

# Germinating ideas

By Craig McDonald, CSD Extension and Development Agronomist

This edition of Germinating Ideas will look at a new product called Bion that may soon be on the market subject to regulatory approval. Bion can help increase systemic induced resistance to both Fusarium wilt and black root rot. We will also look at the issue of micronaire in cotton, what the measurement actually is and some of the potential reasons why some crops ended with higher micronaire values this summer.

## Bion

Subject to permit approval from the APVMA, CSD will have a limited release of the product Bion, formerly known as Boost. Bion is supplied by Syngenta Crop Protection and will be available through CSD as an additional seed treatment. The actual permitted area and the varieties available will be determined once regulatory approval is given.

Bion has shown to have the potential to reduce the impact of both Fusarium wilt and black root rot in cotton.

- Black root rot is favoured by cool conditions at the start of the season. It will not kill plants but will delay the crop. If the season is long enough the crop may make up for the early delay; and,
- Fusarium wilt is favoured by cool spring weather. It is not favoured by a hot dry summer.

Bion has the active ingredient acibenzolar-S-methyl, which has shown to induce systemic resistance. The pathogens that

cause Fusarium and black root rot infect soon after emergence and before foliar applications are practical.

The incidence of Fusarium wilt and the severity of black root rot were significantly reduced when Bion was applied to seed prior to planting.

While not providing complete control, systemic induced resistance is seen as a potentially important component of an integrated disease management package for Fusarium and black root rot of cotton. Other key components of a successful integrated disease management program (IDM) include:

- Variety selection;
- Crop rotation;
- Stubble management;
- Time of planting; and,
- Biofumigation etc.

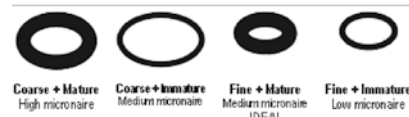
Large-scale field trials were carried out in the 2005–06 season to assess its activity on black root rot and Fusarium. These were in eight or 12 row alternating strips and assessments were done across the strips. Dr Stephen Allen carried out these trials with assistance from the CSD Agronomy team (see Figures 1 and 2).

## What is micronaire of cotton and why has it been higher this season?

With the 2005–06 cotton season now virtually all picked and ginning and cotton classing underway, the topic of high micronaire has been frequently raised.

Micronaire of cotton is determined by two distinct fibre attributes:

- Fineness: Is the weight per unit length of fibre and is a measure of the outside diameter of each fibre; and,
- Maturity: Is the proportion of fibre wall thickened with cellulose inside the fibre.

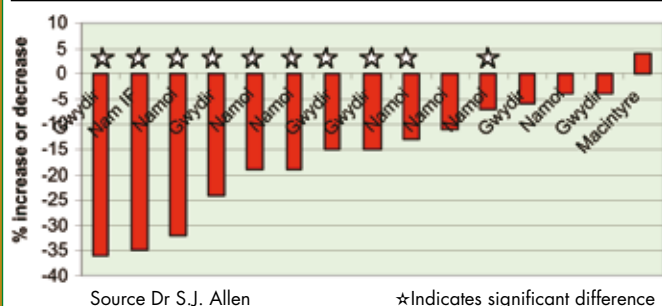


Micronaire is determined by placing 50 grams of lint in a chamber and determining the rate at which air flows through it under pressure. The resistance to this air flow depends on the surface area of the fibre which will depend on both fibre fineness and maturity attributes. Using this method, a rapid air flow indicates high micronaire because of a small surface area that it passes through, and conversely, a slow air flow indicates low micronaire.

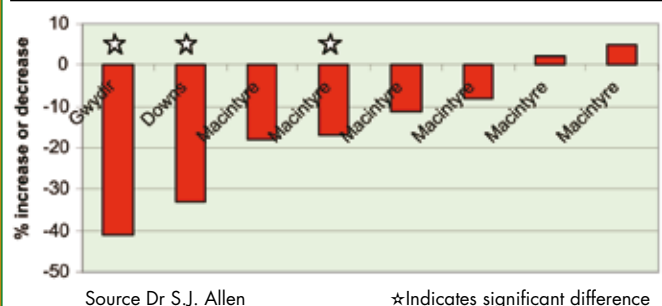
## What can influence fineness?

- The conditions in the first 20 days of fibre development are very important because fibres can actually expand in diameter at that time. Hot, sunny conditions may increase coarseness;
- During the latter part of boll development (fibre thickening), the fibre diameter can be increased during warm to hot, sunny conditions; and,
- There are some differences in varieties (Table 1 and Figure 3).

**FIGURE 1: Bion seed treatment trials — black root rot severity**



**FIGURE 2: Bion Seed treatment trials — Fusarium wilt severity**



### What can influence maturity?

- The conditions during the last 40 days of boll development are the most important. Hot, sunny conditions may increase the daily amount of cellulose deposited inside each cotton fibre, hence increasing maturity; and,
- There are slight differences in maturity between varieties (Table 1 and Figure 3). This is due to both the amount of cellulose that is deposited in the fibre every day and the number of days that this occurs.

