

# **SUCCESS STORIES**

## **Impact of Frontline Demonstrations**

### **On**

## **Farm Mechanization in Haryana**

High capacity power thresher



All India Coordinated Research Project on  
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Central Institute of Agricultural Engineering  
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Investigators : **N K Bansal and S Mukesh**  
Department of Farm Machinery & Power  
Engineering, CCS HAU, Hisar

Compilation and editing : **Dr. Surendra Singh**  
Project Coordinator (FIM)  
CIAE Bhopal

Editorial Assistance	:	Er. YS Bhokardankar Er. G S Chouhan
Word Processing	:	Sh. NG Bhandarkar Sh. R K Hadau
Proof Reading	:	Er. YS Bhokardankar
Reprography	:	Sh. RS Kushwaha

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## 7. High Capacity Multi Crop Thresher

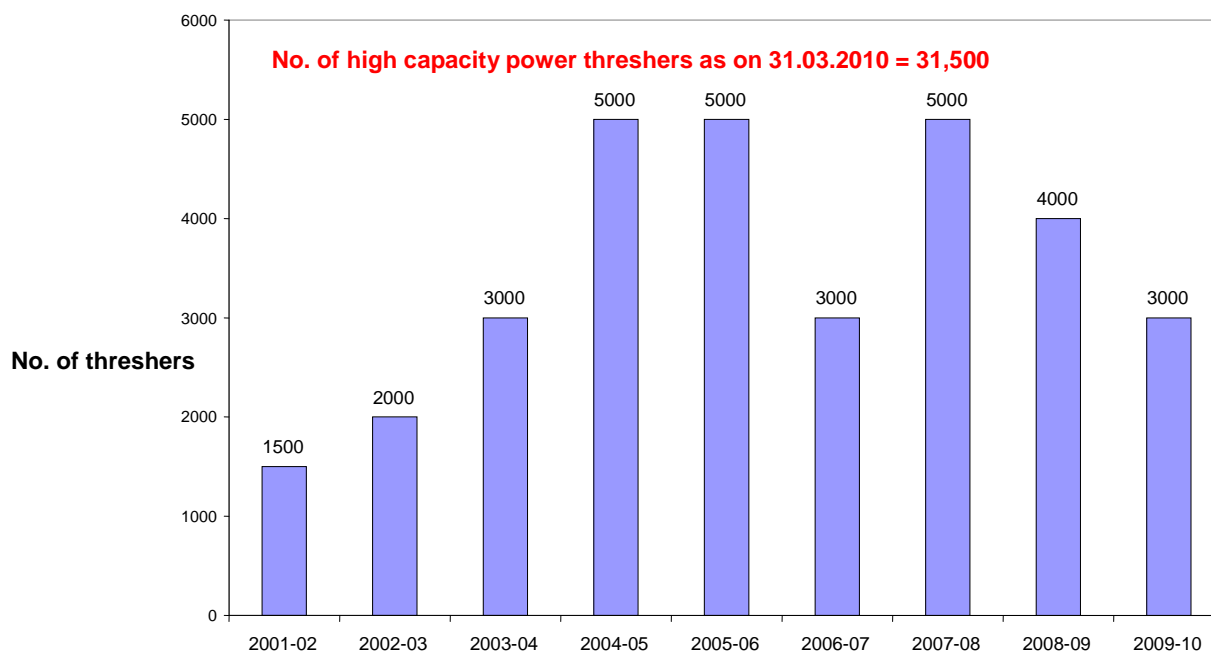
Mechanical threshing of crops has been adopted in Indian Agriculture in a big way. The power wheat threshers are very common and almost all crops are threshed by the multicrop threshers. Threshing operation is 100% mechanized in wheat crop where as in other crops it needs to be perfected. The losses in pulses and oil seed crops with mechanical threshing are quite high. Threshing of other crops has specific requirements. Threshing machines have to be adjusted so that the damage and losses to the grains are minimized, sometimes concave units needs to be changed. Farmers need to be educated about proper adjustments and operation of threshers. Hence, demonstrations of machine and educating the farmers about the use of high capacity multicrop thresher in crops like pearl millet, oilseeds, pulses, guar were given more attention.

**Brief summary of past work done:** The work on multicrop thresher started in 1994-95 when feasibility trials on syndicator type high capacity thresher for Raya and wheat crops were conducted. In the year 1995-96, feasibility trials were further conducted for Raya crop with proper adjustments of cylinder speed, cylinder-concave clearance etc. It was concluded that the machine has good potential for its use in Raya in addition to threshing of wheat crop. The machine was again evaluated in the year 1999-2000 for chickpea. Front line demonstrations of high capacity thresher were carried out in wheat, raya, chickpea, green gram, etc. The grain output capacity was 16-20 q/h for wheat, 8-10 q/h for raya, 6-8 q/h for chickpea and 4-5 q/h for green gram. Threshing efficiency, un-threshed grain and visible damage were recorded to be 98-99%, 2.0% and 1.0% respectively in pulse crops. The total losses were 5.01%.

