EFFECT OF NATURAL INHIBITORS ON TRANSFORMATION OF N-FERTILIZER IN RICE FIELD

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Extended Summary

Nitrogen is essential plant nutrient required in substantial amounts in order to support plant growth and crop production. When the amount of nitrogen in soil is considered to be deficient for satisfactory crop yields, nitrogen fertilizer is added to supplement the soil supplied nitrogen. Nitrogen is mainly transformed to nitrate form and this form is soluble and readily moves with the soil solution. This soluble nitrate form and this form is soluble and readily moves with the soil solution. This soluble nitrogen (NO_3^--N) may be leached to groundwater. Alternatively, nitrogen can also contribute to surface water contamination by means of surface water runoff. Nitrogen may be lost from the soil by plant removal, volatilization, leaching or erosion. Leaching of nitrate is a pollution hazard to ground water that can be controlled through proper management practices (Barbarick, 2008). Nitrification inhibitors are toxic to nitrifying bacteria and when added to soil, temporarily inhibit nitrification. A target number of chemicals have been reported as nitrification inhibitors (Prasad and Power, 1995). Commonly tested nitrification inhibitors are nitrapyrin or N-serve, AM, DCD (dicyandiamide), Thiourea, MBT and calcium carbide. Among these compounds, coated calcium carbide was found to be most effective than costly commercial nitrification inhibitors (Aulakh *et. al.*, 2001). Nitrification inhibitors are used to slow the transformation of ammonium to nitrate until later in the growing season, by delaying the conversion of ammonium nitrogen into nitrate nitrogen, which is susceptible to leaching. Nitrification inhibitors help reduce the environmental pollution of nitrogen fertilizers.

A field experiment was conducted under the project financed by SAURES at Sher-e-Bangla Agricultural University Farm, Dhaka 1207 during the Kharif season of 2008-2009 to study the effect of natural inhibitors on transformation of N-fertilizer in rice field. The experimental soil was clay loam in texture having pH of 6.3. The treatments used were 3 levels of each of urea fertilizers (N) viz. F_1 = low (80kgN/ha), F_2 = medium (100kkgN ha^{-1}), F_3 = high (120 N $kgha^{-1}$), and 5 types of inhibitors viz. I_0 = no inhibitor, I_1 = neem oil, I_2 = neem cake, I_3 = tar, I_4 = DCD (chemical inhibitor) in 15 treatment combinations with 3 replications. The results demonstrated that use of neem oil along with urea fertilizer increased grain yield. The maximum significant garin yield was obtained with the treatment combination F_2I_1 (medium N + $NH4^+$) was found during the entire growing period due to combined application of neem product and fertilizer. Observation revealed that the amount of NO_3^--N was higher than that of $NH4^+$-N in all the sampling stages although the expectation was reverse ie. more amount of NH_4^+-N than that of NO_3^--N. Possible reason may be the lack of proper maintenance of anaerobic condition during soil sampling and subsequent analysis of the soil samples.

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