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Effect of levels and time of N application on performance of late-puddle seeded rice (*Oryza sativa*)

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ABSTRACT

A field experiment was conducted during rainy and winter seasons of 1994-95 to find out the optimum level and time of N application for late seeded rice under puddled condition. In *kharif*, there was significant increase in grain yield up to 80 kg N/ha while in *rabi*, the crop responded up to 120 kg N/ha. Application of N in two splits at sowing / 10 days after sowing (DAS) and maximum tillering (45 DAS) gave yield similar to that of 3 or 4 splits in both *kharif* and *rabi* seasons. In *kharif* under late sown conditions, short duration cultivar WGL 18011-15 (105 days) gave higher yield than long duration varieties Kavya (135 days) and Pothana (125 days) but during *rabi* season both the cultivars under test (IR - 64 : 125 days, Kalinga - 390 days) gave similar yield.

Key words: Rice, Nitrogen

Rapid social changes are forcing farmers to seek alternative methods of crop establishment, particularly in rice crop due to difficulty in getting adequate number of labourers in time. Puddle seeding at many places has been found to be as good as transplanting (Shekar and Singh, 1991). Under situations of late planting due to late receipt of water in *kharif* and damage to seedling in *rabi* by cold, puddle seeding instead of transplanting is recommended as a contingent measure for growing paddy. Grain yield of rice has been found to increase with increasing levels (Bhattacharya and Singh, 1992) and split application of N. Information on the level of nitrogen required and optium time of its application for late puddled seeded rice are not available for northern is Telangana. Hence, the experiment under report was conducted.

MATERIALS AND METHODS

Two field experiments were conducted at the Regional Agricultural Research Station, Jagtial during *rabi* 1994 and 1995 and *kharif* 1994 on sandy clay loam soil having pH 7.4, available N 180 kg/ha, available P_2O_5 9.45 kg/ha and available K_2O 420 kg/ha

In one set of experiment four levels of nitrogen (0,40,80 and 120 kg/ha) and three va-

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rieties (Kavya 135 days, Pothana of 125 days and WGL 18011-105 of 110 days) during *kharif* (1994) while four levels of N (0, 40, 80 and 120 kg/ha) and two varieties (IR 64 of 125 days and Kalinga 3 of 90 days) during *rabi* (1994 and 1995) were tested in three times replicated randomised block design. In another set of experiment 90 kg N during *kharif* and 120 kg N/ha during *rabi* for its 10 treatments of time of N application were test in a RBD replicated three times (Table 2). During each season the experimental crop received uniform dose of P_2O_5 (60 kg/ha), K_2O (40 kg/ha) and zinc sulphate (50 kg/ha). Nitrogen was applied in 3 splits at sowing, tillering and panicle initiation in the experiment on N levels. The crop was sown on 3 September during *kharif* 1994 and on 11 February and 4 February during *rabi* 1994 and 1995 respectively and was harvested as per maturity.

In experiment on time of N application rice varieties IR 64 (125 days) during *rabi* and WGL 18011-15 (105-110 days) during *kharif* were sown.

The crop was sown by broadcasting of sprouted seed @ 100 kg/ha on the puddled and levelled field. The water was drained 12 hours after sowing and rewatering was done on alternate days till the seedlings were of 3 to 4 cm in length.

RESULTS AND DISCUSSION

Nitrogen levels

During *rabi*, 1994 under the late seeded conditions (February 1994), there was significant increase in grain yield with increase in N level up to 120 kg N/ha. However, the difference in grain yield between 0 and 40 kg N/ha was not significant (Table 1).

