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Impact of drum seeder technology in paddy for higher productivity and profitability in Tungabhadra command area of Koppal district

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Abstract

The front-line demonstration was conducted on drum seeder technology in farmer field for assessment of drum seeder implement under the guidance of scientists of ICAR-Krishi Vigyan Kendra, Gangavathi (Koppal district) Under University of Agricultural Sciences, Raichur Karnataka state for three years during *Kharif* season from 2022-23, 2023-24 and 2024-25. The comparison was made between drum seeder technology and manual transplanting with the objective is to save labour requirement, reduction in cost of cultivation and higher net returns to the farmers. The front-line demonstration (Demo plot) revealed that, higher number of effective tillers (700/m^{-2}), less labour required (3 ha^{-1}), higher yield (67.28 q ha^{-1}) and net returns (Rs. 1,10,507 ha^{-1}) as compared to manual transplanting. The concluded that, drum seeder technology has increased 2.91 per cent yield levels, less requirement of labours and cost saving in paddy nursery maintenance.

Keywords: Drum seeder, FLD, productivity, profitability

Introduction

Rice (*Oryza sativa* L.) is the world's largest food crop, supplying half of the world's population. It meets 27% of your daily calorie needs and 20% of your daily protein requirements. Rice production in India accounts for 20-25% of agricultural output and provides food for more than half of the population (Adhikary *et al*., 2022) [1]. In India, rice occupies an area of 45.0 million hectare with a production of 125.0 million tonnes with an average productivity of 2659 kg per hectare which is almost half of the global average. In Karnataka, rice is grown on an area of 1.39 m ha with an annual production of 4.32 m t and a productivity of 3089 kg ha^{-1} (Anon., 2023) [2].

Frontline demonstration is the new concept of field demonstration developed by the Indian Council of Agriculture Research (ICAR) with main objective to demonstrate newly released crop production and protection technologies and its management practices in the farmers' field under different agro-climatic regions of the country under different farming situations. While demonstrating the technologies in the farmers' field the scientists are required to study the factors contributing higher crop production, field constraints of production and thereby generate production data and feedback information (Meena and Singh, 2020) [5]. The low productivity of paddy crop is due to poor adoption of improved technologies of paddy by the farmers. Hence, the Krishi Vigyan Kendra, Gangavathi (Koppal) has organized frontline demonstrations (FLD's) with drum seeder technology with recommended package of practices. The main purpose of this demonstrations was to reduce labour requirement, lower cost of cultivation and higher net returns and to transfer the latest production technologies to farmers in the district. In Koppal district, more than 39,000 hectares of land is under paddy cultivation during *kharif* season. Taking into account the above considerations, frontline demonstrations (FLDs) were carried out in a systematic manner on farmer's field to show the worth and convincing farmers to adopt drum seeder techniques for higher production.

Materials and Methods

The present investigation of Frontline demonstration was conducted on Direct seeded technology with drum seeder during *Kharif* seasons of 2022-23 and 2023-24 by KVK, Koppal under University of Agricultural Sciences, Raichur (Karnataka). In two consecutive years, three villages (Hanawal, Halagera and Bandiharlapura) blocks of Gangavathi selected for demonstration. Total 30 farmers were selected for the demonstration at farmer fields under puddle conditions. The demonstrations comprised of two treatments *viz.*, T_1: Direct sowing with drum seeder T_2: Farmer practice (Manual transplanting). Farmers were accomplished to follow the package of practices and need based input material were provided to the farmers. All the participating farmers were trained on various aspects of Drum seeder production technologies. Direct sowing with drum seeder, the paddy seeds were soaked in salt water for 24 hours for removal of chaffy seeds and high lightened weight seeds followed by seed treatment with *azospirillum* and also carbendazim seed treated (2g/kg). Uniform dose of FYM @ 5.0 t ha^{-1} and 100:50:50 NPK kg ha^{-1} were applied as per package of practices. Remaining agronomic practices

followed in both plots. The grain yield data was collected from demonstrated plot as well as farmer practices as per treatments.

Fig 1: KVK Scientists are visited drum seeder technology plots

Results and Discussion

Grain Yield

The results of front-line demonstration indicated that, grain yield of paddy from both the plots i.e., demonstration and farmers' practices were compared and an average yield of demonstrated plots was 3.37 per cent higher than that of manual transplanting (Table 1). The results were observed that grain yield under demonstrated plots were 71.55, 64,86 and 65.45 q ha^{-1} with an average of 67.28 q ha^{-1} from the year 2022, 2023 and 2024. However, it was 69.33, 63.21 and 62.50 q ha^{-1} with an average of 65.01 q ha^{-1} observed in manual transplanting. The lower yield during 2023 was mainly due to major stem borer incidence and during 2024 also caused due to smut and lodging of crop. The lower yield in manual transplanting which might be due to planting 4 to 6 older seedlings (25 - 30 days old) with irregular spacing may lead to poor growth, poor tillering, lesser number of panicles per metre square and yield. Earlier reports indicated that grain yield reduction is due to planting of the older seedlings. The similar results were reported by Menete *et al.*, (2008) [6] and Bharatha *et al.*, (2022) [3].

Economics

The economics under front line demonstration were presented in Table 2. In order to find the economic feasibility of the demonstrated technologies (Drum seeder) over manual transplanting. some economic indicators like gross returns, net returns and B:C ratio was worked out. The economic viability of improved demonstrated technology over farmer's practice was calculated depending on prevailing price of inputs. The demonstrated technology was higher gross return (Rs. 1,78,338 ha^{-1}), higher net return (Rs. 1,10,507 ha^{-1}) and higher benefit cost ratio (2.62) on overage of three years as compared to manual transplanting (Table 2). Higher net returns which might be due to lower cost of cultivation and higher grain yield. The similar results were also reported by (Daniela *et al.*, 2017) [4] and (Bharatha *et al.*, 2022) [3].

Table 1 Grain yield under front line demonstration plots and farmers practices

Years	Grain Yield (q/ha)		Per cent increase yield
	Drum seeder techniques (Demo plot)	Manual transplanting (Farmers practices)	
2022-23	71.55	69.33	3.20
2023-24	64.86	63.21	2.61
2024-25	65.45	62.50	4.50
Average	67.28	65.01	3.37

Table 2: Economics under front line demonstration plots and farmers practices

Years	Gross returns (Rs/ha)		Net-returns (Rs/ha)		Benefit cost ratio	
	Demo plot	Farmers practices	Demo plot	Farmers practices	Demo plot	Farmers practices
2022-23	1,57,410	1,52,526	99,410	80,526	2.71	2.11
2023-24	2,20,524	2,14,914	1,46,532	1,27,939	2.98	2.47
2024-25	1,57,080	1,50,000	85,580	66,800	2.19	1.80
Average	1,78,338	1,72,480	1,10,507	91,755	2.62	2.12

Note: Price Rs. 2200, 3400 and 2400/ha during 2022, 2023 and 2024, respectively

Conclusion

The drum seeder technology concluded that, higher number of effective tillers, higher yield and net returns as compared to manual transplanting. The drum seeder technology has increased 2.91 per cent yield levels, less requirement of labours and cost saving in paddy nursery maintenance.

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