds in suspension, then plant promptly. 24-hr restricted-entry interval for Granulflo.
		Granuflo-T			
SCLEROTINIA ROT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.1–2.2 kg/ha (0.4–0.9 kg/acre)	0	Suppression only. Begin applications when conditions are conducive to disease development.
DAMPING-OFF/ROOT ROTS					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp., and <i>Fusarium</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.

Table 3–174. Sweet Potato Disease Control — Damping-Off, Stem Rot, Scurf, Sclerotinia Rot, Leaf Blights (page 207) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); N/A = not applicable					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
LEAF BLIGHTS					
SDHI (group 7)	penthiopyrad	Vertisan	1–1.75 L/ha (0.4–0.7 L/acre)	7	Suppression of leaf blights caused by <i>Alternaria solani</i>. Do not make more than 2 sequential applications before switching to a fungicide with a different mode of action. No more than 5 L/ha (2L/acre) of product can be applied per season. See label for rotational crop restrictions. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	167–333 mL/ha (67–135 mL/acre)	7	Leaf blights caused by <i>Alternaria solani</i>. Do not make more than 2 sequential applications before switching to a fungicide with a different mode of action. Maximum 3 applications/season. For optimum control, use a spray adjuvant as stated on the Sercadis label. See label for rotational crop restrictions. 12-hr restricted-entry interval.
QoI/DMI (group 11/3)	azoxystrobin/ difenoconazole	Quadris Top	566–1,000 mL/ha (229–404 mL/acre)	14	Leaf blights caused by <i>Alternaria solani</i>. Do not apply sequential applications of any QoI fungicide or of any tank-mix containing a QoI fungicide. Rotate with fungicides with a different mode of action. See label for re-cropping restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.

Table 3–176. Sweet Potato Insect Control — Aphids, Variegated Cutworm, Armyworm, Slugs (page 209)**Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
sulfoxaflor (group 4C)	sulfoxaflor	Closer	50–150 mL/ha (20–61 mL/acre)	7	Rotate applications with other insecticide groups. Allow at least 7 days between applications. Maximum 2 applications/season. See label for re-cropping restrictions. 12-hr restricted-entry interval or when spray residues have dried.
CUTWORMS, ARMYWORM					
diamide (group 28)	cyantraniliprole	Coragen	250–375 mL/ha (101–151 mL/acre)	1	Use 250 mL/ha (101 mL/acre) for black cutworm, and apply when rain is not expected in the next 24-hrs. Make no more than 2 applications of group 28 insecticides per generation to the same insect species on a crop. Maximum 4 applications/yr. 12-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–303 mL/acre)	7	Variegated cutworm and armyworms only. Use 500 mL/ha (202 mL/acre) for armyworms. See label for tank-mix directions and crop tolerance. Make no more than 2 applications of group 28 insecticides (diamide) per generation to the same insect species on a crop. Maximum 4 applications/season. See label for rotational crop restrictions. 12-hr restricted-entry interval.
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	For black cutworm. Apply when rain is not expected for 24-hrs and apply to smaller plants for optimal control. Maximum 2 applications/yr. 24-hr restricted-entry interval.

Table 3–177. Sweet Potato Postharvest Disease Control — Bacterial Soft Rot, Fungal Rots (page 210)**Additions**

Group Name (Group #)	Common Name	Trade Name	Rate	Notes
BACTERIAL SOFT ROT				
not classified (group NC)	hydrogen peroxide	StorOx	100 mL/10 L water	Spray diluted solution on newly harvested roots. Additional applications can be made daily as a direct injection into humidification water. See product label for details. Do not enter treated areas or storage bins until residues have dried and hydrogen peroxide air concentrations are below mandated safe exposure levels.
FUNGAL ROTS				
phenylpyrrole/ DMI/QoI (group 12/3/11)	fludioxonil/ difenoconazole/ azoxystrobin	Stadium	32.5 mL/tonne	Rhizopus and fusarium rots only. Dilute in 2 L water/tonne. Apply post-harvest as an in-line aqueous spray application to roots immediately before storage. See product label for detailed application instructions. Do not apply to roots that will be used for slip production. Maximum 1 application.

