

Original Research Article

<https://doi.org/10.20546/ijcmas.2022.1104.031>

Comparative Study of 3 Row Manual Rice Transplanter with Traditional Manual Transplanting

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ABSTRACT

Keywords

Transplanter, field capacity, rice, no. of tiller, benefit cost ratio

Article Info

Received:

15 March 2022

Accepted:

05 April 2022

Available Online:

10 April 2022

Rice is the major cereal in Odisha. In Jajpur district rice is also taken as the first cereal crop by most of the people in their diet. It is grown in an area of more than 1.25 lakh ha with a production of about tones of paddy per year in Jajpur district. Farmers are preferred transplanting than direct sowing of paddy. As line transplanting is increasing the production. An attempt in this paper has been made by Krishi Vigyan Kendra, Jajpur to find the efficacy of 3 row rice transplanter developed by Odisha University of Agriculture and Technology over manual line transplanting. Economic analysis from both the methods of transplanting showed that cost of cultivation for manual transplanting was more than that of mechanical transplanting. A benefit cost ratio of 2.05 was found in case of mechanical transplanting than that of manual transplanting i.e., 1.65.

Introduction

Rice is one of the staple food crop of our state Odisha (Patra and Nayak, 2001). Transplanting is generally preferred over direct sowing of seeds due to severe problem of weeds (Obulamma and Reddy, 2002). Rice is the major cereal in Odisha. Transplanting is the major labour intensive work in rice cultivation. It is found that the production increases 10-12 percent in transplanting in comparison to direct sowing. Transplanting of seedling in puddled field is the widely accepted practice in rice cultivation (Goel and Verma, 2000).

Both male and female are involved in this tedious work. Now- a- days shortage of labour and high labour cost is one of the major issues of concern as it leads to failure of scheduled transplanting of rice.

Transplanting operation takes around 22.3% of total time. In India several attempts have been taken to mechanize this transplanting operation by introducing various transplanters. In this process many types of manual rice transplanters like 4-row, 3- row and 2- row have been developed to reduce drudgery and to improve the efficiency by saving the transplanting time.

In Jajpur district rice is also taken as the first cereal crop by most of the people in their diet. It is grown in an area of more than 1.25 lakh ha in Jajpur district. Farmers generally prefer transplanting than direct sowing of paddy as line transplanting is increasing the production. An attempt in this paper has been made to find the efficacy of 3- row- rice transplanter developed by Odisha University of Agriculture & Technology over manual line transplanting. This study was conducted in *Kharif* season 2018. The transplanter has been tested in three different villages i.e. Achyutpur, Niladeipur and Choromuha village of Dharmasala block.

Materials and Methods

In this study Swarna variety paddy had been taken as this variety is widely cultivated in the district and it is grown in medium land. Mat type nursery was grown for use in OUAT- 3- row transplanter prior to 15-20 days of transplanting. For mat type nursery preparation seeds have been first cleaned with water and the chaffs were discarded. Then seeds were soaked in water for 24 hours.

After that the excess water was drained out and was covered with a gunny bag for next 12 hours for germination. Nursery bed of 1.5 meter width is prepared with puddled mud. On the bed one polythene is spread and the air is removed between polythene and bed. Good puddled mud of one inch height has been spread over the polythene which is free from clods, stones, roots and other foreign materials and then the germinated seeds were uniformly spread over the polythene.

Then straws were covered to protect the seeds from birds. After 3 days the seedlings came out and the straws were removed and watering was done by rosecane whenever required. Around 15-20 days seedlings were ready for transplanting.

The details of specification of OUAT 3 row transplanter has been given in Table 1. (Bhuyan & Mohanty, 2017) and the step wise operation photographs has been given in Table 2.

Results and Discussion

From the study it was found that average plant height (cm), number of tillers per hill, number of plants per meter square and grain yield (q/ha) of swarna variety rice in mechanically transplanted plot was 120.5 cm, 16, 32 and 45.20 q/ha respectively whereas it was 119.6 cm, 12, 35 and 41.50 q/ha in control plot where manual transplanting was done. The percentage change in yield was 8.92%.

Uphoff (2002) has explained that the difference in yield and yield attributing characters may be due to age of seedlings in nursery.

