

ABSTRACT

Efficiency of applied nitrogen in direct – seeded flooded rice (*Oryza sativa* L.).

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In Trinidad, rice (*Oryza sativa* L.), is cultivated by most medium- to large-scale farmers as direct seeded flooded rice. Under this production system, N fertilizer plays a vital role in obtaining high grain yields. Low N use efficiencies have been reported under the existing N fertilizer management systems. As such, there exists the need for formulating appropriate N management strategies in order to improve N use efficiency. In view of this, studies were conducted to determine the efficiency of applied N under local conditions and subsequently, to investigate various methods that can be employed to increase the efficiency of fertilizer N.

Two field experiments and one pot experiment were conducted using ^{15}N methodology. The first field experiment was conducted to determine the efficiency of applied $\text{CO}(^{15}\text{NH}_2)_2\text{-}^{15}\text{N}$ at varying rates of application and at different stages during the growth of the rice crop. The second experiment was a pot experiment which was conducted to determine the efficiency of applied $\text{CO}(^{15}\text{NH}_2)_2\text{-}^{15}\text{N}$ at specified times prior to, at, and subsequent to panicle initiation. The second field experiment was conducted to determine the efficiency of applied $\text{CO}(^{15}\text{NH}_2)_2\text{-}^{15}\text{N}$, using various methods of application.

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Fertilizer N application resulted in an increase in the exchangeable soil NH_4^+ -N. A significant ($p < 0.05$) increase in grain yield was achieved with fertilizer N application to the rice crop. A fertilizer N rate of 90 - 103 kg N/ha was found to be optimum with respect to achieving maximum grain yield for the rice crop under local environmental conditions. The efficiency of applied $\text{CO}(\text{}^{15}\text{NH}_2)_2\text{}^{15}\text{N}$ in the rice crop averaged 35% and was significantly ($p < 0.05$) affected by the rate of N application. The timing of N application did not significantly ($p < 0.05$) affect recovery. There was no significant ($p < 0.05$) effect on the efficiency of $\text{CO}(\text{}^{15}\text{NH}_2)_2\text{}^{15}\text{N}$ by varying the time of N fertilizer application at and around the panicle initiation stage. The method of N application was also observed to have a significant ($p < 0.05$) effect on the recovery of applied fertilizer N.

The results of this study show that opportunities exist for increasing N use efficiency and grain yield by employing appropriate N management strategies to high-yielding N responsive rice varieties cultivated under sound crop management practices.

Key Words: Nitrogen efficiency, ^{15}N methodology, direct-seeded flooded rice (*Oryza sativa* L.).