During the year 2002, Frontline demonstrations on multicrop thresher were conducted on pearl millet (bajra), green gram (moong) and cluster bean (guar) crops. Observations on crop input, persons employed, and time taken in threshing and power sources were recorded. High capacity multicrop thresher was demonstrated at different locations in moong & guar crops in the year 2003. The machine was operated at the lowest cylinder speed (300 rpm) in moong to minimize the breakage while in guar; it was operated at 500 rpm. In moong crop, two cutting blades (out of four) were removed to reduce the damage. The average capacity of thresher was 4.0 and 5.0 q/h in moong and guar crops respectively. The breakage was less than 5.0% in moong while in guar; it was 0.5 to 2.0%. Threshing efficiency and cleaning efficiency were observed to be within the prescribed limit.

Success of high capacity multicrop thresher on custom hiring: The farmers and rural youth having entrepreneurship mind were motivated to buy high capacity multicrop thresher and adopt custom hiring business. The farmers having land from 1.0 to 10 ha were pursued to buy their own thresher and do custom hiring business. All these farmers purchased the threshers and have adopted it as an enterprise for custom hiring. An average area threshed on custom hiring was 137 ha and 327 ha under raya and wheat crop respectively in year 2004. A sample survey conducted on those farmers who purchased threshers in Rabi 2005 revealed that the area threshed under different crops by them was 152 ha, 182 ha and 40 ha (in their own farm) and 431 ha, 780 ha and 600 ha (on custom hiring) under raya, wheat and chickpea crops respectively.

**Status and adoption level of high capacity thresher on Custom Hiring:** The farmers and unemployed youths were motivated to use this machine on custom hiring as an entrepreneur. There was wide spread response in its adoption. About 31,500 entrepreneurs are engaged in business of threshing crops with high capacity threshers as on 31.03.2010. Interestingly, small and medium farmers have adopted it as an enterprise for custom hiring. The number of high capacity multicrop thresher procured by the farmers in Haryana is presented in Fig. 7.1.



**Fig. 7.1: No. of entrepreneurs of high capacity power thresher**

Large scale demonstrations were also undertaken during the year 2004 to 2006 with tractor operated high capacity multicrop threshers in different districts of Haryana. Front line demonstrations of tractor operated high capacity multicrop thresher were organized at farmer's fields in different villages covering an area of thousands of hectares. The economics of high capacity multicrop thresher on custom hiring is given in Table 7.1. The net saving per year is estimated to be Rs. 1,33,500/- and the pay back period of machine is one to three years depending upon the make and model. The capacity of machine varies from crop to crop, makes and models. The price of machine varies from ₹ 1, 00,000 to 3, 25,000 depending upon make and model. The power thresher is a good source for generating income for unemployed rural youth and farmers. The specifications of high capacity multi crop thresher are given in Table 7.2. The operation of threshers in different crops is given in Fig. 7.2 to 7.4.

**Table 7.1: Economics of high capacity multicrop thresher on custom hiring.**

Crops	Rate of custom Hiring (₹/ha)	Area covered (ha)	Total income (₹)
Wheat	1500	50	75,000
Raya	1500	30	45,000
Gram	1500	30	45,000
Moong	1500	50	75,000
Arhar	1500	10	15,000
Urd	1500	25	37,500
Guar	1000	50	50,000
Bajra	1000	50	50,000
Total		295	3,92,500
Total hrs used: 740 (Field capacity = 0.4 ha/h)			
Expenditure: ₹ 350/h			
Total expenditure: ₹ 740 x 350= 2,59,000			
Net profit per year = ₹ 1,33,500			
Pay back period= One year to three years			

**Table 7.2: Specifications of high capacity multi crop thresher**

S. No.	Particulars	Specifications
1	Type	High capacity thresher
2	Crops for which suitable	Wheat, Gram, Mustard, Green gram, Urad, Guar, Lentil etc.
3	Over all dimensions, mm: Length Width Height Ground clearance from ground, mm	4100-4320 1160-1740 2290-2500 185-270
4	Type of cylinder	Combination of chaff cutter and spike tooth type
5	Diameter of cylinder, mm	610
6	Length of cylinder, mm	520
7	Number of rows of beater	6
8	Number of beaters per row	7 in three rows and 6 in three rows
9	Size of beaters( spike), mm	Length = 150 and diameter = 20
10	Recommended speed of threshing cylinder, rpm	400-1000

