

TROPICAL COTTON PRODUCTION: CONSIDERATIONS FOR NORTHERN COTTON GROWERS



Photo supplied by Stephen Yeates.

Northern Australia has enormous potential as a cotton production region. Cotton is a proven established and profitable commodity with international export markets. Additionally, the cotton seed produced is a valuable by-product of cotton production that can provide significant benefits for local livestock industries.

Northern cotton faces some very different challenges when compared to traditional temperate growing regions. Higher temperatures and rainfall, soils with lower water holding capacity that are prone to crusting, and the need to allow for compensatory growth after fruit shedding when climatic stresses occur (e.g. cloud, temperature extremes) need to be factored into management plans.

The main thing to remember is to be realistic about initial yield potential. While cotton is a hardy and resilient plant well suited to tropical production, inexperience and the unexpected can quickly result in lost yield potential. During the last 10 years, irrigated crop yields in Northern Australia have varied from 5.5 - 12 bales/ha, with about 10 per cent of irrigated crops abandoned due to unforeseen events. Therefore, if considering tropical cotton, do not assume that you will achieve industry-reported average yields from Southern Australia during your first attempts.

Here are some of the main considerations when growing cotton in a tropical environment.

WET OR DRY SEASON?

Traditional crop production in Northern Australia usually occurs during the dry season, but cotton is more likely to succeed as a wet season sown (summer) crop.

Wet season cropping can throw up significant challenges for both experienced and new growers, including:

- **Reduced availability of products and people.** The wet season is a traditional 'downtime' period, and securing labour, contractors or agronomic inputs is more difficult.
- **Field trafficability.** Have alternative strategies in place to that allow flexible application of crop inputs such as nitrogen when fields cannot be easily driven on.
- **Water availability.** Annual closure of irrigation supply schemes for maintenance or riverine flooding can prevent access to water for irrigation. Ensure that you have a strategy in place to be able to irrigate at short notice during the wet season if conditions suddenly turn dry.
- **Nitrogen (N) management.** High losses (>65 per cent) of N can occur due to leaching and volatilisation if large rainfall events occur before the crop root system has established. Growers should delay applying the majority of N until the start of the peak crop uptake period (about 30-50 days after planting), or apply fertilisers that have been modified to delay oxidation to the soluble nitrate form. Unless the crop is severely deficient, avoid applying N after mid flowering as this will delay maturity.

Remember to expect the unexpected!

No two wet seasons are the same - what worked last year may not be suitable this year. Flexibility and lateral problem-solving are essential in a wet season environment.

IRRIGATED OR DRYLAND/RAINGROWN?

While the majority of cotton production in Northern Australia to date has been with optional irrigation, dryland/raingrown cotton is possible with careful attention to sowing times and water conservation techniques such as zero-till combined with good stubble mulch cover.

IRRIGATED COTTON

Depending on location, cotton can be irrigated to supplement wet season (summer) rainfall or be fully irrigated during the dry season (winter), but not both in a calendar year. Considerations include:

- **Sowing date selection.** Aim to ensure critical flowering and boll filling stages occur during periods of reliable long sunny days, with mild night temperatures (15 - 23°C) that are followed by reliable dry weather for picking. Spring planting (used in temperate Australia), is high risk in the tropics due to low radiation during flowering and high rainfall on maturing bolls (January to March) leading to boll rots and fibre discolouration.
- **Plant populations.** Vigorous early growth leads to larger plants, so lower plant populations (6 - 10 plants/m²) are preferred. At higher establishment rates the plants will compete for light, exaggerating internode expansion and crop height.
- **Crop establishment.** Planting deeper than 3 - 4 cm is risky if intense rainfall follows on soils with the potential to form surface crusts. Soil firming press wheels can exacerbate crusting. Avoid placing N fertiliser with or underneath seed; band to the side, particularly if using DAP.
- **Growth regulation.** Use of growth regulators must achieve a balance between suppressing vigorous early growth and not inhibiting the production of later fruit if required for yield compensation.
- **Irrigation scheduling.** During the transition from the wet to the dry season, scheduling will depend on prior rainfall and the size and depth of the root system. Root system characteristics can vary greatly between seasons and it is possible for crops to become water stressed in less than a week after rain. Large yield losses have occurred at the Burdekin due to this scenario.

