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Effect of different doses of NPK fertilizer on rainfed shallow low land rice

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Abstract
A field experiment was laid out at Crop Research Station, Ghaghraghat, (ANDUAT), Bahraich, U.P. to evaluate the effect of different nutrients (N) level on agronomic traits of newly developed rainfed shallow lowland rice varities. The experiment was comprised of five rice genotypes *viz*., IET 26692, Dhanrasi, Pooja, Savithri and Sambha-Sub 1 and two levels of NPK *viz*., 60:30:30 and 90:45:45 kg/ha. In this trial, 150% of recommended dose of fertilizer (RDF) was found to be promising and also exhibited higher nutrient recovery efficiency. IET 26692 was found to be promising in terms of grain yield and nutrient response at the location. Among the genotypes maximum grain yield was recorded for IET 26692 (3.63t/ha RDF & 3.94 t/ha of 150% RDF) followed by Sambha-Sub1 (3.22t/ha RDF & 3.28 of 150% DF). The study showed that yield of rice. Increases under elevated 150% of recommended dose of fertilizer (RDF).

Keywords: Rainfed shallow lowland, genotypes, nitrogen use efficiency

Introduction
Rice (*Oryza sativa* L.) is one of the most important crops of the world and provides food to more then 50% global population (FAO, 2004). More than 90% of the world's rice is grown and consumed in Asia, where 60% of the earth's population live on (Schoenly *et al*., 1998 & Kole 2006) [6]. It was estimated that 35-60% of the calories consumed by 3 billion Asians comes from rice (Khus, 1997) [5]. Rice is grown in various agro-ecological zones in tropical and subtropical areas, especially in Asia, the continent accounting for 90% of the world's production (IRRI, 2015a) [4]. It is a staple diet of more than 2 billion people in Asia and millions of people in Africa and South America and is a main source of calories for about 60% of the world population (Naresh RK *et al*. 2013) [7]. With the likely growth of world's population, the demand for rice will increase. It provides about 75% of the calories and 55% of the protein in the average daily diet of the people of the India (Bhuiyan *et al*., 2002) [1]. In India it was cultivated in approximately 44.80 million hectare area with the production of 104 million tonnes. Rice is the major crop in Uttar Pradesh and is grown in about 5.90 mha which comprises of 13.5% of total rice in India. Uttar Pradesh has favourable and suitable climate, vast areas of fertile soil, sunshine and adequate water resources. The state ranks 3rd in the country in production of rice. The major area under lowland and flood prone is located in eastern part of Uttar Pradesh. While a major cause of low yield of rice is due to uncertain water a viability of rainfed areas, even the yield of irrigated rice is also low. However, very little progress seems to made on technology development for rainfed rice which constitute nearly 70% or rice hectarage in U.P. Indian farming was largely based on indigenous technical knowledge of the farmers. Indian farming was largely based on indigenous technical knowledge of the farmers. Typically, late emerging tillers do not contribute significantly to the grain yield of rice (Wang *et al*. 2007) [12]; however, theoretically, they possess the potential for high productivity, due to the totipotency of rice coleoptile tissue (Oinam and Kothari 1995) [8]. Rice requires N in larger quantities than any other nutrient, and it is the most critical limiting factor that influences grain yields (Siddiqui *et al*. 2008) [10], Split application of fertilizer especially nitrogen can increase nitrogen use efficiency resulting in high productivity. Indigenous knowledge is the knowledge of indigenous people inhabiting different geographical region of the world with their own language, culture, tradition, belief, folklore, rites and rituals (Chhetry GKN and Belbahri L, 2009) [2].

NPK is the major nutrient which limits the crop growth of rice plant and grain yield.

Materials and Methods

The experiment were conducted at Crop Research Station, (ANDUAT) Ghaghraghat, Bahraich, which is situated at the Latitude (North) 27º50'N, Longitude (East) 81º20'E and Elevation (m. from MSL) 112m. The soil is sandy loam low and low in organic carbon. It is rich in potassium, medium in phosphorus and possesses good water holding capacity and pH 7.50. The experiment was comprised of five rice genotypes *viz*., IET 26692, Dhanrasi, Pooja, Savithri and Sambha-Sub 1 and two levels of NPK *viz*., 60:30:30 and 90:45:45 kg/ha. In these trials the experiment was direct sown in 4th week of June. The experiment was laid out in a split plot design with three replications in 20m^2 plot size, variety specific agronomic practices were raise the crop. Recommended dose of fertilizer 60:30:30:25 kg N: P: K: and ZnSo4/ha recommended dose of fertilizer and 90:45:45:25 kg N:P:K and ZnSo4 in 150% of NPK. Half of the dose of N and full dose of P: K and ZnSo4 were applied basal, while remaining N was top-dressed in 2 equal splits–at tillering and panicle initiation stage. To control weeds, Rift @ 1.25 litre/ha was applied just after transplanting. Crop was harvested at physiological maturity and grain yield was calculated at 14% grain moisture. Randomly 10 hills were selected from each plot to measure the agronomic parameters panicle no. /m2 and panicle weight (g). The data on grain yield of each genotypes were recorded separately by threshing the harvested crop on tarpaulin followed by proper sun drying and winnowing. The data so obtained were subjected to statistical analysis after necessary transformation for final statistical analysis (Gomez and Gomez, 1983) [3].

