GUIDELINES FOR PURCHASING AND USING COMMERCIAL NATURAL ENEMIES IN NORTH AMERICA

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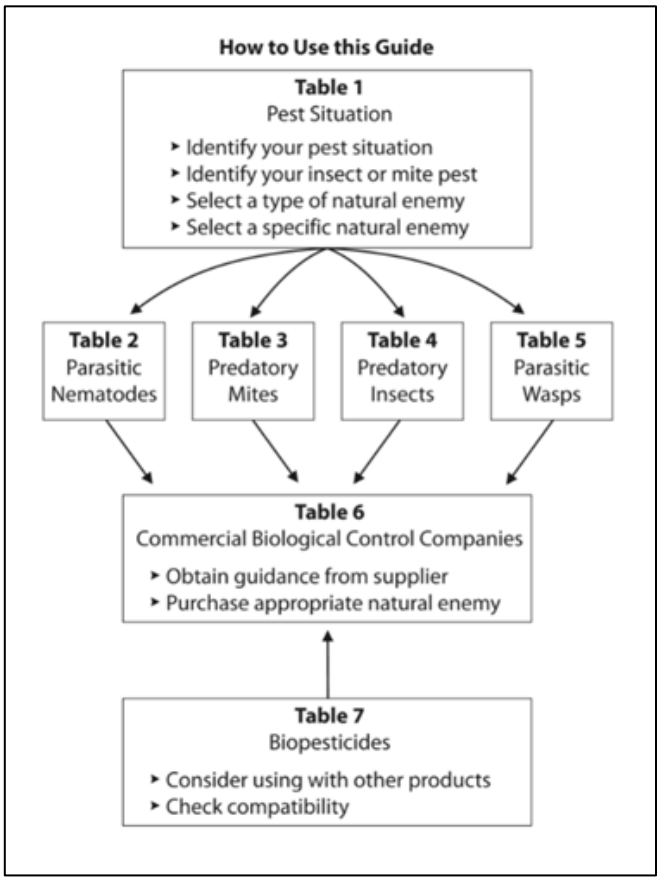
This guide provides assistance in selecting, purchasing and using commercially-available natural enemies and biopesticides for managing accurately diagnosed pest problems. It therefore applies only to situations in which the cause of a pest problem is known and a biological control solution is sought. To choose a commercial natural enemy product, first use Table 1 to locate the habitat of your plant or animal pest and identify the insect or mite. Then, consider using some of the listed types of natural enemies (parasitic nematodes, predatory mites, predatory insects, and parasitic wasps) and biopesticides available to manage these pests. Products often can be used in combination when there is more than one pest problem and sometimes a product will manage a pest for which it was not intended. The reference numbers correspond with the numbered scientific names of natural enemies in Tables 2-5. The natural enemy source companies identified randomly in Tables 2-5 are listed in Table 6, along with their websites. Table 7 provides scientific names for some of the most common microbial insecticides and fungicides that can be used to manage many types of pests alone or, if compatible, in combination with insect and mite natural enemies. The title to Table 7 includes a link to the searchable IR-4 *Biopesticide and Organic Database for Integrated Pest Management* that lists products, sources, and applications. Member practitioners of the Association of Natural Biocontrol Producers shown in Table 8 provide consulting and other support services that are increasingly important for large-scale implementation of biological control. Sources of information on obtaining and using commercial natural enemies follow in the next section.



Biological control companies typically provide customer service to assure that their products are used appropriately. Information they supply includes the availability and cost of natural enemies and biopesticides, descriptions of individual target pests and their biology, and recommendations for applying and evaluating their products. Product instructions usually indicate the habitats and seasons in which the pests are encountered, developmental stages that are susceptible to parasitism or predation, and relevant behavior of the natural enemies, e.g., how far they move and how many pests they can parasitize or consume. Companies included in the detailed species lists (Tables 2-5), are members of the Association of Natural Biocontrol Producers (ANBP). Producers and distributors belonging to ANBP are preferred because they adhere to a quality assurance policy and code of ethics for the industry, and promote research and education on the use of natural enemies. Not listed are most garden centers, companies with very limited geographic markets or product lines, suppliers without comprehensive websites, governmental and other non-commercial producers, so-called big-box stores, and outlets for which information is difficult to find or use.

It is essential to determine that the purchased living organisms are healthy and able to survive long enough to provide biological control in the pest habitat. Suppliers usually provide high quality natural enemy products, but are unable to control conditions during shipment and handling. Temperature extremes, condensation from ice packs, restricted oxygen supply, high organism densities, and long shipping and storage times are some of the factors that can adversely affect natural enemy quality. Therefore, customers should open packages immediately on arrival to provide a better environment for the organisms and detect any potential problems. Packages at least should be inspected for condensation or a fermenting smell and the number of living and dead organisms estimated. If pupae or parasitized host organisms are shipped, the number of emerging adults should be recorded; a sex ratio of at least 40-45% females is expected. Customers are advised to make sure that most eggs hatch or adults are able to move, if products are shipped in these stages of development. Notes should be made on the product name, company batch number, date received, packaging type and condition, number of organisms in the package, and any other pertinent observations on the appearance and performance of the product. After completing the general check, customers can perform additional quality assurance testing, recording the test methods, number of organisms tested and date, or use the products as soon as possible. An easy to use guide is available to help customers assess the quality of natural enemies received from suppliers, the *Grower Guide: Quality Assurance of Biocontrol Products* (see Buitenhuis, 2014 in Sources of Information). The supplier should be notified immediately if there is a problem with the products.

Customers who use biological control products generally want to be directly involved in solving their pest problems. This involvement is essential because products must first be selected and deployed according to general instructions and subsequently evaluated for site-specific effectiveness. It may be necessary to try different products or application procedures, or to modify the environment in ways that enhance the impact of natural enemies. This may involve changing how plants are grown or adding food, companion plants, and refuges for natural enemies. The impacts of commercial natural enemies can be limited to the stage that is released

or be long-term if they reproduce and become established. Typically, several pests are present and, if some must be managed with pesticides, it is necessary to know which pesticides are compatible with the natural enemies. Other considerations are how to release the natural enemies and in what developmental stages. They can be introduced, for example, on special plants with non-pest hosts, so called "banker plants", added as eggs, or allowed to fly from release containers. These kinds of considerations may be addressed in instructions from the source companies or gleaned from the references in this guide.

Commercial biological control products described in this guide have been thoroughly tested for effectiveness and given federal and state approval to assure that they can be released into the environment safely. The products are marketed directly by producers or provided by suppliers after obtaining the necessary shipping permits for natural enemies or EPA registrations for biopesticides. Only products (nematodes, mites and insects) that are insectary-reared, as opposed to field collected, (e.g., lady beetles), and biopesticides that are considered useful and available in North America are included. The guide is updated periodically because some products may be discontinued and new ones become available. ANBP member companies are contacted directly for their updated information. Specialized products, such as those used for weed management, have been excluded from the guide.

