

# Mitigating nitrous oxide emission and increasing productivity of Corn using urease and nitrification inhibitors

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Urease and nitrification inhibitors are proposed as intends to lessen nitrogen losses with applied N fertilizer, thereby enhancing crop NUE and productivity. Field experiment was conducted using silt loam soil to evaluate the effectiveness of urease (Agrotain) and nitrification (Nitrotyrene) inhibitors coated urea on minimizing N<sub>2</sub>O emission and plant growth hormone (GA-K) on harvest yield of Maize at research area, The University of Agriculture Peshawar, Pakistan, during summer 2015. Urea @ 200 kg N ha<sup>-1</sup> with or without UI (Agrotain at 3 L t<sup>-1</sup>), NI (Nitrotyrene 200 g ha<sup>-1</sup>) and plant growth hormone (GA-K salt at 60 g ha<sup>-1</sup>) were applied in 2 splits. Each treatment has 4 replicates laid out in RCB design. The results showed that N-Inhibitors and GA-K treated urea significantly ( $p < 0.05$ ) increased the yield and yielding traits of maize over urea and control. The biological yield, grain yield, stover yield and total N-uptake of maize (grand mean increased 36.8%, 40%, 25.5% and 48.4% respectively) were recorded in combination of all treatments compared with urea. The results on soil N mineralization of NH<sub>4</sub>-N and NO<sub>3</sub>-N showed a significant variation over 64 days interval of fertilizer application with N inhibitors, increasing the soil inorganic N availability and shifted the main form of inorganic N from NO<sub>3</sub>-N to NH<sub>4</sub>-N. N<sub>2</sub>O fluxes varied through time and between treatments; mean N<sub>2</sub>O flux was the highest in the urea alone, while the urea coated with nitrotyrene, agrotain and combined nitrotyrene + agrotain significantly lowered the N<sub>2</sub>O flux by 17.1%, 13.5%, and 32.4%, respectively, over urea. These results indicate that reducing the rate of urea hydrolysis and inhibiting nitrification with combined use of agrotain, nitrotyrene in an alkaline calcareous soil is important to reduce N losses and N<sub>2</sub>O emission hence increasing the yield of Maize crop.