Effects of different levels of N and P on the yield of BINA dhan7 in old Brahmaputra floodplain soil

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Abstract: A field experiment was carried out in Old Brahmaputra Floodplain soil at Soil Science Field Laboratory of Bangladesh Agricultural University, Mymensingh during *aman* season of 2011 to study the response of BINA dhan7 to different levels of nitrogen and phosphorous. The experiment was laid out in a randomized complete block design with four replications. There were seven treatments such as T_1: Control, T_2: Recommended fertiliser dose (RFD) + N_0P_0, T_3: RFD, T_4: RFD-20% NP, T_5: RFD-40% NP, T_6: RFD + 20% NP and T_7: RFD + 40% NP. The recommended fertilizer dose used for the study was 80 kg N, 25 kg P, 35 kg K, 10 kg S and 4 kg Zn ha^{-1}. Nitrogen, phosphorus, potassium, sulphur and zinc were applied through urea, TSP, MoP, gypsum and zinc oxide, respectively. The application of N and P had a significant influence on plant height, effective tiller $hill^{-1}$, panicle length and filled grains $panicle^{-1}$. The N and P uptake by rice plant did not increase considerably due to the different rates of N and P compared to RFD. The grain and straw yield of BINA dhan7 were significantly affected due to treatments. The highest grain and straw yield were 5.47 t ha^{-1} and 6.58 t ha^{-1}, respectively in the treatment T_7 (RFD + 40% NP) where all of N and P fertilizers were applied in higher level. From this study it can be concluded that the treatment T_3 (RFD) is the best for the successful production of BINA dhan7 in Old Brahmaputra Floodplain soil.
Keywords: Nitrigen, phosphorus, BINA dhan 7, yield.

Introduction

Bangladesh is an agro-based country where agriculture is the single largest sector and the mainstay of the country's economy. It accounts for almost above one-third, 35 % of Gross Domestic Product (GDP) and provides employment for two-third of the labour force (Sarkar and Islam, 2001). Agriculture in Bangladesh is dominated by intensive rice *(Oryza saliva* L.) cultivation. Rice is the second most important cereal crop of the world. Half of mankind depends on rice with more than 90 % of the world rice grown and consumed in Asia (Anonymous, 1989). In Bangladesh, rice ranks first in terms of both area and productions and influence tremendously the agrarian economy of the country and is the only source of cash income for most of the farmers.

Geographical situations as well as the climatic and edaphic conditions of Bangladesh are favourable for year- round rice cultivation. Nevertheless, the yield of rice is very low in Bangladesh (3.34 t ha^{-1}) compared to 9.65, 6.59, 6.70 and 6.92 t ha^{-1}in Australia, Korean Republic, Japan and Spain respectively (FAO, 2002). Rice is grown in about 72.47 % of the arable land of 10.12 million hectares. Rice contributes 91.12 % of the total grain production and covers 68% of the total calorie of this country's people (MOA, 1996).

Proper soil fertility management is of prime importance in an endeavor to increase crop productivity as well as sustainable agriculture. Available data indicate that the fertility of this country's soils has deteriorated over the years, which is responsible for stagnating and in some cases, even declining crop yields (Ali *et al.,* 1997).The use of chemical fertilizer as a supplemental source of nutrients has been steadily in Bangladesh, but usually they are not applied in balanced proportions by most our farmers. Therefore, a pragmatic step needs to be taken for balanced application of fertilizer with the limiting nutrient elements where necessary.

Soil is the principal supplier of plant nutrients. Practically no soil can sustain high crop yields for an indefinite period from its own nutrient reserves. Even the most fertile soils can do so only for certain years and at one time the yield will be decline due to the deficiency of some nutrients. However, nutrient deficiencies can be corrected by the judicial application of the deficient nutrient containing fertilizers. On the other hand, higher crop yields naturally have higher demands of nutrients and more pressure on the soil for available forms of nutrients. Moreover, as cropping intensity and yield levels go up, the intake and removal of plant nutrients through harvested crop and other routes from the soil are likely to increase. So, fertilizers are essential in modern farming, contributing about 50 % of the world's crop production (Pradhan, 1992).