Sources of information on obtaining and using commercial natural enemies and biopesticides

Association of Natural Biocontrol Producers (ANBP) Website (http://www.anbp.org). [This is a global commercial biological control organization with members primarily in North America. The website lists producers, distributors, practitioners, and contributing members. Most of the producers and distributors list their products and provide instructions for their use.]

Buitenhuis, R. 2014. Grower Guide: Quality Assurance of Biocontrol Products. Vineland Research and Innovation Centre, Ontario, Canada (https://www.vinelandresearch.com/wp-content/uploads/2020/02/Grower-Guide.pdf). [Procedures are provided for assessing the quality of 28 commercial natural enemies.]

Copping, L. G. 2001. The Biopesticide Manual. British Crop Protection Council, 2nd edition. Farnham, UK. 528 p. [This book contains a comprehensive listing and technical descriptions of biopesticides.]

Electronic Data Information Source (EDIS) website (http://edis.ifas.ufl.edu). [The EDIS website is a comprehensive, single-source repository of all current UF/IFAS numbered peer-reviewed publications. The database is searchable by topic, e.g., agriculture or lawn and garden, and by key words.]

Featured Creatures website (http://entnemdept.ufl.edu/creatures). [This is a set of in-depth profiles of insects, nematodes, arachnids and other organisms. The database is searchable by common name, scientific name, crop or habitat, higher classification, and recent additions.]

Flint, M. L., S. H. Dreistadt and J. K. Clark. 1998. Natural Enemies Handbook. University of California Integrated Pest Management Project. University of California Press, Los Angeles. 154 p. [This book can be used to identify and use many of the most common natural enemies. It contains a considerable amount of information about biological control, including the toxicity to natural enemies of selected insecticides and acaracides.]

Gerson, U., R. L. Smiley and R. Ochoa. 2003. Mites (Acari) for Pest Control. Wiley-Blackwell. 560 p. [This book describes 34 acarine families that include mites useful for controlling pest mites, insects, nematodes, and weeds. It also contains information on using the mites.]

Hajek, A. E. and J. Eilenberg. 2018. Natural Enemies: An Introduction to Biological Control, 2nd edition. Cambridge University Press. 452 p. [This book describes the diversity of organisms used in biological control.]

Hoffman, M. P. and A. C. Frodsham. 1993. Natural Enemies of Vegetable Insect Pests. Cornell Cooperative Extension, Cornell University, Ithaca, N.Y. 63 p. [This book facilitates identification of the major parasites and predators of insect pests of vegetables. It also contains information on entomopathogenic nematodes and microbial insecticides.]

Hoy, M. A. 2011. Agricultural Acarology, Introduction to Integrated Mite Management. CRC Press. 430 p. [This book contains a general introduction to acarology, including the use of mites for biological control.]

International Biocontrol Manufacturers Association (IBMA) website (https://www.ibma-global.org/). [This is a global commercial biological control organization with members primarily in Europe. It has an Invertebrate Biocontrol Agents (IBCA) Professional Group for producers of macroorganisms (insects, mites and entomopathogenic nematodes).]

International Organization for Biological Control (IOBC) website (https://www.iobc-global.org/). [IOBC promotes the development of biological control and its application in integrated pest management. It has biological control working groups and publications.]

Interregional Research Project No. 4 (IR-4) website (https://www.ir4project.org). [IR-4 maintains a *Biopesticide and Organic Database for Integrated Pest Management* (http://ir4app.rutgers.edu/biopestPub/labelDb.aspx). Search categories include commercial crops, commercial turf and ornamentals, residential food crops, residential turf and ornamentals, pest problems (insects, diseases, weeds, nematodes, and animals), plant growth regulators, and states.]

Lacey, L. 2016. Microbial control of insect and mite pests, from theory to practice. Academic Press. 482 p. (https://www.elsevier.com/books/microbial-control-of-insect-and-mite-pests/lacey/978-0-12-803527-6). [This book describes microbial control agents and their implementation in a variety of crops, along with other applications.]

Malais, M. H. and W. J. Ravensberg. 2003. Knowing and Recognizing (Revised Edition). Koppert Biological Systems. 443 p. (https://www.koppertus.com/knowing-recognizing.). [The Koppert Biological Systems website also has information on the toxicity of selected pesticides to natural enemies.]

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Table 1. Habitats of plant or animal pests in North America, typical pests, type of commercial natural enemies available to manage each pest, and species reference number.

Habitats of Plant or Animal Pests	**Identified Pest**	**Commercial Natural Enemies**	
		Type	**No. (see Tables 2-5)**
Citrus	aphids	predatory insects	32, 34, 38-40, 42
	beetles (grubs)	parasitic nematodes	4, 9
	caterpillars	predatory insects	37-40, 42
		parasitic wasps	65, 66
	mealybugs	predatory insects	25, 27, 42
		parasitic wasps	54
	mites	predatory mites	20, 21
	psyllids	Parasitic wasps	57
	scales	predatory insects	27
		parasitic wasps	45

	thrips	predatory mites	17
		predatory insects	34, 42
	whiteflies	predatory insects	26, 34, 38-40, 42
Fruits, Vegetables and Tree Crops	aphids	predatory insects	32, 34, 35, 38-42
		parasitic wasps	44, 49-51
	beetles (grubs)	parasitic nematodes	2
		predatory insects	37
		parasitic wasps	56
	caterpillars	predatory insects	26, 34, 35, 38-40, 42
		parasitic wasps	65, 66, 69
	fungus gnats	predatory mites	13
		predatory insects	31
	leafminers	parasitic wasps	52, 55
	mealybugs	predatory insects	25, 27, 41, 42
		parasitic wasps	54
	mites	predatory mites	19-24
		predatory insects	28, 33, 43
	scales	predatory insects	27, 29
	thrips	predatory mites	13, 16, 20
		predatory insects	31, 34, 38-40, 42
	whiteflies	predatory mites	17
		predatory insects	25, 34-41
	Lygus bugs (strawberries)	parasitic wasps	53
	root-knot nematode (greenhouse tomatoes)	parasitic nematodes	7
	tomato/potato psyllids	parasitic wasps	42

Ornamental Plants and Landscapes	aphids	predatory insects	32, 34, 35, 38-42
		parasitic wasps	44, 49-51
	beetles (grubs)	parasitic nematodes	1, 2, 4, 8, 12
		predatory insects	37-40
	caterpillars	parasitic wasps	65, 69
	fungus gnats	parasitic nematodes	6, 12
		predatory mites	13, 14
		predatory insects	27, 31
	leafminers	parasitic nematodes	6
		parasitic wasps	52, 55
	mealybugs	parasitic nematodes	1
		predatory insects	25, 27, 41, 42
		parasitic wasps	54
	mites	predatory mites	19-24
		predatory insects	28,33
	scales	predatory insects	27, 29
	thrips	parasitic nematodes	6, 12
		predatory mites	13, 14, 16, 17, 20
		predatory insects	31, 34, 38-40, 42
	whiteflies	predatory mites	17
		predatory insects	26, 34, 38-42
	aphids	predatory insects	32, 35, 41, 42
		parasitic wasps	44, 46, 49-51
	caterpillars (moth eggs)	parasitic wasps	65
	fungus gnats	parasitic nematodes	5

