6. Peppers

Products registered for greenhouse pepper insect and mite pests are listed in Table 6–1.
Products registered for greenhouse pepper diseases are listed in Table 6–2.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

LEGEND: PHI = pre-harvest interval (in days) NS = no information was provided on the product label REI = re-entry interval N/A = not applicable
* = product is potentially acceptable for organic production. Organic growers must always check with their certifying bodies to verify the acceptability of any product prior to using it.

IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
APHIDS					
1B	naled	Dibrom	**Vapour:** 9.6 mL/100 m^3 **Fog:** 6.7–13.4 mL/100 m^2	N/A	Do not exceed 1 application per crop cycle, only after the last harvest at the end of the cropping cycle. Vapour treatment: Apply to cold pipes using a plastic squeeze bottle when plants are dry. Do not apply using a paint brush or any other method. Do not apply to hot pipes. Fogging treatment: Apply with automated fogging equipment only. All workers must evacuate the premises during the fogging operations. **REI: 48 hr (must be fully ventilated before re-entry)**
4A	acetamiprid	Tristar 70 WSP	3 water soluble packs/ 1,000 L water	3	Do not exceed 5 water soluble packs (1,667 L of spray solution) per hectare. Do not exceed 2 applications per year. Do not re-apply more than once every 7 days. **REI: 12 hr**
	imidacloprid	Intercept 60 WP	**Mature plants:** 16 g/70 L water/ 1,000 plants **Transplant tray plug drench:** 4.1 g/1,000 seedling plants	3	**Green peach aphid (*Myzus persicae*)** For use as a soil drench using micro-irrigation, drip irrigation, overhead irrigation, or hand-held or motorized calibrated irrigation equipment. Do not apply as a foliar application. Irrigate moderately but thoroughly after application, allowing no leaching and runout from container for at least 10 days after application. Do not exceed 1 application per season. Mature plants: Applications should be made when infestation pressure surpasses threshold and beneficials are not able to maintain pest populations below damage thresholds. Transplants: Apply to 2–3-week-old seedlings in flats at least 10 days prior to transplanting. Do not use less than 15 L solution/100 m^2 of seedling trays. May harm pollinators and certain beneficial insects. **REI: NS**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

LEGEND: PHI = pre-harvest interval (in days) NS = no information was provided on the product label REI = re-entry interval N/A = not applicable

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
APHIDS (cont'd)					
4D	flupyradifurone	Altus	**Foliar:** 500–750 mL/ha **Drench:** 750–1,000 mL/ha (7.5–10 mL/100 m^2)	3	Thorough, uniform coverage of the crop is required for optimum control. Use the higher rate for higher pest infestation levels. Minimum application volume is 500 L per hectare. Foliar: Use appropriate spray volume for adequate crop foliage spray coverage. Spray crop to wet but not to the point of run-off. Drench: Application to soil or soilless media should be made with sufficient water to ensure incorporation into the root zone. Follow with moderate irrigation. Irrigate carefully within the next 10 days to avoid loss of active ingredient due to leaching. Minimum interval between applications is 10 days. Do not exceed 2,000 mL per hectare per crop cycle. **REI: 12 hr**
9B	pymetrozine	Endeavor 50 WG	100–200 g in a minimum of 1,000 L water/ha	3	**Green peach aphid (*Myzus persicae*), melon aphid (*Aphis gossypii*)** Do not exceed 200 g in 1,000 L per application. Do not exceed 2 applications per crop cycle or 3 applications per year in greenhouses with multiple crop cycles. Apply as a foliar spray. Minimum interval between applications is 7 days. On hard-to-wet plants, label recommends adding a non-ionic or organosilicone-based surfactant to improve coverage. **REI: 12 hr**
23	spirotetramat	Kontos	30–42 mL/100 L water **Maximum use rate/ single application:** 300 mL/ha (72 g a.i./ha)	3	Use appropriate spray volume for adequate crop foliage spray coverage. Spray crop to wet but not to the point of run-off. Do not exceed a spray volume of 712–1,000 L per hectare (42–30 mL concentration). Use the higher concentration for higher pest infestation levels. Minimum interval between applications is 7–14 days. Do not exceed 900 mL (216 g a.i./ha) per hectare per crop cycle. Do not exceed 3 applications per crop cycle. Not acutely toxic to adult bees. Residues in/on pollen and nectar may harm bee brood. This product is toxic to certain beneficial insects. **REI: 12 hr**
29	flonicamid	Beleaf 50 SG	**Foliar:** 0.3 g/L water **Drip:** 30 mg/plant	0	Suppression only for foliar application. Apply before populations reach economic thresholds or as populations begin to increase, but before damaging populations become established. Minimum interval between applications is 7 days. Do not exceed 2 applications per crop cycle (no more than 1 application per crop cycle may be foliar). Foliar application method: Apply sufficient volume to ensure good coverage, up to 1,000 L per hectare. The maximum volume should only be used when plant foliage is dense. Do not exceed 1 foliar application per crop cycle. Drip application method: Apply through drip (trickle) irrigation systems or drench by hand using sufficient water volume to ensure delivery of the product to the roots. Do not apply this product through any other type of irrigation system. **REI: 12 hr**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

LEGEND: PHI = pre-harvest interval (in days) NS = no information was provided on the product label REI = re-entry interval N/A = not applicable

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
APHIDS (cont'd)					
UNF	*Beauveria bassiana* strain ANT-03	Bio-Ceres G WP*	2–4 g/L water	0	Reduces pest numbers. Begin treatment of crops at the first appearance of the pest. Application rates, frequency, spray coverage and insect numbers impact the speed at which acceptable control is achieved. Depending on crop treated, 500–1,000 L per hectare of spray volume will typically be required. This product is most effective when used early, before high insect populations develop. Repeat application within 7 days as needed. This product may be toxic to bees exposed to direct treatment or drift. Do not apply this product while bees are actively foraging. **REI: Re-enter into treated areas only after spray has dried.**
	Beauveria bassiana strain GHA	BotaniGard 22WP	250–500 g/400 L water	0	Foliar application method: Spray to wet but not to the point of run-off. Repeat application every 5–10 days. High populations may require 2–5-day intervals. Repeat applications for as long as pest pressure persists. Product use, especially at higher rates, may result in commercially unacceptable visible residues. Fungicides, some insecticide formulations, and some wetting agents and spreaders may kill the spores. Pollinator application method: For suppression. Uses a microbial inoculum dispenser that is attached to the front of the bumble bee hive. When used as directed, the impact on bees is minimal, and is compatible with the release of some biological control agents, including *Aphidius colemani, Amblyseius swirskii, Encarsia formosa*, and *Eretmocerus eremicus*. Do not release *Orius insidiosus* in the presence of bee-vectored BotaniGard 22WP. See label for more details. **REI: Foliar: 4 hr; Bee-vectored: 0**
	Beauveria bassiana PPRI 5339	Velifer	450–900 mL/1,000 L water	0	Apply in sufficient water volume for uniform coverage, but not to the point of run-off. Repeat application every 3–10 days. Use the higher concentration and shorter application intervals when pest population densities are high. May be harmful to beneficial insects and bees. **REI: 4 hr**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
APHIDS (cont'd)					
NC	canola oil	Vegol Crop Oil*	1 part concentrate: 50 parts water (2% solution)	0	Apply at first sign of insect presence. Thoroughly spray plants until the plant parts are wet, including underside of leaves. Insects, including eggs, must be contacted with spray. Do not exceed 4 applications per year. Minimum interval between applications is 7 days. Toxic to beneficial insects. **REI: NS**
	mineral oil	Purespray Green Spray Oil 13E*	10 L/1,000 L water (1% solution)/ha	NS	Deters feeding. Apply when pest first appears. Repeat application every 7–14 days. For effective control, thorough coverage is essential. Do not exceed label rate, otherwise phytotoxicity may result. **REI: 12 hr**
	potassium salts of fatty acids	Kopa Insecticidal Soap*	8 L/400 L water	0	Spray early in morning or evening or when overcast. Combining this product with sulphur or applying this product within 3 days of sulphur application may increase the plant damage caused by sulphur on sensitive plants. Do not tank mix with sulphur when temperatures are higher than 32°C. **REI: NS**
		Neudosan Commercial*			
		Opal Insecticidal Soap*			
		Opal2 Insecticidal Soap*	2 L/100 L water applying 250 L/4,000 m^2		Repeat application bi-monthly or when aphids reach treatment levels using concentrated high-volume power sprayers. **REI: NS**
		Safer's Insecticidal Soap Concentrate*			
NC + 3A	potassium salts of fatty acids + pyrethrins	Safer's Trounce Insecticidal Soap*	5 L/100 L and apply 250 L spray solution/ 4,000 m^2	1	Repeat application bi-monthly or when aphids reach treatment levels using concentrated high-volume power sprayers. **REI: NS**
BANANA MOTH (*Opogona sacchari*)					
11A	*Bacillus thuringiensis* subsp. *kurstaki* strain EVB113-19	Bioprotec 3P DF*	0.8 kg/1,000 L water	0	Foliar application. Make application just prior to egg hatch. Apply the product such that it flows along the stem, coating it well. Thorough coverage of foliage and stems is necessary (minimum of 300 L water/ha). Repeat application every 7 days as needed. **REI: NS**
		Bioprotec CAF*	1.6 L/1,000 L water		
BEET ARMYWORM (*Spodoptera exigu*)					
11A	*Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857	XenTari WG*	500–1,000 g/ha	0	Treat when larvae are young (early instars) before the crop is damaged. Use sufficient spray volume to ensure thorough coverage but not to the point of run-off. Best results are obtained if applications are made in the evening or on a cloudy day. Repeat applications every 3–14 days as needed. This product is toxic to bees and certain beneficial insects. **REI: Re-enter into treated areas only after spray is dried.**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

LEGEND: PHI = pre-harvest interval (in days) NS = no information was provided on the product label REI = re-entry interval N/A = not applicable