Nitrogen and Phosphorus are the primary macronutrients and can play a key role to increase the production of rice to a great extent. Among the plant nutrients, nitrogen is one that deserves special attention because of its large requirement by crop and instability in soil. Many researchers reported that nitrogen has a positive influence on growth, yield and yield components of rice (Navin *et al.* 1996). This important element has been found to be at deficient level in most agricultural soils of Bangladesh.

Phosphorus is the second major nutrient for plant and plays a critical role in the life cycle of plants. Adequate phosphorus nutrition enhances many aspects of plant physiology, including the fundamental process of photosynthesis, N-fixation, flowering, fruiting and maturation. But phosphorus is widely deficient in Bangladesh soils. There are many reasons behind this such as, first, phosphorous does not occur abundantly in soil as N and K. Total content of P in top soil varies between 0.02% and 0.10% (Tisdale *et al.,* 1997). Second, the native P compounds are mostly unavailable for plant uptake. Third, where P fertilizer is added to soils, the element is soon change to insoluble forms. It is needed greatly by young fast growing tissue of plants and performs a number of functions related to growth. development, photosynthesis and utilization of carbohydrates (Tandon, 1987) whereas insufficient nutrient P seriously limits growth and yield of rice (Sarkuman *et al.,* 2005).The goal sustainable crop productivity in an area can be achieved through a constant monitoring and correcting the existing and emerging nutrient deficiencies. As our many soils are deficient in N and P; necessary study should be done to grow rice successfully and profitably.

With the aim of judicious nutrient supply from fertilizers for profitable rice production, the present research was carried out to study the effect of different levels of N and P on the yield and nutrients content of BINA dhan7.

Materials and Methods

The field experiment was carried out in Old Brahmaputra Floodplain soil at the Soil Science Field Laboratory of Bangladesh Agricultural University, Mymensingh during *aman* season of 2011 to study the response of Binadhan-7 to different levels of nitrogen and phosphorous. There were seven treatments such as T_1: Control, T_2: RFD + N_0P_0, T_3: RFD, T_4: RFD-20% NP, T_5: RFD-40% NP, T_6: RFD + 20% NP and T_7: RFD + 40% NP. The experiment was laid out in a randomized complete block design with four replications. Thus, the total numbers of the unit plots were 28 (4x7). The unit plot size was 4m × 2.5 m; the plots were separated from each other by 0.5 m bunds. There were 1 m drains between the blocks. The initial soil sample was collected before land preparation from the plough depth layer (0-15 cm) from 10 locations covering the whole experimental plot. The composite sample was air dried, ground and sieved through a 20-mesh sieve and stored in a plastic bag for physical (textural class) and chemical (OM, pH, total N, available P & S, exchangeable K, Na & Ca and CEC) analysis. The land was prepared by ploughing and cross ploughing with a power tiller. Then the land was made saturated with irrigation water and prepared by successive ploughing, cross ploughing and laddering. All kinds of weeds, stubbles and crop residues were removed from the field before final ploughing and leveling. The full dose of TSP, MOP, gypsum and zinc oxide were applied as basal dose during final land preparation while urea was applied in three equal splits. The seedlings of 21 day old were transplanted maintaining plant spacing 20 cm x 20 cm. Three seedlings were transplanted in each hill. Intercultural operations were done in order to ensure and maintain the normal growth of the crop as and when necessary. When 90% of grain became golden yellow in color, 10 hills (excluding border hills) were randomly selected from each unit plot for recording data on different agronomic crop characters. The grain and straw samples from each plot taken for chemical analysis following appropriate methods. The N and P in the digest were determined in the same method as used in soil chemical analysis. The analysis of variance for various crop characters and also for various nutrients concentrations and nutrient uptake was done following the F-test. Mean comparisons of the treatments were made by the Duncan's Multiple Range Test. Correlation statistics was performed to examine the interrelationship among the plant characters under study.

