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Evaluation of some Paddy Soil Properties on Urease Enzyme Activity

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Abstract

Rice fields using nitrogen-based fertilisers play an important role in the global N_2O budget. Enormous quantities of urea as nitrogen fertiliser are used into the paddy fields because of its relative low cost per unit of nitrogen. Urea hydrolysis in soils is an enzymatic decomposition process by the enzyme urease. Enzyme urease (urea amidohydrolase) catalyzes the hydrolysis of urea to yield ammonia and carbamate, which spontaneously hydrolyzes to form carbonic acid and a second molecule of ammonia. Urease activity influences optimum use of urea fertiliser, N volatilisation, N leaching and environmental pollution related to N. Laboratory experiments were carried out to evaluate urea hydrolysis, as a function of soil urease activity in 30 different paddy soil samples of Guilan province of Iran and their correlations with some soil physico-chemical characteristics. Soils belonged to different soil series. Cation exchange capacity (CEC), organic carbon (OC), total nitrogen (TN), pH and electrical conductivity (EC) and urease activity of soils were measured. Urease activities range from 19.8 to 68.3 μg NH_4^+ g^{-1} soil $2h^{-1}$. Simple correlation analysis of urease activity with properties of this rice soils differing widely in pH, C:N and organic carbon indicated that urease activity was correlated highly significantly with organic carbon (r = 0.80**) and total N (r = 0.73**) and EC (r = 0.63**) and CEC (r = 0.38*). pH was also negatively correlated with urease activity (r = -0.52**) but was not significantly correlated with clay percentage and C:N. Multiple stepwise regression analysis showed that organic carbon and cation exchange capacity (CEC) accounted for most of the variation in urease activity and 77 percentage urease activity were influence OC and CEC in paddy soils.

Keywords: Correlation, laboratory experiments, paddy soils, urea hydrolysis, urease activity

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