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
CORN EARWORM (Tomato Fruitworm) (*Helicoverpa (=Heliothis) zea*)					
11A	*Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857	XenTari WG*	500–1,000 g/ha	0	Treat when larvae are young (early instars) before the crop is damaged. Use sufficient spray volume to ensure thorough coverage but not to the point of run-off. Best results are obtained if applications are made in the evening or on a cloudy day. Repeat applications every 3–14 days as needed. This product is toxic to bees and certain beneficial insects. **REI: Re-enter into treated areas only after spray is dried.**
DUPONCHELIA FOVEALIS					
11A	*Bacillus thuringiensis* subsp. *kurstaki* strain ABTS-351	DiPel 2X DF*	625 g/1,000 L water	0	Make applications when egg hatch is essentially complete when larvae are small but before crop damage occurs. Apply the product such that it flows along the stem, coating it well. Thorough coverage of foliage and stem is necessary. Repeat application every 7 days as needed. **REI: NS**
	Bacillus thuringiensis subsp. *kurstaki* strain EVB113-19	Bioprotec 3P DF*	0.8 kg/1,000 L water		
		Bioprotec CAF*	1.6 L/1,000 L water		
EARWIGS					
NC	potassium salts of fatty acids	Opal2 Insecticidal Soap*	1 part concentrate: 50 parts water	0	Insects must be sprayed directly to achieve proper control. **REI: NS**
		Safer's Insecticidal Soap Concentrate*			
EUROPEAN CORN BORER (*Ostrinia nubilalis*)					
5	spinetoram	Delegate WG	92–132 g/1,000 L water	2	Use the higher rate when insect populations are high and/or insects are large. Apply when eggs hatch and first instar larvae are present. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. Do not apply by a fogger or mister. **REI: 12 hr**
	spinosad	Entrust 80 WG*	30 g/1,000 L water	2	Maximum application volume that can be used is 2,000 L per hectare. Apply when eggs hatch and first instar larvae are present. Do not apply by a fogger or mister. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. **REI: 12 hr**
		Entrust SC*	100 mL/1,000 L water		
		Success	50 mL/1,000 L water		
18	tebufenozide	Confirm 240F	0.6 L/400 L water/ha	3	Good spray coverage is essential for control. Repeat application every 7 days. Do not exceed 4 applications per year. Effective against larval Lepidoptera, however, it is essentially non-toxic to adult bees and does not adversely affect beneficial insects such as predatory mites, beetles, wasps and spiders. **REI: 12 hr**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
FUNGUS GNATS					
11A	*Bacillus thuringiensis* subsp. *israelensis*, serotype H-14, strain AM 65-52	VectoBac 600L	**Light to moderate infestation:** 2–4 L/1,000 L **Heavy infestation:** 4–8 L/1,000 L water	NS	Apply weekly as a soil drench or when pest monitoring indicates the need. This product is a larvicide and will not control adult gnats. **REI: NS**
LEAFHOPPERS					
4D	flupyradifurone	Altus	**Foliar:** 500–750 mL/ha **Drench:** 750–1,000 mL/ha (7.5–10 mL/100 m^2)	3	Thorough, uniform coverage of the crop is required for optimum control. Use the higher rate for higher pest infestation levels. Minimum application volume is 500 L per hectare. **Foliar:** Use appropriate spray volume for adequate crop foliage spray coverage. Spray crop to wet but not to the point of run-off. **Drench:** Application to soil or soilless media should be made with sufficient water to ensure incorporation into the root zone. Follow with moderate irrigation. Irrigate carefully within the next 10 days to avoid loss of active ingredient due to leaching. Minimum interval between applications is 10 days. Do not exceed 2,000 mL per hectare per crop cycle. **REI: 12 hr**
LEAFMINERS					
11A	*Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857	XenTari WG*	500–1,000 g/ha	0	**Tomato leafminer (*Tuta absoluta*)** Treat when larvae are young (early instars) before the crop is damaged. Use sufficient spray volume to ensure thorough coverage but not to the point of run-off. Best results are obtained if applications are made in the evening or on a cloudy day. Repeat applications every 3–14 days as needed. This product is toxic to bees and certain beneficial insects. **REI: Re-enter into treated areas only after spray is dried.**
	Bacillus thuringiensis subsp. *kurstaki* strain ABTS-351	DiPel 2X DF*	500–1,000 g/1,000 L water	0	**Lepidopteran leafminers** Apply at egg hatch. Thorough coverage of foliage and stems is necessary. Repeat application every 7–10 days as needed. **REI: NS**
18	tebufenozide	Confirm 240F	0.6 L/ha	3	**Lepidopteran leafminers** For suppression. Foliar application only. Use a high-volume sprayer. Apply at first egg hatch. Repeat application as needed. Do not exceed 4 applications per crop cycle. Minimum interval between applications is 10 days. Effective against larval Lepidoptera, however, it is essentially non-toxic to adult bees and does not adversely affect beneficial insects such as predatory mites, beetles, wasps and spiders. **REI: 12 hr**
28	chlorantraniliprole	Coragen	200 mL/1,000 L water	1	**Lepidopteran leafminers** Apply at egg hatch. Repeat application as needed. Thorough coverage is important to obtain optimum control. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. Do not exceed a total of 750 mL product per hectare per crop cycle. Apply in a maximum finished spray volume of 1,250 per hectare. **REI: 12 hr**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
LEAFROLLERS					
1B	naled	Dibrom	**Vapour:** 9.6 mL/100 m^3 **Fog:** 6.7–13.4 mL/100 m^2	N/A	Do not exceed 1 application per crop cycle, after the last harvest at the end of the cropping cycle. Vapour treatment: Apply to cold pipes using a plastic squeeze bottle when plants are dry. Do not apply using a paint brush or any other method. Do not apply to hot pipes. Fogging treatment: Apply with automated fogging equipment only. All workers must evacuate the premises during the fogging operations. **REI: 48 hr (must be fully ventilated before re-entry)**
LOOPERS					
5	spinetoram	Delegate WG	92–132 g/1,000 L water	2	**Cabbage looper (*Trichoplusia ni*)** Use the higher rate when insect populations are high and/or insects are large. Apply when eggs hatch and first instar larvae are present. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. Do not apply by a fogger or mister. **REI: 12 hr**
	spinosad	Entrust 80 WG*	72 g/1,000 L water	2	**Cabbage looper (*Trichoplusia ni*)** Maximum application volume that can be used is 1,000 L per hectare. Apply when eggs hatch and first instar larvae are present. Do not apply by a fogger or mister. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. **REI: 12 hr**
		Entrust SC*	240 mL/1,000 L water		
		Success	120 mL/1,000 L water		
11A	*Bacillus thuringiensis* subsp. *kurstaki* strain ABTS-351	DiPel 2X DF*	75–150 g/250 L water	0	**Cabbage looper (*Trichoplusia ni*)** Apply at egg hatch to target young larvae (early instars). For best control, thorough coverage is required. Under heavy population pressure, or for larger larvae, shorten the spray interval or use the higher rate range. Repeat application every 3–14 days as needed. Do not exceed 4 applications per season. **REI: NS**
		DiPel WP*	150–300 g/250 L water/ 4,000 m^2	NS	**Cabbage looper (*Trichoplusia ni*)** Apply to upper and lower portions of the leaves to the point of run-off. Repeat applications will be necessary if a new hatch occurs. **REI: NS**
		Foray 48BA	0.6–1.8 L/ 500–1,000 L water/ha (60–180 mL/1,000 m^2)	NS	**Cabbage looper (*Trichoplusia ni*)** Apply using a high-volume spray. Repeat applications every 10 days. In general, larvae should be treated when they are newly hatched. **REI: NS**
	Bacillus thuringiensis subsp. *kurstaki* strain EVB113-19	Bioprotec 3P DF*	0.92 kg/1,000 L water	0	**Cabbage looper (*Trichoplusia ni*)** Apply to young larvae at first signs of infestation. Repeat applications as needed to maintain control of young larvae. The timing and number of applications will depend on foliage development and larval activity, including egg hatch, stage of larval development and population pressure. Best results are obtained if applications are made in the evening or on a cloudy day. **REI: NS**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
LOOPERS (cont'd)					
11A (cont'd)	*Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857	XenTari WG*	500–1,000 g/ha	0	**Cabbage looper (*Trichoplusia ni*), tomato looper (*Chrysodeixis chalcites*)** Treat when larvae are young (early instars) before the crop is damaged. Use sufficient spray volume to ensure thorough coverage but not to the point of run-off. Best results are obtained if applications are made in the evening or on a cloudy day. Repeat applications every 3–14 days as needed. This product is toxic to bees and certain beneficial insects. **REI: Re-enter into treated areas only after spray is dried.**
13	chlorfenapyr	Pylon	30 mL/100 L water	0	**Alfalfa looper (*Autographa californica*), Cabbage looper (*Trichoplusia ni*)** For suppression. Maximum number of applications per crop cycle is 1. Do not apply using a spray volume greater than 1,000 L per hectare. Do not apply as an ultra-low-volume (ULV) spray. Do not apply through any type of irrigation equipment. This product is toxic to bees and certain beneficial insects. **REI: 12 hr**
18	tebufenozide	Confirm 240F	0.6 L (140 g a.i.)/ 400 L water/ha	3	**Cabbage looper (*Trichoplusia ni*)** Foliar application only. Do not exceed 4 applications per crop cycle. Minimum interval between applications is 7 days. Effective against larval Lepidoptera, however, it is essentially non-toxic to adult bees and does not adversely affect beneficial insects such as predatory mites, beetles, wasps and spiders. **REI: 12 hr**
28	chlorantraniliprole	Coragen	125 mL/1,000 L water	1	**Cabbage looper (*Trichoplusia ni*)** Begin applications when treatment thresholds have been reached. Thorough coverage is required to obtain optimum control. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. Do not exceed a total of 750 mL product per hectare per crop cycle. The maximum finished spray volume is 2,000 L per hectare. **REI: 12 hr**
28	cyantraniliprole	Exirel	250 mL/ha	1	**Cabbage looper (*Trichoplusia ni*)** Thorough coverage is required to obtain optimum control. Select a spray volume appropriate for the size of plants and density of foliage. Do not apply in irrigation water. Use of mist blowers, thermal foggers, ultra-low volume (ULV) and electrostatic sprayers is not permitted. Do not exceed 4 applications per crop cycle. Minimum interval between applications is 7 days. Toxic to bees and certain beneficial insects. **REI: 12 hr**
NC	*Autographa californica Nucleopolyhedrovirus* FV11	Loopex*	50–200 mL/400 L water	0	**Cabbage looper (*Trichoplusia ni*)** Application timing should target small larvae and be applied using high-volume spray systems (minimum 400 L/ha). Uniform spray deposit coverage of the foliage is essential for optimum control. Repeat applications every 7–14 days as needed. **REI: Re-enter into treated areas only after spray is dried.**

