ABSTRACT

Nitrogen Availability for Rice (*Oryza sativa* L.) Under Flooded Conditions

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Three field experiments were conducted at the rice project field sites at Caroni during the 1986/87 dry season and 1987, 1988 wet seasons to evaluate efficient N management practices in broadcast seeded flooded rice. The first two experiments were carried out under completely mechanized and the last under manual systems. In the dry season experiment, ^{15}N labelled fertilizer materials were utilized in microplots. The effect of fertilizer N source as $(NH_4)_2SO_4$ and urea, timing and method of application and N rates on soil exchangeable NH_4^+-N, plant uptake, fertilizer N recoveries and grain yield were studied in the respective experiments.

Fertilizer N application was clearly reflected by an increase in exchangeable soil NH_4^+-N, while N uptake resulted in a decrease of exchangeable NH_4^+-N and ^{15}N uptake pattern of rice, confirming that fertilizer N and native soil N were major sources for the early growth and reproductive stages respectively of the crop. Plant uptake was generally highest at panicle initiation/flowering stages, and top dressing 7 days before panicle initiation increased plant N uptake.

The plant ^{15}N recoveries (straw + grain) were significantly higher from $(NH_4)_2SO_4$ than urea (42.56 and 33.55% respectively) and with split application than single application (41.56 and 34.39% respectively). Lower N rates of both fertilizers generally increased ^{15}N recoveries which ranged from 32.97 to 39.60%. In general the apparent fertilizer N recoveries were consistently higher than ^{15}N recoveries.

Fertilizer N application significantly increased the grain yields over that of the unfertilized N treatment, but fertilizer N source viz. $(NH_4)_2SO_4$ and urea, N rates, and timing of application had no significant effect on grain yield. However, a small increase in mean grain yield was recorded from split application than single application, and no significant differences in grain yields were observed between incorporation of 2/3 urea with mud before sowing and broadcasting of 2/3 urea at 21 days after sowing in drained field. Grain yield and yield components indicate that variety Oryzica 1 was better than Starbonnet. Results of these three experiments suggest that considerable potential exists to increase N use efficiency and grain yield under flooded conditions by manipulating N fertilizer management practices under proper water management, agronomic and plant protection practices.