Journal of Crop and Weed, 12(3):91-93(2016)

Performance evaluation of self-propelled vertical conveyor reaper for harvesting of rice crop in South Bastar Dantewada district of Chhattisgarh state

N. H. TAYADE

Krishi Vigyan Kendra, Dantewada, Chhattisgarh

Received :10.06.2016 ; Revised :14.08.2016 ; 12.09.2016

ABSTRACT

Experiment was carried out to reduce the cost of cultivation in rice crop through mechanical harvesting operation at Krishi Vigyan Kendra, Dantewada and at Farmers field. The vertical conveyor power reaper was used for harvesting rice crop. The overall performance of the vertical conveyor reaper was quite satisfactory. The average actual field capacity of reaper was 0.29 ha/hr with the average field efficiency of 71.25% at an average of 3.2 kmph and fuel consumption was 5.65 lit/ha. The cost of cultivation of paddy could be reduced by reducing 10 man days per hectare through mechanized harvesting. The overall cost of harvesting was found to be reduced in case of mechanized harvesting by self-propelled vertical conveyor reaper. Hence, the mechanical harvesting would be economical compared to the traditional method.

Keywords : mechanical harvesting, working speed, words, reaper, Field efficiency

Rice crop is life for almost half of the global population and majority of the Indian 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 (Anon., 2015). Production of rice is increasing but in most of the parts of the country the harvesting of paddy is still being done manually. Manual harvesting requires about 25 per cent of the total labour requirement of the crop. Nadeem (1983) reported that depending upon the crop yield 120-250 man-hr is required for cutting, bundling and on field stacking of one hectare of rice field by traditional sickle, also huge amount of grain loss is reported for the lack of mechanized harvesting. Mechanized harvesting is an alternative solution to tackle this problem and also results in lesser cost of operation. An alternative straw handling and disposal technology may have to be developed and promoted where farmers have adopted combines for harvesting as burning of straw is creating environmental pollution and farmers are losing valuable animals feed material. Reapers on the other hand are the alternative by product for animal feed and industrial applications (Singh 2002) Keeping the above facts in view, a study was conducted to evaluate the performance self propelled vertical conveyor reaper for harvesting of rice crop to reduce the coat of harvesting of rice through farm mechanization.

MATERIALS AND METHODS

On farm trails and field demonstrations were conducted at Krishi Vigyan Kendra, Dantewada during *Kharif* 2013-14 and *Kharif* 2014-15 to study the economic feasibility of self-propelled vertical conveyor reaper for harvesting of rice. The field trails/ demonstrations were also carried out on farmers' field. Experimental details in respect of crop variety, area covered, date of sowing and harvesting etc. are presented in table 1. The details technical specifications of self-propelled vertical conveyor reaper used are shown in table 2. Speed of operation, width of cutting, total time required to cover the area and fuel consumption were recorded.

The following parameter were studied to study the performance of the self-propelled vertical conveyor reaper

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

B. Actual field capacity was calculated based on area covered and actual time taken for covering the area including the time lost in turning.

C. Field efficiency was obtained by dividing actual field capacity by the theoretical field capacity

D. Labour saving by using the machine compared to manual harvesting was also studied

E. Cost of harvesting per ha by reaper was worked out after taking into considerations the fixed cost, labour cost, fuel cost, filed capacity of the machine and wages of the machine in ha per year and was compared with the manual harvesting.

RESULTS AND DISCUSION

Rice crop was harvested using self-propelled vertical conveyor reaper. Based on the field demonstrations conducted during *kharif,* 2014-2015 and 2015-16, it was

Email: narentayade@rediffmail.com

observed the actual cutting width of the reaper was 1.20 m and the average actual field capacity of the self-propelled vertical conveyor reaper was found to be 0.29 ha/hr with field efficiency of 71.25 % at an average operating speed of 3.2 km hr^{-1}. It took 3.56 hour to harvest 1 hectare area and the average fuel consumption was 5.65 lit/ha (Table 2). The working of self-propelled vertical conveyor reaper was found to be satisfactory.

