

CUSTOM HIRING OF TRACTOR OPERATED STRAW COMBINE IN HARYANA STATE



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Introduction

Haryana is one of the important wheat growing State of the country. Presently the area under wheat crop is 2.3 million ha.

Grain combines were introduced in India in the 1970's. The use of combines helped in timely harvesting of wheat but, it resulted in loss of Bhusa (cattle feed). Estimated loss of bhusa in Punjab was 40 million tones and in Haryana it was 5 million tones. To collect the wheat straw and stubbles left behind after use of grain combine, a wheat straw combine has been developed. It cuts the left over wheat stubbles and also collects the left over straw and ear-head bearing plants from the combine harvested fields. Thus, it recovers the grain and loads the prepared Bhusa into the attached trailer.

Salient features

A straw combine essentially consists of four main units viz., stubble cutting and collecting unit, feeding unit, straw bruising unit and "BHUSA" blowing unit. Two different types of straw bruising mechanisms have been commonly used. These include a spike tooth cylinder and serrated saw type mechanisms. Serrated saw type cylinder are used for straw bruising. Straw combine is operated by a 35 kW tractor and a wire mesh covered is towed behind to collect the bhusa.

Field performance of machine

The work on straw combine was started under the project since year 2001. The field capacity of the machine varies from 0.40 to 0.62 ha/h with an average of 0.52 ha/h. The average width of cut of the machine was 190.8 cm. The straw recovery was 70-80%. The performance of the machine was found to be very good (Fig. 1).

The test results of straw combine are reported in Table 1. The straw split per cent varied from 89.3 to 95.2 and average straw split was 92.36 whereas the length of bhusa varied from 2.1 to 2.4 cm and average length of bhusa was 2.3 cm. The average heights of cut of

stubbles varied from 6.04 to 9.8 cm. The straw recovery varied from 62.7 to 81.0 per cent and average straw recovery was 70.7 per cent. The straw recovery mainly depends upon the stubbles height remaining in the field after harvesting by combine harvester. Straw recovery rate varied from 23.5 to 31.8 q/ha and average straw recovery rate was 28.2 q/ha. The grain recovery varied from 42.6 to 50.0 per cent and average grain recovery was 45.9 per cent. The grain collected ranged from 141-180 kg/ha.

In 2005, the farmers were motivated to purchase straw combine for self use and on custom hiring for increasing their income. Nine farmers purchased this machine. The area covered by these farmers was 199ha (own) and about 570 ha on custom hiring and on an average area covered by a farmer is about 85ha as reported in Table-2. The average rate of custom hiring was Rs. 1250/ha in 2004 and Rs. 1325/ha in year 2005 in Haryana. Average grain recovery was 100-120kg/ha and bhusa recovery was 25q/ha. The cost of machine is Rs. 90,000 to 1, 20,000 depending upon make and capacity of machine.

Table 1 Performance results

The value in parenthesis are grain recovery in kg/ha

T e s t N o.	Av. Weight of straw before straw Reapin g (g/m ²)	Av. Wt. of straw left after straw Reaping (g/m ²)	Av. Wt. of straw collected by machine (g/m ²)	Straw recov - ery (q/ha)	Straw recov - ery (%)	Straw split (%)	Wt. of grain before reaping (g/m ²)	Wt. of Grain left After Reaping g/m ²	Av. Wt. of grain collected (g/m ²)	Grain Reco v ery, (%)
1	470	162.2	303.5	30.3	62.7	93.2	31.4	16.7	14.7 (147)	46.8
2	394	75.6	318.4	31.8	81.0	90.4	29.8	14.9	14.9 (149)	50.0
3	447.7	139.4	308.2	30.8	68.8	89.3	30.6	16.5	14.1 (141)	46.0
4	353.7	111.4	242.2	24.2	68.5	93.7	30.4	12.4	18.0 (180)	59.2
5	332.8	97.2	235.6	23.5	70.7	95.2	31.4	17.7	13.7 (137)	43.6
A v .	400	117.2	282.8	28.2	70.7	92.3 6	30.7	16.6	14.1 (141)	45.9



Fig. 1. Straw combine in operation at farmers fields.

