

could establish in our farms and threaten production. These include **cotton leaf curl virus and exotic races of Fusarium Wilt** that are predicted to have an 'extreme' economic impact on the cotton industry in the case of an incursion in Australian cotton growing areas.

The other high priority pests are:

- **Cotton boll weevil;**
- **Indian green jassid;**
- **Exotic species of spider mites;**
- **Tarnished plant bug;**
- **Biotypes of silverleaf whitefly;**
- **Melon aphid ;**
- **Defoliating strains of verticillium wilt;**
- **Texas root rot; and,**
- **Blue disease.**

Industries that join PHA are permitted to sign the Emergency Plant Pest Response Deed (the EPPRD) which is the formal legally binding agreement between PHA, the Australian Government, all state and territory governments and national plant industry peak-body signatories, which sets out how eradication responses to EPP incidents are to be managed and funded. Cotton Australia became a signatory of the EPPRD in May 2006 which provides the following benefits:

- The procedure for dealing with an emergency plant pest incursion is agreed before one occurs, allowing a swift, coordinated and effective response. This gives us the best chance of preventing the incursion from spreading from farm to farm.
- Potential liabilities are known and funding mechanisms agreed in advance.
- In the event of an incursion affecting cotton crops, Cotton Australia will immediately be at the table side-by-side with government representatives, contributing to decision making about any EPP response.
- Growers whose crops or property is directly damaged or destroyed in the course of response plan are eligible for the payment of owner reimbursement costs, under certain circumstances.

Further information on cotton industry biosecurity contact Cotton Australia on (02) 9669 5222 or go to www.cottonaustralia.com.au/research/biosecurity/.

To learn more about on-farm biosecurity for cotton growers, download a copy of the Cotton Industry Farm Biosecurity Manual from the biosecurity section of PHA's website: www.phau.com.au

Exotic pests and diseases of greatest threat to Australian cotton

Cotton boll weevil

Anthonomus grandis

Cotton boll weevil is specific to cotton and causes large yield losses due to damage to developing bolls and subsequent reduction in lint production. In the USA, control of cotton boll weevil using insecticides costs hundreds of millions of dollars.



Boll weevil. (Jack Kelly Clark, University of California, www.ipm.ucdavis.edu)

Spider mites

Tetranychid mites

Spider mites are in the group that includes ticks. They feed on the undersides of leaves, sucking out the cell contents. Their damage causes a characteristic bronzing of leaves, and if uncontrolled can dramatically reduce yield and fibre quality. Several species are found in Australian cotton, the most common of which is the two-spotted spider mite. However, overseas there are a range of other species that have different host preferences, cause more severe damage or have resistance to some of our key acaricides.



Adult female carmine spider mite, *Tetranychus cinnabarinus*. (Jack Clark, University of California, www.ipm.ucdavis.edu)

Indian green jassid

Amrasca devastans

Indian green jassid is a sap-sucking insect pest that can cause yield losses of up to 25%. While several 'jassid' species are found in Australian cotton the damage they cause is relatively minor, rarely if ever affecting yield. Green jassids inject a toxin as they feed that causes leaves and bolls to drop and can stunt plant growth. Elsewhere green jassids can be managed using resistant varieties and insecticides. Hairy-leaved varieties are used in parts of Africa and the sub-continent where cotton is hand harvested to provide effective resistance against green jassids. Such varieties are not suitable for mechanical harvest as the leaf hairs cause excessive leaf trash in the cotton lint.



Indian green jassid. (NSW DPI)

Tarnished plant bug

Lygus lineolaris

The tarnished plant bug is a pest of over 250 plant species. In cotton, its feeding causes seed abortion, stem or leaf wilting and poor seed germination. It has 2–5 generations per year and can therefore quickly build up to high levels.



Lygus bug. (Jack Clark, University of California, www.ipm.ucdavis.edu)

Whitefly

Bemisia tabaci B-type or Q-type

Whitefly feeding results in a sticky residue, sooty moulds, reduced boll size and poor lint quality. Although the B-type whitefly is present in Australia there is a risk of other B-type strains and other biotypes, e.g. Q-type, entering the country with different insecticide resistance profiles. Whiteflies are also vectors of damaging exotic viruses such as cotton leaf curl disease.



Bemisia tabaci B-type. (Neil Forester)

Melon aphid

Aphis gossipyi – exotic strains

Aphids damage cotton by feeding on young leaves and bolls which can reduce yield. They produce a sticky residue that can cover leaves resulting in reduced photosynthesis and contamination of lint as bolls open, reducing the crop's value. This species may also carry exotic diseases such as blue disease. As well as the risk of disease, there is a risk that new aphid strains entering the country will have different insecticide resistance profiles, making control more difficult.



Melon aphid. (Lewis Wilson, CSIRO)

Verticillium wilt

Defoliating strains

Australian strains of Verticillium wilt are described as mild in comparison to the defoliating strains that originated in North America but are now becoming more widespread. If established in Australia, management would be reliant on the use of resistant varieties, with a lag of several years before adapted varieties were available.



