

**THE EFFECTS OF IAA AND GA<sub>3</sub> ON FIBER  
LENGTH, DIAMETER, AND  
SECONDARY WALL SYNTHESIS**  
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**Abstract**

Fiber perimeter is a textile trait that directly affects fiber fineness. Existing literature regarding the relationship between fiber perimeter and development is contradictory and difficult to interpret since direct studies of fiber diameter have not been done. The current investigation examines the changes in fiber diameter that occur throughout development. Plant grown fibers from *Gossypium barbadense* and three varieties of *G. hirsutum* (MD-51ne, DP-90, DP-50) were examined. All cotton examined exhibited significant increases in fiber diameter through out development, from 5 to 30 days post anthesis. Fiber diameter continued to increase during secondary wall synthesis (as indicated by the development of cell wall birefringence), as did fiber length. Exogenous application of the plant hormones Gibberellic acid (GA<sub>3</sub>) and Indol acetic acid (IAA) during square and boll development resulted in changes in fiber development. Hormone treatment induced small increases in fiber diameter but large increases in fiber length and wall birefringence. These data indicate that fiber diameter (perimeter) is a dynamic trait that changes throughout fiber development, both during fiber elongation (primary wall synthesis) and secondary wall synthesis stages. Hormone-induced changes in fiber diameter indicate that this property is not strictly regulated by the genetics of the plant but is also influenced by the environment (physiology). By understanding the biological control of fiber diameter we may be able to manipulate development in ways to improve this aspect of fiber quality.