Cotton (Gossypium sp.) is sensitive to soil water conditions. Weather conditions, stage of plant development, and type of soil all affect the need for irrigation. In areas where a crop is grown with natural rainfall, irrigation may be quite beneficial when applied at a time of critical need. Under semiarid to arid conditions, irrigation is essential for cotton production. Cotton provides an excellent example of a crop where research has developed opportunities to modify growth processes for optimum production by the use of properly adapted irrigation practices.

A. Rooting Characteristics

The root system of the cotton plant develops rapidly following germination and emergence of the seedling. At the beginning of flowering the taproot may extend to a depth of 1.83 m (6 ft) into a fertile soil with a deep profile and laterally to the adjacent row. In Arizona, USA Erie has found roots 80 inches long growing laterally across adjacent rows from the main stem of the plant (L. J. Erie, personal communication, Sept. 17, 1965). Infertile, highly acid, or dense subsoil may limit root penetration (Rios and Pearson, 1964; Camp and Lund, 1964). At the beginning of the flowering period the root system nearly reaches its maximum extent. During the flowering period an intensification of root activity in the shallower depths takes place, reaching maturity near the end of this period. Beckett and Dunshee (1932) obtained soil water extraction patterns that indicate root activity to a depth of 1.52 m (5 ft) by late June in California, USA. Soil water extraction curves for each 30.48-cm (1-ft) increment were identical to a depth of 1.22 m (4 ft) during the latter part of the season. Gerard et al. (1958, 1964) in the lower Rio Grande valley of Texas, USA found that soil water extrac-