

PRODUCING FUSARIUM-FREE COTTON SEED FOR PLANTING

Adam Kay

**Cotton Research & Development Corporation and Cotton Seed Distributors Ltd
Narrabri, NSW, Australia**

Abstract

The pathogen that causes Fusarium wilt of cotton can be seed-borne. Although effective fungicide seed treatments were available it was considered preferable to produce disease-free planting seed rather than rely entirely on successful disinfestation or time in storage to eliminate the pathogen. The Australian Cotton Growers Research Association and the Cotton Research and Development Corporation coordinated the establishment of a seed production protocol to formalise current practices and ensure that the Fusarium risk was being consistently managed and to provide an assurance that all possible, practical steps were being taken to minimise the risk of planting seed carrying Fusarium wilt.

The seed production protocol covers Fusarium nurseries, breeder's seed lines, non-Fusarium breeder's sites, commercial seed increase, in-season checks, harvesting and ginning. The protocol was endorsed by the Australian Cotton Industry Council and distributed to the industry in 2000. The fact that Fusarium wilt of cotton has not been observed in three remote cotton growing areas or in the large western Namoi region suggests that seed-borne dispersal of the pathogen has not occurred to date in Australia. Most evidence points to disease spread in soil and crop debris attached to vehicles or machinery or carried in flood or irrigation water.

Introduction

Many studies have confirmed the possibility of internal seed-borne transmission of the Fusarium wilt pathogen in cotton seed (Elliott, 1923; Wickens, 1964). Australian cotton growers in disease free areas demand that all possible steps are taken to ensure that cotton planting seed is free from contamination by the pathogen. In a recent study Allen and Kochman (2001) showed that seed treatment fungicides could be effective for eliminating seed-borne infection. Over the last three years Dr Joe Kochman (personal communication) has found that pathogen survival in seed is limited. However, 'Prevention is better than cure' and it is considered preferable to produce disease-free planting seed rather than to rely on successful disinfestation or time in storage to eliminate the pathogen.

For many years both seed companies, Deltapine Australia and Cotton Seed Distributors, have had quality controls in place for their breeding seed increase and trial programs. As the Fusarium Wilt threat emerged they have adapted their quality control programs to ensure the risk of spreading the disease in planting seed is minimised.

In order to formalise current practices and ensure that the Fusarium risk was being consistently managed, the Australian Cotton Growers Research Association and the Cotton Research and Development Corporation convened a meeting with the seed companies. The protocol below was the outcome. It has been endorsed by the Australian Cotton Industry Council and distributed to the industry. It provides an assurance that all possible, practical steps are being taken to minimise the risk of planting seed carrying Fusarium Wilt.

The Seed Production Protocol

Fusarium Nurseries – Breeder's Seed Lines

- Practice "Come clean / Go clean" farm hygiene in all field operations
- No seed is to be saved from any Fusarium infected plant
- Before any promising lines from the Fusarium nursery can be screened more widely, they must be screened through a Fusarium-free quarantine site.
- All breeders seed from the Fusarium breeding program will be treated with an effective disinfection treatment on release from the 'quarantine' site as an added precaution

Non Fusarium Breeder's Site

- Practice "Come clean/ Go clean" farm hygiene in all field operations
- Duplicate sites (where practical)
- If after planting, Fusarium is found in the field where the breeder site is located or where water supply is recirculated from an infected field then the site must follow the Fusarium nursery protocol (above)

Seed Increase Site Selection and Planting

- Practice “Come clean / Go clean” farm hygiene in all operations
- Use acid de-linted seed treated with the best fungicide available for disinfection for pre-commercial release
- No ‘increase’ where field, farm, or locality will add to the risk of Fusarium infection
- A grower declaration must be received to indicate that the field and farm is Fusarium free and there are no known high risk factors associated with neighbouring farms (eg water flow) or practices on farm (eg use of gin trash or compost)
- If Fusarium is identified after planting in the seed increase field - no seed will be accepted or saved from the site
- If Fusarium is identified after planting in other fields on the seed increase farm – no seed will be accepted or saved from the site unless a full risk assessment is conducted on water, machinery, farm hygiene and movement of personnel on farm
- If Fusarium is identified after planting in the seed increase farm locality – seed saving from this site will only be accepted if the risk posed by the detection on a neighbouring farm or farm in the same locality does not pose a significant risk (eg shared overland water flow, shared equipment or contractors etc)
- No gin trash or compost is to be put on fields used for seed production

In-Season Checks of Screening and Seed Increase Sites

- Complete ‘walk through’ field inspection at – seedling stage, mid season and late season
- Aerial surveillance or remote-sensing/thermal imaging where practical with accurate ground-truthing where used

Harvesting & Ginning

- Practice “Come clean / Go clean” farm hygiene principles
- Follow standard Quality Assurance systems developed by both seed companies, including the use of ‘Farmcleanse’ in situations where pickers are given a wash-down prior to commencement of picking a seed increase field.
- In the gin yard designate Module rows for seed increase crops that have not been used for modules from farms known to have Fusarium
- Full clean down of gins before ginning of ‘seed increase’ cotton. Cotton ginned immediately prior to that from a seed crop should be from a Fusarium-free farm/field.

Conclusion

Application of the seed production protocol coupled with the use of appropriate seed treatment fungicide plus the time in storage between harvest and planting provides growers with a significant assurance that cotton planting seed is free from contamination by the Fusarium wilt pathogen. The fact that Fusarium wilt of cotton has not been observed in three remote cotton growing areas or in the large western Namoi region suggests that seed-borne dispersal of the pathogen has not occurred to date in Australia. Most evidence points to disease spread in soil and crop debris attached to vehicles or machinery or carried in flood or irrigation water.

References

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