NITROGEN MANAGEMENT AND LANDSCAPE POSITIONS IMPACT ON CORN PRODUCTION IN MISSOURI

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ABSTRACT

Corn production in Missouri is strongly influenced by soil properties and topographic position (TP), which affect water dynamics and nutrient losses. These spatial differences require effective nitrogen (N) management strategies to improve N use and crop productivity. The objective of this study was to evaluate the effects of N application timing on corn productivity and N losses across three TPs: shoulder, backslope, and footslope. Main plots were TPs, and subplots were N treatments: 100% preplant (PP), 50% preplant + 50% at V6 (PP+V6), 50% preplant + 50% at V9 (PP+V9), and a non-treated control (NTC). TP significantly affected grain yield, dry matter production, plant population, and spadmeter readings. Grain yield was greater at the shoulder (13.5 Mg ha^{-1}) and backslope (11.9 Mg ha^{-1}) than at the footslope (8.8 Mg ha^{-1}). Dry matter production was also greater at the shoulder (26,487 kg ha^{-1}) and backslope (30,840 kg ha^{-1}) than at the footslope (20,847 kg ha^{-1}). All N treatments increased grain yield compared with NTC, while PP+V6 and PP+V9 produced greater dry matter (29,555 and 29,055 kg ha^{-1}, respectively). N application timing affected N losses, with NH_4-N leaching greatest under PP+V9 (5.9 kg N ha^{-1}) and NO_3-N leaching greatest under PP+V6 (94.5 kg N ha^{-1}). Although the TP × N treatment interaction did not significantly affect N_2O-N emissions, greater emissions were observed at the backslope and footslope positions. TP primarily influenced corn productivity, whereas N application timing affected crop productivity and the magnitude and form of N losses.