CottonInfo **Information** *when you need it*

fact sheet

March 2015

Vert alert!

Have you seen this?

Verticillium wilt of cotton is caused by *Verticillium dahliae*, a soil borne fungus that enters the roots and grows into the vascular system of the plant. Identifying Verticillium is the first step in being able to manage it.

Strain:

CRDC-funded research has found that there is more than one strain of *V. dahliae*, as well as variation in virulence within strains in Australian cotton.

The newly identified strain is called VCG 2A, whereas previously all Australian cotton strains were thought to be VCG 4B. At this stage, we don't know how widespread this new strain is. Both are regarded as non-defoliating types.

To understand the diversity of the strains of *V. dahliae* we have in Australian cotton and where they are located, diseased stems from fields need to be collected and the pathogen analysed by a pathologist. Please see details over the page re where to send stem samples for confirmation of the Verticillium strain.

Symptoms:

Symptoms of Verticillium wilt and Fusarium wilt are similar. Verticillium wilt has dark brown to black streaks through the centre of the stem when cut diagonally. When cut lengthways, stems show brown flecking of the inner tissues, rather than continuous browning which is associated with Fusarium wilt infected plants.

Verticillium wilt can also cause a characteristic yellow mottle between the veins and around the leaf margins. Lower leaves are usually affected first. Dead tissue develops at the leaf edges and may replace the mottled areas.

Severe cases need to be tested by a pathologist to determine whether the pathogen is Fusarium or Verticillium. In some instances, there are fields with both Verticillium and Fusarium wilt present. Multiple stems may need to be sent if this is suspected.

Management considerations:

The NSW DPI pathology team are currently undertaking a large number of trials looking at different aspects of Verticillium management. At this early stage, it is not understood if management options will vary between strains, however generally management for Verticillium wilt is the same.

Correct identification of the pathogen is important, because management recommendations vary between Verticillium and Fusarium wilt.

	Verticillium wilt	Fusarium wilt
Resistant varieties	Cotton varieties with high level of resistance to Verticillium wilt are the cornerstone for management of this disease. The level of resistance is communicated through the V-rank which is assigned to each variety. Varieties that are resistant at 25-27°C are susceptible at 20-22°C.	Cotton varieties with high level of resistance to Fusarium wilt are the cornerstone for management of this disease. The level of resistance is communicated through the F-rank which is assigned to each variety. Ensure that seed is treated with BION®, a natural 'plant activator' that triggers the natural defences of the plant before it is exposed to pathogens.
Manage for 'earliness'	Verticillium wilt is most severe during extended wet weather and or waterlogging and in late maturing crops. Verticillium wilt is favoured by cooler temperatures. Extending the period of crop growth late in the season increases this risk.	Cool, wet early season conditions are conducive to infection and the development of Fusarium wilt. The best way to avoid such exposure is to plant as late as possible within the planting window, when soil temperatures are 16°C and rising.
Irrigation management	Throughout the season avoid over-watering waterlogging where possible and avoid late season irrigations that extend maturity. Minimise tailwater to reduce risk of spread.	
Nutrition management	Both Verticillium and Fusarium wilts are also favoured by excessive use of nitrogen which results in late season growth. Potassium is important for natural plant defences and potassium deficiency is associated with more severe symptoms.	
Non-host crop rotation	Crop rotation with non-host crops (i.e. sorghum and cereal crops) may help reduce Verticillium wilt incidence. It is unlikely that rotation alone will provide satisfactory results. Research suggests that the greatest benefit from rotation would be observed when the rotations are initiated early, before inoculum builds up to high levels in the soil.	Rotate with non-hosts for up to 3 years. Hosts such as legumes can potentially increase disease. A summer sorghum/maize-fallow-cotton rotation can increase yield in the third year compared to continuous cotton. Fusarium can survive on non-host crop residues, so residues should be buried or bales as soon as possible after harvest. Avoid green manure crops.
Control alternative hosts	Including volunteer and ratoon cotton, sunflowers, soybeans. In addition to alternative crops, the pathogen that causes Verticillium wilt can also infect common weeds found in cotton growing regions such as noogoora and Bathurst burr, saffron thistle, thornapple, caustic weed, bladder ketmia, burr medic, black bindweed, pigweed, devils claw, turnip weed, mintweed, blackberry nightshade and others. Adopt a zero tolerance approach.	Bladder ketmia, sesbania pea, dwarf amaranth, bellvine and wild melon are weed hosts that show no external symptoms. These weeds may act as an on farm reservoir for the disease and need to be managed in-crop and during fallow periods. Avoid inter-row cultivation with knives if possible. This causes root damage and provides an entry point for the pathogen.
Stubble management	Aim to ensure that crops destruction occurs soon after picking to reduce the build-up of inoculum. Where Verticillium wilt is present, incorporation of cotton residues soon after harvest is beneficial allowing for the rapid breakdown of plant material.	Ideally root pull, with crop residues slashed and retained on the surface for at least one month prior to incorporation. Raking and burning the whole field is NOT an option as raking is likely to spread the disease.

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And remember, always...

Come Clean. Go Clean.

Sending a plant sample for diagnosis:

Both NSW DPI and QLD DAF provide free and confidential cotton pathology diagnostics.

Samples should be sent to your state pathologist. Please **PHONE FIRST** before sending any samples to confirm the address, and to ensure that samples will be processed appropriately on arrived. **DO NOT** send suspected Fusarium wilt samples or unknown samples that could be Fusarium to ACRI. Avoid sending samples late in the week when they may be delayed over the weekend.

See page 126 of the 2014-15 Cotton Pest Management Guide for a form and checklist on sending plant samples for diagnosis.

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Best Practice