Greenhouses and Interiorscapes		predatory mites	14
		predatory insects	31
	leafminers	parasitic wasps	52, 55
	mealybugs	predatory insects	25, 41, 42
		parasitic wasps	54
	mites	predatory mites	19-24
		predatory insects	28, 33
	scales	predatory insects	30
		parasitic wasps	46
	thrips	predatory mites	14, 18, 20
		predatory insects	31
	whiteflies	predatory insects	26, 35, 41, 42
		parasitic wasps	46-48
Turf and Lawns	caterpillars	parasitic nematodes	10
	beetles (grubs)	parasitic nematodes	10, 12
	mole crickets	parasitic nematodes	12
Animal Waste	filth flies	predatory insects	30
		parasitic wasps	58-64

Table 2. Parasitic nematodes. Numbered biological control products [family, genus and species], some (target pests) and source companies.

PARASITIC NEMATODES	
Heterorhabditidae	**Source Company (Randomized, see Table 7)**
1. ***Heterorhabditis bacteriophora*** (cucumber, scarab, Japanese and flea beetles, thrips, white grubs, corn root worms, Colorado potato beetles, black vine weevils, and	BioWorks ▪ Crop Defenders ▪ Bioline AgroSciences ▪ Buglogical ▪ Control Systems ▪ Anatis Bioprotection ▪ Biobest Mexico S.A. de C.V. ▪ Green Methods ▪ BioBee ▪ Evergreen Growers Supply ▪ Rincon-Vitova ▪ Natural Enemies ▪ Sound Horticulture ▪ BASF ▪

root mealybugs, on ornamentals, trees and shrubs)	ARBICO ▪ Beneficial Insectary ▪ Everwood Farm ▪ Natural Insect Control ▪ Sierra Biological ▪ Biobest ▪ Koppert ▪ Plant Products
2. ***Heterorhabditis megidis*** (vine weevil larvae on ornamentals, trees, shrubs and strawberries)	Global Horticultural
3. ***Heterorhabditis indica***	Rincon-Vitova ▪ ARBICO
4. ***Heterorhabditis* spp.** (mix) (vine weevil larvae and other soil borne beetle larvae on ornamentals, trees and shrubs)	Dynamic Ecosystems Crop Supply ▪ Natural Insect Control
Steinernematidae	
5 ***Steinernema carpocapsae*** (fungus gnats on potted plants, wood boring and other caterpillars)	Sierra Biological ▪ Natural Insect Control ▪ Natural Enemies ▪ Buglogical Control Systems ▪ BASF ▪ Koppert ▪ Rincon-Vitova ▪ Hydro-Gardens ▪ Everwood Farm ▪ Biobest ▪ Beneficial Insectary ▪ Green Methods ▪ Anatis Bioprotection ▪ Plant Products ▪ ARBICO ▪ Sound Horticulture ▪ Bioline AgroSciences ▪ BioBee ▪ Global Horticultural ▪ Crop Defenders ▪ Evergreen Growers Supply
6. ***Steinernema feltiae*** (thrips, fungus gnats and leafminers on ornamentals)	BASF ▪ Global Horticultural ▪ BioBee ▪ Green Methods ▪ Bioline AgroSciences ▪ Crop Defenders ▪ Buglogical Control Systems ▪ Sierra Biological ▪ Tip Top Bio-Control ▪ Bio-Control, S. A. ▪ Hydro-Gardens ▪ Natural Insect Control ▪ BioWorks ▪ Koppert ▪ ARBICO ▪ Rincon-Vitova ▪ Beneficial Insectary ▪ Biobest ▪ Anatis Bioprotection ▪ Orcon ▪ Biobest Mexico S.A. de C.V. ▪ Everwood Farm ▪ Sound Horticulture ▪ Plant Products ▪ Evergreen Growers Supply ▪ Natural Enemies
7. ***Steinernema feltiae* MG-13** (root-knot nematodes on greenhouse tomatoes)	Sierra Biological
8. ***Steinernema kraussei*** (black vine weevil)	Biobest ▪ ARBICO ▪ Rincon-Vitova ▪ Evergreen Growers Supply ▪ Beneficial Insectary ▪ Sound Horticulture ▪ Global Horticultural ▪ BASF ▪ Bioline

	AgroSciences ▪ Crop Defenders
9. ***Steinernema riobrave*** (mole crickets, root weevils on citrus, other weevils, caterpillars)	BASF ▪ ARBICO ▪ Sierra Biological ▪ Sound Horticulture
10. ***Steinernema* spp.** (grubs, caterpillars, and fungus gnats)	Green Methods ▪ Natural Insect Control ▪ Bio Control, S.A. ▪ Dynamic Ecosystems Crop Supply ▪ Crop Defenders
Nematode Species Mixes	
11. ***Heterorhabditis bacteriophora*** and ***Steinernema carpocapsae*** (soil borne pests)	Sierra Biological ▪ Sound Horticulture ▪ Buglogical Control Systems ▪ Natural Insect Control
12. ***Steinernema feltiae*** and ***Heterorhabditis* spp.** (soil borne pests)	Buglogical Control Systems ▪ Hydro-Gardens ▪ Anatis Bioprotection ▪ Dynamic Ecosystems Crop Supply ▪ Natural Insect Control ▪ Sound Horticulture ▪ Crop Defenders

Table 3. Predatory mites. Numbered biological control products [family, genus and species], some (target pests) and source companies.

PREDATORY MITES	
Laelapidae	**Source Company (Randomized, see Table 7)**
13. ***Hypoaspis* (*Gaeolaelaps) gillespieii*** (fungus gnats, thrips)	Dynamic Ecosystems Crop Supply ▪ Crop Defenders ▪ Anatis Bioprotection ▪ Natural Insect Control ▪ Applied Bio-nomics ▪ WestGrow Biological Solutions
14. ***Stratiolaelaps scimitus*** (also called *Hypoaspis* or *Stratiolaelaps miles)* (fungus gnats and thrips on potted plants, bedding plants and seedlings)	BioBee ▪ WestGrow Biological Solutions ▪ Plant Products ▪ Sound Horticulture ▪ Evergreen Growers Supply ▪ GrowLiv Biologicals ▪ Natural Insect Control ▪ Beneficial Insectary ▪ Everwood Farm ▪ IPM Laboratories ▪ Natural Enemies ▪ Green Methods ▪ Global Horticultural ▪ Crop Defenders ▪ Dynamic Ecosystems Crop Supply ▪ Buglogical Control Systems ▪ Bioline AgroSciences ▪ Tip Top Bio-Control ▪ Anatis Bioprotection ▪ Rincon-Vitova ▪ Biobest ▪ Applied Bio-nomics ▪ Koppert ▪ ARBICO ▪

