

BIOLOGICAL CONTROL STRATEGY FOR GREENHOUSE BELL PEPPER PRODUCTION



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GROWERS NOTES:

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BIOLOGICAL CONTROL STRATEGY FOR GREENHOUSE BELL PEPPER PRODUCTION

BCA's in pepper crops have been used for over 2 decades and has been successful. In recent years, the most challenging pest problem in pepper crops has been aphids as aphid populations can be very explosive in establishment. A preventive approach is highly recommended to successfully control pest problems, especially aphid control. The use of BCA's is an excellent resistance management tool and can be used successfully right from the start.





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The most common pests that affect greenhouse bell pepper crops are thrips and aphids but also spider mites, broad mites (begonia mites), Loopers/Catepillars and whitefly can also establish well. The use of BCA's is an excellent resistance management tool and can be used very successfully right from the start. BCA's are excellent in preventing pest populations from getting established when they are released early in the crop cycle, ideally already during propagation.

BIOLINE BIOLOGICAL CONTROL AGENTS FOR GREENHOUSE BELL PEPPERS

PEST	BCA	PRODUCT	RATE		TIMING	COMMENTS
			m2	ft2		
Thrips: Western Flower Thrips, Chili Thrips and other species (<i>Frankliniella occidentalis</i>, <i>Scirtothrips dorsalis</i>) Note: In areas where temperatures are consistently >75F/24C, replace <i>Amblyseius cucumeris</i> with <i>Amblyseius swirskii</i>	<i>Amblyseius cucumeris</i>	Amblyline Stick	1 sachet per plant		At transplanting at propagator.	Communicate with propagator.
		Amblyline Mini Sachet	1 sachet per 3 plants		Hang sachet on plant 6 – 8 inches/ 18 to 25 cm from top of the plant.	
	<i>Orius insidiosus</i> (<i>Ephestia</i>)	Oriline i (Bugfood)	0.5 – 1	0.05 – 0.1	Release 4 consecutive weekly introductions starting at end of February. Earlier releases can be done along main walkway if service lights are used to extend daylength to minimum of 12 hours.	NOTE: <i>Orius</i> egg laying capacity can be boosted by introducing Bugfood (Ephestia eggs) weekly during the first 4 to 6 weeks of establishment.
Aphids (small spp), Green Peach, Black Melon, Tobacco aphid (<i>Aphis gossypii</i>, <i>Myzus persicae</i>, <i>Myzus nicotianae</i>)	<i>Aphidius colemani</i>	Apheline	0.25 - 1	0.025 - 0.1	Release weekly and/or use in combination with aphid banker plants.	Ideal release method is Aphiline in Blister Packs. Hang Blister packs in shady spot out of intense direct sunlight.
	<i>Rhopalosiphum padi</i>	Boostline - Aphid banker plant	1 / acre (2.5 / ha) minimum	Apply every other week	Initial introduction is 2 per acre followed by one per acres every 2 weeks.	Consistent releases and maintaining the banker plants are keys to success.
	<i>Aphidoletes aphidimyza</i>	Aphidoline	1	0.1	Release at first sign of aphids. Continue weekly releases until control has been achieved.	Be aware of diapause between October 15th and March 1st.
	<i>Adalia bipunctata</i>	Adaline	10 - 50	1 - 5	Use as hot spot treatment only. Works for quick knock down.	
Aphids (larger spp) Potato aphid, Foxglove aphid (<i>Macrosiphum euphorbiae</i>, <i>Aulacorthum solani</i>)	<i>Aphidius ervi</i>	Erviline	0.25 - 1	0.025 - 0.1	Release weekly before aphids become a problem.	
	<i>Aphidoletes aphidimyza</i>	Aphidoline	1	0.1	Release at first sign of aphids. Continue weekly releases until control has been achieved.	Be aware of diapause between October 15th and March 1st.