Results and Discussion

Plant height: The plant height of Binadhan-7 was significantly affected due to different treatments (Table 1). All the treatments significantly increased the plant height over control. Plant height varied from 79.42 cm to 91.68 cm. The tallest plant (91.68 cm) was recorded in the treatment T_7. T_6 gave the second highest result (89.62 cm). The shortest plant (79.42 cm) was found in the treatment T_1. Plant height observed in the other treatment T_4, T_5 with values 85.53cm and 83.93cm respectively. The result of the present study is in agreement with that of Singh *et al.* (1986) who reported that plant height increased with increasing rates of different fertilizers.

Table 1. Effect of different rates of N and P on the yield contributing characters of BINAdhan7

Treatments	Plant height (cm)	Effective tillers hill^{-1}	Panicle length (cm)	Filled grains panicle^{-1}	Unfilled grains panicle^{-1}	1000-grain wet (g)
T_1 (control)	79.42g	7.30g	22.26e	72.74g	17.27a	19.28f
T_2 (RFD + N_0P_0)	81.07f	8.42f	23.35d	96.40f	16.25b	19.34f
T_3(RFD)	87.71c	11.39c	25.31b	107.53c	14.21c	22.31c
T_4 (RFD - 20%NP)	85.53d	9.64d	24.34c	103.69d	13.17d	20.37d
T_5 (RFD - 40%NP)	83.93e	9.42e	24.15c	101.83e	13.03d	20.24e
T_6 (RFD + 20%NP)	89.62b	12.38b	26.23a	110.38b	12.22e	24.35b
T_7 (RFD + 40%NP)	91.68a	12.64a	26.48a	113.33a	12.10e	25.26a
SE (±)	0.80	0.37	0.28	2.43	0.38	0.44

Figure (s) in a column having common letters do not differ significantly at 5% level of significance Recommended Fertilizer Dose (RFD) = 80 kg N ha^{-1}+ 25 kg P ha^{-1} + 35 kg K ha^{-1}+ 10 Kg S ha^{-1}+ 4 kg Zn ha^{-1}.

Table 2. Effect of different rates of N and P on the yield of Binadhan-7

Treatments	Grain yield (t ha^{-1})	% Increased over control	Straw yield (t ha^{-1})	% Increased over control
T_1 (control)	2.56d	-	3.46e	-
T_2 (RFD + N_0P_0)	3.12c	21.88	4.07d	17.63
T_3 (RFD)	5.23a	104.29	6.24b	80.35
T_4 (RFD - 20%NP)	4.54b	77.34	5.62c	62.43
T_5 (RFD - 40%NP)	4.32b	68.75	5.38c	55.49
T_6 (RFD + 20%NP)	5.38a	110.16	6.44ab	86.12
T_7 (RFD + 40%NP)	5.47a	113.67	6.58a	90.17
SE (±)	0.22	-	0.23	-

Figure (s) in a column having common letter (s) do not differ significantly at 5% level of significance Recommended Fertilizer Dose (RFD) = 80 kg N ha^{-1} + 25 kg P ha^{-1} + 35 kg Kg ha^{-1} + 10 Kg S ha^{-1} + 4 kg Zn ha^{-1}.

Number of tillers hill^{-1}: There was a significant effect of different fertilizer treatments on the production of tillers hill^{-1} of rice plants (Table 1). The number of tillers hill^{-1} varied from 7.30 to 12.64 due to different treatments. The highest number of tillers hill^{-1} (12.64) was found in the treatment T_7.The minimum number of tillers hill^{-1} (7.30) was found in the treatment T_1. When NP rates reduced from the RFD rates then the number of tillers hill^{-1} was reduced in the treatment T_4 and T_5 from 9.64 to 9.42 respectively. Zhou *et al.* (1998) found that N and P nutrition increased the number of tillers hill^{-1} of rice plants.

