

# Plant Population and Fertilization Impacts on Irrigated Corn in Nebraska

By D.T. Walters and A. Dobermann

Since 1999, a team of researchers at the University of Nebraska has been conducting studies to understand the yield potential of corn and soybeans and how management affects it. The crop model discussed in the previous article was a product of this team. The research compares continuous corn to a corn-soybean rotation and evaluates how plant population and nutrient management impact yield. In addition to determining productivity, the research involves an integrated assessment of profitability, input use efficiency, energy balance, and environmental consequences.


A small subset of the information generated from this study is summarized in **Table 1**. Primary tillage was fall moldboard plow from 1999-2002 and mini-moldboard in 2003; row spacing was 30 in.

For the first 4 years, yields increased with population, especially under intensive nutrient management. Likewise, some-

what greater nutrient response occurred at the higher populations. Due perhaps to a change in hybrid or to the nature of the latter part of the growing season, no response to population and no interaction between population and nutrient management occurred in 2003. However, yields were the highest measured in the 5 years.

A satellite study adjacent to the main study evaluated the impact of narrowing row spacing from 30 in. to 15 in. Yields increased from 295 bu/A at 30 in. to 314 bu/A at 15 in. Increasing plant population above 30,000 plants per acre did not increase yield with this hybrid (Pioneer 31N28).

It is meaningful to consider these data in light of the 162 bu/A average irrigated corn yield for the state of Nebraska from 1999 through 2002. The comparison is another illustration of the yield gap that exists between what is normally achieved and what today's germplasm can produce under proper management.

Narrowing that yield gap requires use of the entire growing season by appropriate selection of hybrids and planting dates, establishing optimum plant populations, minimizing nutrient and pest stresses, and in irrigated systems, minimization of water stress. 

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**Table 1.** Impact of nutrient management and plant population on yield of irrigated corn following soybeans in Nebraska.

Population plants/A	Avg. of 1999-2002			Year 2003 only		
	Nutrient management			Nutrient management		
	M1	M2	Resp.	M1	M2	Resp.
	Grain yield, bu/A					
28-31,000	222	231	9	268	285	17
35-41,000	230	244	14	272	285	13
38-47,000	230	246	16	265	279	14

**M1:** UNL fertilizer recommendation for 200 bu corn except initial soil test levels were 70 parts per million (ppm) Bray P-1 (VH) and 350 ppm K (VH).

**M2:** Intensive management aimed at 300 bu/A yield goal . higher N rate with 3 or 4-way split; P and K applied annually; S, Fe, and Zn in 1999 and 2000.

**Soil:** Kennebec silt loam.