

# NURSERY PAPERS

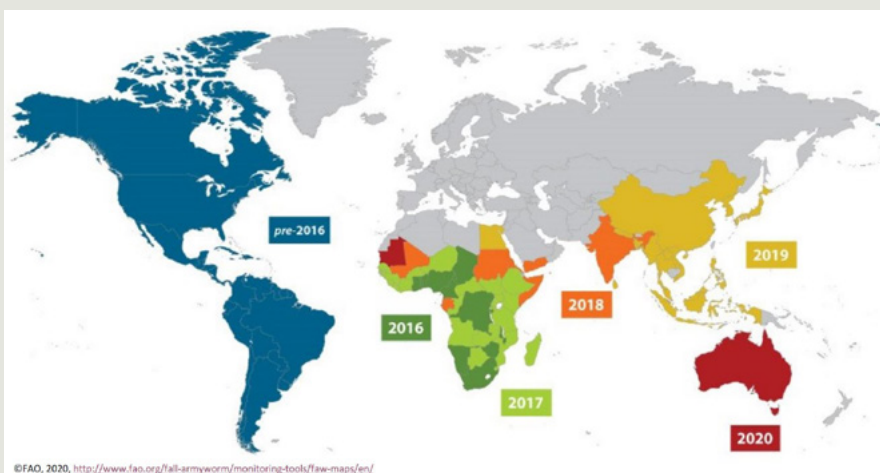
MAY  
2020

## THE ARRIVAL OF FALL ARMYWORM (*Spodoptera frugiperda*): An emergency plant pest incursion

The emergence of yet another exotic plant pest on our shores highlights the importance of having a strong, reliable plant protection and biosecurity program that protects our production nursery industry. This Nursery Paper will inform nurseries of the pest (Fall armyworm), host list, biology and will also highlight some of the procedures that will help businesses effectively manage this pest.

### THE INCURSION

As of early April 2020, the fall armyworm has been detected as far south as Bundaberg, Queensland. This has followed detections in March 2020 in the Northern Queensland regions of Ayr/Homehill and down to Bowen plus detections in Katherine, Northern Territory, and in sentinel traps located in Kununurra, Western Australia. This follows the detections on the Torres Strait islands of Saibai and Erub in January 2020, Bamaga on the tip of Cape York and Croydon (Gilbert River) in mid-February 2020, South Johnstone, Tolga, Lakeland, Mareeba in mid-March 2020.



World distribution of fall armyworm pre-2016 (blue) to April 2020 (red)



Fall armyworm. (Source: USDA Photo Unit, USDA Agricultural Research Service, Bugwood.org.jpg)

Fall armyworm is native to tropical and subtropical regions of the Americas and since 2016 has spread to Africa, the Indian subcontinent, China and South East Asia. Australia's climate and the production of suitable hosts are highly favourable for fall armyworm to establish and spread. Australia's environment and native flora may also be impacted.

Fall armyworm larvae (caterpillar) are known to eat and destroy more than 350 plant species, including maize, cotton, rice, sorghum, sugarcane, wheat and many vegetable, fruit and ornamental crops having caused significant economic losses overseas. The following are some of the recorded fall armyworm host plant families:

<b>Asteraceae</b> - e.g. Chrysanthemum	<b>Geraniaceae</b> - e.g. Pelargonium
<b>Brassicaceae</b> - e.g. Cabbage	<b>Myrtaceae</b> - e.g. Eucalyptus
<b>Cucurbitaceae</b> - e.g. Watermelon	<b>Poaceae</b> - e.g. Wheat / sugarcane
<b>Ericaceae</b> - e.g. Blueberry	<b>Rosaceae</b> - e.g. Roses / peach / apple
<b>Fabaceae</b> - e.g. Beans/peas	<b>Solanaceae</b> - e.g. Tomato / capsicum



# THE PEST BIOLOGY

## Eggs

The eggs are pale yellow in colour and clustered together in a mass, which often contain 100–200 eggs per mass. Egg masses are usually attached to foliage with a layer of mould/silk-like furry substance.

## Larvae

There are 6 instars or larval stages:

- 1st instars are a greenish colour with a dark/black head capsule and less than 2 mm long;
- 2nd and 3rd instars are 3 to 7 mm long, brownish and start to develop white lines along the body;
- 4th & 5th instars are 10 to 17 mm long and 1 to 2 mm thick, have a reddish brown head, and brownish body with light coloured or white lateral lines, dark elevated spots bearing spines cover the body;



'Y' on larvae face. (Source: Steve L. Brown, University of Georgia, Bugwood.org.jpg)

- 6th instar has similar colouring but is about 2.5 mm thick and up to 34 mm long, has a rough or granular texture; and
- There is a distinct inverted 'Y' on the face that continues as a line down the back. There is also a mostly green mature larval form that has light coloured elevated spots.