	<i>Adalia bipunctata</i>	Adaline	10 - 50	1 - 5	Use as hot spot treatment only. Works for quick knock down.	
Two-spotted spider mites (<i>Tetranychus urticae</i>)	<i>Amblyseius andersoni</i>	Anderline	4 to 6	0.4 to 0.6	Can be released as broadcast, but better results are achieved with sachets early in start of the crop. Repeated introductions every 2 to 3 weeks.	
			Release one mini sachet per 6 plants after first flower.			
	<i>Phytoseiulus persimilis</i>	Phytoline	6 to 8	0.6 to 0.8	Start when mites are first detected. Repeat weekly for 3 to 4 weeks until <i>Phytoseiulus</i> is established and mites are controlled.	Early detection improves results. Some growers use 'control pest release' techniques. Talk to your IPM Technical Specialist for more information.
Broad mites (Begonia mites) (<i>Polyphagotarsonemus latus</i>)	<i>Amblyseius cucumeris</i>	Amblyline Stick - Mini Sachet	See thrips strategy. <i>Amblyseius cucumeris</i> and other <i>Amblyseius</i> spp are excellent in controlling broad mites. Broad mites are rare to find these days due to the pro-active strategies that are implemented for thrips. If you discover broad mite, release <i>Amblyseius cucumeris</i> in vermiculite formulation as a spot treatment.			
Caterpillars/loopers (<i>Trichoplusia nii</i> and other species)	<i>Podisus maculiventris</i>	Podline	0.05	0.005	Release weekly starting early in the crop until establishment.	If hotspots with loopers occur, focus releases on hotspots. Nymphs develop better in the presence of prey
	<i>Bacillus thuringiensis</i>	N/A	Follow label instructions		Little to no negative effect on other BCAs	<i>Bacillus thuringiensis</i>
	<i>Orius insidiosus</i>	Oriline i	As per thrips strategy		An established Orius population can be a significant contributor to looper control as they prey on moth eggs. Focus on aphid control using BCAs to avoid interference from systemic crop protection products that harm Orius. An interference from such a product typically results in an increase of looper activity within 2 weeks after application.	
Whitefly, Sweet Potato or Greenhouse (<i>Trialeurodes vaporariorum</i> and or <i>Bemisia tabaci</i>) Note: If <i>Amblyseius swirskii</i> is released for whitefly it will also control thrips larvae eliminating the need to release <i>Amblyseius cucumeris</i> .	<i>Amblyseius swirskii</i>	Swirskiline loose	100	10	Release once when whitefly has been observed.	Broadcast evenly over leaf canopy.
		Swirskiline Stick - mini sachet	One mini sachet per 3 to 6 plants		Release once when whitefly has been observed.	Hang sachet 18 to 24 cm (6 to 8 inches) from top of the plants.
	<i>Encarsia formosa</i> & <i>Eretmocerus eremicus</i>	Encarline - Mix	3 - 6	0.3 to 6	Start at first signs of whitefly Release weekly until whitefly is controlled	Optimal introduction method for wasps is blister packs. Keep blister packs (cards) out of direct sunlight and open release flap on the back.
Fungus gnats & Shore flies (<i>Bradysia spp</i> & <i>Scatella spp</i>) in pepper crops grown in organic or soil media	<i>Stratiolaelaps scimitus</i> (<i>Hypoaspis miles</i>)	Hypoline	100	10	Apply at sticking and at transplanting.	If applied at rooting stage, second application should be half rate at transplanting.
	<i>Dalotia coriaria</i> (<i>Atheta coriaria</i>)	Staphyline	2	0.2		
	<i>Steinernema feltiae</i> & <i>Steinernema carpocapsae</i>	Exhibitline sf Exhibitline sc	250K	25K	Apply at sticking and repeat twice during rooting stage. Reapply immediately after transplanting.	Correct application is critical for efficacy. Make sure solution is agitated, fine filters are removed and pressure is kept low.