Mepiquat chloride (Pix®) recommendations from temperate Australia based on internode length **DO NOT WORK** in tropical production systems.

Yield reductions of up to 26% in wet and 16% in dry seasons occur when excessive Pix application prevents plant recovery from environmental stresses. Local R&D has developed and validated crop monitoring systems based on maintaining an optimum height range relative to the overall height, node number and crop boll load as the crop develops by only using low rates of Pix (repeat dosages when required) and/or other management (e.g. irrigation).



Photo supplied by Paul Brady.

DRYLAND/RAINGROWN COTTON

A combination of low water holding capacity soils, a strongly seasonal rainfall pattern (December to March) and high temperatures makes tropical 'dryland' cropping very different to south eastern Australia where cotton is grown on deep clays with high available moisture following a fallow and sowing occurs during the cooler spring months.

- **Sowing date.** Dryland/raingrown tropical cotton depends heavily on timely in-crop rainfall. Achieving acceptable yields requires a 140 - 150 day period when rainfall is reliable. There is a very narrow sowing window; too early risks rain on maturing cotton causing boll rots and fibre discolouration; too late and the crop can be water stressed before bolls are mature, reducing yield and fibre quality.
- **Crop establishment.** High soil temperatures and surface crusting impede crop establishment. Place seed on moisture and cover with loose soil. Avoid soil firming press wheels.
- **Row spacing.** Skip row configurations are unlikely to be required in tropical dryland/raingrown cotton as root system development usually occurs mid wet season when rainfall is most reliable.
- **Nitrogen.** Applying the majority of fertiliser in-crop 30 - 50 days after planting significantly increases the efficiency of fertiliser uptake by cotton and reduces up-front costs.

Zero tillage combined with uniform surface mulch cover reduces runoff, improves soil water availability, moderates soil temperatures, and improves planting date flexibility. This system has been shown to increase dryland sorghum yield at Katherine by up to 80%.

NORTHERN GROWER CHECKLIST

GINNING AND MODULE TRANSPORTATION

Complete your arrangements for ginning before you commit to planting cotton. **Note:** current biosecurity restrictions exclude ginning of cotton grown in the Northern Territory and Western Australia at any facilities in Central Queensland.

Consider distance to the gin and whether or not the gin will be operating when your cotton arrives (out of season with the southern crop). Access to cost effective transportation for round cotton modules can be a major impediment for cotton production at distant locations, with backloads limited in some areas. Transportation costs have ranged from \$60-\$190 per ginned bale (not module) for growers in Northern Australia depending on distances involved.

SUITABLE EQUIPMENT

Successful cotton production depends on the ability to conduct timely agronomic operations, particularly during the wet season when the window for action can be very short between rainfall events. Weather interruptions and annual leave during summer can make services difficult to acquire. Also, spray contractors are often engaged with weed control with products that are incompatible with cotton during the wet season and a contractor will need to thoroughly decontaminate equipment which takes additional time.

Consider picking costs before you plant. Contract picking can be very cost effective but if the contractor has to travel large distances for a small area of cotton the additional costs might outweigh any potential rewards.

Also consider how you will destroy the crop when you are finished, as the licensing requirements to grow Bollgard® 3 cotton dictate specific crop destruction practices.

CROP MONITORING AND MANAGEMENT ADVICE

The availability of crop consultants is limited in some regions. Wet season cotton production requires agronomic practices that are suited to tropical conditions and some southern cotton production tactics (sowing, nitrogen, growth regulator and irrigation) are not directly transferable. The ability to contextualise advice to match local conditions is essential.

LOCAL COMMUNICATION

Spray drift (onto and off cotton) is an important consideration, both for the cotton crop and for off-field impacts. It is your responsibility to ensure chemical drift is minimised on your farm and does not occur outside your property boundaries. Cotton is highly susceptible to phenoxy herbicides such as 2,4-D. Develop a pesticide application management plan (PAMP) and discuss your plans to grow cotton with your neighbours so any concerns can be adequately addressed.

