RELATIVE GROWTH RATE OF THE MAIN STEM OF THE COTTON PLANT AND ITS RELATIONSHIP TO YIELD

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THERE is a great deal of speculation every year with regard to the probable yield of the cotton crop. Estimates of yields of cotton are based mainly upon the opinion of farmers, ginners, and others who are concerned directly with production of the crop. Physical factors, such as weather conditions, acreage, and stand of plants, also serve as a basis for estimates of cotton yields. These estimates might be improved upon if more were known about the behavior of the plant itself—how it grows and the relationship between the vegetative and fruiting parts. The purpose of this paper is to record some studies on cotton that have a bearing on this relationship and its possible use in estimating yield.

REVIEW OF LITERATURE

The growth structures of the cotton plant have been described by Cook and Meade (4). The fruiting areas are the main structures concerned in this study. The primary fruiting area of the cotton plant includes the fruiting limbs which extend horizontally from the central stalk or main stem. In some varieties secondary fruiting limbs are borne on vegetative branches which develop near the base of the main stem. The important feature about the primary fruiting limbs is that they are always initiated at the apical growing point of the main stem. There are two buds at the base of each cotton leaf, the true auxiliary bud which continues vegetative growth and the extra-auxiliary bud which produces the fruiting limb. The fruiting limb is first observed as a minute floral bud or "square" between stipules of the leaf on the main stem. The first internode of the fruiting limb lengthens, thus carrying the square and its leaf away from the main stem.

As the plant grows in height more fruiting limbs arise at given intervals of time. This is termed the vertical order of the fruiting limbs. In the same manner more floral buds arise as the fruiting limbs grow horizontally. This is termed the horizontal order of the floral buds. The mean intervals of time for both the vertical and horizontal orders are fairly constant throughout the entire fruiting period. Martin, Ballard, and Simpson (8) found the mean intervals of the vertical order to be 2.4 to 3.3 days and of the horizontal order 6.1 to 6.6 days. The time interval and internodal length between any two successive fruiting branches or floral buds may vary considerably with environmental conditions and varieties (5).

Investigators in other fields, such as plant physiology and animal nutrition, have studied the problem of growth rate from a physiological standpoint. Brody (3) and his co-workers at the Missouri Experiment Station in measuring growth of animals recognized cycles, or periods of growth rate, and found that a sigmoid

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3 Figures in parenthesis refer to "Literature Cited", p. 602.