The Andhra Agric. J 73 (1): 020-025, 2026
doi :10.61657/aaj.2026.248

Influence of varieties and N levels on growth and yield of rice in coastal Andhra Pradesh

Yashwanth, Prathibhashree, Jaffar Basha and Sridhar
Department of Agronomy, Acharya N G Ranga Agricultural University,
Agricultural College, Bapatla - 522101, Andhra Pradesh, India

ABSTRACT

A field experiment was conducted entitled "Performance of new rice varieties to varied nitrogen levels in coastal Andhra Pradesh" in the Agricultural College Farm, Bapatla, Andhra Pradesh during *kharif,* 2024. The experiment was laid out in a split plot design with four main plots and five subplots which were replicated four times. The varieties *viz*., BPT 2846, BPT 2782, BPT 3050 and BPT 5204 selected as main plot treatments while nitrogen levels viz., Control (no nitrogen), 100% RDN, 75% RDN + 25% N Green manure incorporation, 75% RDN + 25% N FYM (Farm Yard Manure) and 75% RDN + Bio fertilizer consortium as sub plot treatments. Results revealed that BPT 3050 rice variety performed better by recording greater values of growth and yield parameters than other varieties. Among nitrogen levels, supply of 100 per cent recommended dose of nitrogen recorded higher values of growth, yield parameters and yield. However integrating the organic sources of nutrients viz., farmyard manure or green manure along with 75 per cent of recommended dose of nitrogen also performed on par with 100% N as inorganic sources for all biometric observations.

Keywords: *Biofertilisers, Consortium, Farmyard manure, Green manure and Varieties*

In coastal areas, the impact of nitrogen fertilizer on rice yields varies with application levels. A study showed that increasing nitrogen from 0 to 220 kg N ha^{-1} significantly boosted grain yield, with optimal results at 220 kg N ha^{-1}, achieving up to 6500 kg ha^{-1} in hybrid rice (Sarkar *et al*., 2023). However, nitrogen use efficiency (NUE) can be low, with only 30- 40% recovery in wetland conditions. Different nitrogen application rates in coastal rice fields have significant environment impacts. Excessive nitrogen use often leads to low nitrogen efficiency (NUE), typically around 20-40% resulting in approximately 60-80% of nitrogen remaining unused (Alam *et al*., 2023). This surplus contributes to greenhouse gas emission, water pollution through nitrate leaching, soil acidification, adversely affecting human health.

The choice of rice cultivar, is a crucial determinant of yield potential and adaptability to various environmental conditions. Every year new rice varieties are being released to meet the different farming situations and there is a need to optimize nutrient requirement for the varieties. Understanding how different rice cultivars respond to varying levels of nitrogen fertilization can provide valuable insights into optimizing nutrient management strategies to maximize yield and resource use efficiency.

MATERIALS AND METHODS

A field experiment was conducted entitled "Performance of rice varieties to varied nitrogen levels in coastal Andhra Pradesh" in the Agricultural College Farm, Bapatla, Andhra Pradesh during *kharif,* 2024. The experiment was laid out in a split plot design with four main plots and five subplots which were replicated four times. The varieties *viz*., BPT 2846, BPT 2782, BPT 3050 and BPT 5204 selected as main plot treatments while nitrogen levels viz., Control (no nitrogen), 100% RDN, 75% RDN + Green manure incorporation, 75% RDN + FYM (Farm Yard Manure) and 75% RDN + Bio fertilizer consortium as sub plot treatments.

The varieties selected are of similar growth duration with 145-150 days initially the seeds of different varieties were sown in the nursery beds and later when the land was puddled, the seedlings were transplanted to main field. Line transplanting was carried out to facilitate easy cultural operations in the main filed with spacing of 20 cm between the rows

and 15 cm between the plants. Green manure and FYM were incorporated in the field before transplanting in the respective treatments.

Biometric parameters plant height, number of tillers m^{-2} and drymatter production, panicle length, productive tillers, test weight, filled grains per panicle, grain yield, straw yield and harvest index were recorded to evaluate the performance. Analysis of variance was done whenever the treatment differences were found significant (F test), critical difference was worked out at 5% probability level and the values were furnished.

