

PERFORMANCE TESTING OF FOUR ROW SELF PROPELLED PADDY TRANSPLANTER

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Abstract: Field Trials were conducted at Krishi Vigyan Kendra, Bhandara (Sakoli) as well as on farmers field in 10 different villages during kharif 2011 with view to reduce cost of transplanting operation of paddy crop. A self propelled four row paddy transplanter (MAHINDRA Model) was used for the transplanting purpose. The performance of the mechanical self propelled paddy transplanter was found quite satisfactory. The field capacity, field efficiency and fuel consumption of the four row self propelled paddy transplanter were 0.1 ha/h, 65% and 10 lit/ha, respectively. The cost of mechanical transplanting was found to be 1500 Rs/ha as compared to Rs 5000 Rs/ha as in case of traditional method of manual transplanting followed by farmers in the region. Crop yield in both manual and mechanical transplanting was found at par with average grain yield. The machine was found to be farmer friendly and feasible in terms of time, money and labour requirement as compared to manual method transplanting of paddy.

Keywords: Mechanized transplanting, four row paddy transplanter, field capacity, field efficiency, feasibility.

Introduction

Rice is one of the most important crop and staple food of millions of people which is grown in many countries of the world. The total area planted under rice crop in India is 42.20 million ha, which is the largest in the world as against the total area of 148.40 million ha (Choudhary and Varshney, 2003). Paddy is largely grown traditionally by manual transplanting. Manual transplanting requires a lot of labours besides involving drudgery and is also very expensive. Scarcity of labours is another major problem in some paddy growing area of the country. Manual transplanting takes about 250-300 man hours/ha which is roughly about 25 per cent of the total labour requirement of the crop. Hence, less expensive, farmer friendly and labour saving method of paddy transplanting is urgently needed. The mechanical transplanting of paddy has been considered the most promising option, as it saves labour, ensures timely transplanting and attains optimum plant density that contributes to high

productivity. Keeping this in view, the study was conducted on self propelled four row paddy transplanter to minimize the cost of transplanting of paddy crop through farm mechanization.

Material and Methods

On farm testing and field demonstrations were conducted at Krishi Vigyan Kendra and Agriculture Research Station, Sakoli Dist. Bhandara (M.S.) during kharif 2010-2012 to study the economic feasibility of self propelled four row paddy transplanter for transplanting of paddy. The field trials/field demonstrations were also carried out on farmers field. The soil of the experimental site was sandy loam. The experiment consisted of evaluation of field performance of the mechanical transplanter in comparison with manual transplanting. For this a four row self propelled paddy transplanter (PF4555) was used. The detailed technical specifications of self propelled four row paddy transplanter used are shown in Table 1. Experimental details in respect of crop variety, area covered, date of paddy transplanting and harvesting, etc. are presented in Table 2. Speed of operation, width of working, total time required to cover the area and the fuel consumption were recorded.

Mechanical transplanting requires a special type of seedlings raised on mat type nursery. Raised beds of 58 cm length, 28 cm width and 19 cm height were prepared. Polythene sheet of 28 cm width and 50 micron thickness was used. Soil was sieved and mixed with equal proportion of sand and farm yard manure and spread over the polythene sheet to a depth of 1.9 cm. Sprouted seeds were spread uniformly on the polythene sheet and pressed gently. They were covered with paddy straw and watered for four days. After the fourth day paddy straw was removed and seedlings were grown normally by regular watering. After 15 days the seedlings mats were fed to the mechanical self propelled four row paddy transplanter. In case of manual transplanting method, paddy nursery was raised following the recommended package of practices. Transplanting was done using mechanical transplanter by running lengthwise of the field on the puddled and leveled land with water level in the field kept up to 2 cm only to avoid floating of the seedlings. Observations on speed of operation, depth of placement of seedlings, number of seedlings per hill, number of missed hills, time taken for turning, time taken for loading of seedling mat on to the transplanter, total time taken for transplanting, total area covered, width of coverage and fuel consumption for the transplanting operation were recorded. The following parameters were studied to study the performance testing of the self propelled four row paddy transplanter.

