List of Biological Control Agents (BCAs) for Vegetable Farm Use in Singapore

Biological Control Agent (BCA) is a natural enemy, an antagonist, or competitor used for pest control – which offer farms an alternative to chemical pesticides for pest management. BCAs include fungi, bacteria, predatory insects, predatory mites, parasitoids and entomopathogenic nematodes that prey on and eliminate plant insects.

Predatory insects, predatory mites, parasitoids and entomopathogenic nematodes may be used for pest control in vegetable farms without having to engage the services of a Certified Pesticide Operator[1] (CPO). Bacteria- and fungi-type of BCAs must be registered as pesticide with SFA for use in farms producing vegetables or other food crops[2]. Farms must also engage a CPO to apply or supervise the application of these BCAs.

This table lists and provides guidance on the use of BCAs that are approved for import by NParks[3] and can be used in vegetable farms, supporting safe and sustainable pest management practices to enhance local production. If you wish to use any of the listed BCAs, you will need to apply for a permit from NParks to import from overseas.

Biological Control Agent	Type	Target Pests/Diseases	Preferred Growing Conditions
Aphedius ervi	Insects	Aphids (specifically pea aphid and foxglove aphid)	Prefers temperatures between 18-25 °C; works well in greenhouse and open-field crops
Aphedius colemani	Insects	Green peach aphid and cotton/melon aphid	Effective in temperatures between 20-30 °C; thrives in greenhouse environments
Aphelinus abdominalis	Insects	Potato aphid and other large aphid species	Effective in temperatures between 15-30 °C; suitable for greenhouse and field conditions
Dacnusa sibirica	Insects	Leaf miner larvae (Liriomyza species)	Optimal temperatures 20-25 °C; thrives in greenhouse environments
Diadegma semiclausum	Insects	Diamondback moth (*Plutella xylostella*) larvae	Prefers cooler temperatures of 18-25 °C; suitable for brassica crops
Diglyphus isaea	Insects	Leaf miners (Liriomyza species)	Optimal temperature 18-30 °C; prefers high humidity levels
***Diaeretiella rapae* (M'Intosh, 1855)**	Insects	Aphids, particularly cabbage aphid and mustard aphid	Effective between 15-28 °C; works in open fields and greenhouses
Encarsia formosa	Insects	Greenhouse whitefly (*Trialeurodes vaporariorum*)	Works best between 20-27 °C; used extensively in greenhouse environments
Eretmocerus hayati	Insects	Silverleaf whitefly (*Bemisia tabaci*)	Effective between 22-30 °C; thrives in humid greenhouse conditions
Eretmocerus warrae	Insects	Silverleaf whitefly and greenhouse whitefly	Prefers temperatures of 22-32 °C; used in greenhouse and field settings

(1) For application of Certified Pesticide Operator, please refer to https://www.sfa.gov.sg/farming/pesticides/certification-of-pesticides-operators.

(2) Suppliers of BCAs that have not been registered with SFA as pesticide products can submit an application for pesticide registration via the SFA website at: https://www.sfa.gov.sg/farming/pesticides/pesticide-registration. The full list of registered pesticide products can be accessed at: https://www.sfa.gov.sg/tools-and-resources/pesticides-search

(3)To apply for import permit from NParks, visit the NParks website at https://www.nparks.gov.sg/services/import-plant-plant-products/check-plant-health-requirements/biological-control-agents.

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Biological Control Agent	Type	Target Pests/Diseases	Preferred Growing Conditions
Mallada signata	Insects	Aphids, whiteflies, thrips, and small caterpillars	Prefers temperatures between 18-30 °C; suitable for both field and greenhouse
Neoseiulus californicus	Insects	Two-spotted spider mite and other pest mites	Effective in warm and humid conditions, 20-30 °C
Orius sauteri	Insects	Thrips, aphids, and whiteflies	Best at temperatures between 20-30 °C; thrives in greenhouse settings
Phytoseiulus persimilis	Insects	Two-spotted spider mite (*Tetranychus urticae*)	Optimal temperature range 20-30 °C; high humidity required
Plesiochrysa ramburi	Insects	Aphids, thrips, and whiteflies	Prefers temperatures 18-28 °C; effective in field and greenhouse settings
Stratiolaelaps scimitus	Insects	Fungus gnat larvae, thrips pupae, and soil-dwelling pests	Effective in soil temperatures of 15-25 °C; thrives in moist environments
Typhlodromalus lailae	Insects	Thrips and small pest mites	Thrives in warm climates, 22-30 °C; used in greenhouse and field crops
Typhlodromips montdorensis	Insects	Thrips and whiteflies	Effective in warm conditions, 25-30 °C; works well in greenhouse settings
Typhlodromips swirskii	Insects	Thrips, whiteflies, and pest mites	Best in temperatures of 20-30 °C; thrives in protected cropping environments
Orius tantillus	Insects	Thrips, whiteflies, aphids, and small caterpillars	Prefers warm conditions, 22-32 °C; effective in field crops and greenhouses
Heterorhabditis bacteriophora	Nematode	Larvae of beetles, including white grubs and wireworms	Prefers moist soil environments; effective in temperatures between 20-30 °C
Heterorhabditis indica	Nematode	Larvae of beetles, including root weevils and chafer grubs	Prefers moist soil environments; effective in temperatures between 22-30 °C
Steinernema carpocapsae	Nematode	Larvae of crane flies, leatherjackets, and wireworms	Applied to moist soil where target larvae are active; effective in temperatures between 22-28 °C
Steinnernema feltiae	Nematode	Fungus gnat larvae, thrips pupae, and other soil pests	Best applied to moist soil; effective at 10-25 °C

Let us know your thoughts

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