

Chickpeas are established as a high value winter rotation crop in mixed farming systems in Australia. *Helicoverpa armigera* and *Helicoverpa punctigera* are regular, widespread pests that can be hard to manage. Control effectiveness, cost, resistance, residues and withholding periods are key considerations for growers and their advisors.

The use of cheap, broad spectrum insecticides (such as synthetic pyrethroids) removes beneficial insects from the crop and are often ineffective due to widespread *H. armigera* resistance. Newer chemistries can be expensive, especially under extended pressure throughout flowering and pod set when re-treatment is required.

NPV (Nucleopolyhedrovirus) occurs naturally in the environment and has co-evolved with its hosts over millions of years. As a result, NPV is highly selective and *Helicoverpa* has no known resistance to it. It is a biological agent which is ingested by the larvae which then spreads rapidly through their body. The virus then liquefies the caterpillar, releasing huge quantities of itself into the environment. ViVUS® Max is a commercially produced NPV, manufactured using a larval mass rearing system to produce the virus for direct application by traditional ground and aerial spray equipment as well as through overhead irrigation systems.

ViVUS Max is registered on over 60 pasture and crop species and, almost uniquely, has no withholding period. This makes NPV a very safe tool to use in a mixed farming system.

Since 2002, more than 4 million hectares in Australia have been treated with ViVUS Max.

Inoculation at pre-threshold levels

The strategic use of NPVs during chickpea flowering into early podding has been used for many years by growers and their advisors to manage *Helicoverpa*. The effective use of NPVs in chickpeas requires different thinking compared to using conventional knockdown insecticides.

“Natural” outbreaks of NPV can spontaneously break out in a population under the right conditions. However, this is very unreliable and usually insufficient to control *Helicoverpa* before they cause heavy damage.

The application of ViVUS Max to a small population (pre-threshold) might seem counter intuitive, however by pre-inoculating the crop and deliberately infecting those few larvae, the virus is able to become established in the population. These infected larvae release huge amounts of virus into the crop. In this way, an early low rate application of ViVUS Max can start the natural virus infection cycle, which can continue for many weeks or even months.



Compatibility

The ViVUS Max formulation is highly compatible with nearly all herbicides, fungicides and foliar nutrients (as long the spray solution is below pH 8.0). This means that it is easy and cost effective to add as a tank mix when making a spray pass for other reasons.

Economic damage thresholds

Direct economic yield and quality losses are most likely during the period between pod set and maturity. Using ViVUS Max in the run up to this period can reduce damage or delay the need for a knock down insecticide. The Queensland Department of Agriculture and Fisheries (QDAF) have developed the following threshold calculator for using chemical insecticides.

Yield loss (\$/ha)	=	Average number of larvae per m² X 2.0* x chickpea price (\$/t)
		100

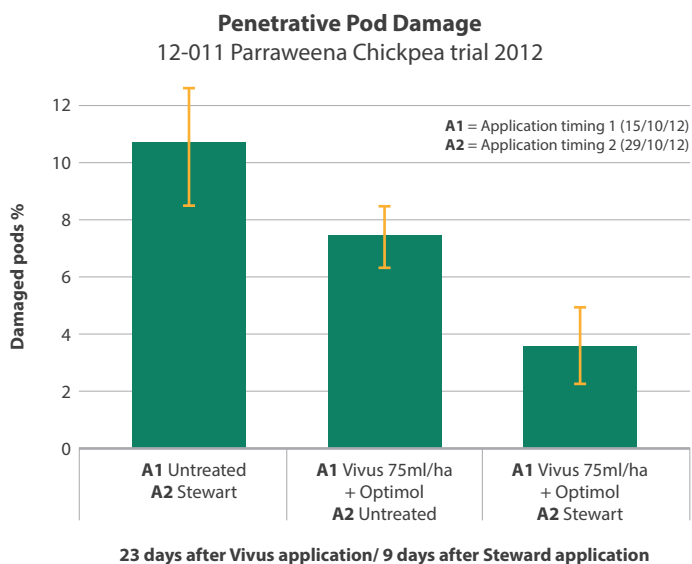
* 2.0 g consumed by each larva.

Where the number of larva per m² is calculated by:

Number of larvae per m²	=	(Number of small larvae x 0.7) + Number of medium larvae + Number of large larvae
		Row spacing (metres)

Damage Reduction

The key benefit of using NPV early is that the presence of the virus minimises the number of larvae that develop beyond 3rd instar. These are the stages when larvae do the majority of their damage. The amount of damage a 2nd instar larvae inflicts is a fraction of that of a 5th or 6th instar larvae. This greatly reduces the sub-threshold damage that occurs prior to the application of a knockdown insecticide and will also minimise damage from larvae that may survive an insecticide spray.