In summer, larvae take about 14 days to mature and up to 30 days during the colder months.

The larvae can attack leaves, shoots, stems and fruit. Plants of different ages, from seedlings to mature plants, can be affected.

## Pupa

Pupa are oval shaped, 20 to 30 mm in length, reddish brown and found at a depth of 2 to 8 cm within the soil. They have also been found pupating in corn cobs. They are usually encased by a cocoon comprising of soil particles held together with silk, but if the soil is too hard the cocoon may be made of curled leaves and other material. Pupation takes approximately 9 days in summer and 20 to 30 days in winter. Survival rates have been shown to decrease with extended periods of cold weather.



Adult Female (Source: Robert J. Bauernfeind, Kansas State University, Bugwood.org.jpg)



Adult Male. (Source: Lyle Buss, University of Florida, Bugwood.org.jpg)

## Adult

Adult moths range from 32–40mm in width (wing tip to wing tip) and typically rest with their wings in a tent-like position. The forewing is brown or grey and the hindwing is white. Male moths have more patterns and a distinct white spot on their forewing. They are highly mobile and can migrate long distances in suitable weather conditions. This pest is prolific, reproducing at a rate of several generations per year.

**NOTE:** There are species of *Spodoptera* already present in Australia which can look similar to fall armyworm. Some are pests, such as lawn armyworm and day-feeding armyworm.

**MORE INFORMATION AND IMAGES CAN BE FOUND BY VISITING THE PEST ID TOOL:**  
[www.pestid.com.au](http://www.pestid.com.au)



Egg mass. (Source: John C. French Sr., Retired, Universities Auburn, GA, Clemson and U of MO, Bugwood.org.jpg)



Larvae. (Source: John C. French Sr., Retired, Universities Auburn, GA, Clemson and U of MO)





# CONTROL

**Key to the control of any pest is a strong plant protection and biosecurity program. Having a robust Integrated Pest Management (IPM) strategy within that program is crucial particularly in managing issues such as pesticide resistance. The strategy should map out plant protection actions required to mitigate the potential damage the pest will cause to a cropping system.**

The BioSecure HACCP program guides and enables businesses to implement practical/measurable plant protection actions to minimise the damage this pest (and others) will do to crops.



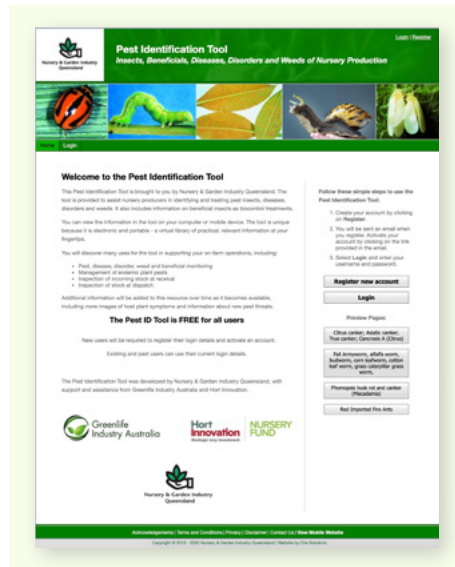
Three key areas to focus actions on are:

1. Preventing the pest entering the business
2. Effective crop monitoring & site surveillance to ensure the pest doesn't become established
3. Final inspection of the product before despatch.

## Preventing the pest entering your business

There are steps to take that will reduce the risk of the pest entering a business. The most important is to understand and know the pest. Staff training is integral to having a strong first line of defence.

- Train staff in recognising the pest, its life cycle, its preferred hosts and general biology such as its mobility, etc., [www.pestid.com.au](http://www.pestid.com.au)
- Define and implement crop monitoring and site surveillance procedures, regular frequency and pattern, which ensure the pest can be intercepted before widespread establishment (BioSecure HACCP Guidelines).
- Staff learning (eLearning Courses) can be achieved on-line at the Greenlife Industry Australia technical library at [www.nurseryproductionfms.com.au](http://www.nurseryproductionfms.com.au)



**NOTE:** the earlier an incursion is detected the more opportunity of using the different actions available in an IPM program to reduce the pest population to a manageable level.

The BioSecure HACCP program has procedures that can easily be implemented that form the basis of a plant protection program.

1. Incoming plant inspection procedure
2. Vehicle inspection procedure
3. Visitor register procedure
4. Site surveillance procedure
5. Insect proof facility procedure

## Monitoring to prevent establishment of the pest

Having an established monitoring program reduces the risk to a business from incursions of damaging pests like the fall armyworm. Plant protection is all about ensuring the crops are not damaged during the growing cycle and are fit for purpose at point of despatch. The product needs to go out the gate, not end up on the discard heap. A robust plant protection program collects solid data that can be used practically to protect crops. The data needs to be collected consistently to allow a business to observe and predict trends, see variances and act on them accordingly.

