

Field Selectivity Makes Emamectin Suitable for IPM

S. Aston, L. Streit, K. McKee and C. Clarke

Novartis Crop Protection Australasia Pty. Ltd.

Integrated pest management (IPM) has become a focus for farmers, particularly in cotton and horticulture, where large volumes of insecticides are often used to grow high yielding crops. Selective insecticides are needed to provide effective control of pests, whilst allowing the maintenance of beneficial populations and other non-target species. Emamectin is a new generation avermectin, that is extremely active on target pests (*Helicoverpa* spp., *Tetranychus* spp. and *Plutella xyostella*) at low rates. Its translaminar activity provides residual activity against foliage feeding insects, yet surface residues degrade rapidly, providing a low hazard environment for beneficials. Field and laboratory studies have been conducted on a wide range of beneficial species relevant to both cotton and horticulture. These are summarised below. Overall, the selectivity of emamectin that has been displayed in these trials makes it a useful tool in IPM systems.

Hazard ratings are based on disruption to populations up to 24 hours after application:

●	Very low disruption	<10% population reduction
■	Low disruption	10 – 20 % population reduction
▲	Moderate disruption	20 – 40% population reduction
◆	High to very high disruption	>40% population reduction

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Beneficial species	Common name	Helps to control	Effect from use of EMAMECTIN	Hazard rating
<i>Aphidoletes aphidimyza</i> *	Aphid midge/ Gall-midge	Aphids	No effect on populations exposed to three hour aged residues, high mortality rates (80%) directly after application.	●
<i>Apis mellifera</i> #	Honey bees	-	No effect on populations 24 hours after application, high mortality rates (100%) directly after application.	■
Araneidae	Spiders	Heliothis	Little effect on populations up to 13 days after application.	■

<i>Campylomma liebknechti</i>	Apple dimpling bug	Mites	Suppression of populations, particularly larvae, up to 10 days after application.	◆
Carabidae	Ground beetles	Caterpillars, Cutworms, Snails, Slugs	Little effect on populations.	■
Coccinellidae	Ladybirds	Aphids, Mites, Heliothis, Scales, Mealybugs	No effect on populations exposed to one hour aged residues, low mortality rates (10%) directly after application.	●
<i>Cotesia spp.</i> (several studies, some field, some laboratory)	Cabbage white butterfly parasite/ Parasitic wasp	Diamondback moth, Cabbage white butterfly, Cabbage looper	No effect on populations exposed to two hour aged residues.	●
<i>Diadegma insularis</i> *	Parasitoid	Diamondback moth	Little effect on populations exposed to 15 hour aged residues, higher mortality rates directly after application (50% at 1 h).	●
<i>Dicranolaius bellulus</i>	Red and blue beetle	Heliothis	Little effect on populations up to 13 days after application.	■
<i>Diglyphus begini</i>	Leafminer parasite	Leafminer, Heliothis	Little effect on populations exposed to 15 hour aged residues, higher mortality rates directly after application (50% at 1 h).	●
<i>Diglyphus isaea</i> *	Parasitic wasp	Leafminer	Up to 20% mortality after exposure to 36 hour aged residues.	▲
<i>Formicidae</i>	Ants	Heliothis	No effect on populations.	●
Predatory Hemiptera	Various spp.	Heliothis, Aphids, Apple dimpling bug, Mites, Thrips	Little effect on populations. Variation between species has been noted.	■

<i>Metaseiulus occidentalis</i> *	Western predatory mite	Two-spotted mite, Tomato russet mite	No effect on populations exposed to three hour aged residues, high mortality rates (80%) directly after application.	●
<i>Microgaster spp.</i>	Parasitoid wasp	Codling moth, Leafrollers	No effect on activity after field application.	●
Microhymenoptera	Various families	Heliothis	No effect on populations within the first week after application.	●
Neuroptera	Lacewings	Aphids, Mites	Little effect on populations; may cause suppression of larvae.	■
<i>Paederus spp.</i>	Rove beetles	Caterpillars, Cutworms, Snails, Slugs	No effect on populations for up to 20 days after application.	●
<i>Podisus maculiventris</i> *	Spined soldier bug	Caterpillars, Beetles	Little effect on populations exposed to four hour aged residues.	■
<i>Pteromalus puparus</i>	Cabbage white butterfly pupal parasite	Cabbage white butterfly	No effect on populations exposed to two hour aged residues, higher mortality rates (30%) directly after application.	●
<i>Trichogramma sp.</i>	Minute wasp	Heliothis	No effect on populations exposed to nine hour aged residues, higher mortality rates (18%) directly after application.	●

Note: Predatory Hemiptera consist of *Deraeocoris* spp., *Orius* sp., *Geocoris* sp., *Nabis* sp., Reduviidae, *Cermatulus* spp. and *Oechelia* spp. * Denotes overseas studies. # Denotes laboratory studies.