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Influence of nitrification inhibitor (Nitrapyrin) on winter wheat yield

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Nitrogen (N) is a crop nutrient that is commonly applied as fertilizer, however the dynamic nature of N and its propensity for loss from soil-plant systems creates a unique and challenging environment for its efficient management. Nitrification inhibitors (NIs) are compounds that can reduce the bacterial oxidation of NH_4^+ to NO_2^- by inhibiting the activity of ammonia-oxidizing bacteria and maintaining a higher proportion of applied nitrogen in the soil by preventing nitrate loss from leaching and gaseous N losses from nitrification and denitrification. The organic compound 2-chloro-6-(tri-chloromethyl) pyridine, commonly known as nitrapyrin (NP), is such a nitrification inhibitor that is used in agriculture. The objective of this study was to investigate the effect of NI (NP) on winter wheat yield compared to farmers practice without NI at a given N rate and same number of N split applications.

A randomized complete block design in five replications was used in this study. Treatments were: T_1 (control treatment - without urea), T_2 (farmers practice - 300 kg urea/ha), and T_3 (urea+NP - 300 kg urea/ha). Urea was applied in three split applications at tillering, stem elongation and booting stages in treatments T_2 (farmers practice) and T_3 (urea+NP). The average grain yield of winter wheat was 8.7 t ha⁻¹ for the farmers practice (T_2) and 9.1 t ha⁻¹ for the urea+NP treatment (T_3) at the same number of split fertilizer applications.

The crop yield data showed that urea applied with NP (T_3) did increase only slightly grain yield, as compared to farmers practice (T_2). The grain yield increase with NP was about 4%, however the statistical analysis showed that this increase due to the application of urea with NP was not significant. Further research is needed to investigate additional nitrification inhibitors and their effect on wheat production.