	Bio Control, S.A.
Phytoseiidae	
15. ***Amblyseius andersoni*** (spider, russet, rust and broad mite)	Everwood Farm ▪ Green Methods ▪ Natural Enemies ▪ Global Horticultural ▪ Hydro-Gardens ▪ Rincon-Vitova ▪ Bioline AgroSciences ▪ ARBICO ▪ Biobest ▪ Tip Top Bio-Control ▪ Sound Horticulture ▪ Evergreen Growers Supply ▪ Crop Defenders ▪ Plant Products ▪ Beneficial Insectary ▪ Natural Insect Control ▪ IPM Laboratories ▪ BioBee
16. ***Amblyseius degenerans*** (also called *Iphiseius degenerans*) (thrips, broad and spider mites on peppers and ornamentals)	Beneficial Insectary ▪ Plant Products ▪ Bio Control, S.A. ▪ Natural Insect Control ▪ Biobest Mexico S.A. de C.V. ▪ Sound Horticulture ▪ Biobest ▪ Crop Defenders ▪ Global Horticultural
17. ***Amblyseius swirskii*** (whiteflies and thrips on vegetables, melons and ornamentals)	BioBee ▪ Evergreen Growers Supply ▪ Biobest ▪ Natural Insect Control ▪ ARBICO ▪ Green Methods ▪ Biobest Mexico S.A. de C.V. ▪ Crop Defenders ▪ Rincon-Vitova ▪ Buglogical Control Systems ▪ Biotactics ▪ Tip Top Bio-Control ▪ Bioline AgroSciences ▪ Hydro-Gardens ▪ Beneficial Insectary ▪ Global Horticultural ▪ Koppert ▪ Bio Control, S.A. ▪ Everwood Farm ▪ GrowLiv Biologicals ▪ Sound Horticulture ▪ Dynamic Ecosystems Crop Supply ▪ Natural Enemies ▪ Plant Products
18. ***Amblydromalus limonicus*** (formerly called *Typhlodromalus limonicus)*(thrips and whiteflies in greenhouses)	Koppert ▪ Everwood Farm
19. ***Neoseiulus californicus*** (formerly called *Amblyseius californicus***)** (two-spotted spider, broad and cyclamen mites on ornamentals, vegetables, fruit and potted plants)	Associates Insectary ▪ Beneficial Insectary ▪ Hydro-Gardens ▪ Koppert ▪ Buglogical Control Systems ▪ Crop Defenders ▪ Foothill Agricultural Research ▪ Bio Control, S.A. ▪ Plant Products ▪ Bioline AgroSciences ▪ ARBICO ▪ Biobest Mexico S.A. de C.V. ▪ Evergreen Growers Supply ▪ Sound Horticulture ▪ Biotactics ▪ Rincon-Vitova ▪ Everwood Farm ▪ Biobest ▪ BioBee ▪ Natural Insect Control ▪ Tip Top Bio-Control ▪ Green Methods ▪ IPM Laboratories ▪ Orcon ▪ Global

	Horticultural ▪ Natural Enemies ▪ WestGrow Biological Solutions ▪ Dynamic Ecosystems Crop Supply ▪ GrowLiv Biologicals
20. ***Neoseiulus cucumeris*** (formerly called *Amblyseius cucumeris*) (two-spotted spider mite and tarsonemid mites, and flower thrips on all crops)	Tip Top Bio-Control ▪ Bio Control, S.A. ▪ Koppert ▪ Rincon-Vitova ▪ Dynamic Ecosystems Crop Supply ▪ Biobest Mexico S.A. de C.V. ▪ Anatis Bioprotection ▪ Natural Insect Control ▪ Applied Bio-nomics ▪ Hydro-Gardens ▪ Beneficial Insectary ▪ Plant Products ▪ Sound Horticulture ▪ Crop Defenders ▪ Buglogical Control Systems ▪ IPM Laboratories ▪ Global Horticultural ▪ GrowLiv Biologicals ▪ Biobest ▪ Natural Enemies ▪ Everwood Farm ▪ ARBICO ▪ Evergreen Growers Supply ▪ BioBee ▪ Green Methods ▪ Bioline AgroSciences ▪ Orcon
21. ***Neoseiulus fallacis*** (formerly called *Amblyseius fallacis*) (two-spotted spider, European red, and citrus red mites on many crops)	Biotactics ▪ Beneficial Insectary ▪ Tip Top Bio-Control ▪ Everwood Farm ▪ Applied Bio-nomics ▪ Dynamic Ecosystems Crop Supply ▪ Anatis Bioprotection ▪ Rincon-Vitova ▪ Sound Horticulture ▪ ARBICO ▪ Green Methods ▪ Crop Defenders ▪ Natural Enemies ▪ Buglogical Control Systems ▪ Evergreen Growers Supply ▪ Natural Insect Control ▪ WestGrow Biological Solutions ▪ Plant Products
22. ***Galendromus occidentalis*** (spider, eriophyid and russet mites on ornamentals and vegetables in greenhouses and interiorscapes)	Foothill Agricultural Research ▪ ARBICO ▪ Evergreen Growers Supply ▪ Buglogical Control Systems ▪ Biotactics ▪ Hydro-Gardens ▪ Natural Insect Control ▪ Rincon-Vitova ▪ Sound Horticulture
23. ***Mesoseiulus longipes*** (also called *Phytoseiulus longipes*) (two spotted spider mites in greenhouses and interiorscapes)	Natural Insect Control ▪ Hydro-Gardens ▪ Evergreen Growers Supply ▪ Sound Horticulture ▪ Buglogical Control Systems ▪ IPM Laboratories ▪ ARBICO ▪ Rincon-Vitova ▪ Tip Top Bio-Control ▪ Biotactics
24. ***Phytoseiulus persimilis*** (spider mites on many crops)	Anatis Bioprotection ▪ Plant Products ▪ Green Methods ▪ Biotactics ▪ BioBee ▪ Koppert ▪ Biobest ▪ Rincon-Vitova ▪ Hydro-Gardens ▪ Orcon ▪ Applied Bio-nomics ▪ Buglogical Control Systems ▪ Natural Enemies ▪ Everwood Farm ▪ Crop Defenders ▪ Sound Horticulture ▪ Biobest Mexico S.A. de C.V. ▪ ARBICO ▪ WestGrow Biological Solutions ▪

	Evergreen Growers Supply ▪ Bioline AgroSciences ▪ Bio Control, S.A. ▪ Beneficial Insectary ▪ Natural Insect Control ▪ Dynamic Ecosystems Crop Supply ▪ Global Horticultural ▪ GrowLiv Biologicals

Table 4. Predatory insects. Numbered biological control products [family, genus and species], some target pests and source companies.

