



Vert alert!

Defoliating strain detected in QLD & NSW

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. Although the industry has been managing Verticillium wilt on cotton for years, a newly identified defoliating strain has been detected in Queensland and NSW.

What is a defoliating strain?

On cotton, strains of *Verticillium dahliae* have been classified into two pathotypes: defoliating (D) strains, which are highly virulent and can completely defoliate the plant; and nondefoliating (ND) strains, which are mildly virulent and can only cause wilt and partial or no defoliation.

ND strains usually induce a non-lethal chronic condition on cotton plants. Symptoms usually appear 5-6 weeks after emergence as interveinal and marginal chlorosis on the first leaf, which become necrotic. Later this symptom spreads up the plant.

An example of the severity of symptoms seen this season.



Moderate epinasty (downward bending leaves) occurs and the plant may die. D strains lead to a rapid downcurling of the terminal leaf and cause severe epinasty, general chlorosis with slight to extensive vascular discoloration in stems, which is followed by sudden and almost total defoliation and abscission of bolls.

Where did it come from?

We do not know how this strain was introduced into Australia, however common pathways for entry include second hand machinery infested with soil and/or trash, human movement of infested soil and infected seed of hosts, not including cotton as *Verticillium dahliae* is not seed-borne in cotton.

How long has it been here?

Examination of historical culture collections has determined that the defoliating strain has been present in Australian cotton for at least 20-30 years.

This season extensive symptoms were observed in QLD and NSW. Many samples have been collected from plants expressing symptoms from both NSW and QLD and are currently being evaluated for strain.

How is the defoliating strain different?

The sudden and rapid onset of severe symptoms may be indicative of the defoliating strain.

Development of Verticillium wilt diseases is influenced by virulence and inoculum density of *V. dahliae*, susceptibility of the host cultivars and the combined effects of environmental and agronomic factors.



Overall, Verticillium wilt diseases are favoured by air and soil temperatures close to the optimum growth range of *V. dahliae* as well as by soil moisture and relative humidity.

The optimal temperatures for growth and reproduction are warmer for the defoliating strain of the pathogen compared to the non-defoliating strain. This may mean that, where the defoliating strain is present, Verticillium Wilt symptoms may be seen more often and further north than they have been in the past.

What is the host range of this strain?

The D pathotype is highly virulent and has a defoliation effect on cotton, okra and olive. Isolates of the D pathotype (Vegetative Compatibility Group (VCG) 1A) also display great variation in virulence on other hosts. Isolates of the D pathotype from different geographic origins have been reported to be moderately to highly virulent but non-defoliating on some varieties of artichoke, celery, flax, safflower and sunflower, mildly virulent on aubergine and tomato, and non-pathogenic to cowpea and muskmelon. Research will be required to confirm the host and non-hosts of the different pathotypes.

The Verticillium wilt pathogen has a very large host range which includes weeds such as Noogoora and Bathurst burr, saffron thistle, thornapple, caustic weed, bladder ketmia, burr medic, black bindweed, pigweed, devils claw, turnip weed, mintweed, black nightshade, and others.

In addition, *V. dahliae* can establish endophytic infection in some plants, such as cereals, which are, thus, named asymptomatic hosts.

What can we do?

- Inspect crops for signs of Verticillium wilt, noting that they can be similar to symptoms of Fusarium wilt. They begin with patchy yellowing between the veins of the leaf. Light to dark brown discoloration can be seen in the stem when cut diagonally and, as the disease progresses, there is a sudden and almost total defoliation and shedding of the bolls.
- If you suspect the disease is in your crop, call the National Exotic Plant Pest Hotline on 1800 084 881. If you are unsure, send several stem samples

to the pathologist in your state:

NSW: Dr Karen Kirkby

0428 944 500

NSW DPI

Elizabeth Macarthur Agricultural Institute

'Camden Park', Woodbridge Road

Menangle NSW 2568

QLD: Dr Linda Smith

0457 547 617

QLD DAF

Basement 3 Loading Dock (off Joe Baker St),

41 Boggo Rd

Dutton Park QLD 4012

- Practice biosecurity measures to prevent the spread of the disease. Remember **Come Clean Go Clean** on the farm and between farms:
 - o Inspect, wash down and decontaminate machinery and equipment, including clothing, using appropriate spray treatments.
 - o Communicate the need for farm hygiene to everyone on the farm.

Management

Management of the defoliating strain is no different than that of the non-defoliating strain. Recommended tactics:

- Manage for earliness, including optimising nutrition and water inputs.
- Avoid late season irrigation.
- Incorporate cotton residues soon after harvest (as Verticillium can survive in crop residues and soil). Mulching of cotton residues as fine as possible prior to incorporation will aid decomposition of the trash thereby reducing inoculum load potential.
- Rotate with non-hosts such as cereals or sorghum.
- Control alternative weed hosts.
- Minimise your tailwater.
- Where whole fields are severely affected, burning residues may be an option to reduce inoculum potentially being incorporated in the soil, however while this has been recommended in other crops, it needs investigating for effectiveness in cotton. Raking and burning will spread inoculum throughout the field, so is NOT recommended where disease is limited to sections of fields.

Verticillium can spread via wind, water or attached to vehicles and machinery - so remember, always **Come Clean. Go Clean.**