CORN RESPONSE TO NITROGEN RATE AT THREE TOPOGRAPHIC POSITIONS WITHIN A TERRACED LANDFORM

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ABSTRACT

Nitrogen (N) application and topographic positions (TPs) are critical factors affecting corn (Zea mays L.) grain yield and quality, particularly in regions with diverse terrain like Northern Missouri. A field experiment was conducted in Northern Missouri in 2022 and 2023 to evaluate the effects of four nitrogen rates (0, 120, 200, and 280 lb N ac-1) and three TPs (shoulder, backslope, and footslope) on corn yield and quality. Corn grain yield increased with N application rates than non-treated check (NTC; 0 N), with significant variability across TPs and years. In 2022, corn yield at the shoulder position increased by 194, 190, and 168% at 120, 200, and 280 lb N ac-1 compared to the control. The backslope position showed the highest yield increase of 231%, particularly at 200 lb N ac-1, while the footslope position also exhibited significant increases of 178 and 179% for 200 and 280 lb N ac-1. In 2023, the shoulder position produced yield increase of 359, 427, and 423% at 120, 200, and 280 lb N ac-1, respectively, compared to NTC. The backslope position had the highest yield at 200 lb N ac-1 with a 448% increase, while the footslope position showed a 637% increase at 200 lb N ac-1 than the NTC. Protein levels significantly increased in 2022, particularly in the shoulder position reaching 8.64% and 9.10% at 200 and 280 lb N ac-1, respectively. The footslope position also showed an increased protein content of 8.45% with 280 lb N ac-1, compared to 6.05% with NTC, with similar but lower trends in 2023. Oil content was not significantly affected by TPs or N rates. These findings indicate the importance of site-specific N management strategies to enhance corn yield and quality in heterogeneous landscapes.

Keywords: Nitrogen rates, Topography, Yield quality, Corn, Sustainable agriculture