Exotic Verticillium wilt. (Vert Jack Kelly Clark, UC Statewide IPM Program)

Cotton leaf curl disease (CLCuD)

CLCuD, sometimes referred to as Gemini virus, can cause yield losses of up to 35% in cotton. It is spread by a whitefly vector. There are at least seven different begomoviruses and several different DNA satellite molecules associated with CLCuD. A cotton plant needs to be infected with at least one begomovirus and one satellite to develop CLCuD.

Symptoms of CLCuD are seen on leaves and initially appear as a swelling and darkening of leaf veins, followed by a deep downward cupping of the youngest leaves then either an upward or downward curling of the leaf margins. Leaf-like structures (enations) on the veins are common and vary in size from only a few millimetres in diameter to almost the size of a normal leaf. These larger structures are often cup-shaped.



Leaf curl disease. (Cherie Gambley, QPIF)

Fusarium wilt

Fusarium oxysporum f. sp. vasinfectum – exotic strains

Fusarium wilt is a fungal disease. Strains of *Fusarium* were identified in Australia in 1993 however the introduction of new strains (races) would increase the difficulty of management as new resistant cotton varieties would be required.

External symptoms can appear in the crop at any stage but most commonly appear in either the seedling phase or after flowering when bolls

are filling. Leaves appear dull and wilted before yellowing or browning progresses to eventual death from the top of the plant. Seedlings may either wilt and die or survive, but often with stunted growth. Adult plants may wilt and die, especially under conditions of stress. Some affected plants may re-shoot from the base of the stem. Lengthwise cutting of the stem from affected plants will show continuous brown discolouration of the tissue. The internal discolouration is similar to that of *Verticillium* wilt but usually appears as continuous browning rather than flecks. Sometimes the discolouration is visible in only one side of the stem. External symptoms do not always reflect the extent of discolouration in the stem.



Fusarium wilt causing vascular discolouration and root knots caused by nematodes. (Chris Anderson, NSW DPI)

Texas root rot

Phymatotrichopsis omnivore

Texas root rot is an extremely damaging fungal disease with a wide host range. It causes sudden death of affected plants, usually during the warmer months. In cotton, infection can result in 100% crop loss. If this disease became established in Australia, control would be extremely difficult as management using rotations and fungicides is usually only partially effective.

Symptoms include yellowing or bronzing of leaves, leaves wilt and die; dead leaves usually remain on plant. At this stage, roots are dead and surface is covered with network of tan fungal strands.



Texas root rot. (Chris Anderson, NSW DPI)

Blue disease

Blue disease is a virus specific to cotton that can reduce yield potential by up to 20%. It is spread by a vector, the cotton aphid. It has been associated with plants infected with cotton leaf roll dwarf virus (CLRDV) and has similarities with cotton bunchy top, anthocyanosis and cotton leaf roll. It is not known if the same pathogen causes all these diseases or if there are multiple pathogens causing similar symptoms. CLRDV was not detected from Australian cotton affected by cotton bunchy top disease. Cotton blue disease affected leaves tend to be smaller, thick, more brittle and leathery and have an intense green to bluish colour with yellow veins. Reddening

of stem petioles and leaf veins can occur in some infections. Leaf edges tend to roll downwards and under and plants become stunted due to a shortening of the branch internodes and produce many branches, giving a bunched zig-zag stem habit. Symptoms are more obvious in plants infected at an early age and stunting is more pronounced. Infected plants also produce smaller bolls and boll shed may occur. Single infected plants can be overlooked if overgrown by nearby healthy plants.



Blue disease. (Murray Sharman DAFF QLD)

Farm Biosecurity Manual for the Cotton Industry

Reducing the risk of new pests impacting on your farm

Version 1.0



Cotton Farm Biosecurity Manual
Available from www.planthealthaustralia.com.au

Bacterial blight

Xanthomonas Axonopodis or *X. Campestris PV Mavacearum* – exotic strains

Although strains of bacterial blight are already present in Australia, they are no longer a problem due to varietal resistance. Exotic strains (races) occur, however, that are 'hypervirulent' and, if established in Australia, would cause large yield losses. The disease is seed borne allowing easy dispersal and introduction of new races into new areas. Bacterial blight is spread by high temperature, humidity and rainfall.

The initial symptoms include the undersides of leaves having angular water soaked lesions. Lesions dry and darken with age then leaves are shed. Black lesions spread along stem. Bolls often infected at base or tip. Lesions dry out and prevent the boll opening. The pathogen is capable of symptomless transfer and therefore could be undetected through quarantine.

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Bacterial blight.

**This document is part of a larger publication -
The Cotton Pest Management Guide for Cotton 2014 - 15**

The complete document can be found on the CRDC or myBMP web sites during the 2014-15 Australian cotton season

www.crdc.com.au

or

www.mybmp.com.au

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