PREDATORY INSECTS	
Coleoptera	
Coccinellidae	**Source Company (Randomized, see Table 7)**
25. ***Cryptolaemus montrouzieri*** mealybug destroyer (mealybugs on citrus, ornamentals, and vegetables, including greenhouses and interiorscapes)	Crop Defenders ▪ IPM Laboratories ▪ Evergreen Growers Supply ▪ Beneficial Insectary ▪ Associates Insectary ▪ Hydro-Gardens ▪ BioBee ▪ Global Horticultural ▪ Buglogical Control Systems ▪ Bio Control, S.A. ▪ Foothill Agricultural Research ▪ Sound Horticulture ▪ Biobest ▪ Everwood Farm ▪ Green Methods ▪ Koppert ▪ Plant Products ▪ Natural Insect Control ▪ Anatis Bioprotection ▪ Orcon ▪ Bioline AgroSciences ▪ Rincon-Vitova ▪ Biobest Mexico S.A. de C.V. ▪ Tip Top Bio-Control ▪ ARBICO
26. ***Delphastus catalinae*** (formerly called *Delphastus pusillus*) whitefly predator (greenhouse, banded-winged, sweetpotato, woolly, azalea, hibiscus, cloudywinged, citrus and rhododendron whiteflies on ornamentals, vegetables, fruit, and citrus, including greenhouses and interiorscapes)	Orcon ▪ WestGrow Biological Solutions ▪ Crop Defenders ▪ Anatis Bioprotection ▪ Applied Bio-nomics ▪ Buglogical Control Systems ▪ Dynamic Ecosystems Crop Supply ▪ Natural Enemies ▪ Koppert ▪ Sound Horticulture ▪ ARBICO ▪ Natural Insect Control ▪ Evergreen Growers Supply ▪ Rincon-Vitova ▪ Plant Products ▪ IPM Laboratories ▪ Hydro-Gardens ▪ Beneficial Insectary ▪ BioBee
27. ***Rhyzobius lophanthae*** (also called *Lindorus lophanthae*) (hard and soft scales and mealybugs on ornamentals, vegetables, citrus and fruit)	Evergreen Growers Supply ▪ Rincon-Vitova ▪ Anatis Bioprotection ▪ Buglogical Control Systems ▪ IPM Laboratories ▪ ARBICO ▪ Natural Insect Control ▪ Foothill Agricultural Research
28. ***Stethorus punctillum*** (two-	Applied Bio-nomics ▪ BioBee ▪ Natural Insect Control ▪ Crop Defenders ▪ Sound Horticulture ▪ Dynamic

spotted spider mites)	Ecosystems Crop Supply ▪ ARBICO ▪ Anatis Bioprotection ▪ Buglogical Control Systems ▪ Natural Enemies ▪ Evergreen Growers Supply ▪ IPM Laboratories ▪ Rincon-Vitova
Cybocephalidae	
29. ***Cybocephalus nipponicus*** scale picnic beetle (euonymus and San Jose scale on ornamentals, vegetables and fruit, including greenhouses and interiorscapes)	Crop Defenders
Histeridae	
30. ***Carcinops pumilio*** (flies in manure)	IPM Laboratories
Staphylinidae	
31. ***Dalotia coriaria*** (also called *Atheta coriaria*) (fungus gnats, shore flies and thrips in vegetables and ornamentals, including greenhouses and interiorscapes)	Plant Products ▪ Crop Defenders ▪ ARBICO ▪ Evergreen Growers Supply ▪ Tip Top Bio-Control ▪ Sound Horticulture ▪ Global Horticulture ▪ Natural Insect Control ▪ GrowLiv Biologicals ▪ Rincon-Vitova ▪ Biobest ▪ WestGrow Biological Solutions ▪ Natural Enemies ▪ Bioline AgroSciences ▪ Bio Control, S.A. ▪ Green Methods ▪ Applied Bio-nomics ▪ Dynamic Ecosystems Crop Supply ▪ Beneficial Insectary ▪ Buglogical Control Systems ▪ Anatis Bioprotection ▪ Everwood Farm ▪ BioBee
Diptera	
Cecidomyiidae	
32. ***Aphidoletes aphidimyza*** (aphids in citrus, ornamentals, fruits and vegetables, including greenhouses and interiorscapes)	Koppert ▪ Global Horticulture ▪ Anatis Bioprotection ▪ Rincon-Vitova ▪ Natural Enemies ▪ Applied Bio-nomics ▪ ARBICO ▪ BioBee ▪ Green Methods ▪ Buglogical Control Systems ▪ Bioline AgroSciences ▪ Natural Insect Control ▪ Beneficial Insectary ▪ Everwood Farm ▪ Biobest ▪ Evergreen Growers Supply ▪ WestGrow Biological Solutions ▪ Sound Horticulture ▪ Tip Top Bio-Control ▪ Biobest Mexico S.A. de C.V. ▪ Orcon ▪ Bio Control, S.A. ▪ IPM

	Laboratories ▪ Hydro-Gardens ▪ Crop Defenders ▪ Dynamic Ecosystems Crop Supply ▪ Plant Products
33. ***Feltiella acarisuga*** (spider mites in ornamentals and vegetables, including greenhouses and interiorscapes)	Biobest Mexico S.A. de C.V. ▪ Beneficial Insectary ▪ Rincon-Vitova ▪ Global Horticultural ▪ Koppert ▪ ARBICO ▪ Hydro-Gardens ▪ Biobest ▪ Bio Control, S.A. ▪ Crop Defenders ▪ Sound Horticulture ▪ Plant Products ▪ Natural Enemies ▪ Everwood Farm ▪ Natural Insect Control ▪ Buglogical Control Systems
Hemiptera	
Anthocoridae	
34. ***Orius insidiosus*** minute pirate bug (thrips, aphids and whiteflies on ornamentals, vegetables and citrus, including greenhouses and interiorscapes)	Sound Horticulture ▪ Bio Control, S.A. ▪ Dynamic Ecosystems Crop Supply ▪ Natural Enemies ▪ Natural Insect Control ▪ Bioline AgroSciences ▪ Tip Top Bio-Control ▪ Evergreen Growers Supply ▪ Everwood Farm ▪ Biobest ▪ Buglogical Control Systems ▪ Biobest Mexico S.A. de C.V. ▪ Rincon-Vitova ▪ IPM Laboratories ▪ Beneficial Insectary ▪ Koppert ▪ Crop Defenders ▪ GrowLiv Biologicals ▪ Anatis Bioprotection ▪ ARBICO ▪ Plant Products ▪ BioBee
Reduviidae	
35. ***Zelus renardii*** assassin bug (generalist predator)	ARBICO
Miridae	
36**.** ***Dicyphus hesperus*** (greenhouse and tobacco whiteflies)	Bioline AgroSciences ▪ Biobest ▪ Sound Horticulture ▪ Crop Defenders ▪ Natural Insect Control ▪ ARBICO ▪ Anatis Bioprotection ▪ GrowLiv Biologicals ▪ BioBee
Pentatomidae	
37. ***Podisus maculiventris*** spined soldier bug (Colorado potato beetles and caterpillars on ornamentals, vegetables and citrus)	ARBICO ▪ Bioline AgroSciences ▪ Sound Horticulture ▪ Rincon-Vitova ▪ Evergreen Growers Supply ▪ Buglogical Control Systems
Neuroptera	