Table 2 Custom hiring on Straw Combine 2004-05

Name & Address of Entrepreneur	Straw combine make and model	Tractor Used	Area covered (ha)	
			Own	Custom
Sh. Rattan Singh Sarpanch, VPO. Ruhnath, Distt. Bhiwani	Standard	HMT-5911	30	---
Ram Phal s/o Ajmer Singh Hansi, Hisar	do	do	30	---
Satyawan, Village RATHERA, Bhiwani	Guru Nanak	New Holland 3630	---	55
Arvinder Singh RATHERA, Bhiwani	Diraba Agril. Works	Sewraj 835	50	100
Late Sh. Ram Pal s/o Mansa Ram, village Dhatrath, Jind 01686-251072.	Kranti, Ludhiana	New Holland Ford-3630 (50hp)	20	80
Kulwant Singh s/o darshan Singh Vill. Umri, Distt. Kurukshetra	Dasmesh	Farm trac-60	29	40
Surinder Singh s/o darshan Singh Vill. Umri, Distt. Kurukshetra	do	Mohindera -275	10	25
Jitender Singh s/o Om Parkash Village Daryapur, Distt, Fatheabad	Standard	Mohindear 265D1	30	70
Sardar Ajit Singh village Dahtrath, Jind 01686-251466 M- 9355176067	Kranti, Ludhiana (two no.)	sonalika - 760	nil	200
Total area covered (ha)			199	570
Average area covered by one farmer(ha) = 85				

Note: Cost of machine (Rs.) 90,000 to 1, 20,000
Rate of custom hiring during year 2004 (Rs. /ha)= 1250
Rate of custom hiring during year 2005 (Rs. /ha)= 1325
Average grain recovery (kg/ha)= 100-120
Average Bhusa recovery (q/ha) = 25.0

Economics of custom hiring

Studies conducted by the centre have shown that the machine gave a net return of Rs. 2400/- per hectare to the machine owning farmers and about Rs. 2100/- per hectare on custom basis. This machine has been

widely accepted by the farmers of Haryana. No specific problem was observed in handling during operation of straw combine in wheat straw field. One skilled operator was required to operate the tractor and straw combine simultaneously. One labour was also required for unloading the trailer at suitable place.

The machine performance data is given in Table-3. The average field capacity of machine was 0.4 ha/h while operating at speed of 2.5 km/h. The average fuel consumption was 4.0l/h and two persons are required for its operation. The cost of operation was Rs. 800/ha. A farmer can save on an average Rs. 66250-72625 while the annual expenditure is about Rs. 40,000 per year. The pay back period of the machine is two years.

Table 3 Economics of Straw combine during year 2004-05 on custom hiring

Average Field capacity (ha/h)	0.4
Average Fuel consumed (l/h)	3.5-4.0
Operating speed, km/h	2.5
Labour required/ha	2 persons
Cost of operation (Rs/ha)	800
Average grain recovery (kg/ha)	100-120
Average Bhusa recovery (q/ha)	25.0
Area covered under FLD (ha) in year 2004	65
Area covered on custom hiring in year 2005 (ha), Own Custom	199 570
Av.rate of custom hiring (Rs/ha)	1250-1325
Av. Work done on hiring by one farmer (ha)	85
Total turn out (Rs/year)	1,06,250- 1,12,625
Expenditure (Rs/ha) (Rs/year)	800 40,000
Net saving (Rs/year)	66250-72625
Cost of machine (Rs)	90,000-1,20,000
Pay back period :	Two years

Status of Technology

The total estimated area covered by straw combine is about 6.0 lac hectares. The estimated number of straw combines in Haryana is 5050.

Table 4 Estimated Number of straw combine sold in Haryana

Year	Number of straw combines
2001-02	50
2002-03	500
2003-04	1000
2004-05	1500
2005-06	2000
Total	5050

Source: contact survey with manufacturers of Haryana and Punjab

- ❖ The tractor use per year has increased.
- ❖ There is saving of time, money and labour.
- ❖ Bhusa can be obtained as by product.
- ❖ Machine repays its cost within two years on custom hiring.
- ❖ The air cleaner needs frequent service because of dust and bhusa during the operation of straw combine.
- ❖ Straw combine is very economical and extensively used by the farmers due to high price of bhusa.

