

DuPont Avatar®

Insecticide safety to beneficial insects

Since being launched into the Australian horticultural industry in 2001, Avatar® (300 g/kg Indoxacarb) has achieved an excellent reputation as a highly effective insecticide for the control of Lepidoptera (caterpillar) pests in vegetables, pome fruit, stone fruit and wine grape crops.

Along with high performance on pest species, Avatar® has been shown to have a “Low to Moderate” impact on beneficial insect populations and has proved itself as a useful product for use in IPM programs.

The safety of Avatar® to beneficial insects can be characterised to be of two basic forms.

Firstly there are those species that for most or all of their life cycle show a high tolerance to Indoxacarb even when exposed to direct spray or wet residues on the leaf surface. These include spiders, many parasitic wasps, predatory mites and predatory flies.

Secondly there are those species that are sensitive to direct spray contact or wet residues but which are generally unaffected by dried residues on leaf surface. Field and laboratory testing has demonstrated that in these cases the population impact is short-term, with rapid recoveries in insect numbers. These include many species of ladybirds, lacewing and honeybees.

Beneficial Species	Species	Host Pest	Crops	Use Rate	Impact
Predatory Mites	<i>Typhlodromus pyri</i> , <i>T. occidentalis</i> , <i>Typhlodromips montdorensis</i>	TS Mite, E R Mite, Mealybug, Western Flower Thrip	Pome	25 g/100 L	Very Low
Parasitic Wasps	<i>Trichogramma spp.</i>	Lepidoptera Parasite (Heliothis, LBAM)	All	250 g/ha	Low
	<i>Diaeretiella rapae</i>	Cabbage Aphid parasite	Crucifers		Low
	<i>Cotesia glomerata</i>	Lepidoptera parasite	Crucifers	250 g/ha	Low
	<i>Aphelinus mali</i>	Woolly Aphid parasite	Pome	20 g/100 L	Low
Lacewings : Direct Spray : Residual activity	–	Scales, Aphids, Heliothis eggs, Mealybug	All	*850 mL/ha 250 g/ha	Moderate to High Low
Spiders	–	General predator	All	*850 mL/ha*	Very Low
Predatory Beetles : Direct Spray : Residual activity	<i>Coccinellids</i> , <i>Ladybirds</i> <i>Stethorus</i>	Mites, Mealybugs, Scale, Aphids	All	25 g/100 L	Moderate Low
Predatory Flies	–	Mealybug	All	*850 mL/ha	Low
Bees : Direct spay Bees : Foraging	<i>Apis mellifera</i>	N/A	All	25 g/100 L	Moderate Low

Note: The nominal AVATAR® rate in grapes is 170 g/ha based on 17 g/100 L at 1000 L/ha application volume.

* - cotton formulation 150 g/ L

Avatar® IPM position in Wine grapes

Avatar® sales have grown to the point where it has become the number one chemical used for the control of Light Brown Apple Moth (LBAM) in wine grapes in Australia (Kleffmann Market Research May 04). The reasons for the growth in sales is due to its excellent field performance, its ability to control all growth stages of LBAM, and its superior residual control compared to competitive products, while at the same time demonstrating high levels of safety to major beneficial insects.

There has been some recent publicity suggesting that the use Avatar® is connected to the increased incidence of Mealybug in some vineyards, due to a potential impact on lacewing populations.

It is important to note that there has been no research or field data showing a correlation between the use of Avatar® and the increased incidence of Mealybugs.

Where increases in Mealybug incidence has been reported, populations have been present not only in vineyards where Avatar® has been applied, but also in vineyards where other management practices for controlling LBAM have been used.

Avatar® IPM position in Wine grapes (continued)

Mealybug is also a major issue in table grapes, and in Western Australian wine grapes where because of the near total absence of LBAM, there has been little or no usage of Avatar® in grape vines to this point.

