

Is popcorn included in permits for FAW?

I have sought clarification from Gordon Cumming at GRDC on the following:

Altacor® is permitted for use in “maize cereals”.

SuccessNeo® is permitted for use in “maize cereals” and the permit goes on to list Maize, popcorn, Teosinte under the “maize cereals” heading (see table below).

Directions for Use:

Crop	Pest	Rate
<u>Maize Cereals</u> Maize Popcorn Teosinte	Fall Armyworm (<i>Spodoptera frugiperda</i>)	250 – 300 mL/ha
<u>Sorghum Grain and Millet</u> Sorghum grain Millet Hungry rice Job's tears Teff or Tef		250 – 300 mL/ha Apply in the vegetative stage of the crop prior to the commencement of flowering.

Maize cereals is a Codex/APVMA crop group that includes maize, popcorn and teosinte – even if the label doesn't specifically mention these crops (as is the case for the Altacor® permit).

This means that anything that is registered/under permit for use in Maize cereals for FAW, can legally be used in popcorn to control FAW.

To check the permits for FAW as they currently stand, go to the APVMA website

(<https://portal.apvma.gov.au/permits>). Enter “fall armyworm” in the search box, and a list of permits comes up. Click on the **view** box to see a copy of the permit.

How difficult was it to identify FAW larvae at first, particularly where there were mixed infestations of helioverpa, northern armyworm in crops? What tips do you have?

It was challenging at first, but doing these things helped to learn how to identify them:

- Always carry a container to collect larvae that you are unsure about
- Take larvae back to the office and look at them with a microscope
- Keep larvae, feeding them on leaf material for a few days, until features become obvious. Smaller larvae are difficult, but important to identify before they are very damaging.
- Windowing is a good indicator. Use it to find plants with larvae – under leaves, in the whorl.

Have you been seeing just one infestation in a crop, or repeated infestations?

In sorghum, have only seen one infestation so far in the early vegetative stage (V4-6) up until early head emergence, but haven't seen larvae transferring onto heads.

In corn, have seen infestations in early vegetative and at late tasselling in the same crop, but a single infestation is more typical.

What have the US entomologists told you about the size of the infestations you have experienced vs what they see in crops?

What they see are far higher than what we are seeing. The numbers I have reported to them are certainly well below the densities that they would be concerned about.

What is your experience with the efficacy of available insecticides?

The Atherton tablelands infestations were sprayed repeatedly, 2-3 times in some crops. Aerial applications of products were giving poor efficacy (chlorpyrifos, SPs, methomyl) at V6-V8, with large larvae entrenched in the whorls under piles of frass (poo). It is no surprise that the efficacy was poor under these conditions.

When FAW turned up in the Burdekin, we took the approach of watching and comparing impact to helioverpa. Luckily, densities were pretty low and didn't require treatment. So I don't have any direct experience with targeting FAW directly.

Helioverpa is still the dominant pest in corn in the Burdekin, and we typically don't spray for it. Just because there are permits, doesn't mean you have to use them. Take an approach of thinking about whether you are likely to get good efficacy from a treatment.

Is there any resistance to insecticides, even overseas?

Resistance to 41 actives reported worldwide to date.

If Australian FAW originate from Asia, then likely to be resistant to:

Carbamates (e.g. methomyl) and Organophosphates (e.g. chlorpyrifos). Unlikely to have resistance to synthetic pyrethroids or Altacor® (Tom Walsh, CSIRO personal communication).

Bt resistance is a challenge in Brazil and the US with Bt crops.

GRDC has a current investment investigating the resistance profile of populations in Australia (Qld and WA). Larvae have been sent from the Burdekin, North Queensland, WA.

How widespread have been the detections of moths in the network of pheromone traps, and how many moths are being caught? Once moths start being caught, do they continue to be caught in the same locations?

RS: Over the past couple of weeks, have a trap in Emerald that has caught 4+ moths each week. The trap at Gindie has also caught FAW moths over a couple of weeks. It is starting to cool down, so it will be interesting to see if the traps continue to catch moths in CQ.

What about winter cropping, wheat, chickpeas and oats?

At this point we don't expect that there will be much impact on winter crops. Unlike helioverpa, FAW are very susceptible to cooler conditions, so we will probably see them disappear earlier, and reappear later than helioverpa. For most of the season, it will be too cool for FAW in winter crops. Warm autumns may provide a short window in which we see some damage to establishing crops in Central Queensland. This year, given the relatively low FAW numbers, it is unlikely that we will see significant damage, even if they occur in winter crops.

Even in the Burdekin, temperatures can hover around 10 degrees, so expect to see a drop in FAW activity in winter.

In terms of which crops may be infested by FAW, that is uncertain. Given the strong preference shown for corn and sorghum so far, it seems more likely that the winter cereals would be susceptible to infestation, compared with pulses and oilseeds.

Will there be overwintering in the CQ cropping areas, or will FAW infestations be driven by influxes from the north each year?

CQ is thought to be an area where FAW could survive all year round, depending on the winter conditions. But this is speculation at this stage, and we will only know when we have seen a few seasons of FAW activity. Anywhere south of CQ, it is more likely that the populations will die out over winter. FAW do not diapause like helioverpa, and they are very susceptible to cool conditions and frosts.

How many eggs do FAW lay, and what is the viability of the eggs?

FAW females lay egg batches with varying numbers of eggs, but 100-200 eggs per batch would be about the average. Eggs are typically deposited on the undersides of the lower leaves and are covered with scales from the females' abdomens. A female will lay a number of batches of eggs in her lifetime, totalling around 1500-2000 eggs.

Cannibalism does occur, but FAW are less cannibalistic than *helicoverpa*.

There may be some potential to reduce the number of egg batches laid by females through the deployment of Magnet® (AgBitech) which attracts and kills moths that feed on it. This approach is going to be trialled in the Ord this winter in corn, and it will be interesting to see how that works.

Is there something like *helicoverpa* NPV available for FAW, and can we get it into Australia?

Yes, AgBitech (who also produce the *helicoverpa* NPV, VivusMax) produce a *Spodoptera frugiperda* NPV product in the US and it is available there and in South America and Africa.

However, because this virus is not present in Australia, its importation is subject to quarantine and there is no guarantee that it could be successfully imported. It is definitely something that is being looked at.

There are NPVs known from *Spodoptera* species in Australia. DAF has some in a collection. There may be value in screening these against FAW. It is important to remember that the *Helicoverpa* NPV (VivusMax) will have no efficacy on FAW.

What insecticides are you targeting FAW with, Brett?

Haven't yet had to treat FAW, the numbers just haven't been high enough and the damage not significant. This season have managed *helicoverpa* in sorghum with NPV and not needed to target FAW.

What are some of the issues associated with increased spraying for FAW, and use of products that are effective against *helicoverpa*?

- Increased use of Group 28s (e.g. Altacor®), Group 6 (e.g. Affirm®), Group 5 (e.g. SuccessNeo®) and Group 22 (e.g. Steward®) for FAW will increase the selection pressure on *Helicoverpa armigera* as it is highly likely both will be present in targeted crops.
- Both FAW and *helicoverpa* have developed resistance to a number of products, and loss of efficacy in these more selective products would pose significant challenges for the grains and other industries.
- Group 22 resistance is already an issue in *helicoverpa* in warmer areas (CQ, Burdekin)

Is Bt cotton effective against FAW?

[can we put some info here from something Paul has written]

Efficacy, or not, against FAW of VIP vs Bt.