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
LYGUS BUGS (TARNISHED PLANT BUG)					
15	novaluron	Rimon 10 EC	835 mL/ha	1	For control of nymphs of Lygus bugs including *Lygus lineolaris*. Apply when the majority of the population is at egg hatch to the second instar. Apply in a maximum spray volume of 935 L water per hectare. Apply in sufficient water volume to ensure thorough coverage. Use the higher spray volumes when foliage canopy is dense and pest pressure is high. Repeat applications every 7 days as needed. Do not exceed 3 applications per crop cycle. Toxic to certain beneficial insects (e.g. predatory mites, parasitoid wasps) and may be toxic to bee colonies exposed to direct treatment, drift, or residues on flowering crops or weeds. **REI: 12 hr**
29	flonicamid	Beleaf 50 SG	**Foliar:** 0.3 g/L water **Drip:** 30 mg/plant	0	Suppression only for foliar application. Apply before populations reach economic thresholds or as populations begin to increase, but before damaging populations become established. Minimum interval between applications is 7 days. Do not exceed 2 applications per crop cycle (no more than 1 application per crop cycle may be foliar). Foliar application method: Apply sufficient volume to ensure good coverage, up to 1,000 L per hectare. The maximum volume should be used when plant foliage is dense. Do not exceed 1 foliar application per crop cycle. Drip application method: Apply through drip (trickle) irrigation systems or drench by hand using sufficient water volume to ensure delivery of the product to the roots. Do not apply this product through any other type of irrigation system. **REI: 12 hr**
MEALYBUGS					
1B	naled	Dibrom	**Vapour:** 9.6 mL/100 m^3 **Fog:** 6.7–13.4 mL/100 m^2	N/A	Do not exceed 1 application per crop cycle, after the last harvest at the end of the cropping cycle. Vapour treatment: Apply to cold pipes using a plastic squeeze bottle when plants are dry. Do not apply using a paint brush or any other method. Do not apply to hot pipes. Fogging treatment: Apply with automated fogging equipment only. All workers must evacuate the premises during the fogging operations. **REI: 48 hr (must be fully ventilated before re-entry)**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
MEALYBUGS (cont'd)					
NC	canola oil	Vegol Crop Oil*	1 part concentrate: 50 parts water (2% solution)	0	Apply at first sign of insect presence. Thoroughly spray plants until the plant parts are wet, including underside of leaves. Insects, including eggs, must be contacted with spray. Do not exceed 4 applications per year. Minimum interval between applications is 7 days. Toxic to beneficial insects. **REI: NS**
	potassium salts of fatty acids	Opal2 Insecticidal Soap*	1 part concentrate: 50 parts water	0	Insects must be sprayed directly to achieve proper control. Repeat applications as needed. **REI: NS**
		Safer's Insecticidal Soap Concentrate*			
MITES					
1B	naled	Dibrom	**Vapour:** 9.6 mL/100 m^3 **Fog:** 6.7–13.4 mL/100 m^2	N/A	**Two-spotted spider mite (*Tetranychus urticae*)** Do not exceed 1 application per crop cycle, after the last harvest at the end of the cropping cycle. Vapour treatment: Apply to cold pipes using a plastic squeeze bottle when plants are dry. Do not apply using a paint brush or any other method. Do not apply to hot pipes. Fogging treatment: Apply with automated fogging equipment only. All workers must evacuate the premises during the fogging operations. **REI: 48 hr (must be fully ventilated before re-entry)**
6	abamectin	Avid 1.9% EC	30 mL/100 L water	3	**Two-spotted spider mite (*Tetranychus urticae*)** Application should be made in 2,000–4,000 L water per hectare. Do not exceed 1,200 mL or apply less than 600 mL product per hectare per application. Use in sufficient water to obtain uniform coverage. Application is limited to between February and October and/or when daily light intensity in the greenhouse is at levels higher than 700 joules per cm^2 per day. Do not exceed 5 applications per crop cycle. Do not exceed 6,000 mL product per hectare per crop cycle. Do not apply through any type of irrigation system. **REI: Re-enter treated areas only after spray is dried.**
13	chlorfenapyr	Pylon	20–30 mL/100 L water	0	**Two-spotted spider mite (*Tetranychus urticae*)** For suppression. Do not exceed 1 application per crop cycle. Do not apply using a spray volume greater than 1,000 L per hectare. Do not apply as an ultra-low-volume (ULV) spray. Do not apply through any type of irrigation equipment. This product is toxic to bees and certain beneficial insects. **REI: 12 hr**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
MITES (cont'd)					
20B	acequinocyl	Shuttle 15 SC	0.21–0.46 L/500 L water (0.07–0.15 g a.i./L of solution)	1	**Two-spotted spider mite (*Tetranychus urticae*)** Apply as a full coverage spray to the foliage. Thorough coverage is essential for effective control. Actual spray volume will vary depending on the size of the plants being sprayed. Application should be made as soon as the mite population reaches economic infestation levels. Apply the higher concentration for heavy pest infestations. Minimum interval between applications is 21 days. Do not exceed 2 applications per crop (0.69 kg a.i./ha). **REI: 12 hr**
20D	bifenazate	Floramite SC	125 mL (30 g a.i.)/ 400 L water	1	**Two-spotted spider mite (*Tetranychus urticae*)** Apply as a full coverage spray to the foliage to obtain uniform coverage. Actual spray volume will vary depending on the size of the plants being treated. Application should be made as soon as mites appear and will provide residual control for up to 28 days. Do not exceed 2 applications per crop cycle. Make only 1 application of this product before rotating to products of an alternate chemical class. This product is primarily active on the motile stages of mites. It is not effective against rust mites, broad mites and flat mites. **REI: 12 hr**
21A	pyridaben	Dyno-Mite WP SanMite WP	284 g/1,000 L water/ha	3	**Two-spotted spider mite (*Tetranychus urticae*)** Do not exceed 2 applications per crop cycle. Apply when mites first appear and before the threshold of 5 mites per leaf is reached. Do not apply this product through any type of irrigation system. Do not apply as a fog. **REI: 12 hr**
	fenpyroximate	FujiMite	2.5 L/ha	1	**Two-spotted spider mite (*Tetranychus urticae*)** Apply when pests are in immature stages or when populations reach economic thresholds. Apply in a minimum spray volume of 1,000 L per hectare to ensure thorough coverage of the foliage. Do not exceed 1 application per crop cycle. Toxic to certain beneficial insects. **REI: 12 hr**
23	spiromesifen	Forbid 240 SC	30–50 mL/100 L water (0.03%–0.05% solution)	3	**Two-spotted spider mite (*Tetranychus urticae*)** Apply under high pest population pressure. Repeat application every 10–14 days as needed. Do not exceed 2 applications per crop cycle. Avoid applying during the warmest part of the day. Mite juvenile stages are often more susceptible than adults. Toxic to certain beneficial insects. Residues on pollen and nectar may harm bee brood. **REI: 12 hr**

[1] See Appendix F for IRAC group definitions.

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
MITES (cont'd)					
UNF	*Beauveria bassiana* PPRI 5339	Velifer	450–900 mL/1,000 L water	0	**Two-spotted spider mite (*Tetranychus urticae*)** Apply in sufficient water volume for uniform coverage, but not to the point of runoff. Repeat application every 3–10 days. Use the higher concentration and shorter application intervals when pest population densities are high. May be harmful to beneficial insects and bees. **REI: 4 hr**
	Metarhizium anisopliae strain F52	Met52 EC	**Foliar:** 0.5–5 L/1,000 L water	0	Foliar application method: Reduces pest numbers. Use the higher application concentration when pest pressure is high. Repeat application every 5–10 days as needed. Spray to wet all foliage but not to the point of run-off. Do not apply through a thermal pulse fogger. **REI: Re-enter treated areas only after spray is dried.**
NC	canola oil	Vegol Crop Oil*	1 part concentrate: 50 parts water (2% solution)	0	Apply at first sign of mite presence. Thoroughly spray plants until the plant parts are wet, including underside of leaves. Mites, including eggs, must be contacted with spray. Do not exceed 4 applications per year. Minimum interval between applications is 7 days. Toxic to beneficial insects. **REI: NS**
	mineral oil	Purespray Green Spray Oil 13E*	10 L/ 1,000 L water (1% solution)/ha	NS	For suppression. Apply when pest first appears. Repeat applications every 7–14 days. For effective control, thorough coverage is essential. Do not exceed label rate, otherwise phytotoxicity may result. **REI: 12 hr**
	potassium salts of fatty acids	Kopa Insecticidal Soap*	8 L/400 L water	0	Spray early in morning or evening or when overcast. Combining this product with sulphur or applying this product within 3 days of sulphur application may increase the plant damage caused by sulphur on sensitive plants. Do not tank mix with sulphur when temperatures are higher than 32°C. **REI: NS**
		Neudosan Commercial*			
		Opal Insecticidal Soap*			
		Opal2 Insecticidal Soap*	1 part concentrate: 50 parts water		**Two-spotted spider mite (*Tetranychus urticae*)** Insects must be sprayed directly to achieve proper control. Repeat application every week for 2–3 weeks. **REI: NS**
		Safer's Insecticidal Soap Concentrate*			
NC + 3A	potassium salts of fatty acids + pyrethrins	Safer's Trounce Insecticidal Soap*	5 L/100 L water	1	**Two-spotted spider mite (*Tetranychus urticae*)** Repeat application every week for 2–3 weeks, and thereafter as needed. If possible, foliage should be misted daily with water until mite control is achieved. **REI: NS**

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Table 6–1. Products registered for greenhouse pepper insect and mite pests