RESULTS AND DISCUSSION

Plant height (cm) recorded in different rice varieties found comparable with each other and no significant difference was observed in plant height of different rice varieties tested under study. However numerically higher plant height was recorded in BPT 3050 and numerically lower plant height was recorded in BPT 5204. Among nitrogen levels tested, 100 % RDN recorded significantly highest plant height (105.11 cm) when compared with control (71.83 cm). However, 100 % RDN treatment recorded comparable values with 75% RDN + FYM (Farmyard Manure), 75% RDN +Green manure incorporation and 75% RDN + biofertilizer consortium. The data presented in the Table no. 1.

Similar trend was observed for number of tillers per sq. m. where numerically higher values were observed in BPT 3050 (369) than other varities and 100 % RDN treatment recorded significantly higher number of tillers m^{-2} (385) when compared with control (307) among nitrogen levels.

Plant height among varieties recorded on par values which might be due to, selection of cultivars with same growth duration without much variation in growth. On par values among different nitrogen combinations was due to integrated supply of organic and synthetic nutrients enhanced the nitrogen use efficiency where it directly correlates with plant height. However, among sub plots, control treatment without nitrogen recorded lower values because growth without nitrogen would not reach expected results due

Table 1. Growth of rice as influenced by varieties and nitrogen levels

Treatment	Plant height (cm)	No. of tillers/m^2	Drymatter production (kg ha^{-1})
Varieties(v)			
BPT 2846	92.1	360	5750
BPT 2782	92.0	357	5709
BPT 3050	94.9	369	5961
BPT 5204	92.4	356	5920
SEm±	1.9	9.9	123.5
C.D.(5%)	NS	NS	NS
CV (%)	7.9	0.7	8.2
Nitrogen levels (N)			
Control (no nitrogen)	71.8	307	5229
100% RDN	105.1	385	6325
75%RDN+ 25 % N Greenmanure incorporation	95.5	372	5931
75% RDN+ 25% N FYM (FarmYard Manure)	95.7	380	5964
75%RDN+Biofertilizer consortium	96.2	359	5727
SEm±	1.7	9.5	183
C.D.(5%)	4.9	27.3	526
C.V.(%)	6.3	9.1	10
Interaction			
SEm±	3.39	18.9	5
CD at 5% V × N	NS	NS	NS
CD at 5% N × V	NS	NS	NS

Table 2. Yield parameters of rice as influenced by varieties and nitrogen levels

Treatment	No. of productive tillers m^{-2}	Panicle length (cm)	Test weight	No of filled grains /panicle
Varieties(v)				
BPT 2846	238	24.0	12.9	204
BPT 2782	235	24.3	13.7	207
BPT 3050	249	24.7	19.9	209
BPT 5204	232	23.6	14.1	197
SEm±	7.2	0.5	0.4	5.11
C.D.(5%)	NS	NS	2.5	NS
CV (%)	11.6	7.5	8.9	9.7
Nitrogen levels (N)				
Control (no nitrogen)	201	22.0	14.9	174
100% RDN	254	25.6	14.9	216
75%RDN+Greenmanure incorporation	247	24.7	15.3	211
75% RDN+ 25% N FYM (FarmYard Manure)	252	24.8	15.5	211
75%RDN + 25% N Biofertilizer consortium	238	23.6	15.2	210
SEm±	6.0	0.5	0.3	3.3
C.D.(5%)	17.3	1.3	NS	9.5
C.V.(%)	8.7	6.7	7.7	5.6
Interaction				
SEm±	11.98	0.93	0.67	6.57
CD at 5% V × N	NS	NS	NS	NS
CD at 5% N × V	NS	NS	NS	NS

to the role of nitrogen in the cell division, cell elongation, essential amino acid and nucleic acid production. Similar findings were recorded by Rachel *et al.* (2022).

Dry matter production (kg ha^{-1}) recorded in different rice varieties was found comparable with each other and no significant difference was observed. However numerically higher drymatter production (5961 kg ha^{-1}) was recorded in BPT 3050 and numerically lower dry matter production values was recorded in BPT 5204 (5920 kg ha^{-1}). Among nitrogen levels tested, 100 % RDN recorded significantly higher drymatter production (6324 kg ha^{-1}) when compared with control (5228 kg ha^{-1}). However, 100 % RDN recorded comparable values with 75% RDN + FYM (Farmyard Manure), 75% RDN +Green manure incorporation and 75% RDN + biofertilizer consortium.

