

Germinating ideas

Compiled by the
CSD Extension and Development Team

WELCOME to germinating ideas. In this edition we discuss some of the considerations around late season crop management including impacts on quality, yield, defoliation as well as pests and disease.

The mild and wet conditions seen across most of NSW and southern Queensland this summer, combined with early insect pressure in some valleys, has resulted in slow crop development. Many crops are set up for a late finish in order to gain some extra yield, but there are risks involved including low micronaire immature cotton and the onset of disease such as Verticillium wilt.

Micronaire

Micronaire is a very complex measure and one that is particularly difficult to manage for. Unlike most other fibre quality parameters there is an upper and lower limit. The micronaire of cotton is determined by two distinct fibre attributes;

- Fineness – the weight per unit length and is a measure of the diameter of the fibre.
- Maturity – is the proportion of fibre wall thickening with cellulose inside the fibre.

Micronaire is predominantly influenced by variety, boll number and position, water stress and temperature. In hotter summers there is a tendency for some regions to achieve high micronaire, (average temperatures above 28°C); likewise in cooler summers there is a tendency for some regions to fall out of the micronaire range (average temperatures above 22°C).

Many growing valleys are experiencing below average temperatures as shown in Table 1, which can be attributed to the conditions brought by the La Niña weather event. With the rest of the season predicted to remain cool it is increasing important

TABLE 1: Average temperatures October 1 to January 20 and January 1 to March 31

Town	Average temp (Oct-Jan)	10 year mean (Oct-Jan)	Jan-Mar 10 year mean (boll fill period)
Narrabri	25.4	26.3	26.5
Moree	24.8	25	26.4
Goondiwindi	25.2	25.2	26.6
Dalby	24.2	23.7	25
Warren	23.4	24	26.3
Griffith	22	22.3	24.7
Hay	21.8	22.4	24.7
Coleambally	21.7	22.1	24.5

to maintain as much early, mature fruit as possible. If the current mild conditions continue into autumn, average temperatures may fall below 22°C resulting in some low micronaire issues.

Yield

In years when lower and middle fruit has been impacted, growing your crop out can help gain some valuable yield. But it can be difficult to compensate for the lost bottom fruit which tend to be more mature and heavier and contribute the most to yield. Data in Figure 1 shows that fruiting nodes 5–12 contribute just under 50 per cent of total bolls, compared to 20 per cent from nodes 13+

As the later fruit typically has less time to mature bolls are typically lighter as shown in Figure 2. The interaction between boll number and weight can impact on yield greatly – 50 per cent variation in boll weight equates to 50 per cent variability in yield with the same boll numbers.

The final irrigation is extremely important in ensuring boll

FIGURE 1: 2019–20 CSD Ambassador segment picking data bolls per metre

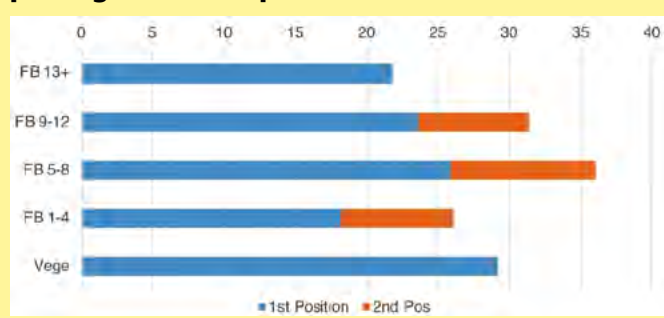
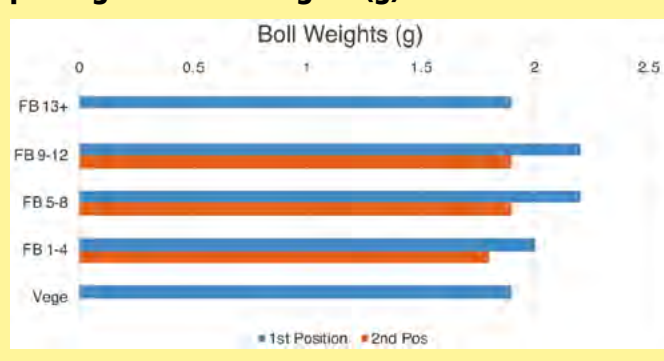


FIGURE 2: 2019–20 CSD Ambassador segment picking data boll weights (g)



maturity, particularly the later fruit. It will take about 45–55 days from last effective flower (cut out) to maturity, although this period differs between valleys and it can take between 65–90 days for last effective flower to maturity in southern NSW. This period will also extend as the daily average temperatures drop. For Bollgard 3 crops, late flowering is where water stress is going to be the most detrimental to final yield and correct irrigation timing is needed to ensure the crop does not suffer water stress.