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
PEPPER MAGGOT (*Zonosemata electa*)					
28	cyantraniliprole	Exirel	1,000–1,500 mL/ha	1	For suppression. Thorough coverage is required to obtain optimum control. Use the higher listed rate and higher spray volumes for large plants or dense foliage. Must be controlled at adult stage. Control may not be possible once oviposition has occurred. Do not apply in irrigation water. Do not exceed 4 applications per crop cycle. Minimum interval between applications is 7 days. Toxic to bees and certain beneficial insects. **REI: 12 hr**
PEPPER WEEVIL (*Anthonomus eugenii*)					
1B	naled	Dibrom	**Vapour:** 9.6 mL/100 m^3 **Fog:** 6.7–13.4 mL/100 m^2	N/A	Do not exceed 1 application per crop cycle, after the last harvest at the end of the cropping cycle. Vapour treatment: Apply to cold pipes using a plastic squeeze bottle when plants are dry. Do not apply using a paint brush or any other method. Do not apply to hot pipes. Fogging treatment: Apply with automated fogging equipment only. All workers must evacuate the premises during the fogging operations. **REI: 48 hr (must be fully ventilated before re-entry)**
4A	thiamethoxam	Flagship WG	14 g/100 L water	1	For suppression. Apply before pests reach damaging levels. Apply in sufficient water volume to ensure thorough coverage, up to a maximum of 2,000 L per hectare. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. Toxic to bees and other beneficial insects. Avoid application when bees or other beneficial insects are actively visiting the treatment area. **REI: 12 hr**
15	novaluron	Rimon 10 EC	835 mL/ha	1	Reduces pest numbers. Apply at initial flowering stage. Apply in a maximum spray volume of 935 L water per hectare. Apply in sufficient water volume to ensure thorough coverage. Use higher spray volumes when foliage canopy is dense and pest pressure is high. Repeat application every 7 days as needed. Do not exceed 3 applications per crop cycle. Toxic to certain beneficial insects (e.g. predatory mites, parasitoid wasps) and may be toxic to bee colonies exposed to direct treatment, drift, or residues on flowering crops or weeds. **REI: 12 hr**
28	cyantraniliprole	Exirel	1,000–1,500 mL/ha	1	For suppression. Thorough coverage is required to obtain optimum control. Use the higher listed rate and higher spray volumes for large plants or dense foliage. Do not apply in irrigation water. Do not exceed 4 applications per crop cycle. Minimum interval between applications is 7 days. Toxic to bees and certain beneficial insects. **REI: 12 hr**

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Table 6–1. Products registered for greenhouse pepper insect and mite pests

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
PSYLLIDS					
1B	naled	Dibrom	**Vapour:** 9.6 mL/100 m^3 **Fog:** 6.7–13.4 mL/100 m^2	N/A	**Tomato psyllid (*Bactericerca cockerelli*)** Do not exceed 1 application per crop cycle, after the last harvest at the end of the cropping cycle. Vapour treatment: Apply to cold pipes using a plastic squeeze bottle when plants are dry. Do not apply using a paint brush or any other method. Do not apply to hot pipes. Fogging treatment: Apply with automated fogging equipment only. All workers must evacuate the premises during the fogging operations. **REI: 48 hr (must be fully ventilated before re-entry)**
6	abamectin	Avid 1.9% EC	30 mL/100 L water	3	**Tomato psyllid (*Bactericerca cockerelli*)** Application should be made in 2,000–4,000 L water per hectare. Do not exceed 1,200 mL or apply less than 600 mL product per hectare per application. Use in sufficient water to obtain uniform coverage. Application is limited to between February and October and/or when daily light intensity in the greenhouse is at levels higher than 700 joules/cm^2 per day. Do not exceed 5 applications per crop cycle. Do not exceed 6,000 mL product per hectare per crop cycle. Do not apply through any type of irrigation system. **REI: Re-enter treated areas only after spray is dried.**
NC	canola oil	Vegol Crop Oil*	1 part concentrate: 50 parts water (2% solution)	0	Apply at first sign of insect presence. Thoroughly spray plants until the plant parts are wet, including underside of leaves. Insects, including eggs, must be contacted with spray. Do not exceed 4 applications per year. Minimum interval between applications is 7 days. Toxic to beneficial insects. **REI: NS**
	potassium salts of fatty acids	Opal2 Insecticidal Soap*	1 part concentrate: 50 parts water	0	Insects must be sprayed directly to achieve proper control. **REI: NS**
		Safer's Insecticidal Soap Concentrate*			
SCALE					
NC	canola oil	Vegol Crop Oil*	1 part concentrate: 50 parts water (2% solution)	0	Apply at first sign of insect presence. Thoroughly spray plants until the plant parts are wet, including underside of leaves. Insects, including eggs, must be contacted with spray. Do not exceed 4 applications per year. Minimum interval between applications is 7 days. Toxic to beneficial insects. **REI: NS**

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Table 6–1. Products registered for greenhouse pepper insect and mite pests

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
THRIPS					
5	spinetoram	Delegate WG	92–132 g/1,000 L water	2	**Western flower thrips (*Frankliniella occidentalis*)** For suppression. Use the higher rate when insect populations are high and/or insects are large. Apply when western flower thrips first appear. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. Do not apply by a fogger or mister. **REI: 12 hr**
	spinosad	Entrust 80 WG*	30 g/1,000 L water	2	**Western flower thrips (*Frankliniella occidentalis*)** For suppression. Maximum application volume that can be used is 2,000 L per hectare. Apply when western flower thrips first appears. Do not apply by a fogger or mister. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 7 days. **REI: 12 hr**
		Entrust SC*	100 mL/1,000 L water		
		Success	50 mL/1,000 L water		
28	cyantraniliprole	Exirel	500–1,000 mL/ha	1	For suppression. Thorough coverage is required to obtain optimum control. Use the higher listed rate and higher spray volumes for large plants or dense foliage. If thrips populations are above thresholds, use a registered knockdown product before application. Do not apply in irrigation water. Use of mist blowers, thermal foggers, ultra-low volume (ULV) and electrostatic sprayers is not permitted. Do not exceed 4 applications per crop cycle. Minimum interval between applications is 7 days. Toxic to bees and certain beneficial insects. **REI: 12 hr**
29	flonicamid	Beleaf 50 SG	**Foliar:** 0.3 g/L water **Drip:** 30 mg/plant	0	Suppression only for foliar application. Minimum interval between applications is 7 days. Do not exceed 2 applications per crop cycle (no more than 1 application per crop cycle may be foliar). Foliar application method: Apply sufficient volume to ensure good coverage, up to 1,000 L per hectare. The maximum volume should be used when plant foliage is dense. Do not apply more than 1 foliar application per crop cycle. Drip application method: Apply through drip (trickle) irrigation systems or drench by hand using sufficient water volume to ensure delivery of the product to the roots. Do not apply this product through any other type of irrigation system. **REI: 12 hr**

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
THRIPS (cont'd)					
UNF	*Beauveria bassiana* strain ANT-03	Bio-Ceres G WP*	2–4 g/L water	0	Reduces pest numbers. Begin treatment of crops at the first appearance of the pest. Application rates, frequency, spray coverage and insect numbers impact the speed at which acceptable control is achieved. Depending on crop treated, 500–1,000 L per hectare of spray volume will typically be required. This product is most effective when used early, before high insect populations develop. Repeat application within 7 days as needed. This product may be toxic to bees exposed to direct treatment or drift. Do not apply this product while bees are actively foraging. **REI: Re-enter treated areas only after spray is dried.**
	Beauveria bassiana strain GHA	BotaniGard 22WP	500–1,000 g/400 L water	0	Foliar application method: Spray to wet but not to the point of run-off. Repeat application every 5–10 days as needed. High populations may require 2–5-day intervals. Product use, especially at higher rates, may result in commercially unacceptable visible residues. Fungicides, some insecticide formulations, and some wetting agents and spreaders may kill the spores. Pollinator application method: For suppression. Uses a microbial inoculum dispenser that is attached to the front of the bumble bee hive. When used as directed, the impact on bees is minimal and is compatible with the release of some biological control agents, including *Aphidius colemani*, *Amblyseius swirskii*, *Encarsia formosa*, and *Eretmocerus eremicus*. Do not release *Orius insidiosus* in the presence of bee-vectored BotaniGard 22WP. See label for more details. **REI: Foliar: 4 hr; Bee-vectored: 0**
	Beauveria bassiana PPRI 5339	Velifer	450–900 mL/1,000 L water	0	Apply in sufficient water volume for uniform coverage, but not to the point of run-off. Repeat application every 3–10 days. Use the higher concentration and shorter application intervals when pest population densities are high. May be harmful to beneficial insects and bees. **REI: 4 hr**
	Metarhizium anisopliae strain F52	Met52 EC	**Foliar:** 0.5–5 L/1,000 L water **Drench:** 108 mL/10 L water	0	Foliar application method: Reduces pest numbers. Use the higher application concentration when pest pressure is high. Repeat application every 5–10 days as needed. Spray to wet all foliage but not to the point of run-off. Do not apply through a thermal pulse fogger. Drench application method: May reduce pest numbers. Drench application should be thoroughly watered-in without causing water to come out of the bottom of the pots/grow bags. Depending on the growing media type and moisture, this will be around 250 mL/4-L pot or grow bag. Re-apply as required. The need for and timing of re-application should be determined by monitoring. Do not apply via drip irrigation. **REI: Re-enter treated areas only after spray is dried.**
NC	mineral oil	Purespray Green Spray Oil 13E*	10 L/ 1,000 L water (1% solution)/ha	NS	For suppression. Apply when pest first appears. Repeat application every 7–14-days. For effective control, thorough coverage is essential. Do not exceed label rate, otherwise phytotoxicity may result. **REI: 12 hr**

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
TOBACCO BUDWORM (*Heliothis virescens*)					
11A	*Bacillus thuringiensis* subsp. *aizawai* strain ABTS-1857	XenTari WG*	500–1,000 g/ha	0	Treat when larvae are young (early instars) before the crop is damaged. Use sufficient spray volume to ensure thorough coverage but not to the point of run-off. Best results are obtained if applications are made in the evening or on a cloudy day. Repeat applications every 3–14 days as needed. This product is toxic to bees and certain beneficial insects. **REI: Re-enter treated areas only after spray is dried.**
13	chlorfenapyr	Pylon	30 mL/100 L water	0	For suppression. Do not exceed 1 application per crop cycle. Do not apply using a spray volume greater than 1,000 L per hectare. Do not apply as an ultra-low-volume (ULV) spray. Do not apply through any type of irrigation equipment. This product is toxic to bees and certain beneficial insects. **REI: 12 hr**
TOMATO HORNWORM (*Manduca quinquemaculata*)					
11A	*Bacillus thuringiensis* subsp. *kurstaki* strain EVB113-19	Bioprotec 3P DF*	0.46–0.92 kg/ 1,000 L water	0	Apply to young larvae at first signs of infestation. Repeat applications as necessary to maintain control of young larvae. The timing and number of applications will depend on foliage development and larval activity, including egg hatch, stage of larval development and population pressure. Best results are obtained if applications are made in the evening or on a cloudy day. **REI: NS**
13	chlorfenapyr	Pylon	30 mL/100 L water	0	For suppression. Do not exceed 1 application per crop cycle. Do not apply using a spray volume greater than 1,000 L per hectare. Do not apply as an ultra-low-volume (ULV) spray. Do not apply through any type of irrigation equipment. This product is toxic to bees and certain beneficial insects. **REI: 12 hr**
WHITEFLIES					
1B	naled	Dibrom	**Vapour:** 9.6 mL/100 m^3 **Fog:** 6.7–13.4 mL/100 m^2	N/A	Do not exceed 1 application per crop cycle, after the last harvest at the end of the cropping cycle. Vapour treatment: Apply to cold pipes using a plastic squeeze bottle when plants are dry. Do not apply using a paint brush or any other method. Do not apply to hot pipes. Fogging treatment: Apply with automated fogging equipment only. All workers must evacuate the premises during the fogging operations. **REI: 48 hr (must be fully ventilated before re-entry)**

