PHYSIOLOGICAL ASPECTS OF ULTRA NARROW ROW COTTON PRODUCTION

D.R. Krieg
Professor of Crop Physiology
Texas Tech University
Lubbock, TX

Abstract

The ideal plant density is one that provides maximum utilization of the environmental resources with a minimum of plant-to-plant competition for those resources. In most crop species in which only a portion of the total biomass has economic value, it is commonly observed that a curvilinear response between plant density and economic yield exists. As plant density increases from low levels, yields increase accordingly reaching a maximum dependent upon the environmental resource supply and the crop species. As density continues to increase, yield per acre begins to decline due to rapidly decreasing productivity per plant resulting from excessive plant-to-plant competition. Equidistant spacing has always been more productive than plants in rows, such as we commonly grow cotton. Narrow row cotton (30 inch rows) has generally out produced traditional 40 inch row spacing at equivalent plant populations. The reason has usually been related to greater light interception per plant and more of the total leaf area being effective leaf area. We have observed greater light interception per unit ground area at equivalent leaf area indices from ultra narrow row to narrow row to traditional 40 inch row spacing. This has resulted in faster growth rates as measured by both crop growth rate (g $DM \cdot m^{-2}$ ground $area \cdot day^{-1}$) and net assimilation rate (g $DM \cdot m^{-2}$ leaf $area \cdot day^{-1}$). The faster growth rate has resulted in more fruiting sites being produced especially during the early part of the fruiting period and also greater fruit retention resulting in higher yields. In the West Texas environment where approximately 40% of the total water supply during the growing season is lost to bare soil evaporation in traditional 40 inch row spacing, the use of narrow and ultranarrow rows produces the greater yield without additional water costs. A greater proportion of the total water supply is used by the plant rather than being wasted by bare soil evaporation.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 1:66-66 (1996)
National Cotton Council, Memphis TN