

### 3. Biological Control Agents Used in Greenhouse Vegetable Crops

Greenhouse vegetable growers use biological control (biocontrol) agents as an integral part of their IPM programs for managing insect and mite pests. Table 3–1 lists commercially available biocontrol agents for major pest species in greenhouse vegetables.

**Table 3–1.** Biocontrol agents for major greenhouse pests

Use caution when using pesticides along with biocontrols because many pesticides are harmful to beneficial insects. Using even one application of harmful pesticide can prevent any further use of biocontrol agents for an extended period of time. Check the following websites for information on compatibility of pesticides with biocontrols: <https://www.biobestgroup.com/en/side-effect-manual> and <https://www.koppert.ca/en/products/side-effects/>.

**LEGEND:** \* = Parasitoids: These usually require only one host for completion of development, often killing it by living on or in its body.  
 \*\* = Predators: These feed on their prey (pest) by catching them but otherwise live independently of them. They must consume more than one individual to reach maturity.  
 \*\*\* = Entomopathogen (i.e. microorganisms that are pathogenic to arthropods)

Pests	Biocontrol Agent
Aphids: various species	<i>Aphelinus abdominalis</i> (parasitic wasp)*
Foxglove aphid ( <i>Aulacorthum solani</i> )	<i>Aphidius colemani</i> (parasitic wasp)*
Green peach aphid ( <i>Myzus persicae</i> )	<i>Aphidius ervi</i> (parasitic wasp)*
Melon aphid ( <i>Aphis gossypii</i> )	<i>Aphidius matricariae</i> (parasitic wasp)*
Potato aphid ( <i>Macrosiphum euphorbiae</i> )	<i>Aphidoletes aphidimyza</i> (predatory midge)** <i>Beauveria bassiana</i> (fungus sold as BotaniGard, Bio-Ceres)*** <i>Chrysopa carnea</i> (lacewing)** <i>Hippodamia</i> sp. (lady beetle)**
Caterpillars (loopers, European corn borers)	<i>Autographa californica</i> Nucleopolyhedrovirus (baculovirus sold as Loopex)*** <i>Bacillus thuringiensis</i> subsp. <i>aizawai</i> (bacterium sold as XenTari)*** <i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i> (bacterium sold as DiPel, Foray, Bioprotec, Thuricide)*** <i>Trichogramma</i> spp. (parasitic wasps)*
Fungus gnat ( <i>Bradysia</i> and <i>Corynoptera</i> spp.)	<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i> (bacterium sold as VectoBac)*** <i>Dalotia coriaria</i> (predatory beetle)** <i>Gaeolaelaps gillespiei</i> (predatory mite)** <i>Steinernema</i> sp. (nematode)** <i>Stratiolaelaps scimitus</i> (= <i>Hypoaspis miles</i> ) (predatory mite)**
Leafminer ( <i>Liriomyza</i> spp.)	<i>Dacnusa sibirica</i> (parasitic wasp)* <i>Diglyphus isaea</i> (parasitic wasp)*

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Pests	Biocontrol Agent
Two-spotted spider mite ( <i>Tetranychus urticae</i> )	<p><i>Amblyseius andersoni</i> (predatory mite)**</p> <p><i>Chrysopa carnea</i> (lacewing)**</p> <p><i>Feltiella acarisuga</i> (predatory midge)**</p> <p><i>Metarhizium anisopliae</i> (fungus sold as Met52)***</p> <p><i>Neoseiulus</i> (= <i>Amblyseius</i>) <i>californicus</i> (predatory mite)**</p> <p><i>Neoseiulus</i> (= <i>Amblyseius</i>) <i>fallacis</i> (predatory mite)**</p> <p><i>Phytoseiulus persimilis</i> (predatory mite)**</p> <p><i>Stethorus punctillum</i> (predatory beetle)**</p>
Whitefly ( <i>Trialeurodes vaporariorum</i> or <i>Bemisia</i> spp.)	<p><i>Amblydromalus limonicus</i> (predatory mite)**</p> <p><i>Amblyseius swirskii</i> (predatory mite)**</p> <p><i>Beauveria bassiana</i> (fungus sold as BotaniGard, Bio-Ceres)***</p> <p><i>Chrysoperia carnea</i> (lacewing)**</p> <p><i>Delphastus catalinae</i> (predatory beetle)**</p> <p><i>Dicyphus hesperus</i> (predatory bug)**</p> <p><i>Encarsia formosa</i> (parasitic wasp)*</p> <p><i>Eretmocerus eremicus</i> (parasitic wasp)*</p> <p><i>Metarhizium anisopliae</i> (fungus sold as Met52)</p>
Western flower thrips ( <i>Frankliniella occidentalis</i> )	<p><i>Amblydromalus limonicus</i> (predatory mite)**</p> <p><i>Amblyseius swirskii</i> (predatory mite)**</p> <p><i>Beauveria bassiana</i> (fungus sold as BotaniGard, Bio-Ceres)</p> <p><i>Chrysoperia carnea</i> (lacewing)**</p> <p><i>Dalotia coriaria</i> (predatory beetle)**</p> <p><i>Metarhizium anisopliae</i> (fungus sold as Met52)***</p> <p><i>Neoseiulus</i> (= <i>Amblyseius</i>) <i>cucumeris</i> (predatory mite)**</p> <p><i>Orius</i> spp. (predatory bug)**</p> <p><i>Steinernema feltiae</i> (nematode)**</p> <p><i>Stratiolaelaps scimitus</i> (= <i>Hypoaspis miles</i>) or <i>Gaeolaelaps gillespiei</i>, <i>Gaeolaelaps aculeifer</i> (= <i>Hypoaspis aculeifer</i>) (predatory mite)**</p>