



COTTON information sheet

Rotations and Cotton Disease

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Rotations are important to plant disease because they affect the survival and reproduction of plant pathogens and the biology and quality of soil. Disease is only one of several factors to consider when choosing a rotation sequence.

SEEDLING DISEASE

(Caused by *Rhizoctonia* and *Pythium*)

Rhizoctonia occurs in all soils and multiplies on crop residues; particularly residues with a low carbon to nitrogen ratio, such as legumes (including woolly pod vetch). However, climatic conditions have the greatest impact on seedling disease.

- Early incorporation of residues from cotton and legumes reduces carryover of *Rhizoctonia*.
- Rotation with cereals is likely to decrease *Rhizoctonia* in cotton. (The strains of *Rhizoctonia* that attack winter cereals are different to those that attack cotton)
- In crusting soils, cereal cover crops and/or standing stubble may improve emergence and establishment of cotton (current research is examining the effect of cover crops on seedling diseases).

BLACK ROOT ROT

(Caused by *Thielaviopsis basicola*)

Black root rot is widespread in NSW and southern QLD. *Thielaviopsis* does not grow on crop residues and survives as long-lived spores in the soil. Each crop of infected cotton deposits more spores in the soil and the severity of black root rot increases according to the number of cotton crops, irrespective of rotations (except for biofumigation crops).

- Woolly pod vetch and Indian mustard have a 'biofumigation' effect on *Thielaviopsis* (i.e. toxic to spores) when grown as 'green manures' (incorporate biofumigation crops at least four weeks before cotton to minimise *Rhizoctonia*)
- Rotation with cereals delays, but does not prevent, the build-up of black root rot (two or more consecutive cereal crops may reduce black root rot and this is the subject of current research)
- Rotation with legume crops may increase black root rot.

ALTERNARIA LEAF SPOT

(caused by *Alternaria macrospora*)

Alternaria leaf spot is ubiquitous in Australian cotton but seldom severe. *Alternaria* survives on cotton residues on the soil surface. *Alternaria* leaf spot at the



pre-square stage is unlikely to cause later problems. *Alternaria* leaf spot affects mature cotton when stressed (e.g. premature senescence).

- Carryover of *Alternaria* is reduced by incorporation of cotton residues between consecutive cotton crops and/or rotation with cereals.

VERTICILLIUM WILT

(caused by *Verticillium dahliae*)

Verticillium is widespread in much of NSW and southern QLD. *Verticillium* survives in infested cotton trash but does not multiply in crop residues. Verticillium wilt increases with the use of susceptible varieties of cotton.

- Rotation with cereals may decrease the severity of Verticillium wilt.

FUSARIUM WILT

(caused by *Fusarium oxysporum* f.sp. *vasinfectum*)

Fusarium wilt is widespread in parts of QLD and is currently spreading in NSW. *Fusarium* survives in infested cotton trash and may also multiply on residues from other crops.

- Rotation with some crops may increase Fusarium wilt ('biofumigation' crops should not be used until their effectiveness is demonstrated by research)
- There is no evidence that any rotation crop will reduce the severity of fusarium wilt
- Retain cotton residues on the soil surface for as long as possible before incorporation
- 'Best bet' option for infested parts of fields: sow cereal in standing stalks, pull and mulch cotton stalks and leave on surface, harvest cereal and burn stubble.

BENEFICIAL ORGANISMS

MYCORRHIZA (a partnership between plants and beneficial fungi)

Mycorrhiza (also known as VAM) occurs when the roots of plants are colonised by 'beneficial' fungi. The plant 'feeds' the fungi with sugars and, in return, the mycorrhizal fungi supply the plant with nutrients from the soil. Cotton is highly dependent on mycorrhizal fungi for uptake of P and Zn. A lack of mycorrhiza development can slow the growth of cotton seedlings. Cropping sequences are important to mycorrhizal fungi because they can only survive and reproduce on living plants.

- Mycorrhizal development in cotton will be adequate after rotation with cereals or legumes in either summer or winter
- After a single season with either bare fallow or rotation with a non-mycorrhizal crop (eg. canola), there will usually be sufficient mycorrhizal fungi in the soil (cotton compensates for a slight lack of mycorrhiza)
- Bare fallow for more than one season or removal of top-soil (especially more than 40 cm) may result in a severe lack of mycorrhiza; a cereal or green-manure crop may restore sufficient mycorrhizal fungi for cotton.

COME CLEAN - GO CLEAN

For further information please contact:

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Your local cotton Industry Development Officer or District Agronomist with NSW Agriculture or Queensland DPI

Cotton CRC web site:

[Http://www.cotton.crc.org.au/publicat/disease](http://www.cotton.crc.org.au/publicat/disease)