



INTEGRATED DISEASE MANAGEMENT FOR Fusarium Wilt

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SEEDLING DISEASES

BLACK ROOT ROT

VERTICILLIUM WILT

FUSARIUM WILT

ALTERNARIA

BACTERIAL BLIGHT

BOLL ROTS

MYCORRHIZAS

OTHER DISEASES AND DISORDERS

TIMETABLE

FARM HYGIENE

ASSESSING DISEASE

GLOSSARY

APPENDICES

THE PATHOGEN

Fusarium oxysporum forma specialis *vasinfectum* (Fov) is a soil-inhabiting fungus that invades cotton plants via the roots and causes a blockage of the water conducting tissues resulting in wilting and eventual death of affected plants. Two different strains have been identified in Australia since the disease was first recorded in the 1992-93 season. The Australian strains of Fov belong to either Vegetative Compatibility Group (VCG) 01111 or 01112. Strains of Fov from overseas have not yet been found in Australia.

SYMPTOMS

External: Growth is stunted and leaves initially appear dull and wilted, before yellowing or browning progresses to eventual death from the top of the plant. Some affected plants may re-shoot from the base of the stem. External symptoms can appear in the crop at any stage but most commonly become apparent in the seedling phase when the plants begin to develop true leaves and after flowering when the bolls are filling. Internal: Lengthwise cutting of the stem of an affected plant will reveal continuous brown discolouration of the stem running from the main root up into the stem. The internal discolouration is similar to that of Verticillium wilt but usually appears as continuous browning rather than flecking in the stem tissue. The severity of external symptoms does not always reflect the degree of internal discolouration that might be seen when the plant is cut open. Often the discolouration might only be visible up one side of the plant.

Symptoms can appear as only a few individual plants or as a small patch, often but not always in the tail drain or low-lying (waterlogged) areas of a field.

