

Performance of tractor operated seed drill for direct seeding in rice

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Received : 28.11.2016; Revised : 20.03.2017; Accepted : 28.03.2017

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■ **ABSTRACT** : The study was conducted to assess the performance of tractor operated seed drill for sowing of rice seeds at Krishi Vigyan Kendra, Dantewada. The field tests were conducted on sandy soil. The treatments were random transplanting of seedling at 35 to 45 days with two hand weeding (T_1) and direct drilling of rice seeds in friable soil condition by seed drill at the onset of monsoon with one hand weeding. The field capacity and average yield was found to be 0.46 ha/hr and 35.00 q/ha, respectively compared to 0.120 ha/hr and 29.90 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 better performance over farmers practice to reduce cost of cultivation and increase net profit.

■ **KEY WORDS** : Drilling, Transplanting, Seed drill, Field capacity

■ **HOW TO CITE THIS PAPER** : Tayade, Narendra Haridas (2017). Performance of tractor operated seed drill for direct seeding in rice. *Internat. J. Agric. Engg.*, **10**(1) : 199-201, DOI: 10.15740/HAS/IJAE/10.1/199-201.

Rice is one of the most important crop and staple food of million of people. The total area under rice during *Kharif* season in India was 37.48 million hectares with the productivity of 88.02 million tones in 2014 (Anonymous, 2015). Rice is largely grown traditionally by manual transplanting. Manual transplanting requires a lot of labours besides involving drudgery and is also very expensive. Scarcity of labour is another major problem in some rice growing areas of the country. Manual transplanting takes about 250-300 man hr/ha which is roughly about 25 per cent of the total labour requirement of the crop. Hence, less expensive, farmers friendly and labour saving method of rice drilling is urgently needed. The mechanical drilling of rice has been considered the most promising option as it saves labour, ensure timely sowing and promising option as it saves

labour, ensure timely sowing and attains optimum plant density that contributes to high productivity. Keeping this in view, the study was conducted on nine row seed cum fertilizer drill to minimize the cost of sowing of rice crop through farm mechanization.

Problem Identified: 1. Low yield in rice 2. Labour shortage at peak period 3. Higher cost of cultivation.

Considering the above points, the assessment of seed drill was done at farmers field for 2014-15 year. The comparison was made between conventional method of sowing (random transplanting of seedlings at 35 to 45 days, with two hand weeding) and rice sowing mechanically using seed drill. Seed drill not only conserved the time and energy but also reduced the cost of cultivation and increased the crop yield.

■ METHODOLOGY

Laboratory testing :

The nine furrows tractor mounted seed drill was tested in laboratory before taking to actual field conditions. Samleshari variety of rice 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 rice sowing using the metering mechanism. The seed-drill was placed on a level ground and jacked upto 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, 2004).

- Determine the nominal width (W) :

$$W = M \times S$$

where, M is the number of furrow openers, S is the openers in meter and W is in meter

- Find the length of a strip (L) having nominal width W necessary to cover 1/25th of a hectare

$$L = 10000/W \times 1/25 = 400/W \text{ meters}$$

- Determine the number of revolution (N) the ground wheel has to make to cover the length of strip (L)

$$\Pi \times D \times N = 10000/W \times 1/25$$

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

- 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 revolution of the drive wheel.

- Put the selected seed and fertilizer in the respective hoppers. Place a sack or a container under each boot for seeds and fertilizer.

- Set the rate control adjustment for the seed and the fertilizer for maximum drilling. Mark this position on the control for reference.

- Engage the clutch or on-off adjustment for the hoppers and rotate the drive wheel at the speed N

$$N = 400/\Pi \times D \times W \text{ rev/min}$$

- Weight the quantity of seed and fertilizer dropped in kg/ha and record on the data sheet

- Repeat the process by suitable adjusting the rate control till desired rate of seed and fertilizer drop is obtained.

The evaluation of nine row seed drill was conducted by rising rice crop in field. The seed drill was evaluated in field in comparison to conventional system (Random transplanting of seedling at 35 to 45 days, with two hand weedings) for raising rice crop during the *Kharif* season over an area of 8 ha at farmers field. The test conditions during the assessment of seed drill are given in Table A.

Table A : Test conditions during the assessment of seed drill		
Sr. No	Parameters	Particulars
1.	Farming situation	Rain fed
2.	Location	Farmers field
3.	Type of soil	Sandy loam
4.	Type of land	Medium
5.	Field preparation	Ploughing and harrowing for making soil friable before direct drilling

Performance of technology with performance indicators :

- Field capacity ha/hr
- Population of established plant in unit area
- Labour requirement, man-h/ha
- Cost of operation, Rs./ha
- Yield, q/ha
- B:C

■ RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Assessment of seed drill for sowing of rice :

Seed drill was evaluated at farmers field for raising rice 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 1.

The field capacity by conventional method was found to be 0.120 ha/hr whereas by tractor operated seed drill, it was found to be 0.46 ha/hr (Table 1). Labour requirement for sowing of rice was much less compared

Table 1 : Parameters recorded of seed drill for line sowing of rice

Treatment	Parameters recorded				
	Field capacity (ha/hr)	Cost of operation (Rs./ha)	Labour requirement (man-hr/ha)	Yield (q/ha)	B:C
T ₁ -Conventional method	0.120	5200	190	29.90	1.77
T ₂ - Sowing of rice using seed drill	0.46	562	17	35.00	2.68

**Fig. 1 : Line sowing of rice by using seed drill**

to conventional rice transplanting method since the operation such as puddling of field, nursery preparation for seedlings and transplanting of seedlings is avoided. The plant population in unit area was more by seed drill compared to conventional rice method. Maximum yield was found to be 29.90 q/ha by seed drill compared to 35.00 q/ha by conventional transplanting method. The farmers reported saving drudgery, time and money as the operation of puddling of field, nursery preparation for seedling and transplanting of seedling was avoided. Sowing by seed drill machine 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 rain to avoid the effects of heavy rains on germination of crop.

The average grain yield increased 17.05 per cent with seed drill machine as compared to conventional system. Thus, the farmers appreciated the machine and are ready to accept the technology. They wanted to use the machine for large area seeding. Rice sowing using

tractor operated seed drill requires less time and gave more yields compared to conventional method of rice transplanting. The performance of the seed drill was found more satisfactory in field compared to conventional rice 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 gave higher yield compared to conventional method of rice transplanting.

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