Drymatter accumulation among varieties noticed non significant values due to the performance of selected varieties which have similar growth as it owned by the genetic characters. Among nitrogen levels, integrating the nutrient supply from organic and synthetic sources enhanced the crop growth by absorbing the essential nutrients in a balanced way which was comparable with sole supply of nutrients from inorganic sources. These were in agreement with the findings of Suresh *et al*. (2022).

The interaction effect of rice varieties and nitrogen levels on plant height , number of tillers per sq.m and drymatter production were found to be non significant.

No significant diiferences were found among varieties regarding no. of productive tillers and filled grains $panicle^{-1}$. However numerically higher number of productive tillers (249 and 209, respectively) are recorded in BPT 3050 and numerically lower number of productive tillers m^{-2} and filled grains $panicle^{-1}$ were recorded in BPT 5204 (*i.e* 232, 197 respectively). Among nitrogen levels tested, 100 % RDN recorded significantly higher number of productive tillers m^{-2} and filled grains (254 and 216 respectively) when compared to control (201). However, 100 % RDN recorded comparable values with 75% RDN + FYM

Table 3. Yield of rice as influenced by varieties and nitrogen levels

Treatment	Yield(kg/ha^{-1})		Harvest Index(%)
	Grain	Straw	
Varieties (V)			
BPT 2846	5125.0	6183	45.3
BPT 2782	5166.0	6138	45.6
BPT 3050	5557.0	6409	46.4
BPT 5204	5078.0	6367	44.2
SEm±	109.0	134.0	0.7
C.D.(5%)	413.8	NS	NS
CV (%)	8.1	8.3	5.6
Nitrogen levels (N)			
Control (no nitrogen)	4179	5620	42.6
100% RDN	5776	6801	45.9
75%RDN+Green Manure incorporation	5442	6382	46.1
75% RDN + 25% N FYM (Farm Yard Manure)	5529	6414	46.3
75% RDN + 25 % N Bio fertilizer consortium	5232	6155	46.0
SEm±	132.2	166.0	0.7
C.D.(5%)	381.1	478.6	2.2
CV (%)	7.3	8.0	9.8
Interaction			
SEm±	247.9	331.9	1.5
CD at 5% V × N	NS	NS	NS
CD at 5% N × V	NS	NS	NS

(Farmyard Manure) (N4), 75% RDN +Green manure incorporation and 75% RDN + bio fertilizer consortium. The data was presented in the Tableno.2.

Similar trend was followed for panicle length (24.69 cm), where BPT 3050 found numerically higher over other varieties and integrating the organic and inorganic source of nitrogen found on par with 100 per cent RDN (25.58 cm).

Productive tillers of selected varieties reported on par values due to their similar tillering capacity with genetic makeup influenced in similar trend among the cultivars. Among nitrogen levels, control without supply of nutrient source experienced severe reduction in tillering capacity because relatively lower amount of nutrients were available for its performance, however supply of 100% per cent of nitrogen executed higher productive tillers as the supply of nitrogen improved the absorption capacity of other nutrients which influences the more fertile tiller production. Similar trend was followed to panicle length. Parallel findings were recorded by Mrudhula *et al.* (2021)

Among different rice varieties, BPT 3050 recorded significantly highest test weight (19.85 g). It was followed by BPT 5204 (14.10 g) which was comparable with BPT 2782 (13.67 g) and BPT 2846 (12.87g). Nutrient levels did not significantly influenced test weight. However numerically higher test weight (15.53 g) was recorded in 75% RDN + FYM (Farmyard Manure) and numerically lower test weight (14.85 g) was recorded in 100 % RDN.

Higher test weight in BPT 3050 might be due to its higher panicle length followed by bold grains, however other varieties exhibited slender grains with lower length. Among nitrogen levels, the values among various levels showed on par values however, relatively higher test weight was observed in fertilized plot either with organic or inorganic than control due to higher absorption of potassium and zinc helps in the translocation of photosynthates which helped in seed filling capacity similar findings was noticed by Samant *et al*. (2022)

The interaction effect of rice varieties and nitrogen levels on productive tillers, panicle length,

test weight and filled grains per panicle were found to be non significant.

