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Research Notes

Effect of integrated nitrogen management on nitrogen use efficiency in wet seeded rice + daincha dual cropping system

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Nitrogen is an essential constituent of different proteins, nucleic acids and many other organic molecules such as chlorophyll. The availability of nitrogen to rice during critical stages influences agronomic efficiency (Yoshida, 1981). Nitrogen applications are aimed to increase the nitrogen availability during the period of rapid uptake. Application of green manures, organic and inorganic manures differ in their use efficiency and recovery of N by the crop. One of the central theories in plant nutrition is to identify the particular nutrient which produces maximum yield per unit of its absorbtion and how far the applied nutrient is taken by the crop plants to produce maximum yield (Yoshida, 1981). Keeping this in view, the present study was intended to compare the N use efficiency and apparent N recovery in wet seeded rice.

An experiment was conducted in wetland farm of Tamil Nadu Agricultural University, Coimbatore during *rabi* season of 2002-2003. The soil was clay having organic carbon 0.70%, available nitrogen 260 kg ha^{-1}, available phosphorus 21 kg ha^{-1} and available potassium 610 kg ha^{-1}. The experiment was conducted in Randomized Block Design with ten treatments and replicated thrice. The treatments were T_1 100% recommended dose of fertilizer N, T_2: 75% recommended dose of fertilizer N, T_3: 50% recommended dose of fertilizer N, T_4: 75% recommended dose of fertilizer N + 25% N as goat manure, T_5: 75% recommended dose of fertilizer N + 25% N as poultry manure, T_6: 75% recommended dose of fertilizer N + 25% N as farmyard manure, T7: 50% recommended dose of fertilizer N + 25% N as goat manure, T_8: 50% recommended dose of fertilizer N + 25% N as poultry manure, T9: 50% recommended dose of fertilizer N + 25% N as farmyard manure. A seed rate of 80 kg ha^{-1} was adopted for paddy Var. ADT 38 and 25 kg ha^{-1} for daincha. The paddy seeds were soaked in water for 24 hours and then incubated for 24 hours for sprouting. Daincha and the sprouted seeds of rice were line sown alternatively using drum seeder at a spacing of 12.5 cm (one row of rice alternated with one row of daincha). The intercropped green manure was pulled out and buried in the inter rows manually on 30 DAS. The N content of different organic manures was determined and the amount required for substituting a specified amount of N was calculated as per the treatment. Organic manures were incorporated into the soil one week before sowing. Recommended dose of fertilizer is 150:50:50 kg NPK ha^{-1}. In accordance with the treatments N was applied at 100%, 75% and 50% of the recommended dose, half quantity of N was incorporated before sowing through urea and rest was applied in three equal splits at active tillering, panicle initiation and heading stages as per the treatment schedule. A uniform dose of 50 kg each of P_2O_5 and K_2O ha^{-1} were applied to all the plots in the form of SSP and MOP before sowing. The N contribution through green manure was

Table 1. Effect of treatments on nitrogen use efficiency and nitrogen recovery

Treatments	N contribution through daincha (kg ha^{-1})	Agronomic use efficiency (kg grain kg N^{-1})	Physiological use efficiecy (kg grain kg N^{-1})	Partial factor productivity (kg grain kg N^{-1})	Apparent N recovery (%)
T_1 100% RDF N	15.51	5.74	29.19	42.24	19.67
T_2 75%RDFN	14.81	4.39	24.58	53.29	17.86
T_3 50%RDFN	14.53	3.89	40.56	76.75	9.60
T_4 75% RDF N +25 %N as GoM	15.54	5.62	28.67	42.12	19.60
T_5 75%RDFN + 25 % N as PoM	15.75	5.77	27.58	42.21	20.93
T_6 75%RDFN + 25 %N as FYM	15.44	5.39	26.70	41.92	20.20
T_7 50%RDFN + 25 N as GoM	15.01	6.66	31.60	55.45	21.07
T_8 50%RDFN + 25 % N as PoM	15.33	7.40	32.76	56.19	22.58
T_9 50% RDF N + 25 %N as FYM	15.01	6.82	31.56	55.46	21.60
SEd	0.4	0.64	3.23	5.83	2.17
CD (P=0.05)	0.9	0.30	1.51	2.70	1.01

RDFN : Recommended dose of fertilizer nitrogen
PoM : Poultry manure
GoM : Goat manure
FYM : Farmyard manure

quantified. Soil samples were analyzed for available N by alkaline permanganate method (Subbiah and Asija, 1956). The crop was harvested at physiological maturity and grain yield from individual plot was recorded separately at 14 per cent moisture content. The N concentration was analyzed by micro kjeldhal method (Humphries, 1956) and was used to work out the N uptake. By using the total N applied, N uptake and grain yield, the efficiency and recovery parameters were calculated. The N content of daincha was included for calculating efficiency and recovery parameters of N. Control plot was maintained for calculating efficiency and recovery parameters. Efficiency and recovery parameters were calculated using the following formulae.