**TABLE 1: Mean micronaire, fineness and fibre maturity of some commercial Bollgard II varieties, nine sites, two years**

	Micronaire	Maturity (%)	Fineness (millitex)
Sicot 289BR	4.37	80	183
Sicot 43BR	4.24	79	177
Sicala 60BR	4.33	78	186
Sicot 71BR	4.47	80	186
Sicot 71B	4.17	80	173

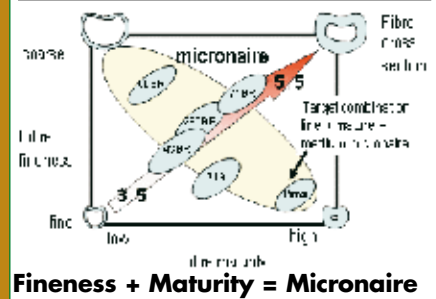
### Climatic and management influences

Hot and sunny conditions during the boll formation period (after first flower) can increase both coarseness and maturity, and hence micronaire. It stands to reason that years with high micronaire are the hottest years and the regions most prone to high micronaire are the hotter regions.

Crop management style in recent years has also contributed to better conditions for fibre thickening and higher micronaire.

- Micronaire is a yield component. Generally a fibre with higher micronaire will weigh more than a fibre with lower micronaire. Management practices that increase yield can also increase micronaire, particularly improved timing of water and nutrient supplies to the crop.
  - First position fruit has higher micronaire. Crops with higher retention of early fruit will generally have higher micronaire. The adoption of Bollgard II and more efficacious conventional chemistry has increased the ability to retain a high proportion of first position fruit.
- The segmented picking work conducted by the CSD Extension and Development team in 2004–05 indicated that on average, micronaire of first position fruit (4.5) was about 10 per cent higher than outer

**FIGURE 3: Illustration of fineness and maturity of some commercial Bollgard II varieties and the impact this can have on micronaire**



position fruit (4.1) from 30 irrigated crops (Figure 4).

Despite differences due to climate and management, variety micronaire rankings will stay true. The absolute values will vary from year to year based on temperature and management.

For example: Sicot 71BR has an average micronaire 0.3 higher than Sicot 71B. This relative difference will exist at high and low micronaire scenarios.

A good demonstration of how the micronaire for the same variety will vary

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*experience and discipline pay a solid return*

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between seasons and regions comes from the CSIRO Advanced Line Trials which are conducted every season across many regions. Two standard varieties have been included in many trials. Figure 5 shows the huge variability in micronaire between seasons and regions for the same variety.

To get an indication of the impact on temperature on these trends, Table 2 shows the number of hot days (greater than 36°C) for this season compared to average, last season and a season with high micronaire (2002-03) and low micronaire (1994-95).

This clearly suggests a tendency for higher micronaire in hotter years and that the 2005-06 season has been one of the hottest years on record in most regions.

Micronaire is a very complex measure and one that is particularly difficult to manage for. Unlike most other fibre quality parameters there is both an upper and lower limit.

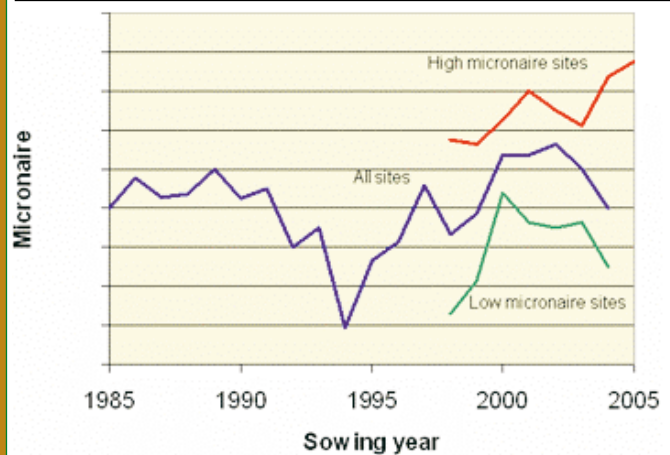
Whilst high micronaire is being discussed widely now, in the mid 1990s there was just as much discussion about low micronaire, particularly in some of the cooler, southern and eastern regions.

**TABLE 2: Hot days (greater than 36°C) between October 1 and March 30**

	2005-06	Av.	2004-05	High 2002-03	Low 1994-95
Emerald	95	62	71	81	73
St George	92	55	58	71	50
Bourke	111	66	80	95	50
Goondiwindi	59	36	50	49	30
Moree	52	34	35	55	24
Wee Waa	72	45	44	65	39

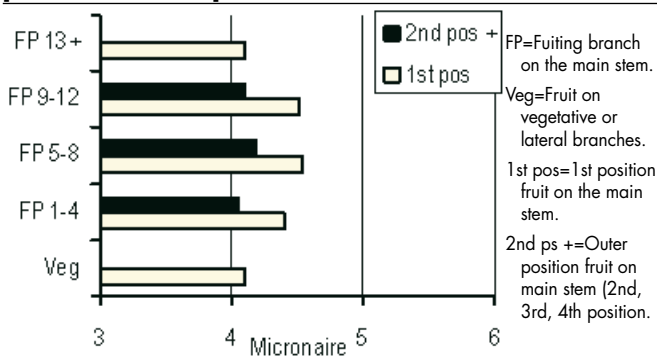
Calculated using SILO Day Degree Calculator on [www.cotton.crc.org.au](http://www.cotton.crc.org.au)

**FIGURE 5: Trends in measured HVI micronaire of the control varieties DP16 and Namcala in the last 20 cotton seasons to 2004-05 and Emerald data from 2005-06)**



Mean of up to 13 sites each season including Emerald, Biloela, Theodore, Brookstead, Boggabilla, St George, Collarenebri, Moree, Bourke, Merah North, Myall Vale, Breeza, Warren and Hillston. Graph prepared by the CSIRO cotton breeding team.

**FIGURE 4: Average micronaire from each position of the plant**



Information collected from 30 irrigated crops from most regions in 2004-05 season. Micronaire of first position fruit (4.5) is 10 per cent higher than second position fruit (4.1).

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