

**PRE-HARVEST PRESCRIPTIONS FOR
POST-HARVEST FIBER QUALITY**

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Abstract

Pre-harvest predictions and prescriptions for post-harvest quality require rapid, reproducible quantification of point-source fiber properties, *i.e.*, fiber 'shape' and 'maturity' qualities. Examination of fiber-quality databases describing 14 genotypes grown in different environments and harvested and ginned by differing methods indicates strong potential for development of predictive fiber-quality models that incorporate environmental factors such as heat-unit accumulation, soil fertility, irrigation, and insolation. Patterns found in site-specific field maps can lead to both prescriptions for soil remediation and segregated harvesting of high and low quality fiber. Both producers and processors expect annual differences in fiber properties, but a two-week difference in planting date within a single growing season can modify micronaire and other important fiber properties in genotype-specific ways. Genotype, growth environment, and/or interactive effects of environment on genetic potential not only alter fiber properties but can also affect yarn strength and evenness and the color of both the undyed and dyed fiber. Indeed, growth environment modulated every fiber and yarn property examined. Strategies for improving cotton fiber quality clearly must incorporate the effects of growth environment on the genetic traits being introduced if intrinsic fiber quality is to be improved rationally. However, there is other vital information missing in the two-way communication between producer and processor, and industry-wide cooperation towards developing a coherent 'language' and measurement system for intrinsic fiber quality is essential.

Relevant Literature References

Wartelle, L.H., Bradow, J.M., Hinojosa, O., Pepperman, A.B., Sassenrath-Cole, G.F., and Dastoor, P. 1995. Quantitative cotton fiber maturity measurements by x-ray fluorescence spectroscopy and Advanced Fiber Information System. *J. Agric. Food Chem.* 43:1219-1223.

Bradow, J.M., Davidonis, G.H., Hinojosa, O., Wartelle, L.H., Pratt, K.J., Bauer, P.J., Fisher, B., Sassenrath-Cole, G.F., Dastoor, P.H., Johnson, A., Landivar, J.A., Locke, D., and Moseley, D. 1996. Environmentally induced variations in

cotton fiber maturity and related yarn and dyed knit defects. *In Proc. 1996 Beltwide Cotton Conferences*, pp. 1279-1284.

Bradow, J.M. 1996. Fiber quality quantification and prediction [pre-harvest] by spinning and dye-defect potentials. *In Proc. 8th Engineered Fiber Selection System Conference*, pp. 52-65.

Bradow, J.M., Bauer, P.J., Sassenrath-Cole, G.F., and Johnson, R.M. 1997. Modulations of fiber properties by growth environment that persist as variations of fiber yarn quality. *In Proc. 1997 Beltwide Cotton Conferences*, pp. 1279-1284.

Bradow, J.M., and Bauer, P.J. 1997. How variety and weather determine yarn properties and dye uptake. *In Proc. 1997 Beltwide Cotton Conferences*, pp. 560-564.

Johnson, R.M., Bradow, J.M., and Sassenrath-Cole, G.F. 1997. Modeling of cotton fiber quality from environmental parameters. *In Proc. 1997 Beltwide Cotton Conferences*, pp. 1454-1455.

Bradow, J.M., Bauer, P.J., Hinojosa, O., and Sassenrath-Cole, G.F. 1997. Quantitation of cotton fibre-quality variations arising from boll and plant growth environments. *Eur. J. Agron.* 6:191-204.

Bradow, J.M., Wartelle, L.H., Bauer, P.J., and Sassenrath-Cole, G.F. 1997. Small-sample cotton fiber quality quantitation. *J. Cotton Sci.* 1:48-58.

Johnson, R.M., Bradow, J.M., Bauer, P.J., and Sadler, E.J. 1999. Spatial variability of cotton fiber yield and quality in relation to soil variability. *In Proc. 4th International Conference on Precision Agriculture*, pp. 487-495.

Bradow, J.M., Johnson, R.M., Bauer, P.J., and Sadler, E.J. 1999. Site-specific management of cotton fiber quality. *Precision Agriculture '99, Part 2: Papers from 2nd European Conference on Precision Agriculture*, pp. 677-686.

Bradow, J.M., and Davidonis, G.H. 2000. Fiber quality from a cotton physiologist's perspective: An overview of quantitation of fiber properties and the cotton production-processing interface. *J. Cotton Sci.* [in press].