Results and Discussion

The data presented in table-1 clearly revealed that the level of NPK increased grain yield significantly. Among the treatment of 100% recommended dose of fertilizer 60:30:30 NPK and genotype IET 26692 was recorded maximum grain yield (3.63 t/ha) followed by Sambha-Sub 1 (3.22 t/ha). The grain yield of tested genotypes Dhanrasi,Pooja and Savitri were recorded as 3.00 t/ha, 2.84 t/h and 2.42 t/ha respectively. When the treatment to 150% of recommended dose of fertilizer that is 90:45:45 NPK was given IET 26692 showed maximum grain yield (3.94 t/ha) followed by Sambha-Sub 1 (3.28 t/ha). The yield of other tested genotypes were recorded as 3.36 t/ha, 3.44 t/ha and 3.19 t/ha of Dhanrasi, Pooja and Savitri respectively. Up to 150% of recommended dose of fertilizer increased the grain yield of IET 26692 (8.53%), Dhanrasi (12.00%), Pooja (21.12%), Savithri (31.81%) and Sambha-Sub 1 (1.86%) as compared to 100% RDF. These genotypes were found significantly superior over standards checks. Maximum panicle number per metre square and panicle weight (g) was recorded with genotype IET 26692 (194 m2 and 2.95 g/panicle).

The present study showed that 150% of NPK was given, the number of panicle per sqm and panicle weight of rice were increased. Thus the grain yield of rice was increased. However, the of 100% RDF were significantly lower than 150% RDF.

Table 1: Grain yield and ancillary characters of rainfed shallow lowland rice under direct sown condition at different levels of NPK fertilizer doses

Sl. No.	Fertilizer level	Varieties	Grain yield t/ha	Panicle/m2	Panicle weight (g)	% Yield increase over the RDF
1	60:30:30:25 NPK ZnSo4	IET 26692	3.63	182	2.67	-
2		Dhanrasi	3.00	172	2.70	-
3		Pooja	2.84	167	2.51	-
4		Savithri	2.42	154	2.83	-
5		Sambha-Sub 1	3.22	178	2.04	-
	90:45:45:25NPK ZnSo4	IET 26692	3.94	194	2.95	8.53
1		Dhanrasi	3.36	180	2.72	12.00
2		Pooja	3.44	174	2.49	21.12
3		Savithri	3.19	161	3.05	31.81
4		Sambha-Sub 1	3.28	187	2.30	1.86
5		CD (0.05%)	0.23	NS	0.05	-
		CV (%)	4.56	6.29	1.11	-
1	Mean of Varieties	IET 26692	3.79	188	2.81	-
2		Dhanrasi	3.18	176	2.71	-
3		Pooja	3.14	171	2.50	-
4		Savithri	2.81	158	2.94	-
5		Sambha-Sub 1	3.25	183	2.17	-
		CD (0.05%)	NS	16.3	0.3	-
		CV (%)	19.20	7.61	9.41	-
	Expt. Mean		3.23	175.00	2.63	-

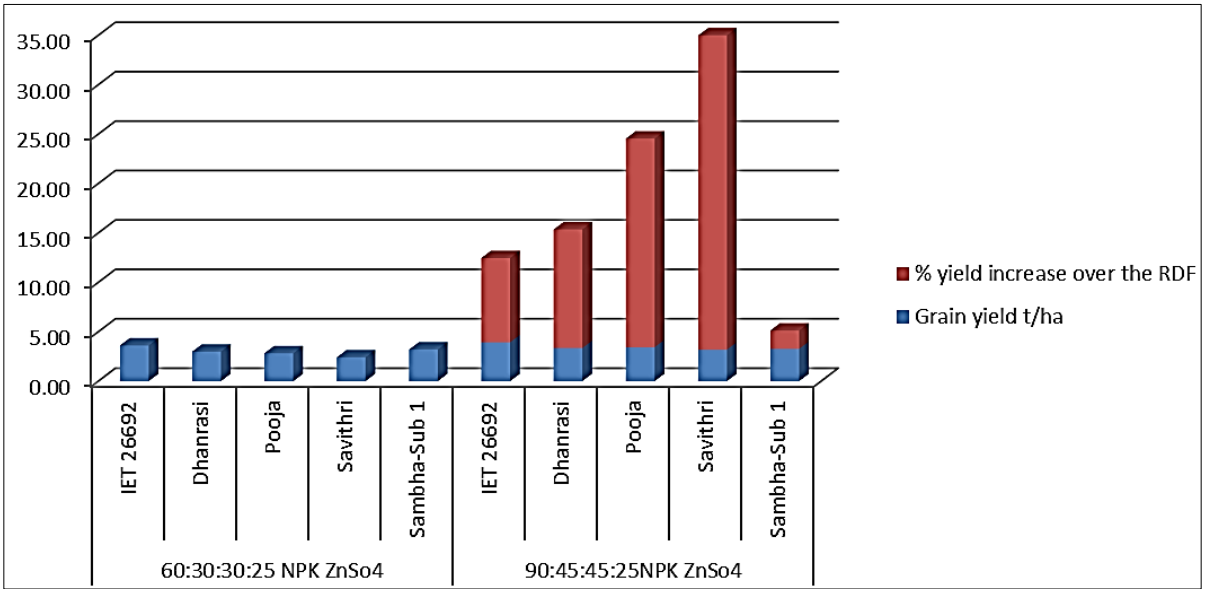

Fig 1: Grain yield of rainfed shallow lowland rice under direct sown condition at different levels of NPK fertilizer doses

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