Fusarium wilt of cotton

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Fusarium wilt (Fusarium oxysporum f. sp. vasinfectum) is present in Australia

However, there are exotic strains of fusarium wilt overseas that can be more damaging or harder to control than Australian strains

Exotic strains of this disease are a concern for Australia’s cotton industry

Fusarium wilt

Fusarium wilt infects the roots of plants at all stages of crop development. First symptoms appear in late spring as soil temperatures increase.

Exotic and Australian strains of fusarium wilt will look the same on infected cotton. However, exotic strains of fusarium wilt can be more aggressive or harder to manage with regular control methods.

Description

Cotton seedlings infected with fusarium wilt display darkened leaf veins followed by leaf yellowing and drop. High levels of the fungus in the soil may result in seedling death.

Leaf yellowing in older plants generally starts in the lower leaves and spreads up the plant. Yellowing begins at the edge of the leaf, spreading inwards, and affected leaves eventually wilt and die (Figure 1). Death of the whole plant can occur, starting from the top of the plant.

When the stem or root of an infected plant is cut lengthways, brown discoloration of internal tissue can be seen (Figure 2).

Certain exotic strains of fusarium wilt will only cause symptoms in association with root knot nematode. In these cases, small galls can usually be seen on plant roots.
Damage
All growth stages of cotton plants are susceptible to fusarium wilt. Seedlings often die and older plants are subject to sudden, severe wilting and often plant death before reaching maturity.

In less severe infections plants may survive but become stunted and have reduced yield.

There is no known treatment for fusarium wilt and once established in the soil the fungus is able to survive without a host plant for several years. Fields may become unsuitable for cotton production unless resistant varieties are planted.

Lifecycle
The fusarium wilt fungus grows through the soil until it comes in contact with host plant roots.

Fungal strands (hyphae) enter the roots to obtain nutrients from the plant. Once inside, the fungus continues to grow upwards through the roots and stems. Growth of the fungus inside plant roots and stems blocks the supply of water to the plant.

As the plant dies, the fusarium wilt fungus grows out onto the surface of leaves and stems where it produces fungal spores.

Spores are returned to the soil as diseased plant material decays. Spores can remain dormant in soil for several years before infecting a new host.

Host range
Cotton is the primary host of the cotton infecting form of fusarium wilt. Other plants that host this form include tobacco, coffee, capsicum, okra, pigeon pea, cowpea, sesame and rubber.

Distribution
Fusarium wilt of cotton is found in nearly all cotton growing regions in the world.

Two strains identified in Australia (VCG1111 and VCG1112) are thought to have evolved locally.

There are currently 8 identified exotic strains that have evolved overseas and pose a threat to Australian cotton varieties due to differences in disease aggressiveness and resistance profiles.

Spread
Fusarium wilt is spread over long distances in contaminated soil. Contaminated soil can be carried on the roots of host plants, boots and clothing, vehicles, machinery and equipment. Fusarium can also be carried in contaminated plant material, or on seeds.

Fusarium wilt spreads locally by growing through the soil from one host plant to another and by spores in the soil. This is a relatively slow process, though fungal dispersal may be aided by on farm activities moving infected soil with people and machinery, or by loose soil being carried in rain runoff.

Management
Resistant cotton varieties are the main method of managing fusarium wilt in cotton crops.

If a strain is present for which there are no resistant cotton varieties, management options are limited. Strategies include:

- Crop rotation with non-host species to reduce presence of fusarium wilt in the soil. Long rotation periods (several years) are more effective than short rotations.
- For strains of fusarium wilt associated with nematodes, control of nematode populations may reduce disease symptoms.

If you suspect an exotic strain
If you suspect exotic strains of fusarium wilt

Call the Exotic Plant Pest Hotline on 1800 084 881

Take photos not samples to minimise the risk of spreading the disease

Email clear photos with a brief explanation and contact details to biosecurity@dpi.nsw.gov.au

A plant pest is a disease causing organism or an invertebrate which threatens agricultural production, forestry or native and amenity plants.

Acknowledgments
Figure 1 courtesy of R. Hillocks, Plantwise.org

Figure 2 courtesy of Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

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