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WHITEFLIES (cont'd)					
4A	imidacloprid	Intercept 60 WP	**Mature plants:** 16 g/70 L water/ 1,000 plants **Transplant tray plug drench:** 4.1 g/ 1,000 seedling plants	3	For use as a soil drench using micro-irrigation, drip irrigation, overhead irrigation, or hand-held or motorized calibrated irrigation equipment. Do not apply as a foliar application. Irrigate moderately but thoroughly after application, allowing no leaching and run-out from container for at least 10 days after application. Do not exceed 1 application per season. Mature plants: applications should be made when infestation pressure surpasses threshold and beneficials are not able to maintain pest populations below damage thresholds. Transplants: Apply to 2–3-week-old seedlings in flats at least 10 days prior to transplanting. Do not use less than 15 L solution/100 m^2 of seedling trays. May harm pollinators and certain beneficial insects. **REI: NS**
4D	flupyradifurone	Altus	**Foliar:** 750–1,000 mL/ha **Drench:** 1,500–2,000 mL/ha (15–20 mL/100 m^2)	3	Thorough, uniform coverage of the crop is required for optimum control. Use the higher rate for higher pest infestation levels. Minimum application volume is 500 L per hectare. Foliar: Use appropriate spray volume for adequate crop foliage spray coverage. Spray crop to wet but not to the point of run-off. Drench: Application to soil or soilless media should be made with sufficient water to ensure incorporation into the root zone. Follow with moderate irrigation. Irrigate carefully within the next 10 days to avoid loss of active ingredient due to leaching. Minimum interval between applications is 10 days. Do not exceed 2,000 mL per hectare per crop cycle. **REI: 12 hr**
7C	pyriproxyfen	Distance	45 mL/100 L water	3	**Greenhouse whitefly (*Trialeurodes vaporariorum*), silverleaf whitefly (*Bemisia tabaci* B biotype) and sweet potato whitefly (*Bemisia tabaci*)** Apply as a foliar spray mixture uniformly to all plant surfaces and to the point of run-off. Make first application when adult insects begin to appear. Repeat application after 14–28 days as needed. Use longer interval when plants are not growing rapidly. Do not exceed 2 applications per cropping cycle. If the cropping cycle is less than 6 months, do not exceed 2 applications per 6 months. **REI: 12 hr**

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
WHITEFLIES (cont'd)					
16	buprofezin	Talus	36-43 g/100 L	3	Apply when adults first appear. Use the higher application rate when pest pressure is high. Minimum interval between applications is 21 days. Do not exceed 2 applications per crop cycle. When using 36 g/100 L, apply no more than 870 L spray solution/ha. When using 43 g/100 L, apply no more than 730 L of spray solution/ha. **REI: 48 hr**
21A	fenpyroximate	FujiMite	2.5 L/ha	1	For suppression. Apply when pests are in immature stages or when populations reach economic thresholds. Apply in a minimum spray volume of 1,000 L per hectare to ensure thorough coverage of the foliage. Do not exceed 1 application per crop cycle. Toxic to certain beneficial insects. **REI: 12 hr**
23	spiromesifen	Forbid 240 SC	30–50 mL/100 L water (0.03%–0.05% solution)	3	**Greenhouse whitefly (*Trialeurodes vaporariorum*), silverleaf whitefly (*Bemisia tabaci* B biotype) and sweet potato whitefly (*Bemisia tabaci*)** Repeat application after 10–14 days as needed. Do not exceed 2 applications per crop cycle. Avoid applying during the warmest part of the day. Effective against nymphs and has some effect on the pupal stage. Will not reduce adult whitefly populations. Toxic to certain beneficial insects. Residues on pollen and nectar may harm bee brood. **REI: 12 hr**
	spirotetramat	Kontos	30–42 mL/100 L water **Maximum use rate per single application:** 300 mL/ha (72 g a.i./ha)	3	Use appropriate spray volume for adequate crop foliage spray coverage. Spray crop to wet but not to the point of run-off. Do not exceed a spray volume of 712–1,000 L per hectare (42–20 mL concentration). Use the higher concentration for higher pest infestation levels. Minimum interval between applications is 7–14 days. Do not exceed 900 mL (216 g a.i.) per hectare per crop cycle. Do not exceed 3 applications per crop cycle. Not acutely toxic to adult bees. Residues in/on pollen and nectar may harm bee brood. This product is toxic to certain beneficial insects. **REI: 12 hr**
28	cyantraniliprole	Exirel	750–1,000 mL/ha	1	For suppression. Thorough coverage is required to obtain optimum control. Use the higher listed rate and higher spray volumes for large plants or dense foliage. Do not apply in irrigation water. Use of mist blowers, thermal foggers, ultra-low volume (ULV) and electrostatic sprayers is not permitted. Do not exceed 4 applications per crop cycle. Minimum interval between applications is 7 days. Toxic to bees and certain beneficial insects. **REI: 12 hr**

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IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
WHITEFLIES (cont'd)					
UNF	*Beauveria bassiana* strain ANT-03	Bio-Ceres G WP*	2–4 g/L water	0	Reduces pest numbers. Begin treatment of crops at the first appearance of the pest. Application rates, frequency, spray coverage and insect numbers impact the speed at which acceptable control is achieved. Depending on crop treated, 500–1,000 L per hectare of spray volume will typically be required. This product is most effective when used early, before high insect populations develop. Repeat application within 7 days as needed. This product may be toxic to bees exposed to direct treatment or drift. Do not apply this product while bees are actively foraging. **REI: Re-enter treated areas only after spray is dried.**
	Beauveria bassiana strain GHA	BotaniGard 22WP	250–500 g/400 L water	0	Foliar application method: Spray to wet but not to the point of run-off. Repeat application every 5–10-days as needed. High populations may require 2–5-day intervals. Product use, especially at higher rates, may result in commercially unacceptable visible residues. Fungicides, some insecticide formulations, and some wetting agents and spreaders may kill the spores. Pollinator application method: For suppression. Uses a microbial inoculum dispenser that is attached to the front of the bumble bee hive. When used as directed, the impact on bees is minimal and is compatible with the release of some biological control agents, including *Aphidius colemani*, *Amblyseius swirskii*, *Encarsia formosa*, and *Eretmocerus eremicus*. Do not release *Orius insidiosus* in the presence of bee-vectored BotaniGard 22WP. See label for more details. **REI: Foliar: 4 hr; Bee-vectored: 0**
	Beauveria bassiana PPRI 5339	Velifer	450–900 mL/1,000 L water	0	Apply in sufficient water volume for uniform coverage, but not to the point of runoff. Repeat application every 3–10 days. Use the higher concentration and shorter application intervals when pest population densities are high. May be harmful to beneficial insects and bees. **REI: 4 hr**
	Metarhizium anisopliae strain F52	Met52 EC	0.5–5 L/1,000 L water	0	Foliar application method: Reduces pest numbers. Use the higher application concentration when pest pressure is high. Repeat application every 5–10 days as needed. Spray to wet all foliage but not to the point of run-off. Do not apply through a thermal pulse fogger. **REI: Re-enter treated areas only after spray is dried.**

[1] See Appendix F for IRAC group definitions.

Table 6–1. Products registered for greenhouse pepper insect and mite pests

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

LEGEND: PHI = pre-harvest interval (in days) NS = no information was provided on the product label REI = re-entry interval N/A = not applicable

* = product is potentially acceptable for organic production. Organic growers must always check with their certifying bodies to verify the acceptability of any product prior to using it.

IRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
WHITEFLIES (cont'd)					
NC	canola oil	Vegol Crop Oil*	1 part concentrate: 50 parts water (2% solution)	0	Apply at first sign of insect presence. Thoroughly spray plants until the plant parts are wet, including underside of leaves. Insects, including eggs, must be contacted with spray. Do not exceed 4 applications per year. Minimum interval between applications is 7 days. Toxic to beneficial insects. **REI: NS**
	mineral oil	Purespray Green Spray Oil 13E*	10 L/1,000 L water (1% solution)/ha	NS	Deters feeding. Apply when pest first appears. Repeat application every 7–14 days. For effective control, thorough coverage is essential. Do not exceed label rate, otherwise phytotoxicity may result. **REI: 12 hr**
	potassium salts of fatty acids	Kopa Insecticidal Soap*	8 L/400 L water	0	Spray early in morning or evening or when overcast. Combining this product with sulphur or applying this product within 3 days of sulphur application may increase the plant damage caused by sulphur on sensitive plants. Do not tank mix with sulphur when temperatures are higher than 32°C. **REI: NS**
		Neudosan Commercial*			
		Opal Insecticidal Soap*			
		Opal2 Insecticidal Soap*	1 part concentrate: 100 parts water		Insects must be sprayed directly to achieve proper control. Repeat application every 2 weeks. **REI: NS**
		Safer's Insecticidal Soap Concentrate*			
NC + 3A	potassium salts of fatty acids + pyrethrins	Safer's Trounce Insecticidal Soap*	5 L/100 L water	1	Repeat application every 2 weeks as needed. **REI: NS**

[1] See Appendix F for IRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

LEGEND: PHI = pre-harvest interval (in days) NS = no information was provided on the product label REI = re-entry interval

