

## Comparative Effect of Different Modes of Nitrogen Application on Mineral Nutrients in Grains of Rice (*Oryza Sativa* L.) Grown At Two Different Locations in Bareilly

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### ABSTRACT

During Kharif season of 2014-15, field experiment were conducted at two different locations (Bilwa and Nawabganj) of Tarai region near Bareilly district (U.P., North India). Split applications of nitrogen fertilizer gave significantly higher values of Ca and Fe than those of basal applications at both the sites. However, site Bilwa was found to be more conducive for var. Jaya in respect to almost all mineral nutrients. For the chosen variety, split applications of nitrogen responded well for the mineral status, as compared to the full basal application.

**Keywords--** Minerals, Puddling, Tillering, Panicle Initiation and *Oryza Sativa*.

for raising the crops (Zhou and Li, 1991, Gaun, G. 2011, Yousaf et al., 2017). Various modes of application of nitrogen fertilizers were used for rice (Thakur and Patel, 1998). Since a lot of literature reviewed show the studies of split nitrogen fertilizer application on nitrogen nutrient uptake but few citations are seen on other mineral nutrient uptakes. Therefore, an attempt has been made through present trials to study the effect of different modes of nitrogen fertilization over the mineral content viz. Ca, P, Mg, Fe, Zn and Mn in the grains of Jaya variety of rice crop grown at two different locations of Tarai region in Bareilly district.

### I. INTRODUCTION

Nitrogen being an important nutrient, along with phosphorus, potassium and other elements, is required essentially for plant growth (Salisbury and Ross, 1994). Nitrogen fertilizer is only applied when needed. Splitting and timing of nitrogen fertilizer application in cereal crops at growth stages, cropping season, variety used seems to be a significant practice these days. Various modes of split nitrogen fertilization like full basal, mid tillering, panicle initiation, first flowering are observed for agronomy practices. Zhaoxin Liu et al. (2019) also studied the timing and splitting of nitrogen fertilizer in order to observe response on increasing crop yield and decrease of nitrogen loss to environment. Liu et al. (2016) also investigated the effect of urea one time root zone fertilization (RZF) on rice growth, nutrient uptake and nitrogen use efficiency (NUE). The mineral profile in rice grains is likely to be affected by changing the locations

### II. MATERIALS AND METHODS

Field experiments were conducted at Bilwa and Nawabganj, Agriculture Research Stations in outskirts of Bareilly city. A basal dose of phosphorus (@75 kg/ha) as super phosphate and potassium (@ 50 kg/ha) as muriate of potash were applied at the time of puddling. The field treatments were performed in replication of four at both the locations, each site having twelve field blocks of size 6x4 sq.m. Nitrogen fertilizer, as urea, were applied in three modes.

Mode A: A full basal dose of 120 (kg N/ha).

Mode B: A dose of 60 (kg N/ha) was given as basal and 60 (kg N/ha) at tillering stage of crop.

Mode C : A dose 60kg (N/ha) was given as basal and 60 (kg N/ha) was at panicle initiation of crop.

Before sowing, the basal status of the soils of both the experimental sites were found in the representative soil samples taken and analysed for main parameters as shown in table 1.

Table 1

Site	pH	Available			Climate
		N (kg/ha)	P (kg/ha)	K (kg/ha)	
Bilwa	7.5	156	42	202	Relatively humid
Nawabganj	7.3	145	45	210	Relatively humid

Grains at the time of maturity were harvested and collected plot wise from both the sites were stored properly and numbered. These samples were then

analysed for mineral nutrients i.e. Ca, P, Mg, Zn, Fe and Mn, according to methods laid down in A.O.A.C. (1990).

### III. RESULTS AND DISCUSSION

The data given in Table-2 revealed that the values of Ca content in all the modes were higher at site Bilwa than Nawabganj. However, values obtained with split application in mode B were significantly much higher than mode A and mode C at both the sites. The above findings were substantiated by trials of Biloik and Ercan (1994) where they reported significant rise in Ca content of rice crop with split applications. On the contrary Fe content recorded higher values at Nawabganj in comparison to Bilwa whereas for mode C, it was significantly higher than mode A and mode B. A similar trend was observed at site Nawabganj even. The above findings were supported by the trials of Jurkowska et al. (1981) where they reported an increase in Fe content due to split application in comparison to basal fertilization. A significant increase in P content was recorded in both the sites with basal application under mode A in comparison

with mode B and mode C. However, P content was found higher at Bilwa than at Nawabganj. But however contrary to this, a significant decrease in P content was shown in the Chinese soil experiment by Zhou and Li (1991) with split nitrogen application. Mg was recorded higher in values at Bilwa, but there was a substantial effect of modes at both the sites. Zn content in grains were found to be higher in values at Bilwa site but still were insignificant among modes of N fertilization. Interestingly, Mn values also showed no set trend as there was no significant difference between the sites as well as modes. Menelik *et al.* (1991) found that no substantial effect on Mn content of wheat grains by application of nitrogen fertilization. Thus it can be inferred from the said trials that soil of Bilwa is more conducive for mineral nutrients. However, split applications of nitrogen gave better results regarding mineral nutrition as compared to basal fertilization.

**Table 2: Mineral content (mg/100 g on dry matter basis) in grains of rice var. Jaya grown at two locations under split nitrogen fertilizations**

Site	Bilwa						Nawabganj					
Mode	Ca	P	Mg	Fe	Zn	Mn	Ca	P	Mg	Fe	Zn	Mn
1	93.48	221.41	94.02	1.74	2.83	1.25	53.11	216.83	81.65	1.88	2.54	1.29
2	96.53	216.88	90.72	1.68	2.94	1.42	54.88	214.15	88.98	1.98	2.66	1.32
3	95.82	218.52	92.39	1.82	3.13	1.37	53.42	215.34	84.41	2.11	2.89	1.52
C.D. P=0.05	2.046	2.002	2.002	0.454	NS	NS	2.313	2.199	1.401	0.046	NS	NS

NS = non significant

### IV. CONCLUSION

It can therefore be concluded from the experiment performed above that rice grown in Tarai region adjoining Bareilly city would be more potentially better in Bilwa Farm in respect to mineral nutrients required to combat malnutrition among masses of North India as because rice is a staple diet among them in their food eating practices.

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