TOMATOES

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change
tomato	Table 3–178, page 212; Table 3–181, page 215–216	Remove Ranman 400SC.
tomato	Table 3–180, page 214	Kasumin 2L rate should specify: 100 ppm using sufficient volume to provide good coverage of treated foliage. Do not apply more than 1.2 L/ha (0.5 L) of product or 240 L/ha carrier volume per application.
tomato	Table 3–180, page 214; Table 3–181, page 215–216; Table 3–183, page 218	Remove Serenade ASO, replace with Serenade MAX.
tomato	Table 3–180, page 214; Table 3–181, page 215–216; Table 3–183, page 218	Replace Serenade MAX with Serenade Opti.
tomato	Table 3–181, page 215–216; Table 3–182, page 217	Remove Bravo 500, replace with Bravo ZN. 2-day pre-harvest interval.
tomato	Table 3–182, page 217	Scala SC + Bravo 500: Bravo 500 rate should be 4.8 L/ha.
tomato	Table 3–185, page 220 Table 3–187, page 224	Last date of use of endosulfan (Thionex EC) on tomato is 31 December, 2016.
tomato	Table 3–188, page 225	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.
tomato	Table 3–186, page 223	Remove Ripcord 400 EC, replace with Mako.
tomato	Table 3–185, page 221; Table 3–187, page 224; Table 3–186, page 223	In Notes for Exirel, add in statement “Do not make a foliar application of Exirel insecticide following an in-furrow or soil application of any group 28 insecticide.”

Table 3–178. Tomato Transplant Production Disease and Insect Control (Greenhouse) (page 212) — Additions

Group Name (Group #)	Common Name	Trade Name	Rate	Notes
SEED AND SEEDLING DISEASE				
Seed Treatments				
not classified (group NC)	<i>Streptomyces</i> Strain K61	Mycostop	5 g/1 kg of seed	Suppression only. Seed treatment. Fusarium damping-off. See label for application instructions.
Soil Treatments				
Qil (group 21)	cyazofamid	Torrent 400SC	30 mL in 100 L of water	Pythium damping-off and root rot. Apply as a soil drench to thoroughly wet the growing medium immediately after seeding. 60-day pre-harvest interval. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	25–250 g/100 L of water	Partial suppression only. For <i>Phytophthora capsici</i> in soil. Make preventative applications to transplants in the greenhouse before transplanting. See product label for application instructions. Follow up applications of 0.1–0.5 kg/ha (40–202 g/acre) can be made at 2–4 week intervals after transplanting. Re-entry permitted once spray deposit has dried.
not classified (group NC)	<i>Streptomyces</i> Strain K61	Mycostop	Refer to label for rates and application instructions.	Suppression only. Fusarium, Phytophthora. Drench or soil spray application after seedling emergence. Apply first spray after emergence using lower rate.
not classified (group NC)	<i>Gliocladium catenulatum</i> Strain J1446	Prestop	Refer to label for rates and application instructions.	Suppression only. <i>Pythium</i> sp., <i>Rhizoctonia solani</i> . Do not tank-mix with any fungicides, insecticides, herbicides or adjuvants.
Foliar Treatments				
not classified (group NC)	<i>Gliocladium catenulatum</i> Strain J1446	Prestop	Refer to label for rates and application instructions.	Suppression only. Botrytis stem canker. Do not tank-mix with any fungicides, insecticides, herbicides or adjuvants.

Table 3–180. Tomato Bacterial Disease Control (page 214) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days)					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	1–3 kg/ha (0.4–1.2 kg/acre)	0	Bacterial spot. Suppression only. Begin applications soon after transplant. Repeat as necessary on a 7–10-day interval. When conditions are conducive to rapid disease development, use in a rotational program with other bactericides.
		Serenade Opti	0.6–1.7 kg/ha (0.2–0.7 kg/acre)	0	Bacterial spot. Suppression only.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% (v/v) solution, applied at 470–940 L solution/ha (190–380 L/acre)	1	Bacterial speck, bacterial spot, bacterial canker. 4-hr restricted-entry interval.