Chrysopidae	
38. ***Chrysoperla carnea*** green lacewing (aphids and other small soft bodied insects on ornamentals, citrus, fruit and vegetables)	Beneficial Insectary ▪ BioBee ▪ Plant Products ▪ Crop Defenders ▪ Natural Insect Control ▪ Biobest ▪ Bio Control, S.A. ▪ GrowLiv Biologicals ▪ Buglogical Control Systems ▪ Everwood Farm ▪ Anatis Bioprotection ▪ Orcon ▪ Koppert
39. ***Chrysoperla rufilabris*** green lacewing (aphids and other small soft bodied insects on ornamentals, citrus, fruit and vegetables)	Evergreen Growers Supply ▪ Global Horticultural ▪ Natural Enemies ▪ Buglogical Control Systems ▪ Everwood Farm ▪ Plant Products ▪ Sound Horticulture ▪ IPM Laboratories ▪ BioBee ▪ Rincon-Vitova ▪ Natural Insect Control
40. ***Chrysoperla* spp.** lacewing (aphids and other small soft bodied insects on ornamentals, citrus, fruit and vegetables)	Biobest ▪ Crop Defenders ▪ ARBICO ▪ Bioline AgroSciences ▪ Kunafin ▪ Natural Insect Control
Hemerobiidae	
41. ***Micromus variegatus*** brown lacewing (aphids, whiteflies and mealybugs on vegetables and ornamentals)	Everwood Farm ▪ Applied Bio-nomics ▪ Crop Defenders ▪ Natural Insect Control ▪ Anatis Bioprotection ▪ WestGrow Biological Solutions ▪ Evergreen Growers Supply ▪ Dynamic Ecosystems Crop Supply
42. ***Sympherobius barberi*** brown lacewing (mealybugs, psyllids, thrips, mites, whiteflies, aphids, small caterpillars, leafhoppers, and insect eggs on grapes, citrus, tree crops and greenhouse crops)	Foothill Agricultural Research
Thysanoptera	
Thripidae	
43. ***Scolothrips sexmaculatus*** (spider mites on fruit trees)	Rincon-Vitova

Table 5. Parasitic wasps. Numbered biological control products [family, genus and species], some (target pests) and source companies.

PARASITIC WASPS	
Hymenoptera	
Aphelinidae	**Source Company (Randomized, see Table 7)**
44. ***Aphelinus abdominalis*** (potato aphids on ornamentals, fruits and vegetables, including greenhouses)	ARBICO ▪ Crop Defenders ▪ Biobest Mexico S.A. de C.V. ▪ Dynamic Ecosystems Crop Supply ▪ Rincon-Vitova ▪ Bio Control, S.A. ▪ Tip Top Bio-Control ▪ Koppert ▪ IPM Laboratories ▪ Global Horticultural ▪ Bioline AgroSciences ▪ Hydro-Gardens ▪ Sound Horticulture ▪ Plant Products ▪ Green Methods ▪ Natural Insect Control ▪ Beneficial Insectary ▪ Everwood Farm ▪ Biobest ▪ Buglogical Control Systems
45. ***Aphytis melinus*** (oleander, citrus scales, including greenhouses)	Hydro-Gardens ▪ Natural Insect Control ▪ IPM Laboratories ▪ Anatis Bioprotection ▪ Buglogical Control Systems ▪ Orcon ▪ Rincon-Vitova ▪ Tip Top Bio-Control ▪ Sound Horticulture ▪ Foothill Agricultural Research ▪ Plant Products ▪ Evergreen Growers Supply ▪ ARBICO ▪ Associates Insectary ▪ Green Methods
46. ***Encarsia formosa*** (whiteflies in greenhouses)	Koppert ▪ Global Horticultural ▪ Biobest ▪ Natural Insect Control ▪ IPM Laboratories ▪ Natural Enemies ▪ Evergreen Growers Supply ▪ Crop Defenders ▪ Everwood Farm ▪ Anatis Bioprotection ▪ Orcon ▪ Bio Control, S.A. ▪ Buglogical Control Systems ▪ Rincon-Vitova ▪ Green Methods ▪ ARBICO ▪ Beneficial Insectary ▪ Hydro-Gardens ▪ Dynamic Ecosystems Crop Supply ▪ Applied Bio-nomics ▪ Sound Horticulture ▪ Bioline AgroSciences ▪ WestGrow Biological Solutions ▪ BioBee ▪ Plant Products
47. ***Eretmocerus eremicus*** (sweetpotato whiteflies, including greenhouses and interiorscapes)	BioBee ▪ Global Horticultural ▪ Beneficial Insectary ▪ Sound Horticulture ▪ ARBICO ▪ Green Methods ▪ Buglogical Control Systems ▪ Biobest Mexico S.A. de C.V. ▪ IPM

	Laboratories ▪ Biobest ▪ Bioline AgroSciences ▪ Natural Insect Control ▪ Koppert ▪ Rincon-Vitova ▪ Plant Products ▪ Bio Control, S.A. ▪ Evergreen Growers Supply ▪ Hydro-Gardens ▪ Crop Defenders ▪ Everwood Farm
48. ***Eretmocerus mundus*** (sweetpotato and tobacco whiteflies in greenhouses)	Bio Control, S.A. ▪ Global Horticultural
Aphidiidae	
49. ***Aphidius colemani*** (cotton, melon, green peach and other aphids on vegetables, fruit and ornamentals, including greenhouses and interiorscapes)	GrowLiv Biologicals ▪ Sound Horticulture ▪ Everwood Farm ▪ Global Horticultural ▪ Natural Insect Control ▪ Biobest Mexico S.A. de C.V. ▪ IPM Laboratories ▪ Bio Control, S.A. ▪ Anatis Bioprotection ▪ Green Methods ▪ Tip Top Bio-Control ▪ Beneficial Insectary ▪ BioBee ▪ Evergreen Growers Supply ▪ Rincon-Vitova ▪ Buglogical Control Systems ▪ ARBICO ▪ Koppert ▪ Hydro-Gardens ▪ Biobest ▪ Bioline AgroSciences ▪ Plant Products ▪ Crop Defenders ▪ Natural Enemies
50. ***Aphidius ervi*** (potato, pea, and green peach aphids on vegetables, fruit and ornamentals, including greenhouses and interiorscapes)	Green Methods ▪ Crop Defenders ▪ Buglogical Control Systems ▪ Plant Products ▪ Biobest Mexico S.A. de C.V. ▪ Beneficial Insectary ▪ Bioline AgroSciences ▪ Rincon-Vitova ▪ BioBee ▪ Tip Top Bio-Control ▪ Hydro-Gardens ▪ Global Horticultural ▪ ARBICO ▪ Biobest ▪ Everwood Farm ▪ Koppert ▪ Evergreen Growers Supply ▪ Natural Insect Control ▪ IPM Laboratories ▪ Bio Control, S.A. ▪ Natural Enemies ▪ Global Horticultural ▪ Dynamic Ecosystems Crop Supply
51. ***Aphidius matricariae*** (green peach aphids on vegetables, fruit and ornamentals, including greenhouses and interiorscapes)	Beneficial Insectary ▪ Crop Defenders ▪ Evergreen Growers Supply ▪ Sound Horticulture ▪ Rincon-Vitova ▪ Dynamic Ecosystems Crop Supply ▪ Biobest ▪ Natural Insect Control ▪ Koppert ▪ Buglogical Control Systems ▪ Plant Products ▪ BioBee

