

Drum Seeding is a Cost Effective method of Paddy Cultivation in Muzaffarnagar District

A.K. KATIYAR, SHIV KUMARV AND PRAMOD KUMAR

Krishi Vigyan Kendra- Muzaffarnagar (U. P.)

Abstract

The On Farm Testing experiments were conducted during three consecutive kharif seasons 2013-15 and four villages of District Muzaffarnagar. The plot size adopted was 200 m² area. In drum seeding method, the seeds were soaked in water for 24 hours then kept in moist gunny bag in warm place for 36 hours for pre-germination. Then pre-germinated seeds were sown in the main field with the help of the drum seeder. SRI method used 10-12 old nurseries for planting. The yield was increased 5.3 and 7.7 percent from SRI method and drum seeder method of planting respectively over old hand planting. The net profit in rupees were increased 18.37 and 33.34% SRI method and drum seeder method of planting respectively. The benefit cost ratio were maximum from drum seeder (1:2.11), SRI method (1:1.92) and lowest (1:1.74) from manual transplanting.

Keywords: pre-germination, villages, SRI, benefit cost ratio, profit

Introduction

Rice is the most staple food crop in Muzaffarnagar district of Uttar Pradesh in India. To mitigate the growing population, paddy production should rise to 120 million tonnes by 2020. India has diverse climatic and soil conditions throughout the country. District Muzaffarnagar is endowed with variety of soil conditions ranging from Medium to highly productive fertile land. Paddy is more suited to medium to high rainfall regions because it requires abundant moisture either through rainfall or irrigation to keep the soil under saturation throughout its life period. Water is the most critical input in order to assure the crop production. However, the cost of production for paddy crop is drastically increased because of enhanced rates of fertilizers and labour wages, due to more demand for labour at the time of transplantation. Under such conditions, the paddy nurseries are growing older and transplantation becomes delayed and limits the net income of the farmer and increases the crop duration. Nursery raising, transplanting, weeding and harvesting and its processing consume most of the labour requirement in paddy cultivation and emphasis should be given for mechanizing these operations in order to reduce the labour requirement in paddy cultivation. Paddy field mechanization is one of the most important necessities for higher yield in future. Hence, in order to reap maximum returns, the cost of cultivation has to be reduced through minimizing the dependence on labour for some of the operations like planting, weeding etc. Recently effort has been made to fabricate very simple

machines like manually operated drum which helps in reducing the investment on labour for planting as they do not consume huge labour force. Hence, an effort has been made in this investigation to evaluate performance of these machines as compared to traditional methods (hand planting) of paddy cultivation. SRI method is also under observation in this region over traditional practice. Muzaffarnagar District increasing area under Basmati Paddy production since few years due to less profit and delay payments received from main crop sugarcane.

Materials and Methods

The On Farm Testing experiments were conducted during three consecutive kharif seasons of 2013, 2014 and 2015 at four villages (Lakhan, Jeevna, Haider Nagar and Rasoolpur Jatan) of District Muzaffarnagar and laid out in large plots with four replications as villages. The plot size adopted was 200 m² area. In drum seeding method, the seeds were soaked in water for 24 hours then seeds were removed and kept in moist gunny bag in warm place for 36 hours for pre-germination. Then pre-germinated seeds were sown in the main field with the help of the drum seeder. The spacing between two rows of paddy sown with drum seeder was 25 cm. The raising of nursery and manual transplanting are both labour intensive and costly propositions (Das, 2003). SRI (System of paddy intensification) method transplanting by hand using 01-12 day old nursery were used with spacing 25x25 cm, the seedlings were raised by wet nursery methods. The

pre-germinated seeds were sown on the respective nursery beds on the same day when seeds were drum seeded directly in the main field. Twenty-five days old seedlings were used for planting by hand. In hand transplanting, random method of planting were adopted. The necessary care was taken to maintain recommended plant population (about 40-45 hills per m² area). Pusa Basmati-1509 medium duration semi dwarf paddy variety was used in all the methods of paddy cultivation. Recommended dose of fertilizer (120:60:40 kg N, P and Kg/ ha) was applied as per package of practices. Weeding was done one time (30-35 DAP) manually in hand planting and in drum seeding planting method one pre emergence and one cono-weeder weeding were required. In SRI method, weeding was done twice (20 DAP by cono-weeder and 40 DAP by manual). The observations viz., yield parameters, grain yield were recorded at harvest. The cost of cultivation were worked out based on the labour and input cost incurred towards paddy cultivation in different methods and based on the prevailed market paddy of outputs, the economics was worked out. The cost of operation of drum seeder is INR 32.73 per hour and INR 297 per hectare (Chavan and Palkar, 2010).

