Short Communication Oryza Vol. 45. No.3, 2008 (245-246)

Grain yield and economics of wet direct sown rice under different establishment methods and nitrogen schedules

S.P. Singh*, B. Sreedevi, R.M. Kumar and S.V. Subbaiah

Directorate of Rice Research, Rajendrangar, Hyderabad - 500 030, Andhra Pradesh, India

ABSTRACT

A field experiment was conducted during the wet season of 1998 and 1999 to study the effect of nitrogen application and methods of stand establishment on wet direct sown rice, Nidhi. Direct seeding using 8-row seeder recorded significantly higher grain yield (4.79 t ha^{-1}) over broadcast method seeding (3.9 t ha^{-1}). SPAD based nitrogen application at the reading 35 recorded mean maximum grain yield (5.40 t ha^{-1}) highest net return (Rs. 6,470 ha^{-1} was recorded in row seeding of stand establishment. Among nitrogen schedules, maximum net returns of Rs. 24,740/ha was recorded by SPAD based nitrogen application at the reading 35.

Key words: *Stand establishment, row seeder, SPAD and LCC based nitrogen application, economics*

Transplanted rice consumes more labour and time, under irrigated condition. Generally, labour availability is a problem with high wage rates during the main operation time. Hence, direct seeding in rice is becoming a popular alternative to transplanting system as it reduces the labour requirement and the cost of cultivation and the grain yield is often higher than transplanted rice under irrigated condition (Bhuiyan *et al.,* 1995; Reddy and Srinivas 1994). The methods of stand establishment and nitrogen management play an important role in rice production. Need based N application to rice crop enhance grain production and reduce the total N requirement in conjunction with standard recommended nitrogen application.

A field experiment was conducted during the wet seasons of 1998 and 1999 at Hyderabad, in silty clay (vertisols) with pH 8.3 and 225.0, 19.0 and 365.0 kg ha^{-1} available N, P_2O_5 and K_2O respectively. Fourteen treatment combinations consisting of two methods of stand establishment viz., Broadcast sowing and seeding in rows by row-seeder in main plots and seven nitrogen schedules viz., Control (No nitrogen); 50% N at basal + 25% N at tillering stage + 25% N at panicle initiation; 1/3 N each at 21,42 and 56 days after sowing; SPAD based nitrogen at the reading 29; SPAD based nitrogen at the reading 32; SP AD based nitrogen at the reading 35; LCC (Leaf Color Chart) basednitrogen at the reading 3 in sub plots replicated thrice in a split plot design. A fertilizer dose of 100 : 60 : 30 kg ha^{-1} N, P_2O_5 and K_2O was applied with full dose of phosphorous and potash as basal through single super phosphate and muriate of potash, respectively.

Pre-germinated seeds at 50 kg ha^{-1} were sown by row-seeder in puddled soil at 20 cm row spacing while 80 kg ha^{-1} was sown by broadcasting with variety Nidhi. Observations on grain yield and yield attributes were recorded at the time of harvesting. The cost of cultivation and economics were based on the existing market price.

Grain yield differences between methods of stand establishment were significant during both the years (Table 1). Sowing in rows recorded significantly higher grain yield (4.79 t ha^{-1}) over the mean grain yield of broadcast method (3.97 t ha^{-1}). The per cent increase in grain yield was of 20.66. Similar results were also reported by Subbaiah *et al.*, 1990 and Anonymous 2000. Yield attributes viz., panicle number (341 m^{-2}) and panicle weight (2.59 g) were significantly higher in row seeding over broadcasting. Among different nitrogen application schedules, maximum grain yield (5.40 t ha^{-1}) was recorded in SPAD based nitrogen application at the reading 35. The per cent increase in grain yield was 161, 30, 22, 3 and 9 when nitrogen applied on SPAD based at the reading 35, 50% N at basal + 25% N at tillering + 25% N at panicle initiation stage; 1/3 nitrogen

Table 1. Grain yield, yield attributes as influenced by methods of stand establishment and nitrogen application schedules

Particulars	Grain yield (t ha^{-1})	Panicle No m^{-2}	Panicle weight (g)	Cost of cultivation (Rs. ha^{-1})	Net income (Rs. ha^{-1})	B:C Ratio
Methods of stand establishment						
Row seeding	3.79	341	2.59	9670	21465	2.22
Broadcasting	4.97	228	2.20	10810	14995	1.39
Nitrogen application schedules						
T1	2.07	241	1.85	9520	3935	0.41
T2	4.17	307	2.34	10570	16535	1.56
T3	4.44	317	2.38	10570	18290	1.73
T4	4.64	324	2.53	10150	20010	1.97
T5	5.22	339	2.58	10360	23570	2.28
T6	5.40	352	2.67	10360	24740	2.39
T7	4.97	324	2.41	10150	22155	2.18

Selling prince of paddy = Rs. 6.50 kg^{-1} ; Cost of nitrogen = Rs. 10.50 kg^{-1}

each at 21, 42 and 56 days after sowing; SPAD based at the readings 29; SPAD based nitrogen at the reading 32 and LCC based nitrogen reading 3, respectively. Similar results were also reported by Peng *et al.* (1996) and Wahab and Jayaprakash (1995). The higher grain yield production under SPAD based N application at 35 reading is due to higher values of yield attributes.

Seeding in rows recorded mean maximum net returns and B : C ratio (Rs. 21,465 and 2.22) over broadcast method. Among different N schedules, SPAD based nitrogen application at the reading 35 recorded maximum net returns and B : C ratio (Rs. 24,740 ha^{-1} and 3,39) followed by SPAD based N application at the reading 32 (Rs. 33,570 ha^{-1} and 2.28) and LCC based N application (Rs 22, 155 ha^{-1} and 2.18). Thus it can be concluded that direct seeding of sprouted seeds under puddled condition using row seeder with SPAD based N management at the reading 35 gave maximum grain yield with efficient N use in vertisols of Deccan plateau of Andhra Pradesh.

REFERENCE

Anonymous 1998. Annual Report, Directorate of Rice Research Vol. 3

Bhuiyan SI, Sattar MA and Khanmak 1995. Improving water use efficiency in rice irrigated through wet seeding. Irrigation Science 16: 1 - 18

Peng S, Garcia FV, Ging HC, Luga RC, Sanico AL, Visperas RM, Cassman KG 1996. Increased N-use efficiency using a chlorophyll meter on high yielding irrigated rice. Field Crop Research 47: 243 – 252

Reddy MD and Srinivas A 1994. Relative performance of puddled seeded and transplanted rice in *rabi* (Post monsoon) season. Journal of Research APAU, 22 (3 - 4) : 89 – 91

Subbaiah SV, Singh SP, Kumar RM and Padmaja K 1999. Drum seeding technology is a substitute for transplanting in India. In proceeding of 2nd CREMNET W orkshop-cum-Group Meeting, 24 - 27th August, 2999 held at SWMRl, Tanjavur, Tamil Nadu

Wahab K and Jayaprakash 1995. Economics of direct seeded rice as influenced by water and fertilizer. Madras Agriculture Journal 82 : 409 – 410