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
BACTERIAL CANKER (*Clavibacter michiganensis* subsp. *michiganensis*)					
24	kasugamycin	Kasumin 2L	1.2 L/240 L water/ha (100 ppm)	1	For suppression. Do not exceed 3 applications per season. Minimum interval between applications is 7 days. Do not make more than 2 sequential applications before switching to a product with a different mode of action. **REI: 12 hr**
M 01	copper octanoate	Cueva Commercial*	0.5%–2% solution applied at 470–940 L/ha	1	Repeat application every 5–10 days. Do not exceed 15 applications per year. If concerned about sensitivity of plants, apply to individual plants or small areas to determine if plant damage occurs. **REI: 4 hr**
BACTERIAL SPECK (BACTERIAL BLIGHT) (*Pseudomonas syringae* pv. *tomato*)					
44	*Bacillus subtilis* strain QST 713	Cease Rhapsody ASO*	1–2 L/100 L water	0	For suppression. Begin application soon after emergence/transplant and when conditions are conducive to disease development. Repeat application every 7–10days as needed. **REI: NS**
M 01	copper octanoate	Cueva Commercial*	0.5%–2% solution applied at 470–940 L/ha	1	Repeat application every 5–10 days. Do not exceed 15 applications per year. If concerned about sensitivity of plants, apply to individual plants or small areas to determine if plant damage occurs. **REI: 4 hr**
P 06	*Bacillus mycoides* isolate J	LifeGard WG*	0.33 g/L water	0	For suppression. Apply in sufficient volume to provide uniform coverage. Do not apply less than 70 g per hectare. Repeat applications every 7 days. **REI: 4 hr**
BACTERIAL SPOT (BACTERIAL LEAF SPOT) (*Xanthomonas campestris* pv. *vesicatoria*)					
24	kasugamycin	Kasumin 2L	1.2 L/240 L water/ha (100 ppm)	1	For suppression. Do not exceed 3 applications per season. Minimum interval between applications is 7 days. Do not make more than 2 sequential applications before switching to a product with a different mode of action. **REI: 12 hr**
44	*Bacillus subtilis* strain QST 713	Cease Rhapsody ASO*	1–2 L/100 L water	0	For suppression. Begin application soon after emergence or transplant and when conditions are conducive to disease development. Repeat application every 7–10 days as needed. **REI: NS**
M 01	copper octanoate	Cueva Commercial*	0.5%–2% solution applied at 470–940 L/ha	1	Repeat application every 5–10 days. Do not exceed 15 applications per year. If concerned about sensitivity of plants, apply to individual plants or small areas to determine if plant damage occurs. **REI: 4 hr**
P 05	*Reynoutria sachalinensis* extract	Regalia Maxx*	1.25–2.5 mL/L water (0.125%–0.25% v/v)	0	For suppression. Begin applications at the first sign of disease or when conditions become conducive for disease development. Repeat application every 7–10 days as needed. Use the shorter spray interval under high disease pressure. Spray to achieve complete coverage but not runoff. Do not apply in a spray volume of more than 1,500 L per hectare. **REI: Re-enter treated areas only after spray is dried.**
P 06	*Bacillus mycoides* isolate J	LifeGard WG*	0.33 g/L water	0	For partial suppression. Apply in sufficient volume to provide uniform coverage. Do not apply less than 70 g per hectare. Repeat applications every 7–14 days. **REI: 4 hr**

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

LEGEND: PHI = pre-harvest interval (in days) NS = no information was provided on the product label REI = re-entry interval

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
EARLY BLIGHT (*Alternaria solani*)					
7	penthiopyrad	Fontelis	1.25–1.75 L/ha	0	For suppression. Begin applications prior to disease development. Repeat application every 7–10 days. Use higher rate and shorter interval when disease pressure is high. Do not exceed 5.25 L per hectare per season. Make no more than 2 sequential applications before switching to a fungicide with a different mode of action. **REI: 12 hr**
19	polyoxin D zinc salt	Polyoxin D Zinc Salt 5SC	537–926 mL/ha (29–50 g a.i./ha)	0	For suppression. Apply as a foliar spray in sufficient water to provide thorough coverage of foliage (and fruit when present). Begin as preventative application when conditions favour disease development. Repeat application every 7–14 days as needed to maintain suppression. Do not exceed 150 g a.i. per hectare per year. **REI: Re-enter treated areas only after spray is dried.**
44	*Bacillus amyloliquefaciens* strain D747	Double Nickel 55*	0.5–2 kg/ha	0	Apply from flowering to fruiting. Repeat application every 3–10 days (or 3–7 days under high disease pressure) for as long as conditions favour disease development. **REI: Re-enter treated areas only after spray is dried.**
		Double Nickel LC*	2.5–10 L/ha		
M 01	copper octanoate	Cueva Commercial*	0.5%–2% solution applied at 470–940 L/ha	1	Repeat application every 5–10 days. Do not exceed 15 applications per year. If concerned about sensitivity of plants, apply to individual plants or small areas to determine if plant damage occurs. **REI: 4 hr**
P 06	*Bacillus mycoides* isolate J	LifeGard WG*	0.33 g/L water	0	For suppression. Apply in sufficient volume to provide uniform coverage. Do not apply less than 70 g per hectare. Repeat applications every 7 days. **REI: 4 hr**
GREY MOULD (BOTRYTIS BLIGHT, STEM CANKER) (*Botrytis cinerea*)					
7	fluopyram	Luna Privilege	500 mL/ha	0	Begin fungicide applications preventatively. Use sufficient water volume and spray pressure to provide thorough and uniform coverage. Do not exceed 2 applications per crop cycle. Minimum application interval is 6 weeks. Do not apply under low light conditions as crop injury may occur. Suggested spray volumes by crop height: 1.7 m: 1,000 L/ha 3.4 m: 1,500–2,000 L/ha **REI: 12 hr**
	penthiopyrad	Fontelis	1.25–1.75 L/ha	0	Begin applications prior to disease development. Repeat application every 7–10 days. Use higher rate and shorter interval when disease pressure is high. Do not exceed 5.25 L per hectare per season. Make no more than 2 sequential applications before switching to a fungicide with a different mode of action. **REI: 12 hr**

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
GREY MOULD (BOTRYTIS BLIGHT, STEM CANKER) (*Botrytis cinerea*) (cont'd)					
17	fenhexamid	Decree 50 WDG	1.5 kg/ha (0.75 kg a.i./ha)	1	Begin application when conditions favour disease development. Repeat application every 7–10 days If conditions continue to favour disease. Do not exceed 3 applications per crop cycle. **REI: 4 hr**
19	polyoxin D zinc salt	Polyoxin D Zinc Salt 5SC	463–926 mL/ha (25–50 g a.i./ha)	0	For suppression. Apply as a foliar spray in sufficient water to provide thorough coverage of foliage (and fruit when present). Begin as a preventative application when conditions favour disease development. Repeat application every 7–10 days as needed to maintain suppression. Do not exceed 150 g a.i. per hectare per year. **REI: Re-enter treated areas only after spray is dried.**
44	*Bacillus amyloliquefaciens* strain D747	Double Nickel 55*	**Foliar:** 1.25–3.6 kg/ha **Low disease pressure:** 0.9–1 kg/ha	0	For suppression. Use from flowering to fruit maturity. Repeat application every 3–10 days (or 3–7 days under high disease pressure) for as long as conditions favour disease development. **REI: Re-enter treated areas only after spray is dried.**
		Double Nickel LC*	**Foliar:** 6.25–18 L/ha **Low disease pressure:** 4.5–5 L/ha		
	Bacillus subtilis strain QST 713	Cease	1–2 L/100 L water	0	For suppression. Begin application when environmental conditions are conducive to disease development. Repeat application every 7–10 days as needed. **REI: NS**
		Rhapsody ASO*			
BM 01	BLAD polypeptide	Fracture	1.5–3.3 L/ha in a minimum of 200 L water/ha	0	Begin applications prior to onset of disease development. Repeat applications every 7–10 days. Use a higher rate and shorter interval when disease pressure is moderate to high. Do not exceed 5 applications per crop cycle. **REI: NS**
		Problad Plus			
BM 02	*Gliocladium catenulatum* strain J1446	Prestop*	0.5% aqueous suspension (25 g/5 L water)	NS	For suppression. Apply as a foliar spray treatment to plant stems and leaves. Spray to wet but not to run-off. Most effective when applied preventively, before disease starts. Repeat applications every 3–4 weeks. Use shorter intervals under conditions of moderate-to-high disease pressure. **REI: 4 hr**
	Trichoderma harzianum Rifai strain KRL-AG2	RootShield HC*	3.75–7.5 g/L water	NS	For suppression. Use a quantity of spray solution to thoroughly cover foliage. Spray to wet but not to the point of run-off. Use higher rates when conditions favour disease development or high disease pressure is anticipated. **REI: 4 hr**
NC	*Aureobasidium pullulans* DSM 14940 and DSM 14941	Botector*	1 kg/ha in 500–2,000 L water	0	Apply preventatively if climatic conditions are favourable for infection or at first sign of disease onset. Repeat application every 7–10 days as needed. Do not exceed 5 applications per year. **REI: 4 hr**

