

Promoting dry direct seeding of rice in line

with post-emergence application of herbicide for higher productivity

Vinamarta Jain*, Krishnakant Rajak and S R K Singh

SKS College of Agriculture and Research Station, IGKV, Rajnandgaon, Chhattisgarh 491 441

Rice is the major crop of Chhattisgarh and cultivated in around 37 lakh ha with average productivity of 1751 kg/ha which is far below of its potential yield. The reason for low productivity in rice production includes a declining rate of growth in yield, depletion of natural resources and labour shortage, lack of awareness of proper improved technology and weed management practices, lack of irrigation facilities and proper management of insect pest and diseases. Weeds are another one of the most detrimental factors in reducing crop yield especially in direct seeded rice. They have reported reduced yield up to 15–90%. Rice is generally grown by broadcasting method in the Rajnandgaon district of Chhattisgarh, gave lower production and productivity of the crop. So the demonstrations were conducted to evaluate the performance of herbicide application in direct seeded rice in farmer's field of villages of Ambargarh Chowki block, i.e. Kaudikasa, Muretitola, Arajkund, Bhagwantola and Netamtola of Chhattisgarh plain in upland rainfed condition.

Keywords: Agave, Evergreen revolution, Zero Budget, Zero Waste

CHHATTISGARH is known as the rice bowl of the country as rice is the main rainy (*kharif*) season crop of Chhattisgarh. In Rajnandgaon district, farmers are growing paddy in very large area, of which 70–80% comes under broadcasting method of sowing. The average productivity of rice is 18.89 q/ha in Chhattisgarh which is far below from national productivity 27.14 q/ha (Agricultural Statistics at a Glance 2020). The main cause for this low productivity is uneven plant population, heavy weed infestation coupled with no or lower basal dose of fertilizers application. Direct seeding of rice is a promising resource conservation technology for rice-wheat cropping system but its adoption is impeded due to heavy weed infestation.

Under the Farmer FIRST Programme, SKS College of Agriculture and Research Station, Rajnandgaon, Chhattisgarh funded by ICAR, New Delhi, adopted five villages (Muretitola, Kaudikasa, Bhagwantola, Arajkund and Netamtola) in tribal area of Ambargarh Chowki block of Rajnandgaon district of Chhattisgarh. The project scientists carried out a field study during *kharif* 2018–19 to evaluate the efficacy of post-emergence herbicides in rice with cultivars, viz. MTU 1010, Rajeshwari, Zinc Rice 2 and IR 64 in direct seed rice at adopted villages. The project scientists introduced dry line sowing of rice by seed-cum-fertilizer drill with post-emergence application of herbicide bispyrabac sodium @200 ml/ha at 20 days after sowing (DAS). A weedy check and



Training and herbicide distribution



Line sowing of paddy (Zinc Rice 2)

manual weeding (20 and 25 DAS) were maintained for comparison. Before implementing demonstrations, PRA survey and group meeting have been conducted by Farmer FIRST Project scientists in the operational villages, so as to identify problems and thrust area. A total of 13 training programmes and 3 method demonstrations were organized. The demonstrations were conducted in 65 ha areas, covered 5 villages during 3 years and compared with existing farmers' practice.

Farmers' practice of rice

Farmers' practice, i.e. broadcasting method of sowing with biasi mainly practiced by the farmers in the district. Biasi is a local practice that is blind hoeing in the standing rice crop one month after broadcasting of seeds. The whole operation depends on rainfall. If delayed in rainfall, biasi operation is also delayed and sometimes if rain not comes during this period farmers left the field as such which results to drastic reduction in yield, i.e. 20–35%.

Effect on yield due to improved technology of rice

The sowing of paddy was done with seed-cum-fertilizer drill with application of post-emergence

application herbicide bispyrabac sodium at 20 days after sowing. The average rice yield was higher (32.50 q/ha) as compared to the existing farmers' practice, i.e. broadcasting sowing with biasi (24.35 q/ha). The percentage increase in yield was 33.47% by improved technology over farmers' practice.