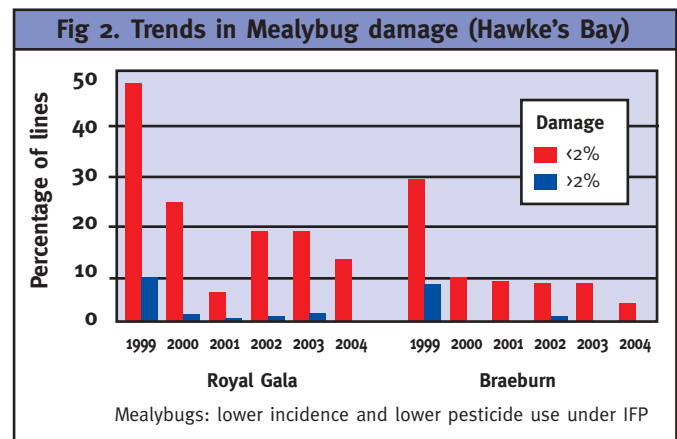
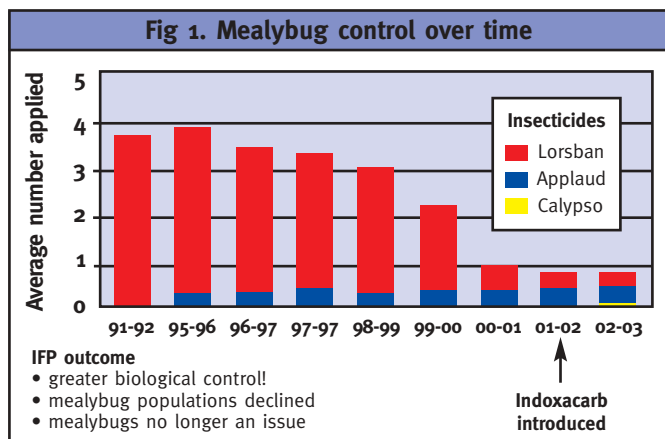
There is currently a submission to the APVMA for the use of Avatar® to control some additional pests in WA because it has been screened and concluded as a soft alternative to current broad spectrum insecticides.

We do know from field observations in brassica and cotton crops (where Indoxacarb has been applied at higher rates and more frequently) there has been a rapid recovery of populations of lacewing following its use.

It must be also remembered that there are a range of other beneficial insects that are potential predators or parasitoids of Mealybug in vineyards. Predatory mites, hover fly and parasitic wasps may act as predators or parasites of Mealybug. Avatar® is rated as having a very low impact on these species even when contacted by direct spray.

Indeed the safety of Avatar® to a range of predatory mite species has been demonstrated globally by the total absence of flaring of pest mite populations in any crop.

A study conducted by Jim Walker et al for Hort Research NZ in a presentation titled Fine Tuning the IFP program 2004 for the NZ apple industry showed the requirement for the use of Mealybug insecticides has declined (fig 1.) over the last 12 years and Mealybug damage has decreased in the Hawkes Bay area (fig 2.).



Indoxacarb was introduced into the NZ market in 2001 for Codling Moth and Leaf Roller (LBAM) control, and has been used in significant quantities over a period where Mealybug incidence and damage has declined.

The same study also showed that there has been a dramatic decline in the requirement for miticides during this period as the NZ industry has moved away from broad-spectrum insecticides. This is not to say that all the credit for these changes can be attributed to the use of Indoxacarb, but it is a valid conclusion to say the widespread use is not having a dramatic or overwhelmingly negative effect on this trend and it is being utilised as a component of New Zealand's Integrated Fruit Product (IFP) system.

In other crops in Australia, and indeed around the world, Avatar® (Indoxacarb) has been classified as "low impact" chemistry ideally suited to IPM programs. If this is the case in the apple market, why then would Avatar® in vines, where lower rates and lower frequencies of application are used, have a much more dramatic impact?

There is a range of other management and environmental factors that may be affecting beneficial insect populations including lacewing, and these may or may not be the cause of the increased incidence of Mealybug. At the time of writing there is no evidence published or otherwise to suggest what the specific link may be.

What we are sure of at this time, is that there is no data specifically linking the increased incidence of Mealybug in grape vines in Australia to the use of Avatar®. In fact currently there is more indication to suggest that it is not the primary cause of this phenomenon. In 2004/05 the Indoxacarb sales increased but the incidence of Mealybug decreased from the previous year.

Conclusion: It was a seasonal event.

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Published and unpublished data of E. I. DuPont de Nemours & Co. Inc.

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