Evaluation of DEKALB® Brand Corn Products to Planting Density

Generally, corn yield potential will become greater with increasing populations[1,2]. However, the optimum plant population density can vary depending on product genetics[3,4,5]. As a hedge against weather related lodging risk and accounting for the plant structure and ear placement of most older, southern adapted products, many Southern producers have traditionally planted corn at lower than optimal plant populations. This is because lodging can occur with increased plant populations and can be magnified when insect or weather damage is introduced[6]. Producers want to know: a) the populations appropriate for each corn product, b) if population and yield can increase without greatly increasing the risk of lodging, and c) the general characteristics of corn products that perform well when planted at higher populations. This demonstration trial was conducted to address those questions and see how DEKALB® brand corn products perform at different plant populations.

Study Guidelines

A corn demonstration trial was conducted at the Monsanto Learning Center at Scott, MS to compare yield response to plant population. Ear characteristics, such as: height, weight, and momentum (height x weight) were measured. Eight DEKALB® corn products (DKC61-88 brand, DKC62-09 brand, DKC64-69 brand, DKC66-86 brand, DKC66-97 brand, DKC67-57 brand, DKC67-88 brand, and DKC69-29 brand) with varying ear placement were chosen for this demonstration. Each product was planted at three populations (33,000, 36,000, and 39,000 plants per acre) in 38 inch X 7.5 inch twin rows. Each twin row plot was replicated twice. Corn was planted on April 10 and harvested on August 29, 2012. Standard agronomic practices for the region, as well as field work and extra preparation needed for the twin row configuration was implemented. The extra work needed to optimize the twin row system, consists of making the beds wide, flat, and stable. The plots were irrigated as needed.

Results

The measurements taken from each replicated plot are shown in Table 1. *Momentum* is a measurement of the combined force from ear weight (grams) and ear placement (inches from the ear shank to the ground), where higher placed heavier ears have the potential to contribute to lodging characteristics for a given corn product. In 2012, lodging did not occur in this demonstration trial. Therefore, some of the higher ear placement products did well at high populations. In reality, the risk of planting high populations of corn products with high ear placement, large ears, and/or the associated increase in ear *momentum*, would be unacceptable in a commercial production system. Additional information from The Scott Learning Center Summary titled 'Standability Evaluations of DEKALB® Brand Corn Products in the Mid South' reports that products harvested a month after the optimum harvest date had significant differences in lodging.

Table 1. Measurements taken from each plot.

Height to the ear shank from ground, 10 ears per plot
Weight per ear in grams from 10 ears per plot
Momentum calculated as height in inches x weight in grams
Yield in bushels per acre from the 4 row X 150 ft plot adjusted to 15.5% moisture

Differences among the DEKALB® brand corn products were seen in most measured parameters. Yield response to population showed three of the products (DKC61-88 brand, DKC62-09 brand, and DKC64-69 brand) had the highest yield at 36,000 plants per acre and a yield decrease at 39,000 plants per acre (Figure 1). Four corn products (DKC66-86 brand, DKC66-97 brand, DKC67-57 brand, and DKC69-29 brand) yielded most at the highest population of 39,000 plants per acre. DKC69-29 brand showed a step-wise increase in yield that corresponded with population. Finally, DKC67-88 brand had a slight increase in yield at 36,000 plants per acre; however, yield held at around 200 bu/acre at the low and high populations.

Five of the corn products (DKC61-88 brand, DKC64-69 brand, DKC66-97 brand, DKC67-57 brand, and DKC67-88 brand) had increases in plant height as populations increased (Figure 2). The general observation of the ear weight measurements concluded that as population increases, ear weight decreases (Figure 3). The combined height and weight measurement, termed *momentum*, did not follow any trend across products. However, based on the *momentum* ratings DKC67-88 brand has the highest potential to lodge (Figure 4). Plant population also had an influence on ear placement and size as higher and smaller ears were witnessed when higher populations were planted.

Older corn products have typically had high ear placement with an increased risk of lodging, especially as populations increased; while, newer corn products, such as DKC66-97 brand, DKC66-86 brand, and DKC67-57 brand, can allow increases in population without greatly increasing risk.

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Momentum gives some idea of the lodging potential but planting configuration and genetically inherent stalk strength are also important in the decision making process. For example, it is not recommended that either DKC67-88 brand or DKC64-69 brand corn products be planted at populations higher than 31,000-33,000 kernels per acre. When these brands are planted at populations that would be appropriate for products such as DKC66-97 brand, there is an increased risk of lodging. Where well adapted, these brands should be planted first, planted at lower (relative to products such as DKC66-97 brand) but appropriate populations (a maximum of 31,000-33,000), and harvested first to best manage the weather related lodging risk.

On the contrary, DKC69-29 brand, DKC66-97 brand, and DKC67-57 brand corn products offer the ability to push yield by increasing populations without greatly increasing risk. However, this should be done with care and within reason. A separate standability study, mentioned earlier, was conducted to reinforce this concept.