Panicle length: The application of different fertilizer levels significantly increased the panicle length of rice (Table 1). Panicle length differed from 22.26 to 26.48 cm due to different treatments. The highest panicle length was observed in the treatment T_7 (26.48cm) and the lowest panicle length was observed in the treatment T_1 (22.26cm). Besides the panicle length (26.23cm) recorded in the treatment T_6 was statistically similar to that in the treatment of T_7. These results are in agreement with Ahmed and Rahman (1991) who observed a significant increase in panicle length due to application of different fertilizer levels. Similar results were also found by Azim (1999).

Filled grains panicle^{-1}: The different treatments significantly increased the number of filled grains panicle^{-1} of Binadhan-7 (Table 1). The number of filled grains panicle^{-1} ranged from 72.74 to 113.33 due to different treatments. The highest number of filled grains panicle^{-1} (113.33) was obtained from T_7 treatment. The lowest number of filled grains panicle^{-1} (72.74) was obtained from the treatment T_1. When NP rates reduced from the RFD values then the number of filled grains panicle^{-1} was reduced 103.69 and 101.83 in the treatment of T_4 and T_5 respectively. Results revealed that different nutrient levels exerted increasing effect on the number of filled grains panicle^{-1}. These results were supported by the findings of Mondal *et al.* (1990) who reported that the number of filled grains of rice increased with the increasing rates of N and P. Halder *et al.* (2000) and Masthan *et al.* (1999) also noted similar results.

Unfilled grains panicle^{-1}: The variation in the number of unfilled grains panicle^{-1} due to different treatments was significant (Table 1). The results indicated that the number of unfilled grains panicle^{-1} varied from 12.10 to 17.27. The highest number of unfilled grains panicle^{-1} (17.27) was produced by the treatment T_1. The lowest number of unfilled grains panicle^{-1} (12.10) was produced by the treatment T_7 which was followed by that observed in the treatments T_6. On the other hand, the number of unfilled grains panicle^{-1} was reduced with the decreasing rates of fertilizes from the RFD values such as the number of unfilled grains panicle^{-1} was 13.17 and 13.03 in the treatment of T_4 and T_5 respectively. Asaduzzaman *et al.* (1996) reported that application of N and P decreased the number of unfilled grains panicle^{-1} of rice.

1000-grain weight: Data in Table 1 indicated that the different treatments significantly increased the 1000-grain weight of Binadhan-7. The 1000-grain weight ranged from 19.28g to 25.26g due to different treatments. The maximum 1000-grain weight (25.26g) was obtained from T_7 treatment. The minimum 1000-grain weight (19.28g) was obtained from the treatment T_1.

Grain yield: Grain yield of Binadhan-7 responded significantly to the different treatments (Table 2). The grain yield due to various treatments ranged from 2.56 to 5.47 t ha^{-1}. All the treatments showed higher grain yield over control. The highest grain yield (5.47 t ha^{-1}) was obtained in the treatment T_7 which was statistically similar to those observed in the treatments T_3 and T_6 with values of 5.23 and 5.38 t ha^{-1} respectively. The lowest grain yield (2.56 t ha^{-1}) was obtained in T_1 treatment. All the treatments showed higher grain yield over control but increasing rate was lower. The highest percentage (113.67%) of increased grain yield over control was recorded in the treatment T_7 and the lowest of 21.88% in T_2 treatment. The grain yields obtained from different treatments ranked in the order of $T_7 > T_6 > T_3 > T_4 > T_5 > T_2 > T_1$. The results revealed that the grain yield increases and decreases slowly with the increasing and decreasing rates of fertilizers from the RFD values. Singh *et al.* (1998) reported that application of NP fertilizers increased grain yield of rice. Similar results were also reported by Asaduzzaman *et al.* (1996).

