BETTER MAIZE RESPONSE TO OPTIMAL FERTILIZER PLACEMENT

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ABSTRACT

Increasing trends in corn (*Zea mays* L.) yields require greater levels of applied nutrients per acre to maintain or increase yields; thus, we need to rethink how to best supply a crops' required nutrients. One significant challenge associated with applying more fertilizer to support greater yields has been the negative environmental effects of increased levels of some nutrients, such as phosphorus. Fertilizer application technologies such as banding the fertilizer below the plant increases the potential for root interception of the nutrients and decreases the vulnerability of the nutrients to surface runoff and erosion; however, plants need to be positioned so they can have access to these nutrients. Placement of the fertilizer at the right place (or distance) from the plant is an essential component of a fertilizer management program. The objective of this research was to determine how plants respond to fertility [112 kg P_2O_5 ha^{-1} as Micro Essentials SZ (12-40-0-10S-1Zn)] placed just prior to planting at varying distances away from the crop row (broadcast and incorporated, or 15 cm deep bands placed 0, 8, 15, 23, 38, or 46 cm parallel to the crop row). A substantial increase in early vegetative growth (V6 growth stage) was observed with fertilizer placed in closer proximity to the plant, despite an initial high soil P test (approximately 60 ppm Mehlich III extraction). Fertilizer banded directly beneath the row resulted in a 103% increase in early season vegetative biomass over the UTC and 29% over broadcast fertilizer. Final grain yield from fertility banded directly beneath the row was 1424 kg per hectare (23 bushels per acre) greater than the UTC. The increase in yield was primarily driven by a 14% increase in kernel number over the UTC. Fertilizer placed within 8 cm of the plant resulted in greater grain yields than broadcast fertilizer; however, broadcast fertilizer out-yielded fertilizer banded further than 15 cm from the row. These data suggest that adapting fertilizer placement techniques such as banding should be used with other technologies that allow seeds to be planted in close proximity to the fertilizer.

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