Chemical Defoliation of Cotton

II. The Influence of Boll Maturity on the Defoliability of Species and Varieties of Cotton

Lamar C. Brown and Claude L. Rhyne

Chemical defoliants, when applied to commercial cottons, usually cause varying amounts of leaf fall. This variation has been attributed to a number of factors, mostly environmental (1, 2, 4). The amount of leaf fall from a cotton plant, however, may depend also upon other factors as yet not thoroughly investigated. One such factor may be a possible differential response of commercial species and varieties of cotton with a possible dependence upon both the degree of boll maturity and the reproductive status of the plant at the time of defoliant application. A series of experiments, therefore, were designed in order to study the response of species and varieties of cotton to chemical defoliation and to determine how this response is related to the degree of boll maturity. The data reported herein are taken from three representative experiments wherein boll maturity could be related to defoliation efficiency among varieties of several species of cotton.

MATERIALS AND METHODS

Experiment 1 was conducted in the greenhouse, being started in the winter of 1951 and terminated in the spring of 1952. Twenty-five varieties of cotton representing the four cultivated species, three related wild species, and three species hybrids, were grown in perforated containers. These containers were embedded in deep sand thus permitting ample root growth. The plants were arranged in randomized blocks, using five replications. A randomized block contained a single plant of each of 25 varieties. In all experiments, leaf counts were made prior to application of the defoliant and again 12 to 14 days after application. From these values the percentage of defoliation was determined. The number of mature and immature bolls was scored on all plants in the experiment. A defoliant, known commercially as AERO Cyanamid X-5 (65% monosodium cyanamid), was applied at the rate of 10 pounds per 12 gallons of water per acre when bolls (capsules) of most varieties were beginning to open.

Experiment 2 consisted of two replications of six varieties planted in the field at two dates in 1952. The main factor representing the four species of commercial cultivated cottons was the date of planting. Main plots were varieties, and sub-plots were experimental defruiting treatments insured that the majority of bolls on the plants would fall into the following age groups: (1) more than 56 days, (2) 25–39 days, (3) 39–56 days, and (4) less than 25 days. The data obtained from many defoliation experiments were analyzed statistically by the chi-squared test of heterogeneity. The mean value, 75% defoliation, used in table 1 of Experiment 3 was based on calculations of defoliation of each variety on each date of maturity and the sub-plots were varieties. Two dates of maturity (age of bolls), the sub-plots were defruiting treatments, and the ultimate factor was plant spacing. The plants spaced 12–14 inches in the row and unthinned were spaced at 2–4 inches. Leaf counts were made on 12 individual plot in order to obtain defoliation percentages. A defoliant was applied by ground machinery at the rate of 7 pounds per 10 gallons of water per acre.

RESULTS

The mean value, 75% defoliation, used in table 1 of Experiment 1 was obtained from many experiments conducted over the past few years. The percentage of defoliation was determined as an indicator of plants (values) deviating from the hypothesis. When Chi-square was found to be significant for a particular plant, thus deviating from...