

IMPROVING CORN YIELD POTENTIAL WITH BANDED PHOSPHORUS FERTILIZER

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Abstract

High fertilizer costs and concerns about water quality issues have caused many Midwest corn producers to take a greater interest in improving the efficiency of phosphorus (P) fertilizer applications. The objective of this research was to determine the effects of P source, rate and placement on P use efficiency in high-yield corn production systems. The experiment was conducted in 2013 at two locations in Illinois. Two P fertilizer sources (mono-ammonium phosphate (MAP, 11-52-0) or an enhanced MAP product containing sulfur and zinc (MicroEssentials® SZ™ [MESZ, 12-40-0-10S-1Zn]), four P rates (0, 56, 112, and 168 kg P₂O₅ ha⁻¹), and two methods of fertilizer placement (pre-plant broadcast with incorporation or banded 10 to 15 cm directly beneath the crop row immediately before planting). There was a substantial increase in early vegetative growth (V8 growth stage) with P rate, and especially with P placement, despite the fact that the soil had a high P test (approximately 45 ppm Mehlich III extraction). For banded P, V8 plant weight increased by 26% compared to traditional broadcast P fertilization. Phosphorus fertilizer use significantly increased grain yields in some cases. On average P fertilizer rate increased yield by 690 kg ha⁻¹ over the untreated check (UTC), while the MicroEssentials P source significantly increased yield by 125 kg ha⁻¹ compared to MAP. Although P placement did not affect final yield, accumulation of levels of some macro and micronutrients N, P, S, & Zn were enhanced by banded fertilization, as was the number of kernels per ear at maturity; however, the higher kernel numbers with banded fertility was offset by smaller individual kernel weights. The results of this research indicate that proper P fertilizer management can set the potential for higher corn yields, even though increased grain yields are not always realized.

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