Braconidae	
52. ***Dacnusa sibirica*** (leafminers on vegetables, fruit and ornamentals, including greenhouse and interiorscapes)	Beneficial Insectary ▪ Natural Insect Control ▪ Biobest ▪ Bio Control, S.A. ▪ Evergreen Growers Supply ▪ Crop Defenders ▪ ARBICO ▪ Global Horticultural
53. ***Peristenus relictus*** (also called *Peristenus relictus* and *digoneutis*), (*Lygus* bugs on strawberries)	Rincon-Vitova
Encyrtidae	
54. ***Anagyrus pseudococci*** (new name is *Anagyrus vladimiri*) (mealybugs on grapes and citrus)	Foothill Agricultural Research ▪ Rincon-Vitova ▪ Sound Horticulture ▪ ARBICO ▪ BioBee ▪ Associates Insectary ▪ Biobest ▪ Evergreen Growers Supply ▪ Koppert
Eulophidae	
55. ***Diglyphus isaea*** (vegetable, tomato, serpentine and chrysanthemum leafminers on vegetables, fruit and ornamentals, and in greenhouses and interiorscapes)	Biobest ▪ Plant Products ▪ Global Horticultural ▪ Biobest Mexico S.A. de C.V. ▪ BioBee ▪ Bio Control, S.A. ▪ Tip Top Bio-Control ▪ Sound Horticulture ▪ Rincon-Vitova ▪ Natural Insect Control ▪ Bioline AgroSciences ▪ Buglogical Control Systems ▪ Koppert ▪ Beneficial Insectary ▪ Evergreen Growers Supply ▪ Green Methods ▪ ARBICO ▪ Hydro-Gardens ▪ Crop Defenders
56. ***Pediobius foveolatus*** (Mexican bean beetle on vegetables)	Buglogical Control Systems ▪ Natural Insect Control ▪ Sound Horticulture ▪ Rincon-Vitova
57. ***Tamarixia radiata*** (Asian citrus psyllid)	Foothill Agricultural Research ▪ Associates Insectary
Pteromalidae	
58. ***Muscidifurax raptor*** (flies in garbage, manure and compost)	Spalding Laboratories ▪ Evergreen Growers Supply ▪ Rincon-Vitova ▪ Buglogical Control Systems ▪ Natural Insect Control ▪ Sound Horticulture ▪ IPM Laboratories ▪ Kunafin
59. ***Muscidifurax raptorellus*** (flies in	IPM Laboratories ▪ Buglogical Control Systems ▪ Spalding Laboratories ▪ Plant

garbage, manure and compost)	Products ▪ Kunafin ▪ Evergreen Growers Supply ▪ Natural Insect Control ▪ Rincon-Vitova ▪ Koppert
60. ***Muscidifurax zaraptor*** (flies in garbage, manure and compost)	Evergreen Growers Supply ▪ Buglogical Control Systems ▪ Rincon-Vitova ▪ Kunafin ▪ Plant Products
61. ***Muscidifurax* spp.** (flies in garbage, manure and compost)	Kunafin ▪ Natural Insect Control ▪ Tip Top Bio-Control ▪ Sound Horticulture ▪ Evergreen Growers Supply ▪ Everwood Farm
62. ***Nasonia vitripennis*** (flies in garbage, manure and compost)	Buglogical Control Systems
63. ***Spalangia cameroni*** (flies in garbage, manure and compost)	Spalding Laboratories ▪ Rincon-Vitova ▪ Buglogical Control Systems ▪ Plant Products ▪ Kunafin
64. ***Spalangia endius*** (flies in garbage, manure and compost)	Kunafin ▪ Spalding Laboratories
Trichogrammatidae	
65. ***Trichogramma brassicae*** (moth eggs on vegetables, fruit, citrus and ornamentals, including greenhouse and interiorscapes)	Everwood Farm ▪ Tip Top Bio-Control ▪ Natural Insect Control ▪ Orcon ▪ Anatis Bioprotection ▪ Global Horticultural ▪ Beneficial Insectary ▪ IPM Laboratories ▪ Kunafin ▪ ARBICO ▪ Green Methods ▪ Sound Horticulture ▪ Plant Products ▪ Rincon-Vitova ▪ Biobest ▪ Evergreen Growers Supply ▪ Crop Defenders ▪ Buglogical Control Systems
66. ***Trichogramma minutum*** (moth eggs on fruit trees in eastern U.S. orchards)	Buglogical Control Systems ▪ Green Methods ▪ Anatis Bioprotection ▪ Crop Defenders ▪ Rincon-Vitova ▪ Orcon ▪ Tip Top Bio-Control ▪ Sound Horticulture ▪ Evergreen Growers Supply ▪ ARBICO ▪ Natural Insect Control ▪ Plant Products ▪ Global Horticultural
67. ***Trichogramma ostriniae*** (European corn borer on corn and peppers, and grape berry moth on grapes)	Natural Insect Control ▪ Anatis Bioprotection ▪ Plant Products

68. ***Trichogramma platneri*** (moth eggs in fruit trees in western U.S. orchards)	Sound Horticulture ▪ Crop Defenders ▪ ARBICO ▪ Evergreen Growers Supply ▪ Rincon-Vitova ▪ Buglogical Control Systems ▪ Everwood Farm ▪ Foothill Agricultural Research ▪ Natural Insect Control ▪ Tip Top Bio-Control
69. ***Trichogramma pretiosum*** (moth eggs on vegetables, field crops and ornamentals)	Plant Products ▪ Crop Defenders ▪ ARBICO ▪ Orcon ▪ Sound Horticulture ▪ Rincon-Vitova ▪ Natural Insect Control ▪ Buglogical Control Systems ▪ Everwood Farm ▪ Green Methods ▪ Bio Control, S.A. ▪ Tip Top Bio-Control
70. ***Trichogramma species*** (moth eggs on vegetables, field crops and ornamentals)	Plant Products ▪ Kunafin

Table 6. Member companies of the Association of Natural Biocontrol Producers that market nematodes, mites, and insects for pest management in North America. Products available from these companies are listed in Tables 2-5. For companies that produce or sell biopesticides, visit the *IR-4 Biopesticide and Organic Database for Integrated Pest* Management (http://ir4app.rutgers.edu/biopestPub/labelDb.aspx).

