Effects of Climate and Planting System on Cotton Pre-maturity and Fiber Quality

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Abstract: The field experiments were carried out in Cotton Research Institute, CAAS in 2000 and 2002. CCRI 29, a hybrid cotton variety, was chosen for tests. Two planting patterns, single cropping and double cropping of wheat-cotton, were used. The tests were made in the same fields.

The flowering stage in cotton fields in 2000 and 2002 was July 10, July 2 and July 10, respectively. Cotton in fields of single cropping was picked four times, and cotton in fields of double cropping was picked three times. *Fusarium* wilt and *Verticillium* wilt were investigated on July 10, July 4 and July 8, respectively in 2000 and 2002. The fiber quality was tested by HVI900 in Supervision Inspection and Test Center of Cotton Quality, Ministry of Agriculture, China. The span length, strength and micronaire value were tested.

The weather station of Cotton Research Institute, CAAS offered the weather records in cotton growing season each year. All the data from the tests were analyzed by software of regression · correlation · path analysis system.

In this study, the time from flowering to boll opening which was about 50 days was separated into three periods. The emphases of this study were the effects of climatic elements on the span length, strength and micronaire value in the periods of 0～20 d, 20～40 d, 40～50 d after flowering. The relations between climatic elements in the three periods, such as ≥20℃ accumulated temperature, sum of daily maximum temperature, sum of daily minimum temperature, days of daily minimum temperature greater than or equal to 15℃, daily temperature range and sunshine hours, and earliness with fiber quality indexes were correspondingly analyzed respectively, in order to discover the correlativity between climatic elements and earliness, fiber quality indexes.

The extent of influence of each index on the earliness of cotton was in turn that climatic conditions > cropping system > measure of early maturing culture.

In the three indexes of fiber quality, the micronaire value was influenced most by outside surroundings, which varied in different years, cropping systems and harvest times. The strength and length varied in different years and harvest times, while unconspicuous between different cropping system.

The difference of the three indexes of fiber quality in different harvest times was all very significant. It showed that the fiber quality was influenced more by outside surroundings. The planting patterns and different measures had a less effect on fiber quality than outside surroundings. The length, strength and micronaire value of fiber ripened from each time were closely interrelated to temperature, especially the daily minimum temperature. The normal growth of fiber would be influenced if the daily minimum temperature was excessive low.

Different cropping system had little effect on the length, more on the strength, and the most on the micronaire value. The main reason was that, the cotton seedling stage in double cropping was in adversity with quite serious conflictions of sunshine, temperature and water resulting from the intercropping crop of wheat. When bad climatic environment such as low temperature, rain and lack of sunshine came, cotton would be seriously delayed in growth and late maturing, and the rate of high quality cotton before frost would be low. An instance occurred in 2002. The rate of cotton before frost of double cropping was 20.1%, lower than that of single cropping. A mass of cotton after frost and green boll cotton were all the fiber of low maturity, underdeveloped and low micronaire value. The order of the strong or weak effect of disease development in fields and configuration on the fiber quality needs further study.

Key words: cotton; climate; pre-maturity; fiber quality