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Significant virus detection in East Timor

Cotton leaf roll dwarf virus (the causal agent of Cotton blue disease)

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Cotton leaf roll dwarf virus (the causal agent of Cotton blue disease) or a virus closely related to this species was detected in an asymptomatic Sea Island cotton plant (*Gossypium barbadense*) in Laivai, Timor Leste.

This sample was collected by Northern Australia Quarantine Strategy (NAQS) pathologist Jane Ray during the recent plant health survey coordinated by the International Plant Health Program (the Australian Government Department of Agriculture, and the Timor Leste Ministry of Agriculture and Fisheries) in May 2013.

Cherie Gambley and Murray Sharman from the Department of Agriculture, Fisheries and Forestry Queensland (DAFFQ) conducted the screening as part of the Cotton Research and Development Corporation (CRDC) funded project 'Surveillance for exotic cotton viruses: Multiple targets in and nearby Australia'. A key component of this project has been to increase collaboration with the Department of Agriculture.

Cotton Blue Disease (CBD) is caused by Cotton leafroll dwarf virus (CLRDV) and Chickpea stunt disease is caused by Chickpea stunt disease-associated virus (CpSDaV). These important diseases appear to be caused by strains of the same virus and both are exotic from Australia. Further work is required to clarify the identity of the virus in Timor Leste and the relationship between the above mentioned diseases.

Cotton blue disease was first described in Africa in 1949 and more recently the causal agent (CLRDV) has been reported from Brazil (Corrêa et al. 2005), Argentina (Distéfano et al. 2010), India (Mukherjee et al. 2012) and Thailand (M.Sharman 2014, personal comm., unpublished). This detection represents a significant geographic jump in the records for the disease.

Cotton blue disease is generally regarded the second most damaging virus disease to commercial cotton *Gossypium hirsutum*, (second to Cotton leaf curl disease) and is a significant threat to the Australian cotton industry. The vector (cotton aphid – *Aphis gossypii*) is widespread in all Australian growing regions.

This disease is a high priority pest of the Australian cotton industry and a national diagnostic protocol is currently being developed by Murray Sharman DAFFQ, as part of CRDC funded project 'Surveillance and monitoring for endemic and exotic virus diseases of cotton.'

Through CRDC, Department of Agriculture and DAFFQ funded study trips, Dr Sharman has also gained knowledge of the disease and skills in field diagnosis in Brazil and Thailand, and is validating the recently developed diagnostic protocol using reference samples from both countries. Chickpea stunt disease caused by Chickpea stunt disease-associated virus (CpSDaV) is also an important virus disease of chickpea vectored by *Aphis craccivora*.

Best Practice



The virus that causes cotton blue disease, CLRDV, is genetically different but in the same genus (polveroviruses) as cotton bunchy top virus. Dr Sharman has previously identified that there are two genetically distinct strains (or species) of cotton bunchy top found in almost all Australian cotton growing regions. Both cotton bunchy top strains have been found in natural infections of native cotton (*G.sturtianum*).

Native cotton *G. sturtianum* and *G. australe* occur in scattered populations across Northern Australia. There is a likelihood that these hosts may be capable of hosting other poleroviruses such as the exotic CLRDV, and as such could act as a pathway for incursion from SE-Asia into Northern Australia through to commercial cotton regions.

Symptoms in Cotton (*Gossypium hirsutum*):

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 bunchy 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.

Symptoms are similar to cotton bunchy top disease but generally more severe. Distinguishing the two diseases in the field may be difficult. The most distinguishing symptom is that cotton bunchy top disease has characteristic pale green angular patterns around the leaf margins and darker green centres (mottle) whilst cotton blue disease affected plants do not display mottle. The green-blue colour, yellow veins and pronounced cupping of leaves observed on blue disease affected plants is not typical on cotton bunchy top plants.

Industry Best Practice:

- Check crops frequently looking out for unusual crop symptoms and if you find anything suspicious, report it immediately. Make sure that you and your farm workers are familiar with the most important cotton pests. Don't move the infected material. Call the Exotic Plant Pest Hotline 1800 084 881, a dedicated reporting line that will be answered by an officer from your state department of primary industries. Early reporting improves the chance of effective control and eradication.
- Seek a copy of the Cotton Farm Biosecurity Manual from Cotton Australia via talktous@cottonaustralia.com.au or 02 9669 5222.
- Come Clean Go Clean –should be practiced on all farms regardless of whether pests or diseases are known to be present. Complete the *myBMP* self-assessment for best practice biosecurity at www.mybmp.com.au.
- Visits to farms overseas should be declared on re-entry to Australia. All clothes and footwear should be washed before returning. Fungal spores can even be carried in hair, so a shampoo is worthwhile.
- Maintain zero tolerance of cotton volunteer plants and other weeds at all times throughout the year to prevent pests harbouring there. Like cotton bunchy top, blue disease requires a living host to survive. Ratoon and volunteer cotton provide a year round host of both virus, and cotton aphid which spread these viruses.



Cotton leaf roll. Image: Murray Sharman