

**MARKETING AUSTRALIA'S FIBRE
BREEDING FOR FIBRE QUALITY**

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As a plant breeder I readily acknowledge that breeding for fibre quality is very important. Within Deltapine Australia's breeding program a significant emphasis is placed on breeding for fibre quality. This fibre selection process is targeted at all stages of our breeding program.

The question for plant breeders is how do we set priority in a breeding program which meet the fibre quality needs of everyone in the market place while developing competitive high yielding varieties? Fibre quality parameters are complex and plant breeders need to consider various issues when setting priorities and making decisions on fibre quality.

There is a range of individual fibre characters which need to be considered. These individual traits must be selected in combination with each other and in combination with agronomic traits, plant growth and development characteristics, disease tolerance levels and yield potential.

Different fibre quality characteristics are probably controlled by separate genes. In addition several genes may determine the final fibre quality of any particular characteristic. Positive and negative correlations exist between different characters. For example, two of the most important fibre characters, fibre length and fibre strength, are negatively correlated to yield. Hence, selecting to improve one character may have deleterious effects on the selection of other important quality and agronomic characteristics.

Plant breeders have two markets to consider when developing varieties. These are cotton growers and cotton spinners. Both groups have different perceptions on the fibre quality requirements of varieties.

Cotton growers are primarily concerned with the final gross margin return on a crop and ultimately aim to produce the cotton which maximises their gross margin. Currently the unit price paid is based on a standard grade with a premium and discount sheet. This process operates on the main fibre characters of :

- Fibre Strength
- Fibre Length
- Micronaire
- Grade

While the premiums for fibre quality above base grade are small the penalty discounts for poor quality fibre can be severe. From a plant breeders point of view, under this current regime, our primary incentive is that we ensure that our future varieties produce a consistent, minimum base grade fibre quality so they do not demand price discounts.

Cotton spinnability is the primary concern of the spinner. As such the spinner has a different view of fibre quality compared to the grower. There are a range of raw cotton quality characteristics which determine the fibre value, both in terms of its various end product uses and its suitability for the various manufacturing processes. The spinning method used by a mill determines the ranking of cotton fibre properties required. As breeders these requirements need to be considered in the development of our cotton varieties.

There are a range of fibre characteristics which we can added to the 4 listed previously. These traits include the following :

- Fineness
- Fibre Maturity
- Fibre Uniformity
- Fibre Elongation
- Trash or Non-lint Content

- Colour
- Short Fibre Content
- Neps Content
- Stickiness

Currently many of these additional characteristics do not have regular, reliable and repeatable measurement techniques. Continuing advances and developments in HVI testing equipment will resolve many of these issues. How important will these traits be in the future? Many of the fibre properties listed above are important to the spinning industry and end users. As plant breeders we must consider possible future trends in fibre requirements and be building these traits into our breeding programs.

Once all the possible fibre characters are included I am sure you will agree that the range of genetic combinations of individual fibre characters is immense. In addition, all these traits need to be considered in combination with agronomic characteristics. High quality breeding lines and selections are available in most breeding programs. Due to the negative correlations between traits most of these selections are slightly lower yielding or, in most cases, I am sure they would be commercially released. The small rewards offered as price premiums

for the quality of these selections is quickly negated by the potential lower yields.

Generalisations can be made and trends can be identified regarding the market importance of cotton fibre characteristics. Manufacturing technology and the wide range of end use products ensure that there is a market for all types of cotton. Under current marketing arrangements I believe cotton growers will select high yielding varieties which produce consistent average fibre quality while avoiding future fibre quality discounts. It must also be remembered that fibre quality characters can be significantly influenced by the environment, crop management and ginning techniques. Obviously cotton breeders have no influence over these areas.

Without doing a detailed analysis on masses of trial data, I would suggest that fibre quality improvements have been made by plant breeders over time. The challenge for cotton breeders is to continue this process and to breed varieties with fibre characteristics required by the market, whilst maintaining the properties demanded by the grower (such as yield, agronomic traits, disease tolerance). At Deltapine we have a very high reliance on HVI testing techniques for determining fibre quality. I believe that improvements and advances in this objective measurement technology will lead to further

advances and improvement in varieties. It will also allow for closer links between breeding cotton varieties for cotton growers and breeding for the needs of spinners. Cotton spinners may have to offer sufficient financial reward for superior fibre traits or potentially good selections may not see the light of day.