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
PHYTOPHTHORA BLIGHTS (LATE BLIGHT, PHYTOPHTHORA FOLIAR BLIGHT)					
21	cyazofamid	Torrent 400 SC	25 mL/100 L water	0	***Phytophthora capsici*** Make the first application of the solution as a soil drench to thoroughly wet the growing medium immediately at transplant. The second application, if needed, can be made 6–8 weeks later. Do not make sequential applications of other fungicides in the same group. Do not use a surfactant with this drench application. Do not apply a drench volume greater than 200 mL per plant per application. **REI: 12 hr**
40	mandipropamid	Revus	600 mL/ha (150 g a.i./ha)	1	***Phytophthora capsici (foliar phase)*** Applications should begin prior to disease development. Do not exceed 4 applications per season. **REI: 12 hr**
49	oxathiapiprolin	Orondis Orondis Ultra B Zorvec Enicade	0.175–0.35 L/ha	0	***Phytophthora infestans, Phytophthora capsici*** Foliar application only. Begin applications prior to disease development. Repeat applications every 5–14 days. Use the higher rate and shorter interval when disease pressure is high. Do not exceed 4 applications per crop cycle per year. Where multiple crop cycles are produced in the same year do not exceed 6 foliar applications or 1.4 L per hectare per year. Make no more than 2 sequential applications before switching to a fungicide with a different mode of action. **REI: 12 hr**
P 07	mono- and dibasic sodium, potassium, and ammonium phosphites	Phostrol	2.9–5.8 L/ha in a minimum of 225 L water/ha	0	***Phytophthora capsici*** For suppression. Begin applications when conditions favour disease development. Repeat applications every 7–14 days. Use the higher rate and shorter application interval when disease pressure is high. Do not exceed 4 applications per year. **REI: Allow entry only after thorough ventilation, spray mist has cleared and the treated surface has dried.**
	mono- and di-potassium salts of phosphorous acid	Confine Extra	5–10 L/ha in a minimum of 100 L water	1	***Phytophthora* spp., *Phytophthora infestans*** For suppression. Do not exceed 5 foliar and/or irrigation applications per growing season. Begin applications when conditions are favourable for disease. **REI: Allow entry only after thorough ventilation,spray mist has cleared and the treated surface has dried.**
		Rampart	**Foliar:** 3–8 L/1,000 L water/ha **Drench:** 5–7 L in a minimum of 1000 L water	0	***Phytophthora capsici*** For suppression. Use the higher rate and shorter application interval when disease pressure is high. Foliar: Apply lower rate every 2–4 weeks after plants become established. Drench: Apply with normal irrigation schedule. **REI: 4 hr. After REI, re-entry into treated areas is only permitted after thorough ventilation, spray mist has cleared and the treated surface has dried.**
M 01	copper octanoate	Cueva Commercial*	0.5%–2% solution applied at 470–940 L/ha	1	***Phytophthora infestans*** Repeat application every 5–10-days. Do not exceed 15 applications per year. If concerned about sensitivity of plants, apply to individual plants or small areas to determine if plant damage occurs. **REI: 4 hr**
P 06	*Bacillus mycoides* isolate J	LifeGard WG*	0.33 g/L water	0	For suppression. Apply in sufficient volume to provide uniform coverage. Do not apply less than 70 g per hectare. Repeat applications every 7 days. **REI: 4 hr**

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
POWDERY MILDEW					
3	myclobutanil	Nova WSP	340 g/ 1,500–3,000 L water/ha	3	Do not exceed 1 application per crop cycle. Apply as soon as possible after initial infection. **REI: 12 hr**
7	fluopyram	Luna Privilege	100 mL/ha	0	***Leveillula taurica*** Begin fungicide applications preventatively. Use sufficient water volume and spray pressure to provide thorough and uniform coverage. Do not exceed 3 applications per crop cycle. Minimum interval between applications is 6 weeks. Do not apply under low light conditions as crop injury may occur. Suggested spray volumes by crop height: 1.7 m: 1,000 L/ha 3.4 m: 1,500–2,000 L/ha **REI: 12 hr**
19	polyoxin D zinc salt	Polyoxin D Zinc Salt 5SC	278–926 mL/ha (15–50 g a.i./ha)	0	***Oidium neolycopersici*** Apply as a foliar spray in sufficient water to provide thorough coverage of foliage (and fruit when present). Begin as preventative application when conditions favour disease development. Repeat application every 7–14 days as needed to maintain suppression. Use a higher rate under conditions of high disease pressure. Do not exceed 150 g a.i. per hectare per year. **REI: Re-enter treated areas only after spray is dried.**
46	tea tree oil	Timorex Gold*	1–1.5 L/ 400–800 L water/ha	2	***Leveillula taurica*** Do not spray during the warm hours of the day and in hot seasons with temperatures above 35°C. Do not apply through any type of irrigation system. Good coverage and wetting of foliage is required. For preventive treatments, repeat application every 7–14 days as needed. Use shorter application intervals under conditions that promote rapid disease development. Do not apply with captan or sulphur, which could cause phytotoxicity. **REI: 24 hr**
7 + 11	boscalid + pyraclostrobin	Pristine WG	1.2 kg in a minimum of 250 L water/ha	1	***Leveillula taurica*** For suppression. Begin applications prior to disease development. Do not apply this product using any type of foggers or misters. Do not exceed 1 application per crop cycle. Do not use on plants that will be transplanted. **REI: 12 hr**
9 + 12	cyprodinil + fludioxonil	Palladium WG	775 g/ 475–2,000 L water/ha	1	***Leveillula taurica*** For suppression. Begin applications when conditions become favourable to disease but before infection. Repeat application every 7–10 days as needed. Make no more than 2 sequential applications before alternating with a treatment with another mode of action. Do not exceed 3 applications per crop cycle. **REI: 24 hr**
BM 02	*Streptomyces lydicus* strain WYEC 108	Actinovate SP	425 g/1,100 L water/ha	NS	***Leveillula taurica*** For suppression. Apply as a foliar spray to leaves and blossoms. Begin applications at transplant. Repeat application every 7 days. Spray to wet but not to the point of run-off. **REI: Do not enter treated area until spray is dried.**

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
POWDERY MILDEW (cont'd)					
M 02	sulphur	Agrotek Vaporized Sulphur*	0.4–3.2 g/1,000 m^2	NS	***Leveillula taurica*** Use 1 vaporizer per 1,000 m^2. Start using before plants show signs of infection. Use for 1–8 hr per night, 2–7 days per week. Do not apply if temperature is above 24°C and high humidity prevails. Certain species of beneficial insects are sensitive to sulphur. **REI: 2 hr**
		Bartlett Microscopic Wettable Sulphur*	543–760 g/ 1,000 L water/ha	NS	Do not exceed 10 applications per crop cycle. Minimum interval between applications is 14 days. Do not apply if high temperatures (above 26°C) and high humidity prevail or are expected during the 3 days following application. **REI: 24 hr**
P 05	*Reynoutria sachalinensis* extract	Regalia Maxx*	1.25–2.5 mL/L water (0.125%–0.25% v/v)	0	***Erysiphe cichoracearum, Leveillula taurica, Oidium neolycopersici*** For suppression. Begin applications at the first sign of disease, or when conditions become conducive for disease development. Repeat application every 7–10 days as needed. Use the shorter spray interval under high disease pressure. Spray to achieve complete coverage but not to the point of run-off. Do not apply in a spray volume of more than 1,500 L per hectare. **REI: Re-enter treated areas only after spray is dried.**
NC	mineral oil	Purespray Green Spray Oil 13E*	10 L/1,000 L water (1% solution)/ha	NS	***Leveillula taurica*** For suppression. Apply when conditions are favourable for disease development and/or when first symptoms appear. Repeat application every 7–14 days. For effective control, thorough coverage is essential. Do not exceed label rate, otherwise phytotoxicity may result. **REI: 12 hr**
	potassium bicarbonate	MilStop*	5.6 kg/2,000 L water/ha	0	***Leveillula taurica*** Start application at first sign of disease. Uniform and complete coverage of the foliage is essential for the most effective results. Number of applications will depend on disease pressure. Repeat application every 7 days. Do not exceed 10 applications per season. Do not apply through any type of irrigation system. **REI: 4 hr**
		Sirocco*	5.6 kg/ha	0	***Leveillula taurica, Oidium lycopersicium*** Begin applications at the first sign of disease or when conditions are conducive to disease development. Label recommended spray volume is 1,000–2,000 L per hectare. Repeat application every 7 days. Do not exceed 10 applications per year. **REI: 4 hr**
SEPTORIA LEAF SPOT					
M 01	copper octanoate	Cueva Commercial*	0.5%–2% solution applied at 470–940 L/ha	1	***Septoria lycopersici*** Repeat application every 5–10 days. Do not exceed 15 applications per year. If concerned about sensitivity of plants, apply to individual plants or small areas to determine if plant damage occurs. **REI: 4 hr**

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
ROOT DISEASES					
ROOT ROTS (DAMPING OFF)					
4	Metalaxyl-M and S-isomer	Subdue Maxx	1.5–2.5 mL/10 L water	2	***Pythium aphanidermatum*** Apply 250 mL of solution as a drench to the growing media at the base of each plant. Irrigate within 1–2 days to ensure product reaches the root zone. Apply immediately after transplanting or when Pythium root rot is present. Use the higher rate under conditions of high disease pressures, or when there is a history of high disease pressure. Do not exceed 1 application per crop cycle. Do not apply to the foliage. Do not use in the propagation house. **REI: 12 hr**
21	cyazofamid	Torrent 400SC	30 mL/100 L water	60	***Pythium* spp.** Apply as a soil drench to thoroughly wet the growing medium immediately after seeding. Do not exceed 1 application. Do not use any surfactant. **REI: 12 hr**
28	propamocarb hydrochloride	Previcur N	10 mL/10 L water Apply solution at a rate of 100–200 mL/plant.	1	***Pythium* spp.** Do not mix with other products. Prevent intense sunlight after application. Do not exceed 4 applications per crop cycle. Do not exceed 2 seeding/seedling applications per crop cycle. Do not exceed 2 after-transplanting applications per crop cycle. The higher rate should be used for second and third application. **REI: 12 hr**
44	*Bacillus subtilils* strain MBI 600	Serifel*	50 g/12.5 L water/ 21.9 m^3 growing media	NS	***Fusarium* spp., *Pythium* spp., *Rhizoctonia solani*** For suppression. Prior to planting, apply as a spray while suspended onto 21.9 m^3 of plant growing media (potting soil, peat moss or peat-based mixtures). Mix thoroughly to ensure adequate distribution of the product. **REI: NS**
BM 02	*Gliocladium catenulatum* strain J1446	Prestop*	0.5% aqueous suspension (25 g/5 L water) See **Remarks.**	NS	***Pythium* spp., *Rhizoctonia solani*** For suppression. Apply as a growing media treatment or as a drench treatment. Most effective when applied preventively, before disease starts. Treat the growing media prior to seeding, transplanting or potting, or else make a drench application immediately after seeding, transplanting or potting. Additional applications can be made as a drench. Repeat applications every 3–6 weeks, with shorter intervals used under conditions of moderate-to-high disease pressure. **REI: 4 hr** **Rates:** **Growing media:** 125–250 mL of suspension/10 L growing media **Soil drench:** 20 L suspension/10 m^2 growing media
	Streptomyces lydicus strain WYEC 108	Actinovate SP	See **Remarks.**	NS	***Pythium* spp.** For suppression. Apply as a seed treatment through mist-type commercial seed treatment equipment, slurry or other comparable methods that provide thorough coverage of treated seeds. Prior to planting, dissolve product in water and spray directly on seed. For hydroponic systems, apply solution to the growing media or apply as a soil drench. Repeat application every 7–14 days. **REI: Re-enter treated areas only after spray is dried.** **Rates:** **Seed treatment:** 7.5–42 g in 300 mL water/kg of seed **Hydroponic systems:** 420–840 g/ha **Soil drench:** 42–84 g/100 L water/m^3 of growing media

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

For more information on pesticide application, visit www.sprayers101.com — search keywords "greenhouse" or "airblast 101."