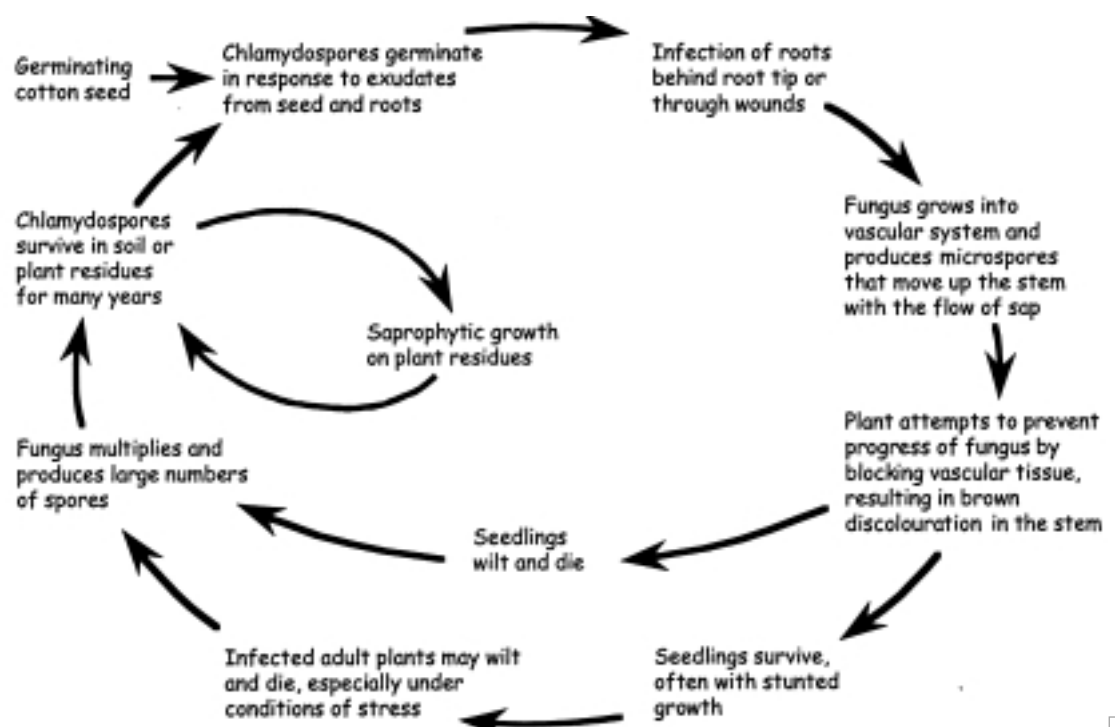
ECONOMIC IMPACT

Once introduced it is almost impossible to eradicate and failure to control the build-up of the disease results in fields becoming no longer suitable for cotton production. Once introduced into a field on a farm the pathogen may be quickly dispersed to other fields via the irrigation system.

ASSESSMENT

Establish a transect across the field and assess for the presence or absence of disease symptoms in ten plants in every tenth row. The presence of the disease is best determined by checking for the characteristic brown internal discolouration within the lower stem.

DISEASE CYCLE



FAVOURED BY

- Use of susceptible varieties
- Stresses in the crop such as waterlogging, root damage through cultivation, unfavourable growing conditions
- Poor farm hygiene on and between farms and between districts
- Dispersal
- Infested soil or plant material (eg. infected stems) attached to vehicles, machinery, boots etc. is the major mode of dispersal of this fungus. One gram of soil can contain up to 5000 Fov spores
- Spores can survive in soil and in crop residues and can be spread in overland flows and in irrigation water
- Fov can also be seed-borne

SURVIVAL

Spores: This fungus produces two types of spores. Conidia for short term survival and dispersal and thick-walled chlamydospores that enable long-term survival.

Saprophytic growth: Once introduced into a field, this fungus is also able to persist in the absence of cotton plants by surviving with low levels of saprophytic growth on decaying organic matter in the soil and also in the rhizosphere of some other plants eg. some weed species. It may not cause disease in these other plants but can survive at a reduced population level.

HOST RANGE

The form of *Fusarium oxysporum* that causes disease in cotton plants (*vasinfectum*) is specific to cotton and is not known to cause wilt disease of other crops. The strains of Fov present in Australia appear to be equally capable of causing disease in commercial cotton varieties although the susceptibility of these varieties varies from highly susceptible to partially resistant. The relationship of the Australian strains of Fov with the native *Gossypium* species (native members of the cotton family) is unknown at this stage but is being investigated.

Alternative weed hosts include bladder ketmia, sesbania pea and dwarf amaranth (etc??)

A CONTROL STRATEGY FOR Fusarium Wilt

PLANNING

- If your farm is free from this disease, try to keep it that way! – See 'Farm Hygiene'; 'Come clean-Go clean'
- Use the most resistant cotton varieties available, especially if Fov occurs in your district
- Ensure that seed is treated (eg. Quintozene and Apron)

PLANTING

- Plant to avoid unnecessary stress to germination and early growth eg. not in cold conditions.

IN CROP

- Control weeds during and between crops
- Avoid mechanical inter-row cultivations if possible during the crop (eg. use shielded sprayer to control weeds)
- Manage the crop to avoid stresses such as waterlogging, over-fertilisation, root damage
- Maintain farm hygiene and awareness of incoming traffic through the season
- Conduct regular inspections to allow early detection of any suspicious looking plants. If any are found, send immediately to QDPI for analysis. Educate farm workers what to look for and encourage reporting
- If Fov is confirmed, rogue and burn for small patches
- Solarisation may also be an appropriate treatment for small affected patches detected early in the season.
- Isolate affected areas from irrigation flows and traffic to avoid spreading the fungus. Minimise tail-water from affected fields.

LATE SEASON

- Ensure that harvesting machinery is clean
- If Fov has been confirmed on your farm notify all relevant parties so that measures can be taken to avoid spreading the fungus to other fields on your property and to other regions

AFTER HARVEST

- After harvest, retain crop residues on the surface for as long as possible before incorporation

ROTATIONS

- Selection and management of rotation crops is important as the pathogen is able to survive in association with the residues of non host crops.
- Summer flooding, where possible, has been shown to be effective but does not eradicate the pathogen.