



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; SP-8(10): 125-127
Received: 26-08-2025
Accepted: 29-09-2025

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Impact of front line demonstration on rice yield and economics through wet direct sowing in West Godavari district of Andhra Pradesh

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DOI: <https://www.doi.org/10.33545/2618060X.2025.v8.i10Sb.4057>

Abstract

Rice is a predominant crop in both Kharif and Rabi seasons and plays a major role in augmenting the income of small and marginal farmers of West Godavari district. Farmers are growing rice by transplanting method, a traditional way of rice cultivation. Therefore, efforts have been made to demonstrate wet direct sowing with package of practices in West Godavari district. The present study was carried out by Krishi Vigyan Kendra, Undi during 2023-24 and 2024-25 in *Rabi* season to assess the impact of wet direct sowing with package of practices on rice yield and economics. The higher rice yield 9000, 8430 and 8715 kg/ha, gross returns (Rs. 196470, 193890 and 195180/ha), net returns (122720, 115740 and 119230) and Benefit Cost ratio of 2.66, 2.48 and 2.57 were recorded under demonstration plot compared to farmers practice during 2023-24, 2024-25 and in pooled data also.

Keywords: Rice, wet direct sowing, cost of cultivation, net returns and yield

Introduction

Rice (*Oryza sativa* L.) is one of the most significant food crops in the world and more than half of the world's population depends on rice. It is the primary dietary source after wheat and provides 43% of the calories needed by over two-thirds of Indians. Therefore, increasing rice production and productivity is essential for eliminating hunger, guaranteeing food security, and serving as a necessary precondition for long-term economic growth (O'donnell, 2010)^[7].

In India Rice crop occupies an area of 478 L ha with a production of 1378 L T and productivity of 2882 kg/ha. Whereas in Andhra Pradesh, it grows in an area of 19 L ha with a production of 74 L T and productivity of 3822 kg/ha [Ministry of Agriculture and Farmers welfare, Govt. of India, 2023-24].

In West Godavari district, paddy is the major crop grown during Rabi with an area of 0.89 L ha, production and productivity of 4.97 lakh T, 5570 kg/ha, respectively [Department of Agriculture and Farmers welfare, Govt. of India, 2023-24].

At present, in west Godavari district rice is cultivated by transplanting method by raising nursery for about 30 days. Later seedlings are pulled and transplanted manually in a zigzag manner without proper spacing in the main field after puddling. The Majority of farmers use over aged seedlings due to delayed monsoon.

The cost of production for various activities has increased by 33% for seed, 45% for chemical fertilizers, 100% for labor, and 35% to 40% for tillage operations over the past five years (Bharath *et al.*, 2022)^[3]. "The cost of transplanting alone is almost 15% of the overall cost of producing rice, and yield loss is sustained when transplantation is postponed because of a labour shortage" (Ponnuswamy *et al.*, 2005)^[8].

Rice is a water intensive crop. impending water crisis and increasing labour costs have forced to search for the alternative crop establishments from traditional transplanting. Due to the challenges of maintaining the nursery, the unpredictable and delayed arrival of rains, the high cost of labour and the off-farm migration of agricultural workers, farmers were forced to use alternative transplanting techniques.

Direct-seeded rice cultivation (DSR), in which seeds are sown directly in the field, requires less

labor than conventional transplanted rice cultivation (TPR), in which seedlings grown in a nursery must be transplanted into the field (Kumar and Ladha, 2011) ^[5]. Direct seeding can cut labor requirements by more than 20% in terms of working hours needed, replacing the labor-intensive and costly process of transplanting of rice seedlings.” (Santhi *et al.*, 1998) ^[10]. Direct seeding is an alternative rice cultivation technology that can reduce the labour and energy requirements for crop establishment and the demand for irrigation water. It offers faster and easier planting, reduces labour requirement, crop maturity 7- 10 days earlier, more efficient water use and less methane emission and often higher profit in areas with an assured water supply. Globally, the DSR technology has demonstrated efficacy in conserving water and increasing rice yield; at present, it accounts for 23% of rice production (Rao *et al.*, 2007) ^[9]. Due to the development of early-maturing varieties, better nutrient management techniques, and increased accessibility to chemical weed control measures, many farmers in northern and eastern India transitioned from puddled transplanted rice to direct seeded rice (DSR) production (Meena *et al.*, 2022) ^[6]. However, due to a number of variables, DSR yields are less constant than transplant yields. In DSR, rice plants must compete with weeds after germination, which is likely to result in low crop growth due to insufficient weed control (Rao *et al.*, 2007) ^[9]. Apart from the sowing techniques unawareness of the farmers about the improved high yielding varieties and adoption of proper package of practices are also the reasons responsible for reducing the production and productivity of paddy (Abraham *et al.*, 2017) ^[1]. Keeping this in view KVK, Undi has conducted front line demonstrations on wet direct sowing with package of practices in rice with a objective of impact of wet direct sowing with package of practices on not only rice crop productivity but also cost benefit performance in farmers fields of West Godavari district.

