

Performance of tractor operated seed drill for sowing of paddy

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Abstract

The study was conducted to assess the performance of tractor operated seed drill for sowing of paddy seeds. The field tests were conducted on sandy loam soil. The treatments were T1- Random transplanting of Seedlings at 35 to 45 days, with two hand weedings, T2- Direct drilling of paddy seeds in friable soil by seed drill at the onset of monsoon with pre-emergence application of Pendimethalin at 1.0 kg/ha and one hand weeding. Paddy sowing using seed drill showed better results over farmers practice and recorded higher yield. The field capacity and average yield was found to be 0.67 ha/h and 33.15 q/ha, respectively compared to 0.125 ha/h and 25.73 q/ha observed in case of conventional method. The tractor operated seed drill was found to be better compared to conventional method of transplanting of paddy seedlings. The technology assessed performed better over farmers practice.

Keywords: Drilling, transplanting, seed drill

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 areas 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.

Problems identified:

1. Low yield in paddy
2. Labour shortage at peak period
3. Higher cost of cultivation

Considering the above points, the assessment of seed drill was done at farmers fields for three years (2009/2010/2011). The comparison was made between conventional method of sowing (Random transplanting of Seedlings at 35 to 45 days, with two hand weedings) and paddy sowing using seed drill (Drilled paddy). Seed drill not only conserved the time and energy, but also reduced the cost of cultivation, and increased the crop yield.

Materials and Methods**Laboratory Testing**

The nine furrows tractor mounted seed drill was tested in laboratory before taking to actual field conditions. PKV-HMT variety of wheat was selected for the study. The seed were passed through the grooves of the fluted roller to check the regularity of flow and damage. The line to line spacing of seed drill was adjusted at 20 cm. The machine was calibrated for 70 kg/ha normal conditions. The calibration for fertilizer per hectare was also done.

Calibration of seed drill

The seed-drill was calibrated for paddy sowing using the metering mechanism. The seed-drill was placed on a level ground and jacked up to facilitate the rotation of ground drive wheel freely. Laboratory test was carried for ten revolution of ground drive wheel for each exposure length of fluted rollers. The following steps were followed for calibration of seed-cum fertilizer drill (Sahay, 1990).

1. Determine the nominal width (W) of drill

$$W = M \times S$$

Where M is the number of furrow openers and S is the spacing between the openers in metre and W is in metre

2. Find the length of a strip (L) having nominal width W necessary to cover $1/25^{\text{th}}$ of a hectare

$$L = \frac{10000}{W} \times \frac{1}{25} = \frac{400}{W} \text{ metres}$$

3. Determine the number of revolutions (N) the ground wheel has to make to cover the length of strip (L)

$$\Pi \times D \times N = \frac{10000}{W} \times \frac{1}{25}$$

$$= \frac{400}{\pi \times D \times W} \text{ rev/min}$$

4. Jack up the drill so that the ground wheel turns freely. Make a mark on the drive wheel and a corresponding mark at a convenient place on the body of the drill to help in counting the revolutions of the drive wheel.
5. Put the selected seed and fertilizer in the respective hoppers. Place a sack or a container under each boot for seeds and fertilizers.
6. Set the rate control adjustment for the seed and the fertilizer for maximum drilling. Mark this position on the control for reference.
7. Engage the clutch or on-off adjustment for the hoppers and rotate the drive wheel at the speed N

$$N = \frac{400}{\pi \times D \times W} \text{ rev/min}$$
8. Weigh the quantity of seed and fertilizer dropped from each opener and record on the data sheet
9. Calculate the seed and fertilizer dropped in kg/ha and record on the data sheet.
10. Repeat the process by suitable adjusting the rate control till desired rate of seed and fertilizer drop is obtained.

The seed drill was field evaluated in comparison to conventional system (Random transplanting of Seedlings at 35 to 45 days, with two hand weedings) for raising paddy crop during the Kharif season over an area of 0.20 ha at farmers field. The test conditions during the assessment of seed drill are given in Table 1.

Table 1: Test conditions during the assessment of seed drill

Sr. No.	Particulars	2009-10	2010-11	2011-12
1.	Farming situation	Rainfed	Rainfed	Rainfed
2.	Location	Farmers field	Farmers field	Farmers field
3.	Type of soil	Sandy loam	Sandy loam	Sandy loam
4.	Field preparation	Ploughing and harrowing for making soil friable before direct drilling	Ploughing and harrowing for making soil friable before direct drilling	Ploughing and harrowing for making soil friable before direct drilling

Performance of technology with performance indicators

1. Field capacity
2. Population of established plant in unit area
3. Labour requirement, man-h/ha
4. Cost of operation, Rs/ha
5. Yield, q/ha

Results and Discussion

Assessment of seed drill for sowing of paddy

Seed drill was field evaluated at farmer fields for raising paddy crop in comparison to conventional method. It was found that paddy seed was germinated uniformly without any gap using the seed drill. Data related to machine performance, crop growth and yield are presented in Table 2.

The field capacity by conventional method was found to be 0.125 ha/h whereas by tractor operated seed drill, it was found to be 0.67 ha/h. Labour requirement for sowing of paddy was much less compared to conventional paddy transplanting method since the operation such as puddling of fields, nursery preparation for seedlings and transplanting of seedlings is avoided. The plant population in unit area was more by seed drill compared to conventional paddy transplanting method. Maximum yield was found to be 48.10 q/ha by seed drill compared to 37.75 q/ha by conventional transplanting method. The farmers reported saving drudgery, time and money as the operations of puddling of field, nursery preparation for seedling and transplanting of seedling was avoided. Sowing by seed drill required less time and gave more yield compared to transplanting method but there is need to keep land ready well in advance and sowing before start of rains to avoid the effects of heavy rains on germination of crop.

The average grain yield received for three years with seed drill machine was about 33.15 q/ha which was higher than conventional system in which it was about 25.73 q/ha. Thus, the farmers appreciated the machine and are ready to accept the technology. They wanted to use the machine for large area seeding. The performance evaluation of 9 rows seed drill was conducted by raising of paddy crop in field during kharif season. Paddy sowing using tractor operated seed drill requires less time and gave more yield compared to conventional method of transplanting of paddy seedlings.

Table 2: Field performance of tractor operated seed drill for sowing of paddy

Parameters of assessment	2010-11		2011-12		2012-13	
	Conventional method	Sowing of paddy using seed drill	Conventional method	Sowing of paddy using seed drill	Conventional method	Sowing of paddy using seed drill
Field capacity, ha/h	0.125	0.63	0.125	0.63	0.125	0.67
Cost of operation, Rs/ha	4800	498	4800	498	4800	498
Labour requirement, man-h/ha	180	15	180	15	180	15
Yield, q/ha	18.75	22.19	20.67	29.15	37.75	48.10

The performance of the seed drill was found more satisfactory in field compared to conventional paddy transplanting method.

Conclusion

Sowing of paddy using tractor operated seed drill was found to be more economical for the farmers as it reduced the cost of production and give higher yield compared to conventional method of paddy transplanting.

References

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