Company	Website
Anatis Bioprotection	http://anatisbioprotection.com/en/
Applied Bio-nomics	http://www.appliedbio-nomics.com
ARBICO Organics	http://www.arbico-organics.com
Associates Insectary	http://www.associatesinsectary.com
BASF Agricultural Specialties	http://betterplants.basf.us.com
Beneficial Insectary	http://www.insectary.com
BioBee USA	http://www.biobee.com/
Biobest Canada	http://www.biobestgroup.com
Biobest Mexico	http://www.biobestgroup.com
Biobest USA	http://www.biobestgroup.com
Bio Control, S. A.	http://www.biocontrol.cr
Bioline AgroSciences	https://www.biolineagrosciences.com/
Biotactics	http://www.benemite.com
BioWorks	http://www.bioworksinc.com
Buglogical Control Systems	http://www.buglogical.com

Crop Defenders	http://www.cropdefenders.com/
Dynamic Ecosystems Crop Supply	http://www.dynamicecosystems.ca
Evergreen Growers Supply	http://www.evergreengrowers.com
Everwood Farm	http://www.everwoodfarm.com/
Foothill Agriculture Research (FAR Inc.)	https://www.far-inc.com/
Global Horticultural	http://www.globalhort.com/
Green Methods	http://greenmethods.com
GrowLiv	http://www.growliv.com/
Hydro-Gardens	http://www.hydro-gardens.com
IPM Laboratories	http://www.ipmlabs.com
Koppert Biological Systems	http://www.koppert.com
Kunafin "The Insectary"	http://www.kunafin.com
Natural Enemies	https://naturalenemies.com/
Natural Insect Control	http://www.naturalinsectcontrol.com/
Orcon (Organic Control)	http://organiccontrol.com/
Plant Products	http://www.plantproducts.com/
Rincon-Vitova	http://www.rinconvitova.com
Sierra Biological Inc.	http://www.sierrabiological.com/
Sound Horticulture	http://soundhorticulture.com/
Spalding Laboratories	https://www.spalding-labs.com
Tip Top Bio-Control	http://www.tiptopbiocontrol.com/
WestGrow Biological Solutions	https://www.thebuglady.ca/

Table 7. Biopesticides. Common microbial insecticide and fungicide active ingredients and some target pests. The searchable IR-4 Project *Biopesticide and Organic Database for Integrated Pest Management* lists the products, sources, and applications for biopesticides (http://ir4app.rutgers.edu/biopestPub/labelDb.aspx).

BIOPESTICIDES
Microbial Insecticides
Bacillus thuringiensis aizawai (Bta) (caterpillars)
Bacillus thuringiensis israelensis (Bti) (mosquitoes, blackfly larvae and fungus gnats)

Bacillus thuringiensis kurstaki (Btk) (caterpillars)
Bacillus thuringiensis tenebrionis (Btt) (beetle larvae)
Bacillus popilliae Milky Spore (Japanese beetles)
Bacillus sphaericu (mosquito larvae)
Beauveria bassiana (aphids, grubs, chinch bugs, grasshoppers, crickets and sod webworms)
***Burkholderia* spp.** (aphids, stink bugs, leafhoppers)
Chromobacterium subtsugae (aphids, whiteflies, thrips, caterpillars)
Hirsutella thompsonii (mites)
Metarhizium anisopliae (grasshoppers)
Nomuraea rileyi (caterpillars)
Nosema locustae (grasshoppers)
Nucleopolyhedrosis virus (NPV) (caterpillars)
Paecilomyces fumosoroseus (whiteflies, aphids)
Saccharopolyspora spinosa (caterpillars, beetle larvae, thrips and leafminers)
Verticillium lecanii (aphids, whiteflies, scales)
Microbial Fungicides
Agrobacterium radiobacter (crown gall)
Bacillus amyloliquefaciens (fungal diseases)
Bacillus licheniformis (fungal diseases)
Bacillus pumilis (fungal diseases)
Bacillus subtilis (fungal and bacterial diseases)
Gliocladium virens (*Pythium, Rhizoctonia, Fusarium*)
Pseudomonas fluorescens (fire blight)

Reynoutria sachalinensis (Powdery mildew and *Botrytis* grey mold)
***Streptomyces* spp.** (*Fusarium*, damping off, *Pythium, Phytophthora* and fire blight)
***Trichoderma* spp.** (*Pythium, Rhizoctonia, Fusarium, Cylindrocladium* and *Thielaviopsis*)

Table 8. Association of Natural Biocontrol Producers practitioners that provide support services for biological control.

Company	Services Provided
BioTEPP Inc. VIROSOFT CP4 - BioTEPP	Produces environmentally-friendly bio-pesticides to help reduce the spread of chemical pesticides.
Buglady Consulting http://www.bugladyconsulting.com/	Provides expert advice on pest management and plant health, focusing on IPM and biological control.
LITSINGER IPM Email: alitsinger80@yahoo.com	Specializes in biological control with an organic emphasis on disease and pest prevention for high valued crops.
M3 Agriculture Technologies http://www.m3agriculture.com	Supports import, storage, transport and aerial sterile insect and natural enemy release using unmanned aircraft.
Parabug Biocontrol by Drone | Parabug	Uses unmanned aerial vehicles to apply commercially-reared beneficial insects to control agricultural pests.
The UAV-IQ Precision Ag. https://www.uaviq.com	Uses drones to release beneficial insects exactly when and where they're needed to suppress pests.
The Quebec Institute for the Development of Ornamental Horticulture (IQDHO) Home - IQDHO	Assists growers to determine their agroenvironmental profiles and set and reach their IPM objectives.

Footnotes

1. This document is IPM-146 (originally titled *Guidelines for Purchasing and Using Commercial Natural Enemies and Biopesticides in Florida and Other States*, published July 2010 by Norman C. Leppla, professor, and Kenneth L. Johnson II, USDA, NIFA, National Needs Fellow, IPM Florida), one of a series of the Entomology and Nematology Department, UF/IFAS Extension. Original publication date July 2010. Revised August 2015. Reviewed December 2018. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

2. Lynn M. LeBeck, executive director, Association of Natural Biocontrol Producers (ANBP); and Norman C. Leppla, professor and integrated pest management program director, Entomology and Nematology Department; UF/IFAS Extension, Gainesville, FL 32611.

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