Straw yield: Results presented in the Table 2 showed that straw yield of BINAdhan7 were significantly influenced by different treatment under study. The straw yield ranged from 3.46 to 6.58 t ha^{-1}. All the treatments gave higher straw yield over control. Again, the straw yield was always higher in all the treatments than that of grain yield. Like grain yield, the treatment T_7 also produced the highest straw yield (6.58t ha^{-1}) which was statistically identical to that recorded (6.44t ha^{-1}) in the treatment T_6. The treatment T_6 was statistically similar (6.24t ha^{-1}) to the treatment T_3 (RFD). The lowest straw yield (3.46t ha^{-1}) was recorded in the treatment T_1. The highest percentage (90.17) of increased straw yield over control was noted in the treatment T_7. The straw yield due to different treatments ranked in the order of $T_7 > T_6 > T_3 > T_4 > T_5 > T_2 > T_1$. The results revealed that the straw yield increases and decreases slowly with the increasing and decreasing rates of fertilizers from the RFD values respectively. A significance increase in rice straw with the increasing application of N was reported by Idris and Matin (1990).

Correlation matrix: Grain yield is a complex character that resulted from the interaction of many plant growth and yield contributing characters like plant height, number of tillers hill^{-1}, panicle length, number of filled and unfilled grains panicle^{-1} and 1000-grain weight. In order to observe the interrelationship among the plant characters studied a correlation matrix was done (Table 3).

Plant height was significantly correlated with the number of tillers hill^{-1} ($r = 0.968^{**}$). The number of filled grains panicle^{-1} was positively and significantly correlated with tillers hill^{-1} ($r = 0.851^{**}$), plant height ($r = .868^{**}$) and panicle length ($r = .877^{**}$). Unfilled grains panicle^{-1} had a negative and significant correlation with tillers hill^{-1} (r = -

0.844**), plant height (r = - .847**), panicle length (r= - . 816**) and filled grains panicle^{-1} (r = - 0.823 **). Panicle length was found positively correlated with tillers hill^{-1} (r = 0.939**) and plant height (r = .946**). 1000-grain weight had also a positive and significant correlation with filled grains panicle^{-1} (r =0.721**), whereas the number of unfilled grains panicle^{-1} was negatively correlated with 1000-grain weight (r = -0.740**). The overall correlation's matrix indicated that grain yield was positively correlated with the number of tillers hill^{-1} (r =0.808**), plant height (r = 0.855**), panicle length (r = .874**), number of filled grains panicle^{-1} (r = 0.845**) and 1000-grain weight (r = 0.698**) but negatively correlated with the number of unfilled grains panicle^{-1} (r = - 0.743**). These results are in agreement with BINA (2007).

Table 3. Correlation matrix among the plant characters of Binadhan-7

Characters	Grain yield	Straw yield	Tiller hill^{-1}	Plant height	Panicle length	Filled grain	Unfilled grain
Grain yield							
Straw yield	0.998**						
Tillers hill^{-1}	0.808**	0.814**					
Plant height	0.855**	0.861**	0.968**				
Panicle length	0.874**	0.884**	0.939**	0.946**			
Filled grain	0.845**	0.856**	0.851**	0.868**	0.877**		
Unfilled grain	-0.743**	-0.761**	-0.844**	-0.847**	-0.816**	-0.823**	
1000-grain weight	0.698**	0.702**	0.948**	0.939**	0.876**	0.721**	-0.740**

** = 1 % Level of significance, NS = Not significant

Table 4. N and P content in grain and straw of Binadhan-7 as influenced by different rates of N and P

Treatment	%N		%P	
	Grain	Straw	Grain	Straw
T_1 (control)	0.952d	0.644d	0.129c	0.089c
T_2 (RFD + N_0P_0)	1.008cd	0.756bc	0.133c	0.097bc
T_3(RFD)	1.12ab	0.796b	0.153ab	0.11b
T_4(RFD - 20%NP)	1.092abc	0.70c	0.149b	0.088c
T_5(RFD - 40%NP)	1.064bc	0.672cd	0.145bc	0.073d
T_6(RFD + 20%NP)	1.148ab	0.812ab	0.156a	0.112b
T_7(RFD + 40%NP)	1.176a	0.84a	0.159a	0.129a
SE (±)	0.016	0.018	0.002	0.003

Figure (s) in a column having common letter(s) do not differ significantly at 5% level of significance Recommended Fertilizer Dose (RFD) = 80 kg N ha^{-1} + 25 kg P ha^{-1} + 35 kg K ha^{-1} + 10 Kg S ha^{-1} + 4 kg Zn ha^{-1}.