1.Agronomic use Effieciency (kg grain kg N^{-1}) =

$$\frac{\text{Grain yield in fertilized plot (kg ha}^{-1}\text{) – Grain yield in unfertilized plot (kg ha}^{-1}\text{)}}{\text{Quantity of N applied (kg ha}^{-1}\text{)}}$$

2. Apparent recovery (%) =

$$\frac{\text{Nitrogen uptake in a particular treatment – Nitrogen uptake in control}}{\text{Quantity of N applied in the treatment}} \times 100$$

3.Partial factor productivity (kg kg^{-1} N applied) =

$$\frac{\text{Grain yield}}{\text{N applied}}$$

4. Physiological use efficiency (kg kg^{-1} N) =

$$\frac{\text{Yield (treated) – Yield (control)}}{\text{Nutrient uptake (treated) – Nutrient uptake (control)}}$$

In respect to different rates and levels of N, treatments exerted difference for agronomic use efficiency. Application of 50% RDF N + 25% N as poultry manure registered higher agronomic use efficiency followed by 50% RDF N + 25% N as FYM (Table 1). This might be due to quick release of nitrogen by incorporation of organic manures and application of inorganic fertilizers, which increased the production capacity per kg of N applied. This falls in line with the findings of Chakraborthy *et al.* (2001). Further the dissolution effect of green manures and organics may lead to increased nutrient availability upto grain filling besides directly supplying nutrient from its decomposition products. This corroborates with the findings of Bin (1983).

Physiological use efficiency was the highest with the application of 50% RDF N (Table 1). Higher physiological use efficiency indicates the higher conversion efficiency of applied N towards grain production, the lower values of physiological use efficiency indicates the higher concentration of N in crops. This was earlier reported by Janaki (2003).

The lowest N application resulted in the highest partial factor productivity. Partial factor productivity was the highest with the application of 50% RDF N (Table 1). Higher partial factor productivity might be due to higher rate of grain productivity for every kg of N applied. This falls in line with the findings of Cassman *et al.* (1993).

Nitrogen recovery showed that the values were higher with the application of 50% RDF N + 25% N as poultry manure followed by 50% RDF N + 25% N as FYM (Table 1). This might due to increased N availability from the readily soluble source. This is in accordance with the findings of Chakraborty *et al.* (2001).Thus, from the present investigation it is inferred that for getting higher physiological use efficiency and partial factor productivity, application of 50% RDF N whereas, for getting higher agronomic use efficiency and apparent N recovery, application of 50% RDF N + 25% N as poultry manure along with intercropping daincha in wet seeded rice is recommended.

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Research Notes

Floristic composition of weed flora in banana plantation

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Banana *(Musa paradisiaca)* in India ranks second in terms of area and production and it accounts for 12 percent (4,33,000 ha) of the total area under fruit crops and 30 percent (10.46 mt) of the total fruit production. In Cuddalore district of Tamil Nadu, banana is cultivated in 3827 ha with a total production of 34,563 t and the productivity is lowest in Tamil Nadu (9.3 t ha^{-1}). The fruit is inexpensive, possesses medicinal values and used in all auspicious occasions in South India. Weed menace in banana is severe due to its wider spacing, lesser tillage operation and slow canopy coverage during early growth phase. Under normal planting distance rhizomatous and stoloniferous weeds and many broad leaved weeds competed severely with banana especially during its early stages of crop growth (Chacko and Reddy, 1981). For effecting weed management for such situation, basic understanding of the floristic composition of weeds in that particular locality becomes imperative.

A phytosociological survey of weed flora was undertaken in banana plantations concentrating in and around nearby villages of Chidambaram *viz.,* Sivapuri, Mutlur and Vallampadugai during August 2000. The survey was conducted using the procedure outlined by Sen (1981). Banana plantations not lesser than 800m^2 in area were selected wherein no weed control measure had been taken upto 6 months from planting, preceding the survey at every 3 km distance, covering a total distance of 12km in each of the villages. The number and size of sample quadrats used in each plantation were 10 and 0.25 m^2 respectively.

The weed flora comprised of five grasses, one sedge and nine broad leaved weeds. The