BIOSECURITY RESTRICTIONS

There are key pests, weeds and diseases that only occur in Northern or Southern Australia and therefore biosecurity practices that limit movement of these organisms between regions is critically important. The Pink Bollworm that occurs naturally in WA and the NT has the potential to be a major pest if spread to Southern Australia. Similarly soil-borne diseases, nematodes and resistant weed species that occur in Southern Australia have the potential to reduce cotton yield potential if they were introduced to the north.

Implementing quarantine best practices to prevent the spread of these organisms by the movement of machinery, people and cotton modules is a key consideration. Monitoring for any unusual pests or crop symptoms is also critically important for cotton grown in Northern Australia due to the closer proximity to South East Asia where several insect disease threats reside.

TRANSGENIC COTTON REQUIREMENTS

There are specific industry and government regulations that apply to production of transgenic (Bollgard Roundup Ready Flex®) cotton in Australia. These can vary between regions, so talk with your relevant Bayer representative regarding your requirements.

CROP INPUTS

You will need to source suppliers for farm inputs such as seed, fertiliser, herbicides, insecticides, growth regulators, defoliant and a licence to grow GM cotton Technology User Agreement (TUA).

BEST PRACTICE

The Australian cotton industry utilises the myBMP (best management practice) system to demonstrate to the community the industry's improved farming practices and careful management of our natural resources. Expansion of cotton in to new areas should consider and manage risks to water quality, local fauna, and natural vegetation.

MARKETING

Cotton has unique marketing parameters based around fibre quality. Discuss premium and discount sheets as well as price with an experienced cotton merchant/marketer. For a list of Australian merchants, see www.austcottonshippers.com.au

RESOURCES

CONNECTING TO THE COTTON INDUSTRY

The cotton industry has a large number of information resources to support cotton growers and it is important to stay informed on emerging issues and best practice. **Southern information will not always be applicable to Northern Australia so use information specific to northern regions if available.**

PUBLICATIONS

Wet season planted cotton: NORpak Burdekin and North Queensland coastal dry tropics

🔗 <http://www.insidecotton.com/xmlui/handle/1/203>

Dry season planted cotton: NORpak Ord River Irrigation Area Cotton production and management guidelines for the Ord River Irrigation Area

🔗 www.insidecotton.com/xmlui/handle/1/204

COTTON INDUSTRY LEADING RESEARCHERS FOR NORTHERN COTTON PRODUCTION CONTACTS



CSIRO

Stephen Yeates

✉ Stephen.Yeates@csiro.au



Queensland
Government

QUEENSLAND DEPARTMENT OF

AGRICULTURE AND FISHERIES (DAF)

Paul Grundy

✉ Paul.Grundy@daf.qld.gov.au

AUSTRALIAN COTTON INDUSTRY ORGANISATIONS



COTTON AUSTRALIA

- Advocating for the Australian cotton industry.
- Peak representative body for the Australian cotton industry.

🔗 www.cottonaustralia.com.au



COTTON RESEARCH AND DEVELOPMENT CORPORATION (CRDC)

- Science underpinning the cotton industry's success.
- Delivering outcomes in cotton research, development and extension.

🔗 www.crdc.com.au



COTTON SEED DISTRIBUTORS (CSD)

- Australia's leading supplier of cotton planting seed.
- CSD is a major investor in cotton breeding, research and extension.

🔗 www.csd.net.au



BAYER

- Multinational agricultural biotechnological and chemical company.
- Supplier of biotechnology traits to the Australian cotton industry.

🔗 www.monsanto.com.au



MYBMP

🔗 www.mybmp.com.au



CROP CONSULTANTS AUSTRALIA

- Aim to promote crop consultancy as a profession

🔗 www.cropconsultants.com.au



COTTONINFO

- Cotton industry's extension program designed to connect cotton growers with research.
- Joint venture between industry partners Cotton Australia, CRDC and CSD.

🔗 www.cottoninfo.com.au

Photo supplied by Paul Grundy.