This graph (left) shows that under high insect pressure, a single application of ViVUS Max applied two weeks before the crop reached economic threshold (when it was sprayed with Steward®), provided greater damage reduction than the threshold spray of Steward. This exceptional level of performance from NPV is not usual, but shows that when applied early and under good conditions, ViVUS Max can be very effective in chickpeas. The combination of the early ViVUS Max with a threshold Steward spray was the best performing treatment and provided over 60% damage reduction compared to Steward alone.

Size matters, and it takes time

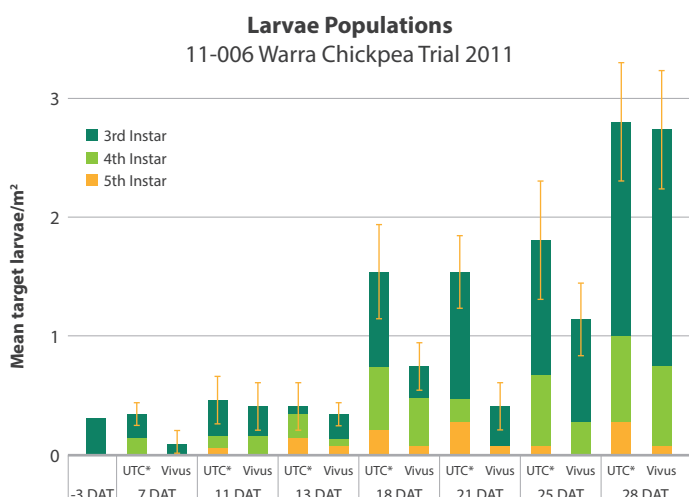
Larger larvae are less susceptible to NPV infection, and are more likely to be in entrenched feeding locations (such as inside pods), making them less likely to ingest the virus.

To become infected, *Helicoverpa* larvae must be actively feeding. A study by QDAF showed that most infection occurs in the first hour after application. As temperatures fall below 18°C, larvae tend to become less mobile around the plant and cease feeding at temperatures below 12°C. Further, NPV infection is a biological process and while in summer ViVUS Max may control larvae in a few days, in winter, although feeding stops quickly, death may take 6 to 10 days.

Instar	Age (days)	Size category	Length (mm)	Actual size	ViVUS Max timing
1st	0 - 2	Very Small	1 - 3		✓✓
2nd	2 - 4	Small	4 - 7		✓✓
3rd	4 - 8	Medium (small)	8 - 13		✓
4th	8 - 11	Medium (large)	14 - 23		✗
5th	11 - 14	Large	24 - 28		✗
6th	14 - 18+	Large (snake)	29 - 40+		

Delayed/Fewer Insecticides

It is often reported that early applications of ViVUS Max in chickpeas delays larval numbers reaching economic threshold. Results from trials have confirmed this effect in the majority of situations - an example can be seen in the graph (below) where threshold levels were delayed by 10 days due to the use of ViVUS Max. In addition, the number of 4th and 5th instar larvae remained low in the ViVUS Max treated area. Depending on the season, delaying the first chemical insecticide can have the effect of eliminating the need for a clean-up spray close to harvest.



* UTC - Untreated Control; ViVUS Max applied at 75mL/ha.

Why ViVUS Max instead of Synthetic Pyrethroids (SPs)?

Under sub-threshold conditions, the application of synthetic pyrethroids for *Helicoverpa* control will have limited to no economic benefit. SPs usually offer good control of eggs and small larvae that are present at spraying, but have short residual control. NPV inoculation using ViVUS Max early can provide ongoing suppression of *Helicoverpa* for many weeks, with no disruption to highly beneficial species that may be present such as ants and spiders.

Recommendation

Extensive trials showed that early applications of ViVUS Max at low rates can give a consistent economic benefit to chickpea growers under both low and high pressure scenarios.

- + Use ViVUS Max at the registered rate of 75mL/ha (preferably with Optimol Biological Insecticide Optimiser);
- + Apply during the warmer parts of the day (>18°C) when larvae are actively feeding;
- + Apply after larvae first appear and before the presence of pods - larvae must be present to get the NPV inoculation benefit; and
- + If possible, time applications to be applied in mixture with other products such as fungicides and herbicides as ViVUS Max is highly compatible in mixture.
- + Use ViVUS Max according to the instruction on the label.

Label extract: Use 75 to 150mL/ha ViVUS Max + Optimol®

Use lower rates as a preventive measure in pre-podding chickpeas. Use the high rate when the pest population has reached economic threshold. The addition of Optimol is likely to improve the performance of ViVUS Max in chickpeas. ViVUS Max is unlikely to reduce larval numbers below threshold if the initial population exceeds 6 per metre of row - use alternative control options under these populations.

Always read the label before use.

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For further information, call 1800 242519
or visit www.agbitech.com



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