Nutrient content in grain and straw

Nitrogen content: There was significant effect of the different treatments on N concentration of both rice grain and straw (Table 4). The N content in grain varied from 0.952 to 1.176%. The treatment T_7 resulted the maximum N content in grain (1.176%) which was statistically similar to those recorded in the treatments T_3, T_4 and T_6 with values of 1.12, 1.092 and 1.148 % N respectively. The minimum value (0.952%N) was recorded in the treatment T_1 which was statistically similar to that observed in the treatment T_2 with value 1.008 % N.

The N content in straw due to different treatments ranged from 0.644 to 0.840% (Table 4). The highest value (0.840% N) was found in the treatment T_7 which was statistically identical to that observed in the treatments T_6 with value of 0.812% N respectively. The lowest value (0.644%N) was noted in the treatment T_1. The grain N content was always higher in all the treatments.

Phosphorus content: Results presented in the Table 4 indicated that phosphorus content in both grain and straw of BINAdhan7 was significantly influenced by the different treatments under study. The P content in grain ranged from 0.129 to 0.159%. The highest P content (0.159% P) was recorded in the treatment T_7 which was statistically similar to those observed in the treatments T_3 and T_6 with values of 0.153 and 0.156% P respectively. The lowest value (0.129) was observed in the treatment T_1 which was followed by that noted in those treatments and T_5 with values of 0.133 and 0.145% P.

The phosphorus content in straw varied from 0.089 to 0.129% (Table 4). The highest P content (0.129%) was recorded in the treatment T_7. The lowest value (0.089 %P) was observed in the treatment T_1 which was followed by that noted in those treatments T_2 and T4 with values 0.097 and 0.088% P. The P concentration in grain was higher than that of straw in all the treatments. Kadu *et al.* (1991) observed that P percentage in both grain and straw of rice was highest with the increasing N and P rates. Similar results were also found by Azim (1999).

Nutrient uptake by BINA dhan7

Nitrogen uptake: Results in Table 5 indicated that the N uptake by grain and straw of Binadhan-7 was significantly affected due to different treatments. The N uptake by grain varied from 24.34 to 64.45 kg ha^{-1}. The highest N uptake (64.45 kg ha^{-1}) by grain was recorded in the treatment T_7 (RFD + 40%NP) which was statistically similar to those observed in the treatments T_3 and T_6 with N uptake of 58.31 and 61.62 kg ha^{-1} respectively. The lowest N uptake (24.34kg ha^{-1}) by grain was obtained in the treatment T_1 (control) which was followed N uptake in the treatment T_2 with value of 31.45 kg N ha^{-1}.In straw, the N uptake ranged from 22.25 to 55.51kg ha^{-1} (Table 5). The highest N uptake (55.51kg ha^{-1}) by straw was observed in the treatment T_7 which was statistically similar to those

observed in the treatments T_3 and T_6 with values of 49.63 and 52.54 kg N ha^{-1} respectively. The lowest N uptake (22.25kg ha^{-1}) was recorded in the treatment T_1 which was followed by those observed in the treatments T_2 and T_5 with N uptakes of 30.86 and 36.54kg ha^{-1} respectively. It was observed that N uptake by grain was higher than that of straw.

In case of total N uptake, BINA dhan7 was significantly influenced by different treatments. The total N uptake due to different treatments ranged from 46.59 to 119.96 kg ha^{-1} (Table 5). The highest total N uptake (119.96 kg ha^{-1}) was recorded in the treatment T_7 which was statistically similar to those observed in the treatments T_3 and T_6 with N uptake of 107.94 and 114.16 kg ha^{-1} respectively. The lowest total N uptake (46.59 kg ha^{-1}) was noted in the treatment T_1 which was followed by that recorded in the treatment T_2 with N uptake of 62.31 kg ha^{-1}. Phongpan *et al.* (1988) reported that N uptake by rice increased significantly with increasing rates of urea application. Similar results were also noted by Kadu *et al.* (1991). Our results indicated that N uptake was increased with the increasing rates of fertilizer from the RFD values and vice-versa.

