



Research Paper

## Comparative Evaluation of Paddy Sowing Methods in Chandrapur District, Maharashtra

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### Abstract

Rice is the principal kharif crop of Chandrapur district, Maharashtra. Rising labour costs, water scarcity during crop establishment, and increasing production expenses have encouraged farmers to adopt alternative rice establishment methods. This paper evaluated and compared major paddy sowing methods, namely Conventional Manual Transplanting (CT), Direct Seeded Rice (DSR), System of Rice Intensification (SRI), and Mechanical Transplanting (MT), based on yield, labour requirement, cost of cultivation, profitability, and resource-use efficiency. Available research indicated that DSR and mechanical transplanting substantially reduced labour requirements and cultivation costs while maintaining yields comparable to those of conventional transplanting. SRI achieved higher yields but generally required greater labour input. For rice-growing regions such as Chandrapur, DSR and mechanical transplanting appeared to be economically viable alternatives to conventional transplanting. These methods can improve resource-use efficiency, reduce production costs, and enhance the profitability of rice cultivation.

**Keywords:** Paddy, Direct Seeded Rice, Mechanical Transplanting, SRI, Yield, Labour Requirement, Benefit-Cost Ratio.

### I. Introduction

Rice occupies a major share of cultivated land in Chandrapur district of eastern Maharashtra. Traditional puddled transplanting remains the dominant method of crop establishment. Chandrapur receives substantial monsoon rainfall and has extensive rice cultivation. The district faces, Seasonal labour shortages, Increasing wage rates, Need for cost reduction, Demand for sustainable water use. However, increasing labour shortages during peak transplanting periods, higher wage rates, and changing rainfall patterns have led farmers to explore alternative sowing techniques.

The major rice establishment methods practiced or promoted in Chandrapur include:

**Conventional Manual Transplanting (CT):** Seedlings are raised in a nursery and transplanted manually into puddled fields. This method ensures good crop establishment, better weed suppression initially, familiar to farmers but high labour demand, high cultivation cost and greater water requirement.

**Direct Seeded Rice (DSR):** Seeds are sown directly into the main field using seed drills, drum seeders, or broadcasting. This method requires lower labour, reduced cultivation cost, earlier crop maturity and lower water use, however, greater weed pressure, requires proper field levelling and sensitive to rainfall irregularities.

**System of Rice Intensification (SRI):** Young seedlings are transplanted at wider spacing with alternate wetting and drying irrigation practices. It has potentially higher yield, better root growth, and improved water productivity but skilled labour required, labour-intensive weeding and difficult adoption on large farms.

**Mechanical Transplanting (MT):** Rice seedlings are transplanted using self-propelled or tractor-operated transplanters. It reduced labour dependency, uniform plant spacing and timely transplanting but it needs higher machinery investment and mat-type nursery preparation. These methods differ significantly in labour requirement, water use, production cost, and profitability.

## II. Materials and Methods

The comparative analysis was based on field evaluations conducted in paddy growing regions of Chandrapur district. Data were compiled to compare major paddy sowing methods practiced in rice-growing areas, to evaluate their effect on grain yield, labour requirement, cost of cultivation, benefit-Cost (B:C) ratio and to identify the most suitable method for Chandrapur district.

## III. Results and Discussion

As per Table 1., The labour requirement in DSR (8-15) was substantially lower than transplanting methods (40-45), while SRI generally required the highest labour input (70-80) due to specialized transplanting and frequent weeding operations. Mechanical transplanting reduced labour (18-25) considerably compared with conventional transplanting DSR significantly reduces expenditure on nursery raising and transplanting operations. Mechanical transplanting reduced labour expenses but involved machinery costs. SRI often incurred higher labour costs despite lower seed rates.

**Table 1. Comparative Performance of Different Paddy Establishment Methods**

| Parameter                           | Conventional Transplanting | DSR                  | SRI           | Mechanical Transplanting |
|-------------------------------------|----------------------------|----------------------|---------------|--------------------------|
| Grain Yield (t/ha)                  | 5.0–6.0                    | 5.0–6.2              | 5.5–7.0       | 5.5–6.5                  |
| Labour Requirement (person-days/ha) | 40–45                      | 8–15                 | 70–80         | 18–25                    |
| Cost of Cultivation (₹/ha)          | 50,000–60,000              | 40,000–50,000        | 55,000–65,000 | 45,000–55,000            |
| Water Requirement                   | High                       | Low                  | Medium        | Medium                   |
| Weed Management Requirement         | Low                        | High                 | Medium        | Medium                   |
| B:C Ratio                           | 1.8–2.5                    | 2.2–3.2              | 2.0–2.8       | 2.3–3.0                  |
| Crop Duration                       | Normal                     | Earlier by 7–10 days | Similar       | Similar                  |

SRI produced the highest yield (5.5-7.0t/ha) under good management, mechanical transplanting generally produced yield comparable to or slightly higher than conventional transplanting, DSR yield was often similar to conventional transplanting when weeds were effectively controlled. Yield differences were usually smaller than differences in production costs. DSR required the least labour because nursery raising and manual transplanting were eliminated. SRI required the highest labour due to precise planting and repeated mechanical weeding. (Table 2)

**Table 2. Labour requirement**

| Method                     | Labour (person-days/ha) |
|----------------------------|-------------------------|
| DSR                        | 9–15                    |
| Mechanical Transplanting   | 18–25                   |
| Conventional Transplanting | 40–45                   |
| SRI                        | 75–80                   |

Studies had consistently reported higher profitability for DSR and mechanical transplanting because of lower cultivation costs and comparable yields. DSR saved 15–30% irrigation water, SRI improved water productivity through alternate wetting and drying and Conventional transplanting required the highest water input.

## IV. Conclusion

The comparative assessment of paddy establishment methods indicated that Direct Seeded Rice (DSR) and Mechanical Transplanting offered the best combination of profitability, labour savings, and production efficiency for Chandrapur district. Conventional transplanting was remained reliable but was increasingly constrained by labour shortages and high production costs. SRI had provided higher yields under ideal management conditions but required substantially more labour and management skill.

Considering yield stability, labour requirement, cost of cultivation, and benefit-cost ratio, DSR was emerged as the most economically attractive rice establishment method for large-scale adoption in Chandrapur district, followed by mechanical transplanting.

### References

- [1]. Farooq, M., Siddique, K. H. M. Rehman, H. Aziz T., Lee, D. J. and Wahid, A. (2011). Rice direct seeding: Experiences, challenges and opportunities. *Soil and Tillage Research*, 111(2), 87-98.
- [2]. Gill, M. S., Kumar, Pardeep and Kumar, Ashwani. (2002). Growth and yield of direct-seeded rice (*Oryza sativa*) as influenced by seeding technique and seed rate under irrigated conditions. *Indian Journal of Agronomy*, 51(4).
- [3]. Kaur, S., and Singh, S. (2016). Energetics, productivity and weed control in different rice (*Oryza sativa*) establishment methods in North-Western Indo-Gangetic Plains. *Indian Journal of Agronomy*, 61(2).
- [4]. Gathala, M. K., Ladha, J. K. Kumar, Sharawat Y. S., Kumar V., Sharma P. K., Sharma S. and Pathak H. (2011). Tillage and crop establishment affects sustainability of South Asian rice wheat system. *Agronomy Journal* 103(4): 961-71.
- [5]. Kumar, A. et al. (2018). Rice root growth, photosynthesis, yield and water productivity improvements through modifying cultivation practices and water management. *Agricultural Water Management*, 206, 67-77.