Results and discussion

The data on grain yield of paddy influenced by different methods of paddy cultivation are presented in table 1. The results showed that there was difference in grain yield recorded with different methods of paddy cultivation during kharif seasons of 2013, 2014 and 2015 in pooled data. The data indicated that the grain yield of paddy recorded with on an average over three years, maximum grain yield was recorded by drum seeder method (48.90 q/ha) closely followed by SRI planted paddy (47.80 q/ha) which were found to be on par with each other but superior over traditional hand planting method (45.40 q/ha). Murumkar *et al.* (2014) showed that use of paddy drum seeder increased the grain yield compared to farmers practice of broadcasting. Drum seeder technology reduced the seed rate compared to broadcasting of seed on puddled

soil and resulted in higher returns to farmers over normal broadcasting of paddy seeds. The labour requirement was found to be less compared to the traditional method of broadcasting.

The yield parameters viz., plant height were recorded highest with drum seeder (94 cm) followed by SRI method (91 cm) panicles per m² lowest with hand planting (265) and maximum panicle observed by drum seeder method (278 panicle per m²). Number of tillers per plant was highest by drum seeder (11.5) close followed by SRI method of planting (11.0). The thousand grain weight was found from drum seeder as 27.0 gm. Higher than other method of planting paddy (Table 1).

The data on gross and net returns of paddy cultivation by different methods is given in table 2. The data on net returns indicated maximum with drum seeder planting (Rs.43870.00/ha) followed by SRI method of planting (Rs.38945.00/ha) and lowest from traditional practice (Rs.32900.00/ha). The gross returns indicated maximum with drum seeder planting (Rs. 83130.00/ha) followed by SRI method of planting (Rs.81260.00/ha) which was on par and lowest profit from traditional practice (Rs.77180.00/ha).

The higher return with the drum seeder was mainly due to reduction in cost of labour for operations like planting, weeding and other operations. From the results, it can be concluded that paddy cultivation by using drum seeder were found to be more economical than SRI method and least from manual planting. The paddy cultivation by using drum seeder can also be employed to grow paddy in areas where the labour is scarce and costly as the net return realised with this method was comparable to that of manual planting. The benefit cost ratio were maximum from drum seeder (1:2.11), SRI method (1:1.92) and lowest (1:1.74) from manual transplanting. Singh (2008) analyzed economics, shows lower cost of production and higher benefit-cost ratio in order. Based on the result, no-till drilling and drum seeding could be recommended to the farmers in labor scarcity area for establishment of paddy. Singh and

Table 1: Averaged yield parameter data for three years and four villages

S.No.	Parameter	Traditional hand transplant	SRI method transplanting	Direct sowing by drum seeder
1	Plant height cm	84	91	94
2	No. of panicles /m ²	265	274	278
3	Number of tillers /plant	10.0	11.0	11.5
4	Thousand grain wt. gm.	26.6	26.9	27.0
5	Grain Yield q/ha	45.40	47.80	48.90
6	Yield increase % (over hand planting)	-	5.3	7.7

Table 2: Difference between methods of cultivation

Particulars	Traditional methods	SRI Methods	Drum seeder method
Seed rate (PB-1) kg/ha	37.5	12.0	18.0
Days of transplant	28-30	10-12	0 (Direct seeding)
Cost of nursery(Rs.)	2450	1500	0
Labour required transplanting/ seeding operation	45	25	3
Spacing	Zigzag method	25 cm x 25 cm	25 cm between rows x 7-8 cm hill to hill in a row
Water management	5 cm or more standing water from transplanting to harvest	Alternate wetting and drying only till panicle stage. And 2-3 cm standing water before harvest.	No standing water after seeding and field kept wet till panicle initiation than 2-3 cm standing water 120 days before harvest.
Weed management	One manual weeding required 30-40 manual labour	One manual weeding with 3-4 labour is sufficient to soil incorporation of weeds into the using cono-weeder and one manual weeding required 15-20	Weedicide is a must once pre emergence weedicide just 1-2 days after seeding and one weeding by cono weeder run in one direction.
Yield q/ha	45.40	47.80	48.90
Total cost of cultivation Rs./ ha	44280.00	42315.00	39260.00
Gross return Rs./ha (sale @1700Rs./q)	77180.00	81260.00	83130.00
Net return Rs./ha	32900.00	38945.00	43870.00
Net profit increased % (old method)/ha	-	18.37	33.34
Benefit cost ratio	1:1.74	1:1.92	1:2.11

Hensel, (2012) observed more gross return for drum seeded paddy. The Yield was increased 5.3 and 7.7 percent from SRI method and drum seeder method of planting respectively over old hand planting. Rampuram (2013) also observed the profit attained due to SRI paddy cultivation was higher as compared to traditional paddy cultivation. It was also revealed from experimental trials that net profit in rupees were increased 18.37 and 33.34 percent SRI method and drum seeder method of planting respectively over old hand planting methods of paddy cultivation. Malleswara Rao et al. (2014) also revealed that due to mechanized cultivation practices, the crop was ready to harvest eight to ten days early than farmer's practices. The experiment well proved to raise the socio-economic status of the farmers by changing their strategy towards mechanized paddy cultivation.

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