The information discussed in this report is from a single site, non-replicated, one-year demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

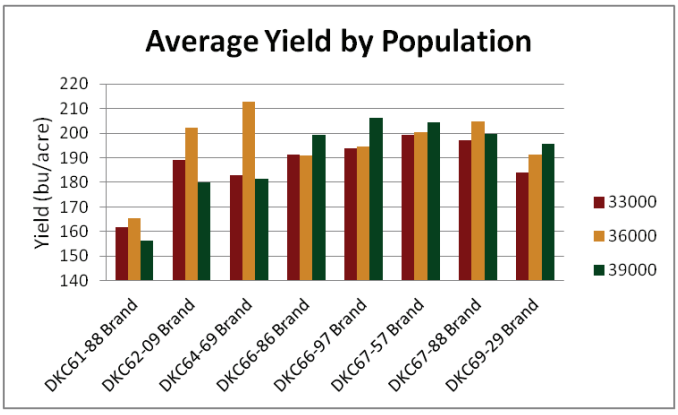

Figure 1. Average yield of different DEKALB® Brand corn products at three different plant populations. Source: 2012 Scott Learning Center Demo Trial.

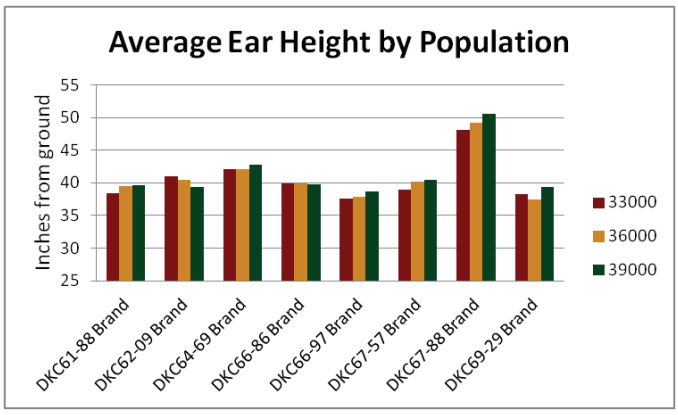

Figure 2. Average ear height of different DEKALB® Brand corn products at three different plant populations. Source: 2012 Scott Learning Center Demo Trial.

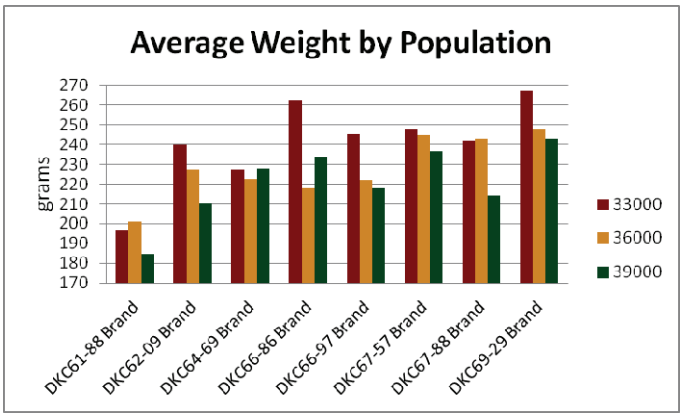

Figure 3. Average ear weight of different DEKALB® Brand corn products at three different plant populations. Source: 2012 Scott Learning Center Demo Trial.

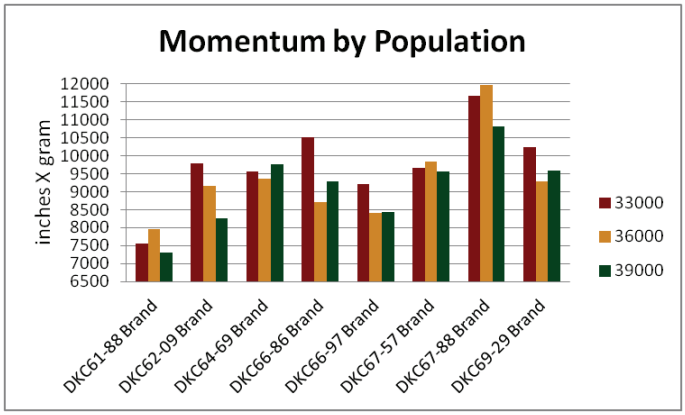

Figure 4. Average momentum measurement (ear height X ear weight) of different DEKALB® Brand corn products at three different plant populations. Source: 2012 Scott Learning Center Demo Trial.

Sources: [1]Thomason, W. 2005. Corn plant populations and yield goals. Virginia Tech Cooperative Extension. Crop and Soil Environmental News, March 2005. Available online: www.ext.vt.edu/; [2]Williams, W.A., Loomis, et al. 1968. Canopy architecture at various population densities and the growth and grain yield of corn. Crop Sci. 8:303-308; [3] Collins, W.K., Russell, W.A., Ederhart, S.A. 1965. Preformance of two-ear type of Corn Belt maize. Crop Sci. 5:113-116; [4] Cox, W.J. 1996. Whole-plant physiological and yield responses of maize to plant density. Agron. J. 88:489-496; [5]Widdicombe, W.D. and Thelen, K.D. 2002. Row width and plant density effects on corn grain production in the northern Corn Belt. Agron. J. 94:1020-1023; [6]Sorensen, R.B. et al. 2006. Row pattern, plant density, and nitrogen rate effects on corn yield in the Southeastern US. Plant Management Network; Standability evaluations of DEKALB® brand corn Ppoducts. Scott Learning Center Demonstration Report 2012.