Table 5. Effect of different rates of N and P on N and P uptake by Bina dhan7

Treatment	N uptake (kg ha^{-1})			P uptake (kg ha^{-1})		
	Grain	Straw	Total	Grain	Straw	Total
T_1 (control)	24.34d	22.25e	46.59e	3.31d	3.06d	6.37d
T_2 (RFD + N_0P_0)	31.45d	30.86de	62.31de	4.13d	3.95cd	8.08cd
T_3(RFD)	58.31ab	49.63abc	107.94ab	8.05ab	6.81b	14.86a
T_4(RFD - 20%NP)	49.50bc	38.80bcd	88.30bc	6.72bc	4.94c	11.66b
T_5(RFD - 40%NP)	45.93c	36.54cde	82.46cd	6.23c	3.96cd	10.18bc
T_6(RFD + 20%NP)	61.62a	52.54ab	114.16a	8.42ab	7.21b	15.63a
T_7(RFD + 40%NP)	64.45a	55.51a	119.96a	8.72a	8.50a	17.22a
SE (±)	2.92	2.69	5.39	0.42	0.38	0.77

Phosphorus uptake: The phosphorus uptake in both grain and straw of BINA dhan7 was significantly influenced due to various treatments used in the experiment (Table 5). The ranges of P uptake observed in grain were 3.31 to 8.72 kg ha^{-1}. The maximum P uptake (8.72 kg ha^{-1}) by grain was recorded in the treatment T_7 which was statistically identical to those noted in the treatment T_3 and T_6 with P uptake of 8.05 and 8.42 kg ha^{-1} respectively. The minimum P uptake (3.31 kg ha^{-1}) by grain was observed in the treatment T_1 which was followed by that noted in the treatment T_2 with P uptake of 4.13 kg ha^{-1}.

In case of straw, the P uptake varied from 3.06 to 8.50 kg ha^{-1} (Table 5). The highest P uptake (8.50 kg ha^{-1}) was recorded in the treatment T_7 which was statistically different from all other treatments. The second highest P uptake (7.21kg ha^{-1}) was noted in the treatment T_6 which was followed by the observed in the treatment T_3 with P uptake of 6.81kg ha^{-1}. The lowest P uptake (3.06 kg ha^{-1}) was found in the treatment T_1 which was followed by that recorded in the treatment T_2 with P uptake of 3.95kg ha^{-1}.

The total P uptake by grain and straw was also significantly affected by the different treatments (Table 5). The total P uptake by BINA dhan7 varied from 6.37 to 17.22 kg ha^{-1}. The highest total P uptake (17.22 kg ha^{-1}) was recorded in T_7 treatment which was followed by those observed in the treatments T_3 and T_6 with P uptake of 14.86 and 15.63 kg ha^{-1} respectively. The lowest value of total P uptake (6.37 kg ha^{-1}) was noted in the control (T_1) which was followed by that recorded in the treatments T_2 with P uptake of 8.08kg ha^{-1}. Datta and Dhiman (2001) stated that total P uptake increased with the increased levels of P. Similar results were also reported by Subbian *et al* (1989).

The application of N and P had a significant influence on plant height, effective tiller $hill^{-1}$, panicle length and filled grains $panicle^{-1}$. The N and P uptake by rice plant did not increase considerably due to the different rates of N and P compared to RFD. The grain and straw yield of BINAdhan7 were significantly affected due to treatments. The highest grain and straw yield were 5.47 t ha^{-1} and 6.58 t ha^{-1}, respectively in the treatment T_7 (RFD + 40% NP) where all of N and P fertilizers were applied in higher level. From this study it can be concluded that the treatment T_3 (RFD) is the best for the successful production of Binadhan-7 in Old Brahmaputra Floodplain soil.

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