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Nitrogen mineralization in some selected paddy soils of Bangladesh

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Abstract The nitrogen (N) requirement for paddy rice cultivated in Bangladesh amounts to approximately 80-120 kg N ha^{-1}. Lack of knowledge on N mineralization in subtropical paddy soils of this country leads farmers to fill up this N requirement by costly mineral fertilizers, which have typically with low efficiency. This research aims at estimating potential mineralizable nitrogen in paddy soil to improve the N use efficiency. For this purpose, as a first step a set of nine (9) soil samples were collected from farmers' fields across the country representing Silmondi, Sara, Noadda, Jagdol, Sonatala, Pirgacha, Gopalpur, Barisal and Gangachara soil series. Then the soil samples were subjected to a laboratory incubation at saturation for 14 weeks at 25 °C to determine the N mineralization and NH3 volatilization. The highest amount of N mineralization was observed in Jagdol (28.0 mg N kg^{-1}) followed by Gangachara (26.2 mg N kg^{-1}), Noadda (25.3 mg N kg^{-1}), Pirgacha (18.4 mg N kg^{-1}), Sonatala (9.4 mg N kg^{-1}), Gopalpur (9.2 mg N kg^{-1}), Pirgacha (7.2 mg N kg^{-1}), Silmondi (6.5 mg N kg^{-1}) and then N in Sara (3.2 mg N kg^{-1}). The N mineralization in studied soils were varied from 5.5 kg ha^{-1} in Sara series to 43.2 kg ha^{-1} in Jagdol series when the N mineralization data were converted to kg N ha-1. Significant amounts of mineralized N ranging between 4.7 and 46.7 kg NH_3-N ha^{-1} were lost through volatilization process during the 14 weeks incubation period. Nitrogen mineralization potential of this soil set was also studied under crop growing condition in pot culture. The highest amount of N uptake was observed in Noadda (96 kg ha^{-1}) followed by Gangachara and Pirgacha (78 kg ha^{-1}), Sonatola (75 kg ha^{-1}), Barisal (74 kg ha^{-1}), Jagdol (70 kg ha^{-1}), Silmondi (60 kg ha^{-1}), Sara (55 kg ha^{-1}). The lowest N uptake was recorded in Gopalpur (50 kg ha^{-1}) soil series.

Keywords Nitrogen, Mineralization, Soil nutrient