Table 3–181. Tomato Fungal Disease Control — Anthracnose, Early Blight, Late Blight, Septoria Leafspot (page 215–216) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ANTHRACNOSE, EARLY BLIGHT, LATE BLIGHT, SEPTORIA LEAF SPOT					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–304 mL/acre)	1	Anthracnose, early blight, septoria leaf spot. See label for recropping restrictions. 12-hr restricted-entry interval.
	fluxapyroxad	Sercadis	167–333 mL/ha (68–135 mL/acre)	7	Early blight. Use high rate to target black mold (<i>Alternaria alternata</i>) of ripe fruit. Follow label instructions regarding use of a non-ionic surfactant. See label for rotational crop restrictions. 12-hr restricted-entry interval.
QoI/DMI (group 11/3)	azoxystrobin/ difenoconazole	Quadris Top	375–625 mL/ha (152–253 mL/acre)	1	Anthracnose, early blight, septoria leaf spot. Use high rate for septoria leaf spot. Do not apply until 21 days after transplanting. Do not apply for 6 days before or after metribuzin. See label for re-cropping restrictions. 12-hr restricted-entry interval.
Qil (group 21)	cyazofamid	Torrent 400SC	0.1–0.2 L/ha (0.04–0.08 L/acre)	1	Late blight. Tank-mix with non-ionic or organosilicone surfactant. See label for directions. See label for re-cropping restrictions. 12-hr restricted-entry interval.
carbamate/ chloronitrile (group 28/M5)	propamocarb/ chlorothalonil	Tattoo C	2.7 L/ha (1.1 L/acre)	5	Late blight. See label for rotational crop restrictions. 48-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.5–2 kg/ha (0.2–0.8 kg/acre)	0	Early blight. Suppression only. See label for details on choosing a rate. Re-entry permitted once spray deposit has dried.
	<i>Bacillus subtilis</i>	Serenade MAX	4.5 kg/ha (1.8 kg/acre)	0	Early blight. Suppression only.
		Serenade Opti	2.5 kg/ha (1 kg/acre)	0	Early blight. Suppression only.
inorganic (group M1)	copper octanoate	Cueva	0.5%–2% (v/v) solution, applied at 470–940 L/ha (190–380 L/acre)	1	Early blight, late blight, septoria leaf spot. 4-hr restricted-entry interval.
chloronitrile (group M5)	chlorothalonil	Bravo ZN	2.4–4 L/ha (0.97–1.6 L/acre)	2	Anthracnose, early blight, late blight, septoria leaf spot. 48-hr restricted-entry interval.

Table 3–182. Tomato Fungal Disease Control — Botrytis Gray Mold, Sclerotinia White Mold (page 217) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BOTRYTIS GRAY MOLD, SCLEROTINIA WHITE MOLD					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Botrytis gray mold. Suppression only.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Botrytis gray mold. Suppression only.
	<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55	0.9–1 kg/ha; or 1.25–3.6 kg/ha (0.36–0.4 kg/ac; or 0.51–1.46 kg/ac)	0	Botrytis gray mold. Suppression only. See label for details on choosing a rate. Re-entry permitted once spray deposit has dried.
chloronitrile (group M5)	<i>chlorothalonil</i>	Bravo ZN	4.8 L/ha (1.9 L/acre)	2	Botrytis gray mold. 48-hr restricted-entry interval.
not classified (group NC)	BLAD polypeptide	Fracture	1.5–3.3 L/ha (0.6–1.3 L/acre)	0	Botrytis gray mold. Do not mix with foliar fertilizers.

Table 3–183. Tomato Fungal Disease Control — Phytophthora Blight, Powdery Mildew (page 218) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
PHYTOPHTHORA BLIGHT					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Phytophthora blight. Suppression only. Soil application. See label for application instructions.
POWDERY MILDEW					
SDHI (group 7)	benzovindiflupyr	Aprovia	500–750 mL/ha (202–303 mL/acre)	1	See label for recropping restrictions. 12-hr restricted-entry interval.
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade MAX	3–6 kg/ha (1.2–2.4 kg/acre)	0	Suppression only.
		Serenade Opti	1.7–3.3 kg/ha (0.7–1.3 kg/acre)	0	Suppression only.
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.
aryl-phenyl-ketone (group U8)	metrafenone	Vivando SC	0.75–1.12 L/ha (0.3–0.45 L/acre)	7	See label for re-cropping restrictions. 12-hr restricted-entry interval.

