LETTERS TO THE EDITOR

Comments on “Yield Response of Corn to Crowding Stress” by Hashemi et al. (Agron. J. 97:839–846)

Hashemi et al. (2005) have collected valuable data concerning the responses of maize (Zea mays L.) to crowding stress, especially related to harvest index (HI). We would like to take this opportunity to demonstrate a general response of maize HI to plant density by combining their data with data from four other published studies. This could give additional guidance as to the general response of maize HI to planting density. For each study, the HI values were standardized by dividing each HI value by the mean HI for densities less than 10 plants m⁻². For the Hashemi et al. study in Massachusetts, this mean was 0.49. For the other studies, means were 0.58 for a dwarf hybrid in Minnesota (Westgate et al., 1997), 0.50 for the two most recently released hybrids in Guelph, Ontario in the study of Tollenaar (1992), 0.54 for a study in Texas by Kiniry et al. (2002), and 0.51 to 0.55 with a mean of 0.54 for a study of Echarte and Andrade (2003) in Argentina with their two most recently released hybrids. As shown in Fig. 1, and as discussed by Echarte and Andrade (2003), HI was relatively stable and had a plateau at planting densities low enough that interplant competition did not reduce individual plant growth below a threshold. The density for this threshold appeared to be near 10 plants m⁻². Above 10 plants m⁻², HI decreased linearly with a slope of −0.012 units of relative HI per plants m⁻², and the r² was 0.77. This general response was for recently released hybrids in environments without drought or nutrient stresses causing reduced yields and reduced HI values. Larger HI decreases with increasing planting densities can take place in older hybrids less tolerant to high plant density stands (Echarte and Andrade, 2003). Harvest index reductions may occur at low plant densities in hybrids with lack of prolificacy and low yield potentiality of the uppermost ear. As demonstrated by Hashemi et al. with data from Iran, a much different HI response could occur in some other environments.

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Reply

The authors wish to thank Dr. Kiniry and Dr. Echarte for their comments and additional information. It is also noteworthy that harvest index of a prolific hybrid at the Massachusetts location (data was not presented in the article) improved from 35.1 for 3 plants m⁻² up to 45.0 with 6 plants m⁻² and then declined gradually to 39.1 with further increased density to 12 plants m⁻². The difference from single-eared hybrids was primarily due to a reduction in secondary and tertiary ears and tillers that occurred in low density of the prolific hybrid but not at higher densities.

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