Differences in cost of cultivation for the farmers in operational area

Broadly there are three methods of rice cultivation. FIRST method is broadcasting either dry seed or pre-soaked sprouted seed (soaked for 24 h and incubated for 48 h) in the puddled field. The second method is line sowing of rice with seed-cum-fertilizer drill in well prepared seedbed. The third method is transplanting of seedlings under puddled condition. Cost of cultivation under transplanting method in terms of reduction in labour and inputs is highest followed by in line sowing by seed-cum fertilizer drill and broadcasting method (Table 1).

Economic benefits of the technology

The net monetary return and benefit cost (B:C) ratio were also higher in line sowing with the use of post-



Improved practice (MTU 1010)



Farmers' practice (MTU 1010)

Table 1. Comparative cost of cultivation (₹/ha) under all three methods of rice cultivation

Particular	Broadcasting method	Seed-cum fertilizer drill	Transplanting manual
Field preparation	2500	2500	3000
Seed @20/kg	2000	1600	1000
Sowing/transplanting	300	1500	3600
Fertilizers	3500	4200	4200
Post emergence herbicide		1400	1400
Biassi operation	1800		
Weeding	2500	2500	2500
Spraying pesticide	2000	2000	2000
Harvesting	3750	3750	3750
Threshing	3000	3000	3000
Total (₹/ha)	21350	22450	24450

Table 2. Effect on economic parameter

Particular	Net income (₹/ha)	B:C ratio (₹/ha)
Farmers' practice	49200	2.9
Improved technology	71950	3.7

emergence herbicide bispyrabac sodium over farmers practice (Table 2). Farmers really appreciated the demonstrated technology for controlling the weeds under rainfed upland situation.

Other benefits from the disseminated technology

However cost of cultivation is slightly higher in line sowing by seed-cum fertilizer drill but differences in yield were 8.15 q/ha. Other benefits in comparison to farmers' practice (Broadcasting) includes that rice crop mature 15 days earlier to farmers' practice which promote establishment of succeeding crop chickpea, lentil in residual moisture. The B: C ratio was also higher in line sowing compared with farmers' practice.

SUMMARY

Under Farmer FIRST Programme, scientists successfully initiated dry direct seeded rice with effective weed management at farmers' field of 5 adopted villages in tribal area of Chhattisgarh with improved paddy variety and seed-cum-fertilizer drill. The demonstrations were conducted on line sowing with the use of post-emergence herbicide in rice in 65 ha area. The study revealed that the higher grain yield of rice could be achieved with application of bispyribac sodium applied at 20 DAS at the rate of 200 ml/ha or 200 g/ha. The net monetary return and benefit cost (B: C) ratio were higher in improved demonstrated technology. It is concluded from the trail that the line sowing of rice with application of post-emergence herbicides gave higher yield and net monetary return at farmers' field of Ambagarh Chowki block of Chhattisgarh plain.

*Corresponding author's e-mail: vinamarta_jain@rediffmail.com

Drought-tolerant rice Swarna Sukha Dhan for rainfed upland ecology of Uttar Pradesh

A drought- tolerant rice variety Swarna Sukha Dhan (RCPR 16, IET 24692) was notified and released for cultivation under drought prone rainfed upland ecology in Uttar Pradesh. RCPR-16 (IET 24692) has recorded yield advantage of 11.48 and 19.63% over NDR 97 (best check) and Shusk Samrat (local check) respectively. Swarna Sukha Dhan is a short duration (110–115 days), high-yielding (3.5–4.0 tonnes/ha), and multiple-stresses (drought, diseases and insect pest) tolerant with desirable cooking quality traits. Quality wise IET 24692 showed high hulling (78.4%), milling recovery (70.9%), head-rice recovery (68.4%), medium slender grain type with intermediate amylose content (22.32%) and alkali spreading value (ASV=4.0). It has GC content (49 mm) with very occasionally chalky and medium slender grains indicating good cooking quality.



Source : ICAR Annual Report 2021-22