Materials and Methods

Krishi Vigyan Kendra, Undi has carried out Front Line demonstrations on wet direct sowing with package of practices in rice in farmers’ fields of West Godavari district during Rabi season for two consecutive years i.e., 2023-24 and 2024-25. Trial was conducted in 05 locations every year thus making a total of 10 demonstrations in farmers fields of Akiveedu and Siddhapuram villages. Each FLD plot was in 0.4 ha. Existing farmers practice is traditional transplanting method. While Seed rate: 15 kg/acre, wet seed treatment with carbendazim @ 1g/litre, vvariety: MTU-1121 (non lodging, medium slender,

medium duration, high yielding), Planting method: broadcasting, Pre emergence application of Pyrazosulfuron ethyl @ 80-100 g/acre, Post emergence application of 2,4-D Na salt @ 500 g/acre was displayed in demo plot (Table 1). A total of 10 farmers were selected based on their innovativeness, progressive and activeness in adoption of latest technologies with the help of department officials and direct observation during field visits and interactive meetings. Trainings to farmers, Field days and group meetings were also organized and good agricultural practices in rice crop to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The KVK Scientists used to visit to the demonstrations plots and farmer’s plot (control) on regular basis for close supervision and data collection during the entire process of demonstration programme. During two years apart from yield data, economics were also recorded from assessment plots and control plot separately at the time of harvest.

Table 1: Comparison between demonstration package and farmers’ practice in paddy cultivation

Parameter	Demonstration package practice	Farmers’ practice
Seed rate	38 kg/ha	50 kg/ha
Seed treatment	carbendazim @ 1g/litre	No seed treatment
Sowing method	Broadcasting	Transplanting
Fertilizer dose	180:90:60 (N:P:K kg/ha)	Imbalanced use
Crop duration	Matures 7-10 days earlier than transplanting	Normal crop period
Labour requirement for sowing	One labour for broadcasting	Six to eight for transplanting

Results and Discussion

Yield

The higher rice yield recorded under demonstration plot was 9000, 8430 and 8715 kg/ha during 2023-24, 2024-25 and in pooled data respectively (Table 2). The yield enhancement due to the improved practices was to the tune of 3.23, 2.18 and 2.70 per cent over farmers’ practice. Yield enhancement in rice and other crops under frontline demonstration has amply been documented by Goto *et al.*, 2025 ^[4], Abraham *et al.*, 2017 ^[1].

Table 2: Impact of wet direct sowing on rice yield in farmers fields of West Godavari district during Rabi 2023-24 and 2024-25.

Year	Yield (Kg/ha)		% increase in yield
	Demo	Control	
2023-24	9000	8718	3.23
2024-25	8430	8250	2.18
Pooled	8715	8484	2.70

Table 3: Economics of rice as influenced by wet direct sowing in farmers fields of West Godavari district during Rabi 2023-24 and 2024-25.

Year	Cost of cultivation (Kg/ha)		Gross Returns (Rs./ha)		Net Returns (Rs./ha)		B:C ratio	
	Demo	Control	Demo	Control	Demo	Control	Demo	Control
2023-24	73750	80250	196470	190314	122720	110064	2.66	2.37
2024-25	78150	82050	193890	189750	115740	107700	2.48	2.31
Pooled	75950	81150	195180	190032	119230	108882	2.57	2.34

Economics

Data furnished in Table 3 clearly indicated that demonstrated plot recorded less cost of cultivation during the both the years of study and in pooled data compared to farmers practice plot. This is due to less labour cost in direct sown plot. The higher gross returns (Rs. 196470, 193890 and 195180/ha) were recorded with demonstrated plot when compared to farmers practice (Rs.

190314, 189750 and 190032/ha) during 2023-24, 2024-25 and in pooled data, respectively. Demo plot recorded higher net returns (122720, 115740 and 119230 during 2023-24, 2024-25 and in pooled data, respectively) and Benefit Cost ratio of 2.66, 2.48 and 2.57 compared to control 110064, 107700 and 108882 Rs./ha and 2.37, 2.31 and 2.34 during both the years of study and pooled data as well. The higher gross returns, net returns

and B:C ratio in demo plot might be due to reduced cost of cultivation. These results are in collaboration with the findings of Sidhu *et al.*, 2014^[11], Bairwa *et al.*, 2019^[2].

Conclusion

From the above study, it can be concluded that wet direct sowing with package of practices is performing well in farmers fields of West Godavari district under Front line demonstrations in terms of yield, gross returns, net returns and farmers got high Benefit cost ratio besides overcome the problem of labour shortage compared to transplanting method of rice cultivation.

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