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## PERFORMANCE EVALUATION OF VERTICAL CONVEYOR REAPER FOR HARVESTING PADDY CROP

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## **ABSTRACT**

The study was conduct to reduce the cost of cultivation in paddy through mechanizing harvesting operation at Agricultural Research Station Mundagod and also at farmers' field. The vertical conveyor power reaper (KAMCO Model KR 120) was used for harvesting paddy crop. The overall performance of the vertical conveyor reaper was quite satisfactory. The average actual field capacity of power reaper was 0.27 ha/hr with the average field efficiency of 69% at an average of 3.3 kmph and the fuel consumption was 5.7 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 methods.

#### **KEYWORDS**

mechanised harvesting, field capacity, field efficiency.

#### INTRODUCTION

ice 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 tonnes in 2014 (Anonymous 2015). The production of rice has increased as a result of improved methods of farming, but the harvesting techniques employed are still primitive. Harvesting is the first and major post-harvest operation. Harvesting operation has to be done at particular period when the crop is matured and the time required for harvesting is very less. But these two conditions cannot be fulfilled due to the shortage of manpower at the time of harvesting, which leads to delay in harvesting and field grain losses and also higher wages during peak harvesting period and leads to extra cost in total cost of cultivation. 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 paddy 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, when the farmers harvest the crop by using combines, farmers are losing valuable animal feed material. Reapers on the other hand are the alternative harvesting equipment, provided straw is considered as economic by-product for animal feed or industrial applications (Gyanendra singh 2002). Keeping the above facts in view, a study was conducted to evaluate the performance of vertical conveyor reaper for harvesting paddy crop to reduce the cost of harvesting of paddy through farm mechanization.

#### **MATERIAL AND METHODS**

The field trials were conducted at Agricultural Research Station, Mundagod in Uttara Kannada district, Karnataka state during *rabi* season 2014-15 to study the economic feasibility of self propelled vertical conveyor reaper for harvesting paddy. The field demonstration were also conducted in farmers' field to study the performance at field level. A commercial self propelled vertical conveyor reaper was procured and the detailed technical specifications are given in Table 1. The reaper has adjustable cutting height of 10-30 cm from ground level. The crop was left aside after cutting at the right side of the machine. Speed of operation, width of cutting, total time required to cover the area and fuel consumption were recorded using the above observation the following parameters were studied to study the performance of the self propelled vertical conveyor reaper.

- 1. Theoretical field capacity was calculated based on the speed of operation and width of the 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 the turning.
- 3. The field efficiency was obtained by dividing actual field capacity by the theoretical field capacity.
- 4. Labour saving by using the machine compared to manual harvesting was also studied.

## **RESULT AND DISCUSSION**

Paddy crop was harvested using self propelled vertical conveyor power reaper. Based on the field demonstrations conducted during *rabi* 2014, it was observed that the actual width of cutting by reaper was 1.20 m, and the average actual field capacity of the self propelled vertical conveyor reaper was 0.27 ha/hr with field efficiency of 69 % at an average operating speed of 3.3 km/hr. It took 3.62 hour to harvest 1 hectare area and the average fuel consumption was 5.7 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 9 man day per hectare for manual collection and bundling of harvested crop as compared to 19 man day of labour per hectare in manual harvesting, connecting and bundling of the crop. 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 power reaper could be used successfully with labour saving of about 10 man day per hectare and eliminating the drudgery on the part of the labour. The area of 2.16 ha can be harvested per day if the field capacity is kept at 0.27ha/hr. The number of hectare of usage per year taking in to 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 year is 129.6 ha, considering the actual field capacity as 0.27 ha/hr. Thus, mechanization in paddy harvesting is feasible solution for reducing the cost of harvesting of paddy crop without any yield reduction.

#### TABLE 1: SPECIFICATION OF SELF PROPELLED VERTICAL CONVEYOR REAPER

SI No	Parameters	Specifications
1	Manufacture	Kerala Agro Machinery Corporation Ltd. (A Govt. of Kerala undertaking), Athani-683 585 Dist. Ernakulam.
2	Model	KR-120
3	Dimensions, L x W x H, cm	239 x 147 x 90
4	Weight, Kg	116
5	Power unit	3.5 HP single cylinder 4 stroke, air cooled petrol start, kerosene run engine
6	Working capacity, ha/h	0.25 to 0.30
7	Crop release	Right side of the machine (viewed from rear)
8	Travel speed, km/h	
	Forward	3.5
	Backward	3.0
9	Applicability	Dry and wet land
10	Cutting device	Reciprocating knife bar
11	Cutting height, cm	10-30 cm from ground level (adjustable)
12	Cutting width, cm	120

#### **TABLE 2: PERFORMANCE OF REAPER IN DRILL SOWN PADDY**

SI No	Parameters	Kharif 2014	Kharif 2014	Kharif 2014	Kharif 2014	Average
1	Date of harvest	13-11-14	15-11-14	2-12-14	7-12-14	
2	Total area(ha)	3.61(131.67x27 4.32mts)	2.00 (145 x 138 mts)	0.28 (75.4x37.4 mts)	0.61(38x41mt s)	
3	Speed of operation (Km/hr)	3.2	3.3	3.3	3.4	3.3
4	Width of operation (m)	1.2	1.2	1.2	1.2	1.2
5	Theoretical field capacity(ha/hr)	0.38	0.40	0.40	0.41	0.39
6	Actual field capacity(ha/hr)	0.25	0.27	0.29	0.30	0.27
7	Field efficiency(%)	66	68	73	74	69
8	Time taken to cover 1 ha area (hr)	4.0	3.7	3.45	3.33	3.62
9	Fuel consumption (lit/ha)	6.0	5.8	5.5	5.5	5.7
10	Manual Labour required to cut the crop per ha	17	17	19	20	18.25
11	Variety	Jaya	Jaya	Abhilash	Abhilash	

### **CONCLUSION**

The overall performance of the vertical conveyor reaper was quite satisfactory. The average actual field capacity of power reaper was 0.27 ha/hr with the average field efficiency of 69% at an average of 3.3 kmph and the fuel consumption was 5.7 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 methods.

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