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Performance Evaluation of Self Propelled Reaper Binder

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ABSTRACT: *The testing of self propelled Reaper binder was carried out for harvesting of wheat crop on the university farm at CDF, Wanirambhapur, Dr.PDKV, Akola and harvesting of paddy crop at KVK, Sindewahi. The average forward speed was 3.22 km/h, average field capacity of the reaper binder was 0.359ha/h. and field efficiency was 91.76 per cent. The average shattering loss was found 0.23 per cent only. The average cost of operations was found to be 1725.76 Rs/ha.*

Key Words: *Harvesting , Reaper, Binding, Mechanical harvesting*

INTRODUCTION

In the eastern Vidarbha paddy is grown as main cereal crop. In Vidarbha Area under paddy crop is 7.165 lakh hectares and under wheat crop 3.92 lakh. Out of total man hours required for paddy cultivation around 20% of it is required for harvesting and bundle making. Timely harvest of crop is vital to achieve better quality and higher yield of the crop. The shortage of labour during harvesting season and vagaries of the weather causes greater losses to the farmer. Harvesting by locally available tools causes delay in the harvest and have direct effect on the yield. It is therefore essential to adopt the mechanical method so that the timeliness in harvesting operation could be ensured as well as the cost of operation can be reduced and field losses are minimized to increase the productivity and production on the farm. Considering the above facts and constraints feasibility testing of self propelled reaper binder for harvesting and bundle making of wheat have been carried out on field of Krishi Vigyan Kendra, Sonapur – Gadchiroli, Maharashtra.

SPECIFIC OBJECTIVES

1) To test the field performance of the self propelled reaper binder.
2) To study the economics of use of self propelled reaper binder.

PROJECT TECHNICAL PROFILE

The self propelled reaper binder machine is used for reaping the wheat and paddy crop and tying the bundles of the reaped crop by the twine automatically. It consists of reciprocating cutter bar for cutting the crop.

Table 1
Specification of the self propelled reaper binder

Sr. No.	*Particulars*	*Specifications*
1	Make	BCS
2	Model	Standard
3	Manufactured by	Bcs India Pvt.Ltd, Vill. Mangarh,Kohara Machiwara Road, Po. Kohara,Dist-Ludhiana-141112
4	Cutting width	4 feet
5	Height of cut	5-7 cm
6	Engine	10.2 hp Diesel,
7	Gear	4 Forward & 1 Reverse

The cut crop is gathered at the centre of machine continuously in standing position by the collecting fingers provided in front of the machine. A spring actuated lever is provided to control the size of the bundle of the reaped crop. As soon as the pressure of the reaped crop increases above the spring tension, the releasing of the bundle and tying knot around the bundle is done simultaneously by the machine. The

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tied bundle is then released gently on the ground at the centre of the machine. The seat is provided for operator and below the operators seat the steering wheel is provided which is operated by the foots. The steering is also done by breaking one of drive wheels.

METHODOLOGY

The testing of self propelled reaper binder has been carried out at KVK, Gadchiroli, Dr. PDKV, and on farmers field at Gadchiroli district. The parameters that were measured during field test are as follows:

- Speed of travel (forward speed)
- Fuel consumption
- Total operating time
- Field efficiency
- Effective field capacity
- Harvesting losses

RESULTS

The results of field performance based on test conducted are summarized in Table 2.

Table 2
Test results of self propelled reaper binder and manual harvesting of wheat crop

Sr. no	*Parameter*	*Self propelled reaper binder*				*Manual harvesting*
		Trial				
		1	*2*	*3*	*Average*	
1	Crop	wheat	wheat	wheat	-	wheat
2	Variety	HD2189	Balram-1	Balram-1	-	Balram-1
6	Height of plant , cm	97.2	88.6	88.3	91.36	88.6
7	Row spacing , cm	20	20	20	20	20
8	Number of tillers per sq. m	406	525	522	484.3	523
9	Height of cut, cm	18.28	14.18	14	15.48	23
10	Condition of crop	erect	erect	erect	-	erect
11	Diameter of stem at Cut, cm	4.06	4.19	4.34	4.19	4.12
12	grain moisture content, %	10.14	10.32	10.32	10.26	10.32
13	Straw moisture content, %	9.32	9.74	9.74	9.6	9.74
14	Actual area covered (ha)	0.33	0.17	0.36	-	0.2
15	No. of Labours	1	1	1	1	16
16	Total time of operation (min)	49	34	70	-	159.6
17	Effective working width (cm)	153.1	153.3	153.3	152.2	-
18	Forward speed (kmph)	3.7	3.27	2.7	3.22	-
19	Theoretical field capacity (ha/hr)	0.45	0.40	0.33	0.39	-
20	Effective Field capacity (ha/hr)	0.41	0.36	0.31	0.36	0.075
21	Field efficiency %	90	90.45	94.83	91.76	-
22	Labour requirement, man-hr/ha	2.21	2.77	3.20	2.72	213.67
23	Fuel consumption (lit/ha)	2.13	1.66	1.99	1.92	-
24	Fuel consumption (lit/hr)	0.869	0.600	0.621	0.696	-
25	Yield from 1 m^2 (gm)	490.5	494.32	480.5	493.0	490.8
26	Harvesting losses (g/m^2)	5.62	3.67	4.64	4.60	9
27	Shattering losses, %	1.14	0.74	0.97	0.93	1.83
28	Uncut loss,%	Nil	Nil	Nil	Nil	Nil
29	Harvest losses (shattering+Uncut) %	1.14	0.74	0.97	0.93	1.83
30	Cost of operation (Rs/ha)	1660.66	1702.38	1814.26	1725.76	3333
31	Cost of operation (Rs/hr.)	674.22	612.85	566.04	620	250

The testing of self propelled Reaper binder was carried out for harvesting of wheat crop on the kvk farm at Gadchiroli and on farmers field at Gadchiroli district. The results of field performance based on test conducted are summarized in Table 2. The average plant height, row spacing , and height of cut were 91.36 cm 20 cm, 15.48 cm respectively. The mean values of forward speed, fuel consumption, effective field capacity, and harvesting losses were 3.22 Km/h, 1.92 lit/ha, 0.36 ha/h, and 0.93 % respectively. It was observed that the irrigation channels prepared at the head lands causes difficulty in running over them.

FINDINGS

1. The average effective field capacity and field efficiency of the self propelled reaper binder was found to be 0.36 ha/h and 91.76 % respectively

Figure 1 & 2: Reaper – Binder while harvesting wheat and making bundles

where as the effective field capacity in manual harvesting was 0.075 ha/h.

2. Fuel consumption of self propelled reaper binder was 0.7 lit/hr, 1.92 lit/ha.
3. Average value of harvest losses in mechanical harvesting was 0.93 percent only where as average value of harvesting losses in manual harvesting was 1.83% which is more than that of mechanical harvesting.
4. The cost of operation for self propelled reaper binder and for manual harvesting were 1725.76 Rs/ha and 3333 Rs/ha respectively.
5. The per cent saving in the cost of operation and time are 48.22% and 79.21% respectively by harvesting of wheat with self propelled reaper binder over manual harvesting.

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