1. Theoretical field capacity was calculated based on the speed of operation and width of cutting of the machine.

2. Actual field capacity was calculated based on area covered and actual time taken for covering the area including the time lost in turning.
3. Field efficiency was obtained by dividing actual field capacity by the theoretical field capacity.
4. Labour saving by using the machine compared to manual transplanting was also studied.
5. Cost of mechanical transplanting per ha was worked out after taking into consideration the fixed cost, labour cost, fuel cost, field capacity of the equipment and usage of the machine in ha per year and was compared with the manual transplanting.

Results and Discussion

Paddy transplanting was done using self propelled four row paddy transplanter. Based on the field testing conducted during kharif 2010-11, 2011-12, it was observed that the number of seedlings transplanted per hill was and the depth of seedlings transplanted about cm in case of mechanical transplanting. The actual field capacity of the self propelled four row transplanter was 0.12 ha/h with a field efficiency of 78% at an average operating speed of 1.2 kmph (Table 3). It took 8 h to transplant 1 ha area and the fuel consumption was 8.0 l/ha or 1.0 lit/h.

The working performance of the self propelled four row paddy transplanter was found to be satisfactory. The labour requirement was found to be 2 man days per hectare compared to 32 man days of labour per hectare in manual transplanting of paddy. Thus, it saved 30 man days of labour per hectare.

Table 1. Technical Specifications of 4 row self propelled paddy transplanter

Sl. No.	Particulars	Machine specifications
1.	Make and model	PF4555
2.	Name	Mahindra Rice transplanter
3.	Type	Walking behind
4.	Over all dimensions , cm	
A	Weight , kg	170
B	Length, cm	245
C	Width, cm	148
D	Height, cm	84
5.	Fuel capacity of tank, liter	3.2

6.	Power	3 HP Air Cooled 4 stroke petrol Engine
7.	Diver	One
8.	Transplanting speed, kmph	1.22 to 2.66
9.	Traveling speed, kmph	5.18
10.	No. of rows	4
11.	Type of Nursery	Mat Type
12.	Row spacing, cm	30
13.	Hill spacing, cm	12.2/13.8/15.7
14.	No. of sampling per hill	3 – 5
15.	Width of Mat Nursery, cm	28
16.	Length of mat nursery, cm	58
17.	Depth of mat nursery, cm	1.9
18.	Field Capacity, sq- m per hr	1760
19.	Price, Rs	2,75,000/-

Table 2. Details of the demonstrations

Sr. No.	Particulars	Kharif 2010-2011		Kharif 2011-2012	
		Mechanical transplanting	Manual transplanting	Mechanical transplanting	Manual transplanting
1.	Paddy variety	PKV HMT	PKV HMT	PKV Kisan	PKV Kisan
2.	Area, ha	1.00	0.25	1.00	0.25
3.	Plant height, cm	88.28	88.20	90.62	90.60
4.	No. of spikelets/panicle	166	165	156	157
5.	No. of panicles/m ²	248	251	268	274
6.	Panicle length, cm	17.5	18.2	20.5	21.4
7.	Test weight, g	13.52	13.60	16.04	16.10
8.	Grain yield, q/ha	31.48	31.62	36.50	36.85

Table 3. Field performance of four row self propelled paddy transplanter

Sr. No.	Parameters	Kharif 2010	Kharif 2012
1.	Date of transplanting	10.08.2010	24.08.2012
2.	Speed of operation,	3.2	3.2

	km/h		
3.	Width of operation, m	1.2	1.2
4.	Time taken to cover 1 ha area	3.30 h	3.45 h
5.	Depth of seedlings transplanted, cm	5	5
6.	Theoretical field capacity, ha/h	0.29	0.28
7.	Actual field capacity, ha/h	0.176	0.178
8.	Field efficiency, %	70	72
9.	Labour requirement, man days/ha	11	11
10.	Fuel consumption, l/ha	5.70	5.80
11.	Cost of mechanical transplanting, Rs/ha	1500	1500
12.	Cost of manual transplanting, Rs/ha	5000	5000

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