



Low Micronaire in Cotton Production

Low micronaire can be caused by a shortened growing season or not enough carbohydrates available to reach maturity. Prolonged cool and cloudy weather during late boll set can promote heavy fruit retention, which can lead to low micronaire.

Background

Micronaire is a measurement of cotton fiber fineness (linear density) and maturity (level of cell-wall development).¹ When cotton begins to bloom, cells that eventually form fibers elongate into the boll. Final fiber length is attained roughly 16 to 20 days after formation, and once the fibers are fully elongated, they will begin to thicken from the inside out. Carbohydrates produced through photosynthesis allow cellulose to be added to the cotton fiber walls, which increases both thickness and strength.²

Micronaire that is too high or too low can present problems for use in the textile industry. Cotton buyers and textile manufacturers prefer a micronaire range of 3.5 to 4.9 and cotton produced outside of this range may receive deductions.³ Low micronaire cotton prevents the uniform dyeing of yarn. It can also form neps, or small knots, that can result in yarn breakage during the spinning process.²

Cotton varieties that characteristically have very fine fibers can have low micronaire and high quality, but more often cotton with low micronaire is the result of immature cotton at harvest. Immature cotton can occur if the growing season is cut short or if the crop does not have enough carbohydrates available to finish the bolls that are already set.

Causes

Shortened growing season. Disease, frost, and applying harvest aids too early can prevent a cotton crop from reaching maturity. Once leaves have senesced, fiber development may only continue for two to three days. The more immature bolls at the top of the plant will have a lower micronaire than earlier-developed bolls on the lower portion of the plant, resulting in ununiform maturity throughout the plant, and further reducing the quality of the lint.

Not enough carbohydrates available. Low micronaire can occur when a cotton crop does not have enough carbohydrates available to support the boll load. For example, a crop with a potassium (K) deficiency is unable to shed bolls to balance the lack of available K in the soil. Instead, the crop will maintain the boll load and remove any available K from the leaves, causing bronzing and senescence. Without the leaves to photosynthesize, the crop can not produce enough carbohydrates to mature the bolls, leading to low micronaire. Quality is further impacted by K deficiency because K is required for fiber elongation and thickening, which can decrease strength, length, and uniformity.



Figure 1. Stored cotton bales.

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Reduced carbohydrate availability can also stem from dense, rank growth, too much nitrogen, heavy irrigation or precipitation, and a heavy boll load. Any situation that promotes heavy vegetative growth can reduce light penetration to the lower canopy, reducing the carbohydrates available for boll maturity, and lowering micronaire. Moderately cool temperatures during late boll set can also lower micronaire because moderate temperatures can promote a heavy boll load due to the lack of boll shed from high temperatures.²

Management

Low micronaire can be highly weather dependent, but there are several management practices that can help reduce the likelihood of a low micronaire cotton crop. Maintain appropriate nutrient levels throughout the season to help prevent nutrient deficiencies that can lead to immature bolls. Control rank growth by avoiding applying too much nitrogen, controlling irrigation, and timely application of plant growth regulators. Scout for insects and diseases and control when necessary. Delay harvest aid application until the crop is almost ready to terminate.⁴

Consider the risk of low micronaire when selecting a cotton variety as some varieties inherently have lower micronaire. Selection of a cotton variety with a micronaire rating on the lower end may increase the likelihood of discounts if growing conditions become unfavorable.

Sources:

¹ Montalvo, J.G. 2005. Relationships between micronaire, fineness, and maturity. The Cotton Foundation. The Journal of Cotton Science. <https://www.cotton.org/>. ² Hake, K., Bragg, K., Mauney, J., and Metzger, B. 1990. Causes of high and low micronaire. National Cotton Council. Physiology Today. Vol. 1, No. 12 <http://www.cotton.org/>. ³ Dodds, D. Cotton micronaire—potential problems exist this year, plan accordingly. <http://www.eyetest.com/>. ⁴ Warrick, B.E. 2002. Cotton harvest-aid recommendations for the 2002 crop. Texas A&M AgriLife Extension. <https://sanangelo.tamu.edu/>. Web sources verified 12/14/18. 180129145323

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