

Nitrogen fertilizer timing and placement for aerial sown rice

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Nitrogen fertilizer accounts for approximately 25% of the costs of growing rice so it is important that this input is used as efficiently as possible. With the introduction of potentially high yielding semi dwarf varieties and declining soil fertility, high levels of fertilizer are required. To avoid the possibility of nitrification before permanent flood (PF), growers are encouraged to apply fertilizer as close as possible to PF. In practice the timing and placement of application varies widely depending on weather conditions and various management problems. Two experiments were undertaken to investigate the importance of timing and placement of urea on aerial sown M7 rice.

Material and Methods

Experiment 1 studied the response of M7 rice to urea applied at 50 kg N/ha on 7 different occasions; 15 days, 11 days, 8 days, 4 days, 2 days and 1 day prior to PF, and 2 days after PF. Fertilizer was incorporated with a Roterra immediately after application and PF applied on October 11. Experiment 2 examined 4 times of application, 15 and 8 days before PF and 1 and 21 days after PF. At each time before PF the urea (75 and 150 kg N/ha) was applied in 4 different ways; on top of dry soil, on top of wetted soil, on top of dry soil which was then wetted, and drilled 5 cm below the soil surface.

Results and Discussion

In experiment 1 there was no significant difference between treatments fertilized between 11 days before and 1 day before PF. Fertilization 15 days before PF however reduced agronomic efficiency from 35 to 26 kg grain/kg N. Nitrogen applied into ponded water 2 days after PF produced a low efficiency of 15 kg grain/kg N. In experiment 2 urea increased yields up to 150 kg N/ha. Before PF the yield response was increased as the time before flooding was reduced from 15 to 8 days. Agronomic efficiency rose from 27 to 32 kg grain/kg N. Low responses were recorded when nitrogen was topdressed into the water after PF with agronomic efficiencies of 7 and 8 kg grain/kg N for 2 and 21 days after PF respectively. Highest responses were obtained when the urea was drilled deep (efficiency 34 kg grain/kg N) and lowest response when the fertilizer was placed on to wetted soil (24 kg grain/kg N).

Results show that urea nitrogen fertilizer will be used more efficiently if drilled into the soil and applied within approximately 11 days before PF. It is highly likely that temperature and soil moisture conditions before PF during spring will vary the nitrification rate and hence potential loss of N applied. Delaying application until soon after PF results in low fertilizer use efficiency. Presumably differences between treatments were related to differences in loss of gaseous N by volatilisation and/or nitrification then denitrification reactions.