Appendix-I

Type	Tractor operated PTO driven
Source of power	45 hp tractor
Overall dimension (LxWxH) without straw pipe, mm	3370 x 2450 x 2150
Length of cutter bar, mm	2134
Minimum height of cut, mm	25-50
Size of chopping drum (LxD), mm	1370 x 700
Rotational speed of chopping drum, rpm	530
Size of blower (diameter), mm	280
Speed of blower, rpm	1020
Field capacity, ha/h	0.4-0.8
Straw output, t/h	0.75-1.5
Weight, kg	1785
Unit price, Rs	75,000

Appendix-II

List of manufacturers

1. M/s Jitla Agro Industries, Mr. Bhagwan Singh, G.T Road, Dabwali, Distt. Sirsa. P:223240
2. M/s Laxmi Straw Reaper, Mr. Sushil Bansal, Begu Road, Sirsa
3. M/s Bharat Agriculture Works, Mr. Loda Singh, Jivan Nagar, Rania, Distt. Sirsa
4. M/s Zandu Steel Works, Hisar Road, Ambala City. Mr. Jaipal Ph. 0171-2530143
5. M/s Zandu Engineering Works, Hisar Road, Ambala City, Mr. Ramji Lal Ph. 0171- 25306566
6. Guru Nank Engg. & Foundary, Jind Road, Kaithal. Sh. Bajinder Singh Ph. 223923
7. Laxmi Agricultural Implements, New Karnal Road, Kaithal. S. Guru Baur Singh. Ph. 226791
8. M/s Aggarwal Agril. Works, Jind Road, Assandh Sh Kailash Aggarwal

- Ph. 278726
9. M/s Sarawati Krishi Udhog, Karnal Road, Assandh Sh Satpal
Ph. 278501
 10. M/s Boota Siigh and Sons (J.M.H. Thresher), Begu Road,
Sirsa.
Ph: 245424
 11. Mr. Santosh singh Raj Singh, Sirsa Road (Near bus stand),
Rania, Distt. Sirsa
 12. M/s Jitla Agro Industries, Mr. Bhagwan Singh, G.T Road,
Dabwali, Distt. Sirsa. P:223240
 13. Dayal Agro Engineering Works, Kaithal Road, Pehowa. S.
Sukhvinder Singh Ph. 230528
 14. Kamboj Krishi Udhog, Kaithal Road, Pehowa. S. Malkiat
Singh
 15. Narendra & Mahendra Agril. Implements, Kaithal Road,
Pehowa. Narinder Singh. Ph. 223227
 16. Guru Nank Engineering Works, Kaithal Road, Pehowa.
Mukhtiar Singh. Ph. 01741-220247
 17. National Agro Industries, Link Road, Industrial area, Ludhiana-
141003 (Punjab)
 18. ASS foundry & Agril. Works, G.T.Road, Jandiala Guru,
Amritsar-143115, Punjab Near Police Station,
Jandiala Guru, Amritsar-143115 (Punjab)
 19. Guru Nanak Khalsa engineering works, Pehowa, Kurukeshtra,
Haryana
 20. Bharat Agril. Industries, Karnal, Haryana
 21. Punni Agricultural Works, Punni Thresher Tohana, Haryana
 22. Panishar Agricultural Works, Amargarh, Punjab
 23. Malwa Agro Industries, Ludhiana, Punjab
 24. Amar Agricultural Implements works, Amar Street, Janta nagar
Gill road, Ludhiana-141003, Punjab
 25. Bharat Industrial corporation, Akalsar Road, Faridkot, Moga-
142001, Punjab
 26. Madho Mechanical works, B-49, Focal point, G.T. Road,
District Faridkot, Moga-142001, Punjab
 27. Kalsi Mechanical works, Majestic Road, District Faridkot,
Moga-142001, Punjab
 28. Punjab Engineering Works. Talwandi Bhai, Ferojpur, Punjab

- 29 M/s Indian Hadamba Thresher, Barara Bypass, Ambala City
- 30 M/s Punjab Agro Sales (India), Delhi Bye-pass, G.T Road,
Karnal Sh. Ajit Dawar Ph. 2220113, 22220957 (O), 2282063,
2283063
- 31 M/s Bharat Industries/ M/s Bharat Steel Discs, Delhi Bye-pass
, G.T Road, Karnal
- 32 Mr. J.M.L Patni, Mr. Rakesh Patni, Deepak Ph.
2220262,2221555(O), 2200804, 2201918
- 33 Engineering Sales Corporation, 55/3, HSIDC, Karnal, Sh. D.N
Bhardawaj, Ph. 2272922, 2221355,(O), 2387536