CRYSTALLINITY, CRYSTALLITE SIZE AND SOME PHYSICAL PROPERTIES OF TWO FIBER MATURITY LEVELS IN SOME EGYPTIAN COTTON CULTIVARS

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The ELS Egyptian cotton cultivars, (Giza 45 and Giza 77) at two fiber maturity levels, were used in this study. The crystalline characters in their native state and after waxy materials extraction were studied using a wide angle X-ray diffraction technique. The crystallinity percent after waxy materials extraction of the high maturity Giza 45 and Giza 77 fibers were 80% and 81%, respectively. They were 67% and 69% of the low maturity fibers of the same order. Native cotton fiber including waxy materials gave misleading crystallinity percent values of 80% and 82% for high and low maturity levels of Giza 45, respectively. This result indicates the importance of extraction of the wax before X-ray diffraction analysis. Moreover, there is a relationship between fiber maturity and degree of crystallinity after waxy materials extraction . The crystallite size for each of the high and low maturity levels is about 3.5 nm. However, the cotton having higher fiber maturity had higher values of fiber strength at 1/8 or 0 inch gauge, number of convolutions per 1 cm, and secondary wall width. The immature cotton Giza 45 and Giza 77 showed high values of the waxy substanaces of the weight of moisture free of 0.71% and 0.51%, respectively. The corresponding values of the high maturity cotton were 0.53 and 0.49, respectively.

1. Introduction

Determining the maturity of cotton fiber as a part of the fiber testing is of great importance to the cotton yield, marketing and textile inductries processing. Maturity means more utility. Crystallinity is known to influence the mechanical and chemical behaviour of cotton cultivars. The measured crystallinity of fifteen different cultivars of cotton by the Iodine-absorption method showed very small dispersion and no definite relationship between crystallinity and other physical properties [1]. The bimodal (040)