CORN GRAIN YIELD AND QUALITY RESPONSE TO COMMERCIAL BIOSTIMULANT PRODUCTS AND NITRIFICATION INHIBITORS

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ABSTRACT

Biological nitrogen (N) fixation by microorganisms plays a crucial role in the N cycle, transforming atmospheric nitrogen (N_2) into ammonia (NH_3) and enhancing plant growth. The objective of this study was to evaluate three biological N fixing products or biostimulants (BS), including *Gluconacetobacter diazotrophicus* (BS-1), *Klebsiella variicola* + *Kosakonia sacchari* (BS-2), and *Methylobacterium symbioticum* (BS-3) for their in-field performance in enhancing corn (*Zea mays* L.) grain yield and quality parameters. A three-year study was established at the University of Missouri Lee Greenley Jr. Memorial Research Farm in Novelty, MO from 2020 to 2022 with different levels of N fertilization to corn (0, 50, 100, 150, 200 lb N ac^{-1}) along with an application of three BS and a nitrification inhibitor (NI) nitrapyrin at 100 lb N ac^{-1}. Over three years, grain moisture, test weight (TW), and grain quality parameters were measured. Significant differences were observed among N treatments for TW in 2021 and 2022. Averaged over 3 years, TW was non-significant. Furthermore, the results indicated that when averaged over three years Biostimulants did not improve corn yield over the N treatments when data was averaged over three years. There were yearly differences in corn grain yield among N rate treatments and 200 lb N ac^{-1} had 98 to 118% yield increase over the control. In 2021, the 100 lb N ac^{-1} + NI treatment had 14 to 23 bu ac^{-1} higher corn grain yield compared to other treatments except for 100 lb N ac^{-1} + BS-3. The treatments with BS and NI showed higher grain oil content in all the years when compared to the treatments with higher N rates (150 and 200 lb N ac^{-1}). The highest grain protein was found in the treatment 200 lb N ac^{-1}. All treatments were non-significant for corn grain starch content. The findings suggest that integrating biological N fixers and NI's into N management strategies does not always improve grain yield and might not help reduce reliance on synthetic fertilizers in corn production.