



# Crop Management for Optimum Fiber Quality and Yield

Yield is the most important factor to consider in developing a cotton production plan. However, in an effort to realize maximum profits from a cotton production system it is also important to recognize the significance of fiber quality. In Arizona, we have faced several challenges in recent years associated with optimum fiber quality requirements from a regional, statewide, and field to field basis. For example, many farms have experienced difficulties with high micronaire (mike) values in the past few years that sometimes have resulted in discounts on fiber value. Crop management for both optimum yield and fiber quality is a realistic and important approach to take for a profitable cotton production system.

Fiber properties such as length, strength, micronaire, and grade are all important to consider in terms of crop management. There are many crop management factors that have been associated with fiber quality. Some of these factors include:

- variety
- weed control
- planting date
- insect control
- plant population
- earliness
- row spacing
- uniform fruiting patterns
- fertility
- defoliation
- irrigation
- harvesting
- growth regulators
- seed cotton storage

Probably the most important aspect determining the potential for fiber quality of a cotton crop is variety. In several studies addressing cotton fiber properties (Meredith 1986 and 1990) genetics has been shown to have a very strong influence on fiber strength and length, accounting for over 80% of the variability associated with these two properties, respectively. An example that is often considered in this context is the San Joaquin Valley of California and the Acala varieties

that are grown there. Accordingly, the length and strength properties commonly associated with the Acala fibers are derived primarily from the varieties (genetics) grown not the environment per se. Variety can also have a strong influence on grade. For example, hairy leaf varieties are commonly associated with higher trash contents.

One approach to addressing crop management in relation to fiber quality, is to consider the primary fiber properties and the management factors that can have a strong impact on them.

## Length

Besides variety, water management and maintaining good plant-water relations during fiber development is probably the most important factor affecting fiber length. This is one of the reasons we stress the importance of good water management in-season and minimizing or eliminating water stress. In-season irrigations should be scheduled so that no more than 50% of the plant-available soil-water is depleted between irrigations. Water stress can reduce not only crop vigor, fruit retention, and yield; but also fiber length. There is also evidence that fiber length can be reduced due to severe weathering in the field. This might occur if

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severe or prolonged rainy periods are experienced following boll opening. If harvesting is seriously delayed and open bolls are exposed in the field for a long time (months) fiber length could be affected.

## Strength

Most varieties that have high yield potentials also have good fiber strength characteristics. Any factor that can cause physical or microbial damage to the fiber can reduce strength. Therefore, similar to affects on fiber length, severe weathering can negatively impact strength as well. Strength can also be reduced in cotton lint from over-ginning.

## Micronaire

Fiber fineness is determined primarily by variety. However, the maturity of cotton fibers can be affected substantially by environment and management. Unfortunately, a single fiber measurement cannot fully distinguish between fineness and maturity. Therefore, major deviations in mike readings for a given variety are most likely due to problems in fiber maturity management. In general, bolls set on the plant early in the season tend to develop high micronaire levels by the end of the season and bolls set on the plant later in the season tend to have lower micronaire, or be less ma-

ture. The blending of the fiber from bolls set throughout the season can often result in overall mike values that are acceptable. Whenever the crop experiences a notable drop in boll retention, micronaire can be affected. In Arizona we have commonly seen high mike values for fields that have experienced substantial losses in fruit retention late in the season, commonly associated with the monsoon season. High mike values in situations like this can be exacerbated by prolonging the crop late in the season without realizing a major gain in boll retention to compensate for bolls lost under the adverse conditions. Without gaining a significant boll load late in the season, plant carbohydrates are loaded into existing bolls, creating fibers with higher micronaire. Management factors that lead to crop **earliness** and **uniform fruit retention patterns** are very important in terms of fiber micronaire. Therefore; planting date, water, fertility, plant growth regulator, insect, weed, disease, defoliation, and harvest management each can contribute significantly to the overall micronaire and general fiber quality of a crop.

Each of these management factors can be addressed independently. But remember, each of these factors can affect, independently and collectively, the yield and quality of a cotton crop, and therefore, overall crop value and profitability.

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