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* = product is potentially acceptable for organic production. Organic growers must always check with their certifying bodies to verify the acceptability of any product prior to using it.

FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
ROOT ROTS (DAMPING OFF) (cont'd)					
BM 02 (cont'd)	*Streptomyces* strain K61	Mycostop WP*	See **Remarks.**	NS	***Fusarium* spp.** For suppression. Apply immediately after transplanting. Repeat applications every 3–6-weeks. For seedling production, apply first spray after emergence using lower rate. **REI: NS** **Rates:** **Rockwool:** 5–10 mg/plant (for spraying and drenching, use 10–20 mL/plant of 0.05% suspension) **Beds:** 5–10 g/100 m^2 (for spraying and drenching, use 0.1–0.2 L/m^2 of 0.05% suspension)
	Trichoderma harzianum Rifai strain KRL-AG2 and *Trichoderma virens* strain G-41	BW240 WP	30–60 g/100 L water/ m^2 of soil/potting mixture surface	0	***Fusarium* spp., *Phytophthora* spp., *Pythium* spp., *Rhizoctonia* spp.** For suppression. Apply immediately after sowing seed or planting. Repeat application after 8–10 weeks if the disease is expected. Do not use overhead boom chemigation for second application or after the four-leaf stage. Use a higher rate and shorter interval when disease pressure is high. **REI: 4 hr**
M 04	captan	Captan 50 WP	2.5 kg/1,000 L water applied at rates of 50–85 L/100 m^2	NS	Use as a soil treatment. Work into the upper 7.5–19 cm of soil before planting. **REI: 48 hr**
		Captan 80 WP	1.5 kg/1,000 L water applied at rates of 50–85 L/100 m^2	NS	Use as a soil treatment. Work into the upper 7.5–10 cm of soil before planting. **REI: 48 hr**
		Maestro 80 DF	1.25 kg/1,000 L water applied at rates of 50–85 L/100 m^2		
		Supra Captan 80 WP			
NC	garlic powder	Influence WP*	10–20 kg/ 1,000 L water/300 m^2	0	***Pythium* spp., *Rhizoctonia solani*** For suppression. Apply as a drench to the substrate surface at seeding. Use the higher rate under high disease pressure or when conditions are conducive to disease development. **REI: Do not enter treated area until spray is dried.**

[1] See Appendix G for FRAC group definitions.

Table 6–2. Products registered for greenhouse pepper diseases

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
ROOT ROTS (CROWN AND ROOT ROT, ROOT AND STEM ROT, ROOT AND STEM WILT)					
12	fludioxonil	Medallion	300 mL/1,000 L water	1	***Fusarium solani*** For suppression. Use as drench application of 250 mL solution per plant. Apply to seedling crop prior to transplanting. Do not exceed 2 applications per crop cycle. Do not apply to the foliage. **REI: 12 hr**
21	cyazofamid	Torrent 400 SC	25 mL/100 L water	0	***Phytophthora capsici*** Make the first application of the solution as a soil drench to thoroughly wet the growing medium immediately at transplant. Repeat application after 6–8 weeks as needed. Do not make sequential applications of other fungicides in the same group. Do not use a surfactant with this drench application. Do not apply a drench volume greater than 200 mL per plant per application. **REI: 12 hr**
28	propamocarb hydrochloride	Previcur N	10 mL/10 L water Apply solution at a rate of 100–200 mL/plant.	1	***Pythium* spp.** Do not mix with other products. Prevent intense sunlight after application. Do not exceed 4 applications per crop cycle. Do not exceed 2 seeding/seedling applications per crop cycle. Do not exceed 2 after-transplanting applications per crop cycle. The higher rate should be used for second and third application. **REI: 12 hr**
40	mandipropamid	Micora	600 mL/ha (150 g a.i./ha)	1	***Phytophthora capsici*** For suppression. Begin applications prior to disease development. Apply as a drench to the base of the plant in sufficient water to ensure the root area is covered. Apply as a foliar spray in sufficient water to ensure good coverage of foliar tissues. Repeat applications every 7–10 days. Do not exceed 1 drench and 3 foliar applications per crop cycle.
		Revus	600 mL/ha (150 g a.i./ha)	1	***Phytophthora capsici (soil phase)*** Applications should begin prior to disease development. Do not exceed 4 applications per season. **REI: 12 hr**
44	*Bacillus subtilis* strain MBI 600	Serifel*	50 g/12.5 L water/ 21.9 m^3 growing media	NS	***Fusarium* spp., *Pythium* spp., *Rhizoctonia solani*** For suppression. Prior to planting, apply as a spray while suspended onto 21.9 m^3 of plant growing media (potting soil, peat moss or peat-based mixtures). Mix thoroughly to ensure adequate distribution of the product. **REI: NS**

[1] See Appendix G for FRAC group definitions.

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
ROOT ROTS (CROWN AND ROOT ROT, ROOT AND STEM ROT, ROOT AND STEM WILT) (cont'd)					
BM 02	*Gliocladium catenulatum* strain J1446	Prestop*	0.5% aqueous suspension (25 g/5 L water) See **Remarks.**	NS	***Pythium* spp.** For suppression. Apply as a growing media treatment or as a drench treatment. Most effective when applied preventively, before disease starts. Treat the growing media prior to seeding, transplanting or potting, or else make a drench application immediately after seeding, transplanting or potting. Additional applications can be made as a drench. Repeat applications every 3–6 weeks, with shorter intervals used under conditions of moderate-to-high disease pressure. **REI: 4 hr** **Rates:** **Growing media:** 125–250 mL of suspension/10 L growing media **Soil drench:** 20 L suspension/10 m^2 growing media
	Streptomyces lydicus strain WYEC 108	Actinovate SP	See **Remarks.**	NS	***Pythium* spp.** For suppression. Apply as a seed treatment through mist-type commercial seed treatment equipment, slurry or other comparable methods that provide thorough coverage of treated seeds. Prior to planting, dissolve product in water and spray directly on seed. For hydroponic systems, apply solution to the growing media or apply as a soil drench. Repeat application every 7–14 days. **REI: Re-enter treated areas only after spray is dried.** **Rates:** **Seed treatment:** 7.5–42 g/300 mL water/kg of seed **Hydroponic systems:** 420–840 g/ha **Soil drench:** 42–84 g/100 L water/m^3 of growing media
	Streptomyces strain K61	Mycostop WP*	See **Remarks.**	NS	***Fusarium* spp., *Phytophthora* spp.** For suppression. Apply immediately after transplanting. Repeat application every 3–6-weeks. For seedling production, apply first spray after emergence using lower rate. **REI: NS** **Rates:** **Rockwool:** 5–10 mg/plant (for spraying and drenching, use 10–20 mL/plant of 0.05% suspension) **Beds:** 5–10 g/100 m^2 (for spraying and drenching, use 0.1–0.2 L/m^2 of 0.05% suspension)
	Trichoderma harzianum Rifai strain KRL-AG2	RootShield Granules*	600–750 g/m^3 (loose) planting mix or soil	NS	***Fusarium* spp., *Pythium* spp., *Rhizoctonia* spp.** For suppression. For best results, thoroughly incorporate granules during mix preparation or pot filling, or incorporate into planting beds by raking or tilling. **REI: 4 hr**
		Bora HC*	**Drench:** 55–110 g/m^3	NS	***Fusarium* spp., *Pythium* spp., *Rhizoctonia* spp.** For suppression. Can be applied through low-pressure watering nozzles such as fan nozzles or other watering systems. **REI: 4 hr**
		Bora WP*			
		RootShield HC*			
		RootShield WP*			

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FRAC Group[1]	Common Name/ Active Ingredient	Trade Name/ Formulation	Rate	PHI	Remarks
ROOT ROTS (CROWN AND ROOT ROT, ROOT AND STEM ROT, ROOT AND STEM WILT) (cont'd)					
M 04	captan	Captan 50 WP	2.5 kg/1,000 L water applied at rates of 50–85 L/100 m^2	NS	Use as a soil treatment. Work into the upper 7.5–19 cm of soil before planting. **REI: 48 hr**
		Captan 80 WP	1.5 kg/1,000 L water applied at rates of 50–85 L/100 m^2	NS	Use as a soil treatment. Work into the upper 7.5–10 cm of soil before planting. **REI: 48 hr**
		Maestro 80 DF	1.25 kg/1,000 L water applied at rates of 50–85 L/100 m^2		
		Supra Captan 80 WP			
P 07	mono- and dibasic sodium, potassium, and ammonium phosphites	Phostrol	2.9–5.8 L/ha in a minimum of 225 L water/ha	0	***Phytophthora* spp., *Pythium* spp.** For suppression. Begin applications when conditions favour disease development. Repeat applications every 7–14 days. Use the higher rate and shorter application interval when disease pressure is high. Do not exceed 4 applications per year. **REI: Allow entry only after thorough ventilation, spray mist has cleared and the treated surface has dried.**
	mono- and di-potassium salts of phosphorous acid	Confine Extra	5–10 L/ha in a minimum of 100 L water	1	***Pythium* spp.,** For suppression. Do not exceed 5 foliar and/or chemigation applications per growing season. Begin applications when conditions are favourable for disease. **REI: Allow entry only after thorough ventilation, spray mist has cleared and the treated surface has dried.**
		Rampart	**Foliar:** 3–8 L/1,000 L water/ha **Drench:** 5–7 L in a minimum of 1,000 L water	0	***Phytophthora* spp., *Pythium* spp.** For suppression. Use the higher rate and shorter application interval when disease pressure is high. Foliar: Apply lower rate every 2–4 weeks after plants become established. Drench: Apply with normal irrigation schedule. **REI: 4 hr. After REI, re-entry into treated areas is only permitted after thorough ventilation, spray mist has cleared and the treated surface has dried.**
NC	garlic powder	Influence WP*	10–20 kg/ 1,000 L water/300 m^2	0	***Pythium* spp., *Rhizoctonia solani*** For suppression. Apply as a drench to the substrate surface at seeding. Use the higher rate under high disease pressure or when conditions are conducive to disease development. **REI: Re-enter treated areas only after spray is dried.**

[1] See Appendix G for FRAC group definitions.