Table 3–185. Tomato Insect Control — Aphids, Cutworms (page 220) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
Soil Treatment					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplanting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
CUTWORMS					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Variegated cutworm, black cutworm. For black cutworm, apply to foliage when rain is not expected in the next 24 hrs. Do not apply Voliam Xpress following a soil application of any group 28 insecticide. 24-hr restricted-entry interval.

Table 3–186. Tomato Insect Control — Colorado Potato Beetle (page 222–223) — Additions

LEGEND: PHI = Pre-Harvest Interval (in days); — = not specified on label					
Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
COLORADO POTATO BEETLE					
Transplant or Soil Treatments					
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	In-furrow application at transplanting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
Foliar Treatment					
pyrethroid (group 3A)	cypermethrin	Mako	85 mL/ha (34 mL/acre)	3	Apply when first signs of insects appear and damage is visible.

Table 3–187. Tomato Insect Control — Cabbage Looper, Tomato or Tobacco Hornworm (page 224) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days); — = not specified on label

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
CABBAGE LOOPER					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Do not apply Voliam Xpress following a soil application of any group 28 insecticide. 24-hr restricted-entry interval.
neonicotinoid/ diamide (group 4A/28)	thiamethoxam/ cyantraniliprole	Minecto Duo 40WG	750 g/ha (303 g/acre)	—	Early-season control only. In-furrow application at transplanting. See label for application details. Do not apply foliar group 4 (neonicotinoid) or group 28 (diamide) insecticides in the same season as an in-furrow or soil application. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
HORNWORM, TOMATO OR TOBACCO					
pyrethroid/ diamide (group 3A/28)	lambda-cyhalothrin/ chlorantraniliprole	Voliam Xpress	500 mL/ha (202 mL/acre)	7	Do not apply Voliam Xpress following a soil application of any group 28 insecticide. 24-hr restricted-entry interval.

Table 3–188. Tomato Insect Control — Stink Bug, Brown Marmorated Stink Bug (page 225) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
BROWN MARMORATED STINK BUG					
See ontario.ca/stinkbug for the most up-to-date information on registrations and brown marmorated stink bug control measures.					
organophosphate (group 1B)	malathion	Malathion 85E	975 mL/ha (395 mL/acre)	3	Suppression only. Maximum 4 applications/yr. 12-hr restricted-entry interval.

Table 3–189. Tomato Insect Control — Tarnished Plant Bug, Two-Spotted Spider Mite (page 226) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
TWO-SPOTTED SPIDER MITE					
beta-ketonitrile derivative (group 25)	cyflumetofen	Nealta	1 L/ha (405 mL/acre)	3	Apply before mites exceed threshold. 12-hr restricted-entry interval.
not classified (group NC)	mineral oil	PureSpray Green Spray Oil 13E	10 L in 1000 L water/ha (1% solution) to ensure thorough coverage	—	Suppression only. See label for crop safety and chemical compatibility precautions. 12-hr restricted-entry interval.

TURNIPS

This information is provided as a guideline only. See product labels for complete information. For resistance management, rotate between fungicides from different chemical groups and rotate between insecticides from different chemical groups. For information on insecticides and bee poisoning, see Chapter 1 and Chapter 2 in Publication 838, *Vegetable Crop Protection Guide 2014–2015*.

GENERAL CHANGES

Crop	Table Number, Page Number	Change/Update
turnips	not applicable	Last date of use of Diazinon 5G (PCP# 12538, granular formulation) was 31 August, 2015. Soil drench applications with liquid diazinon formulations are permissible as per label instructions. Last date of use of diazinon is 31 December, 2016.
turnips	Table 3–193, page 230	Remove Ripcord 400 EC, replace with Mako.
turnips	Table 3–193, page 230; Table 3–194, page 231	Malathion 85E label was updated 15 April, 2014, including updated restricted-entry intervals and maximum number of applications per year as indicated below. Read the label for directions for use.