The labour requirement in mechanical harvesting was found to be 8 man -days per hectare for manual collection and bundling of harvested crop as compared to 18 man- days of labour per hectare in manual harvesting, connecting and bundling of the crops. Thus it saved 10 man days of labour per hectare similar results reported by Manjunath *et al.*, (2009). From the above evaluation, it can be concluded that the vertical conveyor reaper could be used successfully with labour saving of about 10 man-days per hectare and eliminating the drudgery on the part of the labour. The area of 2.25 ha can be harvested per day if the field capacity is kept at 0.29 ha hr^{-1}. The number of hectare of usage per year take into consideration of two harvesting season in a year and 30 days of harvesting period per season and 8 working hours per day, the maximum area on which the self-propelled vertical conveyor reaper can be operated in years is 135.0 ha, considering the actual field capacity as 0.29 ha hr^{-1}. Thus, mechanization in paddy harvesting is feasible solution for reducing the cost of harvesting of rice crop without any yield reduction.

The overall performance of the vertical conveyor reaper was quite satisfactory. The average actual field capacity of reaper was 0.29 ha hr^{-1} with the average field efficiency of 71.25 per cent at an average of 3.20 kmph and the fuel consumption was 5.65 lit/ha. The cost of cultivation of rice could be reduced by reducing 10 man-days per hectare through mechanical harvesting would be economical compared to the traditional methods.

Table1: Specification of self-propelled vertical conveyor reaper

Sl No	Parameters	Specification
1	Dimensions, LxWxH (m)	2.39 x 1.77 x 0.90
2	Weight, Kg	116
3	Power unit	3.5 HP single cylinder 4 stroke, air cooled, Petrol start, Kerosene run engine
4	Working capacity, (ha h^{-1})	0.25 -0.30
5	Crop release	Right side of the machine (viewed from rear)
6	Travel speed, (km h^{-1})	
	Forward	3.5
	Reverse	3.0
7	Applicability	Dry and wet land
8	Cutting device	Reciprocating knife bar
9	Cutting height, (cm)	10-30 cm from ground level (adjustable)
10	Cutting width, (cm)	120
11	Model	KR-120
12	Manufacture	Kerala Agro-machinery Corporation Ltd.(A Govt. of Kerala undertaking), Athani-683 585, Ernakulam

Table 2: Performance of self-propelled vertical conveyor reaper in direct sown rice

Sl No	Parameters	Kharif, 2014-15	Kharif, 2015-16	Average
1	Date of harvest	17/11/2014	03/11/2015	
2	Total area (ha)	05.23	09.00	
3	Speed of operation (Km hr^{-1})	03.10	03.30	03.20
4	Width of operation (m)	01.20	01.20	01.20
5	Theoretical field capacity (ha hr^{-1})	00.40	00.40	00.40
6	Actual field capacity (ha hr^{-1})	00.27	0.30	0.29
7	Field efficiency (%)	67.50	75.00	71.25
8	Time taken to cover 1 ha area (hr)	03.70	03.33	03.56
9	Fuel consumption (lit ha^{-1})	05.80	05.50	05.65
10	Manual Labour required to cut the crop per ha	19.00	17.00	18.00
11	Variety	MTU 1010	Indira Barani	

REFERENCES

Anonymous 2015. *Business Standard Publication.*

Gyanendra Singh, 2002 Equipment to ensure timeliness. The Hindu Survey of Indian Agric., pp. 195-98

Manjunath M.V., Masthana Reddy B.G., Shashidhar S.D. and Joshi, V.R.2009. Field performance evaluation of vertical conveyor paddy reaper. *Karnataka J. Agri. Sci.*, **22** : 140-42

Nadeem Amjad, 1983. Field performance evaluation of rice reaper. In. *Agriculture Mechanization in Asia, Africa and Latin America*, **14** : 35-40

Patil Y.M., Anuraj B. and Kareekatti S.R., 2014 Performance evaluation of vertical conveyor reaper for harvesting paddy crop. Int. J. Res. in Computer App. Manag., **6** : 24-25.