The transplanting of young aged seedlings (twenty days old seedling) along with soil and roots intact resulted in early adaptation of seedlings to the soil thereby showing better yield performances than transplanting of twenty five to thirty days old seedling in manual transplanting. Moreover, roots of seedlings in mat nursery are less likely to get damaged by uprooting or cutting of mat for transplanting. In mechanical transplanting, 2-3 seedlings per hill were planted whereas in manual transplanting generally, 4-5 seedlings were planted. The difference of number of seedlings while transplanting by both methods also contributed to difference in yield and yield attributing characters.

The reason for difference is well explained by Maiti and Bhattacharya (2011) and Rasool *et al.*, (2013) where they reported that planting fewer numbers of seedlings per hill produced more healthy leaves and tillers and ultimately produced higher grain yield.

More number of tillers and higher yield may also be due to proper row to row and plant to plant spacing in mechanically transplanted paddy over random manual transplanting. The comparative study of cost economics of both the transplanting methods was presented in Table 4. From Table 4, it can be found out that cost of preparation of mat nursery for mechanical transplanting of paddy (Rs.1950) was higher than that of conventional nursery bed preparation for manual transplanting (Rs. 800).

Table.1 Specification of OUAT- 3- row transplanter.

Sl. No	Details	Specification
1	Name	OUAT 3 row transplanter
2	Type	Manual (using mat type nursery)
3	Dimension (L×W×H) in mm	600× 600× 940
4	Weight (kg)	18
5	No. of rows	3
6	Row spacing (cm)	24
7	Planting depth(cm)	3-4
8	No. of hills per square meter	30-35
9	No. of seedlings per hill	2-5
10	Area coverage (ha/day)	0.066
11	Mandays/ha	15.15
12	Force requirement (kgf)	14.8
13	Field efficiency (%)	58%
14	Cost of transplanter, Rs	8500/-

Table.2 The parameters of the present study was given in Table 2.

Parameters	Farmer's practice	Three row manual transplanter(OUAT)
Average Field capacity(ha/h)	0.004	0.016
Average labour requirement(mandays/ha)	38	12
Average no. of seedlings/hill	5	3
Average no. of hills planted /m ²	35	32
Missing hills(%)	Nil	2%
Floating hills(%)	Nil	nil
Row spacing(cm)	22cm	24
No. of tillers per hill(no)	12	16
Yield(q/ha)	41.50	45.20

Table.3 Comparative study of Cost economics

Parameters	Manual transplanting	3-row- manual transplanter
Cost of nursery preparation (Rs/ha)	800	1950
Cost of transplanting (Rs/ha)	11,400	4750
Cost of cultivation(Rs/ha)	41,550	36,350
Gross income(Rs/ha)	68,475	74,580
Benefit cost ratio(B:C)	1.65	2.05

Fig.1 Photographs of step wise operation



Also, from the table it can be concluded that labour charge for transplanting (Rs.1250) and weeding operations (Rs.1000) was reduced in mechanical transplanting over manual transplanting (Rs.5500) due to use of mechanical paddy transplanter and power weeder.

Due to maintenance of proper row to row and plant to plant spacing in mechanical transplanting method it was easy for intercultural operation like weeding and spraying.

Economic analysis from both the methods of transplanting shows that cost of cultivation for

manual transplanting (Rs.41550/- per ha) was more than that of mechanical transplanting (Rs.36350/- per ha). Gross return for both manual and mechanical transplanting was Rs. 68475 and Rs.74580/- respectively.

Net return for mechanical transplanting (Rs.38230/-) was also higher than manual transplanting (Rs. 26925/-). A benefit cost ratio of 2.05 was found in case of mechanical transplanting than that of manual transplanting *i.e.*, 1.65. Thus, it can be concluded that mechanical transplanting of paddy has more profitability than conventional manual transplanting and can boost up farmer's economy.

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How to cite this article:

Bijayalaxmi Mohanta. 2022. Comparative Study of 3 Row Manual Rice Transplanter with Traditional Manual Transplanting. *Int.J.Curr.Microbiol.App.Sci*. 11(04): 239-243.
doi: <https://doi.org/10.20546/ijemas.2022.1104.031>