Crops that come under stress prior to defoliation (60 per cent bolls open or four Nodes Above Cracked Boll), can suffer some fibre quality reduction, especially micronaire. The degree of reduction increases the earlier the stress occurs. Crops chasing later fruit are also more susceptible to premature senescence if nutrient availability is limited, because this condition is favored by cool, cloudy weather late in the season. The last irrigation is important to ensure that the later bolls are finished without stress but not impacting on picking and other farming operations later in the crop's life.

Defoliation

Growing your crop out and delaying maturity can have negative impacts on the effectiveness of your defoliation program. Defoliation after or during a frost event can cause damage to the abscission layer making defoliants poor or in some cases ineffective. Prolonging defoliation increases the risk of damage to bolls that have already opened, particularly in wet conditions where mold could reduce lint quality. Some issues and considerations with late defoliation include:

- Some defoliants are taken up slowly by the leaves and will wash off in rain, resulting in an incomplete defoliation. Rain after applying a boll conditioner may interrupt boll growth and cause 'tight lock'. Areas most vulnerable to rainfall during defoliation include southern and eastern NSW.
- Cool temperatures, low humidity and water stress can increase the waxiness and thickness of the leaf cuticle reducing chemical uptake. Wetting agents can assist with this problem.
- Hormonal defoliants and boll conditioners work at an optimal minimum temperature of around 18°C compared with herbicide defoliants that have lower optimal minimum temperatures of 13–16°C. Higher rates are often needed to offset the effects of low temperatures.

The timing of defoliation can also impact on micronaire and ideally defoliation should occur around 60 per cent open bolls. Defoliating too early or late can lower micronaire as shown in Figure 3.

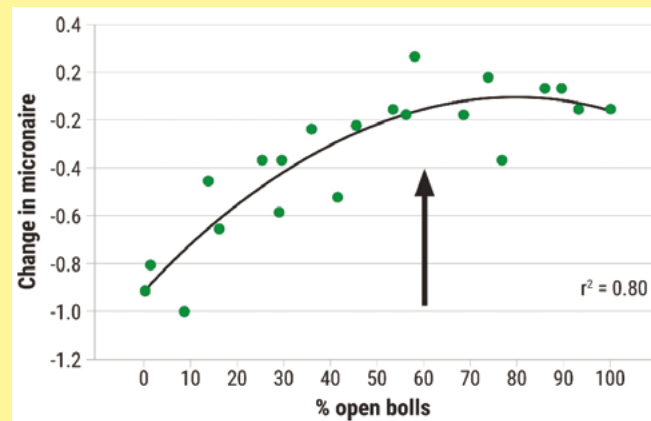
Pests and disease

As the average daily temperature drops and surrounding farms begin to defoliate, later season crops can be subject to pest infestations and the onset of late season crop diseases.

Whitefly are a major late season cotton pest. They have the ability to contaminate lint with honeydew, have a large host range, can rapidly reproduce and can develop resistance to many insecticides. Adult whitefly are extremely mobile, capable of flying for two or more hours and may be carried long distances by wind.

As leaf matter falls to the ground in defoliated crops, whitefly will move on to another suitable host, making a later crop extremely susceptible to large population increases in a short amount of time. If not detected early these populations can significantly reduce the quality of open bolls, as contamination with honeydew can encourage the growth of mould. Whitefly are best managed with a combination of natural enemies and

FIGURE 3: Change in micronaire according to timing of defoliation



(Adapted from Bange et al. 2009)

insecticides. Other late season pests include mealybug, mirids and aphids all of which can impact in yield and quality.

Diseases such as Verticillium wilt and Alternaria can impact late season crops. Verticillium wilt can infect plants at any time during the season and favors cool, damp conditions. Temperature highly influences the incidence and severity of Verticillium wilt. The timing of a cool snap will also influence the impact of the disease on yield. A temperature drop during peak flowering or boll fill will likely have more impact on yield (but not necessarily disease incidence) than these conditions occurring later in the growing season. In the case of a late crop, Verticillium wilt can impact on yield greatly as the temperatures drop and later fruit is in peak boll fill.

Alternaria is a primary fungal leaf disease. Pathogens can be carried over on infected cotton residues from the previous season and are spread by air-borne spores. The development of symptoms is favored by any physiological or nutritional stress such as heavy fruit load, premature senescence or low potassium. Plants that are close to cut-out are generally more susceptible. Alternaria can impact boll development resulting in yield losses of up to 10 per cent in serious cases.