Among different varieties tested, BPT 3050 (5557 kg ha^{-1}) recorded significantly higher grain yield which was on par with BPT 2782 (5166 kg ha^{-1}). N levels also showed significant differences with respect to grain yield. Among nitrogen levels tested, 100 % RDN treatment recorded significantly higher grain yield (5776 kg ha^{-1}) when compared with control treatment (4179 kg ha^{-1}). However, 100 % RDN treatment recorded comparable values with 75% RDN + FYM (Farmyard Manure) and 75% RDN +Green manure incorporation. The data is presented in the Table no. 3

Straw yield (kg ha^{-1}) recorded in different rice varieties was found non significant. However numerically higher straw yield (6409 kg ha^{-1}) was recorded in BPT 3050 and numerically lower straw yield was recorded in BPT 2782 *i.e* 6138 kg ha^{-1}. There were significant differences in straw yield with respect to nitrogen levels. Among nitrogen levels tested, 100 % RDN treatment (N2) recorded significantly higher straw yield (6801 kg ha^{-1}) when compared with control treatment (5620 kg ha^{-1}). However, 100 % RDN treatment recorded comparable values with 75% RDN + FYM (Farmyard Manure), 75% RDN +Green manure incorporation and 75% RDN + bio fertilizer consortium.

Harvest index was found non significant for various varieties and nitrogen levels.The interaction effect between rice varieties and nitrogen levels for grain, straw yield and harvest index was found to be non-significant.

The grain yield of any crop is largely determined by its growth and yield-attributing characteristics, which play a crucial role in crop improvement. In this context, BPT 3050 recorded higher grain yield due to its superior growth and yield-contributing traits, whereas the other cultivars showed lower yields owing to comparatively weaker growth and yield attributes. Among nitrogen levels, higher grain yield was noticed in 100 per cent nitrogen application due to the supply of recommended dose of nitrogen fertilizer which improves the cell division, cell elongation and better crop growth followed by enhanced nutrient uptake efficiency and synergistic effect of nutrients. Similar yields were also noticed in integrated treatments where in supply of 75 per cent of synthetic nitrogen along with farmyard manure or green manure or bio fertilizers, where incorporation of farmyard manure which improves the soil nutrient availability to the plant, green manures add greater amount of biomass and bio fertilizer fixes the atmospheric nitrogen. Similar findings were recorded by Singh and Kumar (2014).

CONCLUSION

It is concluded that growing of cultivar BPT 3050 with 100% recommended N results in higher growth, yield parameters and yield. However, integration of 75% N through organic sources is better for sustainable yields.

LITERATURE CITED

Alam M S, Khanam M and Rahman M M 2023. Environment-friendly nitrogen management practices in wetland paddy cultivation. *Frontiers in Sustainable Food Systems*, *7*: 020570.

Mrudhula K A, Suneetha Y and Veni B K 2021. Effect of nitrogen levels on growth, yield, nitrogen uptake and economics of rice variety BPT 2782- Bhavathi. *International journal of chemical studies*. 9(1): 2496-2499.

Rachel C S, Singh S, Thapa J E and Gayethri G 2022. Impact of Organic Manures and Foliar Spray of Moringa Leaf Extract (Moringa oleifera L.) on Growth and Yield of Rice Bean [*Vigna umbellata* (Thunb.) Ohwi and Ohashi]. *International Journal of Plant & Soil Science*. 34(18): 110-119

Samant T K, Garnayak L M, Paikaray R K, Mishra K N, Panda R K, Swain S K, Sarangi S K and Jena S N 2022. Effect of nutrient management and rice establishment methods on biochemical and physiological attributes, yield and economics of rice (*Oryza sativa* L.) in rice-groundnut cropping system in coastal Odisha. *Journal of the Indian Society of Coastal Agricultural Research.* 40(1): 38-45.

Sarkar S, Ray K, Garai S, Banerjee H, Haldar K and Nayak J 2023. Modelling nitrogen management in hybrid rice for coastal ecosystem of West Bengal, India. *Peer Journal.* 11:4903.

Singh D and Kumar A 2014. Effect of sources of nitrogen growth yield and uptake of nutrients

in rice. *Annals of Plant and Soil Research*. 16 (1): 359-361.

Suresh G, Mehera B and Kumar P 2022. Effect of organic manures on growth and yield of Wheat (*Triticum aestivum L.)*. *The Pharma Innovation Journal.* 11(7): 759-762.

Received on 20.01.2026 and Accepted on 22.02.2026