It's essential that procedures are established for staff involved in the tasks of crop monitoring, site surveillance and despatch inspections. A strong monitoring program is one that is efficacious, enables the collection of valuable data and provides efficient time management regarding the implementation of a plant protection program.

Available to businesses via the Greenlife Industry Australia technical website is a suite of training courses (look for the ELEARNING tab).

The BioSecure HACCP crop monitoring course is easy to access, relevant, valuable and up to date.

Protecting plant crops requires a consistent approach. Providing staff with a procedure to follow consistently, reduces the risks of an incursion affecting sales. BioSecure HACCP procedures that are specific to crop monitoring, ensuring the pest doesn't become established, are:

1. Pest and disease monitoring procedure
2. Weed crop monitoring procedure
3. Sticky trap use procedure and inspection

## Final crop inspections before dispatch

Satisfied customers are extremely important to a business's viability and reputation. Businesses must ensure the crop sold is of the highest standard, meets the clients expectations and is fit for purpose. Having a strong plant protection program integrated into the business growing timeline will ensure when it comes to the final inspection, before despatch, the crop will exceed customer expectations. By following the BioSecure HACCP dispatch procedure, despatch will become more efficient, with fewer rejections and each consignment truly reflects the professionalism of the business.

To access videos and example templates of all the above procedures please visit [www.nurseryproductionfms.com.au](http://www.nurseryproductionfms.com.au)



# CHEMICAL CONTROL

The Australian Pesticides and Veterinary Medicines Authority (APVMA) has approved the following minor use permits relating to fall armyworm in nursery crops.

**TABLE 1. CURRENT MINOR USE PERMITS**

PER89241	Success Neo and Delegate Insecticide / Various Crops / Fall Armyworm
PER85010	Spinner Turf Insecticide / Nursery stock (non-food) / Various Pests
PER89293	LANNATE-L and EUROCHEM SENECA ULTRA 400 INSECTICIDE / Non-bearing ornamentals / Fall armyworm

To check for the latest chemical permits applying to fall armyworm using the APVMA's permit portal—search for 'fall armyworm' and check the 'pest/purpose' button. <https://apvma.gov.au>

**Greenlife Industry Australia** identified the following actives currently showing efficacy internationally and have applied to the APVMA for appropriate permits.

**TABLE 2. PESTICIDE ACTIVE INGREDIENT LIST**

<b>Acephate</b> (Orthene Xtra & Lancer 750 SP – Group 1B)	<b>Emamectin</b> (Proclaim – Group 6)
<b>Alpha-cypermethrin</b> (Dominex Duo & Alpha Forte 250 SC – Group 3A)	<b>Indoxacarb</b> (Avatar – Group 22A)
<b>Chlorantraniliprole</b> (Coragen & Acelepryn GR Turf – Group 28)	<b>Lambda-cyhalothrin</b> (Karate Zeon – Group 3A)
<b>Chlorantraniliprole + thiamethoxam</b> (Durivo – Group 28+4A)	<b>Methoxyfenozide</b> (Prodigy – Group 18)
<b>Cyantraniliprole + thiamethoxam</b> (Spinner Turf – Group 28+4A)	<b>Novaluron + acetamiprid</b> (Cormoran – Group 15+4A)
<b>Pyrethrins</b> (Pyganic – Gp3A)	<b>Azadirachtin</b> (Azamax – Group 22A)

## FURTHER INFORMATION

Fall armyworm: should you be concerned (The Beatsheet)

<https://thebeatsheet.com.au/fall-armyworm-should-you-be-concerned/>

<http://nurseryproductionfms.com.au/download/pest-management-plan-for-caterpillars-in-production-nurseries/>

<http://pestid.com.au>

Fall armyworm (Queensland Department of Agriculture and Fisheries)

<https://www.business.qld.gov.au/Industries/farms-fishing-forestry/agriculture/crop-growing/priority-pest-disease/fall-armyworm>

Map of fall armyworm in Africa and Asia (Food and Agriculture Organization of the United Nations)

<http://www.fao.org/emergencies/resources/maps/detail/en/c/902959/>

Fall armyworm update and alert (including a pesticide emergency use permit for a variety of crops) (Hort Innovation)

<https://www.horticulture.com.au/hort-innovation/news-events/fall-armyworm-update-and-alert/>

<https://www.greenlifeindustry.com.au/>

PAST EDITIONS OF NURSERY PAPERS ARE AVAILABLE ONLINE on the GIA website:

[https://www.greenlifeindustry.com.au/Section?Action=View&Section\\_id=46](https://www.greenlifeindustry.com.au/Section?Action=View&Section_id=46)