EFFECTS OF ENVIRONMENT ON COTTON PLANT PRODUCTIVITY

G. Guinn

Results obtained during 1973 agreed with earlier findings in indicating that nutritional stress increases ethylene evolution and shedding of young bolls. For example, subjecting plants to low light intensity increased ethylene evolution and square and boll shedding. Removing older bolls decreased the rate of ethylene evolution by 4-day-old bolls as compared with the rate by 4-day-old bolls on plants that were not defruited. Presumably the older bolls competed with the young bolls for photosynthetic products and, thus, caused a nutritional stress that stimulated ethylene production by the younger bolls.

Much time and effort were spent in trying to devise acceptable methods for extraction, purification, and measurement of auxin and abscisic acid. Polyvinylpyrrolidone was effective in removing phenolic contaminants from abscisic acid extracts, but tended to sorb auxin. The addition of NaCl during extraction improved recovery of both auxin and abscisic acid (ABA), presumably by disrupting ionic bonds that tend to bind auxin and ABA to proteins.

Preliminary results indicated that nutritional stress caused moderate increases in ABA content of 6-day-old bolls, as well as increasing their ethylene evolution. Both ABA and ethylene stimulate abscission.

Results obtained to date indicate that nutritional stress caused by low light intensity can be an important factor in square and boll shedding. Periods of cloudy weather or excessive mutual shading caused by rank growth and very close spacing can cause most of the squares and bolls on the lower part of the plant to shed. Light intensity incident upon leaves in the vicinity of developing bolls is an important factor in the retention of those bolls.

STEM AREA AS AN INDEX TO LEAF AREA AND PLANT DRY WEIGHT IN COTTON

K.E. Fry

In cotton (Deltapine-16) the stem diameter or its corresponding cross section (c.s.) was found to be a useful index of plant area and shoot dry weight. Stem diameters were measured weekly at fixed points 1 cm below the cotyledonary nodes of field plants with a hand micrometer. Leaf areas and shoot dry weights were measured weekly on selected plants. Stem c.s. area, leaf area, and dry weight increased in the pattern of the S-shaped growth curve between 20 and 85 days after emergence with maximum growth rates obtained between 55 and 65 days. Under a semi-desert environment increasing amounts of irrigation resulted in increased growth rates and final values of the above parameters, yet the relation of the stem c.s. area to leaf area or to shoot dry weight was not significantly influenced by the irrigation treatments. The best fitting curves for each relation above were power functions. Correlation coefficients were 0.99 and 0.98 for leaf area and shoot dry weight for data taken between 20 and 130 days after emergence.