In *rabi* 1995 and *kharif* 1994, on the other hand, the grain yield increased significantly with increase in N application up to 80 kg/ha. The yield difference between 80

Table 1. Effect of levels of nitrogen application on grain yield (t/ha) of late puddle seeded rice

Treatment	*Rabi*, 1994	*Rabi*, 1995	*Kharif*, 1994
N level, kg/ha			
0	2.00	2.15	1.09
40	2.05	2.90	1.96
80	2.48	3.36	2.21
120	3.04	3.60	2.27
CD (P = 0.05)	0.30	0.28	0.16
Variety			
IR 64	2.33	3.13	-
Kalinga 3	2.46	2.87	-
Tellahamsa	-	3.00	-
Kavya	-	-	1.73
Pothana	-	-	1.64
WGL 18011 - 15	-	-	2.28
LSD (P = 0.05)	NS	NS	0.14

and 120 kg N/ha was not significant. Response to N application was the maximum at 40 kg N/ha. Regression analysis revealed significantly positive relation between N application (X) and grain yield (Y). Three regression equations during three seasons (*rabi* 1994, 1995 and *kharif* 1994) were observed.

Rabi 1994 : $Y = 1.86 + 0.0088\ x$
$R^2 = 0.9024^{**}$

Rabi 1995 : $Y = 2.28 + 0.01203\ x$
$R^2 = 0.9466^{**}$

Kharif 1994 : $Y = 1.314 + 0.009475\ x$
$R^2 = 0.8056^{**}$

Thus for each 1 kg of nitrogen application there was an increase of 8.9, 12.0 and 9.8 kg of grain in *rabi* 1994, *rabi* 1995 and *kharif* 1994 respectively. During *kharif* 1994, among the varieties tested, under late sown condition (Sept. 1st week) short duration variety WGL 18011-15 gave higher yield than the two long duration varieties Kavya and Pothana. This implies that the short duration varieties of 105 days are better than 125-135 days duration varieties for late sown condition in *kharif*. This might be due to low temperature injury in long duration varieties at flowering (Reddy *et al.*, 1995). During *rabi*, both the varieties under test have resulted in similar yield.

Time of nitrogen application

Application of nitrogen in two splits at sowing/10 DAS and maximum tillering (45 DAS) for short duration IR 64 in *rabi* and WGL 18011-15 in *kharif* has given similar yields as that of 3 or 4 splits made at different stages (Table 2). In *rabi*, application of N in 2 splits at seeding and initial tillering/panicle initiation resulted in similar grain yield as that of N applied in four splits applied at sowing/seedling, initial

Table 2. Effect of time of N application on gran yield (t/ha) of late puddle seeded rice

Time of N application	*Rabi*, 1994		*Kharif*, 1994	
	Grain	Straw	Grain	Straw
Basal, initial tillering (30 DAS), maximum tillering (45 DAS) and panicle initiation	4.25	3.30	2.87	5.63
Basal, initial tillering, panicle initiation	4.13	3.78	2.81	6.28
Basal, initial tillering	3.65	3.52	2.63	5.48
Basal, maximum tillering	4.09	3.56	3.01	5.72
Basal, panicle initiation	3.77	2.98	2.36	6.08
Seedling (10 DAS), initial tillering (30 DAS), maximum tillering (45 DAS) and panicle initiation	4.54	3.26	2.86	4.84
Seedling, initial tillering, panicle initiation	3.68	3.45	2.95	5.42
Seedling, initial tillering	3.60	3.50	2.78	5.82
Seedling, maximum tillering	4.11	3.30	2.99	5.34
Seedling, panicle initiation	3.54	3.09	2.63	5.64
CD (P = 0 .05)	0.77	0.42	0.24	0.77

tillering, maximum tillering stage and panicle initiation. Nitrogen application in two splits at basal/seedling stage (10 DAS) and initial and maximum tillering stage resulted in similar straw yield as that of the crop receiving nitrogen in there splits at basal/seedling, initial tillering and panicle initiation (Table 2).

These results indicate that for late puddle sown rice, application of 80 kg N/ha to gallmidge resistant short duration (105 days) cultivar in *kharif* and 120 kg N/ha to 120 days cultivar in *rabi* at seeding/seedling and panicle initiation stages results in higher grain yield.

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