Table 3–192. Turnip Disease Control (page 229) — Additions

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

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
ALTERNARIA LEAF SPOT					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	Suppression only. See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
DOWNY MILDEW					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.4 kg/ha (0.56 kg/acre)	0	Suppression only. Begin applications when environmental conditions are conducive to disease development and repeat on a 7–10 day interval.
WHITE MOLD					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade Opti	1.1–2.2 kg/ha (0.4–0.9 kg/acre)	0	Suppression only. Begin application soon after emergence and when conditions are conducive to disease development. Repeat applications on a 7–10 day interval.
POWDERY MILDEW					
SDHI (group 7)	fluxapyroxad	Sercadis	250–333 mL/ha (101–135 mL/acre)	7	See label for rotational crop restrictions. Maximum 3 applications/season. 12-hr restricted-entry interval.
	penthiopyrad	Fontelis	1–1.75 L/ha (0.4–0.7 L/acre)	0	Use higher rates and shorter spray interval when disease pressure is high. See label for rotational crop restrictions. Apply no more than 4.5 L/ha/season (1.8 L/acre/season). 12-hr restricted-entry interval.
ROOT ROTS (<i>Rhizoctonia solani</i>, <i>Pythium</i> spp. and <i>Fusarium</i> spp.)					
microbial (group 44)	<i>Bacillus subtilis</i>	Serenade SOIL	2.7–14 L/ha (1.1–5.7 L/acre)	0	Suppression only. Root rots caused by <i>Rhizoctonia solani</i> , <i>Pythium</i> spp. and <i>Fusarium</i> spp. May be applied at planting and/or post-planting. See label for application instructions. For broadcast or banded applications, incorporate into the seed zone with rainfall or overhead irrigation within 24-hrs.

Table 3–193. Turnip Insect Control — Flea Beetles, Leaf-Eating Caterpillars, Cutworms (page 230) — Additions**LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
FLEA BEETLES					
diamide (group 28)	cyantraniliprole	Verimark	6.75–9 mL/100 m of row; or 750–1,000 mL/ha (304–405 mL/acre)	21	Early season damage reduction. Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–1,000 mL/ha (202–405 mL/acre)	7	See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
pyrethroid (group 3A)	cypermethrin	Mako	123 mL/ha (50 mL/acre)	21	Apply when insects appear.
CUTWORMS					
diamide (group 28)	cyantraniliprole	Exirel	500–750 mL/ha (202–304 mL/acre)	7	Variegated cutworm only. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
LEAF-EATING CATERPILLARS (IMPORTED CABBAGEWORM, CABBAGE LOOPER, DIAMONDBACK MOTH)					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Imported cabbageworm and cabbage loopers only. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 1-day restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	250–500 mL/ha (101–202 mL/acre)	7	Cabbage looper only. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.

Table 3–194. Turnip Insect Control — Aphids, European Chafer Grubs, Swede Midge, Cabbage maggot (page 231) — **Additions****LEGEND:** PHI = Pre-Harvest Interval (in days)

Group Name (Group #)	Common Name	Trade Name	Rate	PHI	Notes
APHIDS					
organophosphate (group 1B)	malathion	Malathion 85E	535–1,345 mL/ha (216–544 mL/acre)	3	Control of aphids with malathion has been inconsistent in many areas. Ensure thorough coverage. Apply when temperature is at or above 20°C. Maximum 1 application/yr. 1-day restricted-entry interval.
diamide (group 28)	cyantraniliprole	Exirel	500–1,500 mL/ha (202–607 mL/acre)	7	For optimum control of aphids, use a spray adjuvant as stated on the Exirel label. See label for tank-mix directions, crop tolerance information and rotational crop restrictions. Do not make a foliar application of Exirel insecticide for a minimum of 60 days following an in-furrow application of any group 28 insecticide. Maximum 4 applications/season. 12-hr restricted-entry interval.
CABBAGE MAGGOT					
diamide (group 28)	cyantraniliprole	Verimark	10–15 mL/100 m of row; or 1,100–1,700 mL/ha (445–687 mL/acre)	21	Apply as a narrow band in-furrow. Do not make a subsequent foliar application of any group 28 insecticide for a minimum of 60 days following an in-furrow application of Verimark. See label for rotational crop restrictions. Maximum 1 application/season. 12-hr restricted-entry interval.



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