11	Type of concave	Grate of parallel rectangular bars
12	concave grate openings for different crops ( three different sizes)	Small grains like mustard& bajra Medium grains like wheat, guar, moong, urd, lentil,etc Bold grains like Gram( Kabli), soybean,
13	Concave clearance, mm	5-20 ( Adjustable)
14	Number of Aspirators	Two
15	Speed of Aspirators ( rpm)	700-1000
16	Feeding unit	Manual. Feeding unit having a conveyor, wooden platform of size 1500 x 2000 x 25mm
17	Height of feeding chute from Ground, mm	1500-1600
18	Length of feeding chute, mm	1050-1160
19	Width of feeding chute, mm	260-270
20	Number of cutters	Three
21	Type of sieve	Perforated with round holes of thickness
22	Number of sieves	For crops mentioned above
23	Transportation system	Two pneumatic wheels new one of standard make mounted on square axle of size 2*2 inch fitted with rim standard make bearing, Tyre size 6.00-16 of 10 ply rating
24	Power transmission	B-size, V grooved pulleys to get different speed as mentioned above
25	Accessories	Two set of cutters, set of sieves for different crops, Set of concaves for different crops
26	Output capacity (q/h) Wheat	15-20



**Fig. 7.2:** A view of operation of high capacity multicrop thresher on custom hiring in wheat crop at farmer's fields.



**Fig. 7.3:** Threshing green gram crop with thresher on custom hiring



**Fig. 7.4:** Threshing green gram crop with high capacity front feeding thresher on custom hiring.

## Performance of high capacity front feeding thresher

- In the green gram, the performance was satisfactory at moisture content of 13.5%. The threshing efficiency, cleaning efficiency and output capacity increased from 88.6%, 94.9% and 525.2 kg/h to 92.7%, 96.27% and 594.1 kg/h when the cylinder speed was increased from 403 to 435 rpm respectively. The grain loss also increased from 1.1 to 2.8% (Table 7.3).
- In cluster gram, the performance was satisfactory at a moisture content of 10.2%. The threshing efficiency, cleaning efficiency and output capacity increased from 96.3%, 95% and 734.7 kg/h to 97%, 99% and 865.8 kg/h, when the cylinder speed was increased from 504 to 535 rpm respectively. The grain loss was within the prescribed limits (Table 7.4).
- In brown mustard crop, the performance was satisfactory at moisture content of 16.5%. The threshing efficiency, cleaning efficiency and output capacity increased from 97.5%, 96.2% and 570 kg/h to 98%, 96.8% and 580 kg/h, when the cylinder speed was increased from 540 to 600 rpm respectively. The grain loss was within the prescribed limits (Table 7.5).

**Table 7.3: Performance data of high capacity front feeding thresher in green gram.**

Moisture content (%)	Cylinder speed (rpm)	Cleaning efficiency (%)	Threshing efficiency (%)	Sieve loss (%)	Damaged grain (%)	Unthreshed grain (%)	Blower loss (%)	Total loss (%)	Output capacity (kg/h)
13.8	403	88.60	94.87	1.07	5.20	5.10	1.10	2.17	525.21
	417	90.76	95.28	1.10	5.29	5.05	1.20	2.30	556.38
	435	92.70	96.27	1.30	5.31	4.94	1.50	2.80	594.12
16.5	403	82.60	94.40	0.85	1.32	5.60	0.51	1.36	357.60
	417	83.32	95.15	0.96	1.41	5.34	0.56	1.52	455.41
	435	85.25	95.29	1.20	1.97	5.10	0.61	1.81	475.92



**Table 7.4: Performance data of high capacity front feeding thresher in cluster bean.**

Moisture content (%)	Cylinder speed (rpm)	Cleaning efficiency (%)	Threshing efficiency (%)	Sieve loss (%)	Damaged grain (%)	Unthreshed grain (%)	Blower loss (%)	Total loss (%)	Output capacity (kg/h)
10.2	504	95.0	96.3	0.60	0.79	3.73	0.26	0.32	734.7
	516	96.1	96.5	0.79	0.98	3.49	0.33	1.07	783.8
	535	99.0	97.0	1.03	1.13	3.10	0.51	1.54	865.8
13.5	504	94.0	95.5	0.70	0.28	4.50	0.24	1.94	540.3
	516	94.9	96.0	0.90	0.35	4.02	0.31	1.21	560.1
	535	95.7	95.0	1.04	0.48	3.52	0.41	1.45	649.8

**Table 7.5: Performance data of high capacity front feeding thresher in brown mustard.**

Moisture content (%)	Cylinder speed (rpm)	Cleaning efficiency (%)	Threshing efficiency (%)	Sieve loss (%)	Damaged grain (%)	Unthreshed grain (%)	Blower loss (%)	Total loss (%)	Output capacity (kg/h)
13.5	540	95.8	97.2	0.03	0.05	1.20	0.3	1.5	514.5
	580	96.0	97.4	0.02	0.06	1.10	0.3	1.5	525.6
	600	96.3	97.8	1.03	0.09	1.09	0.4	1.8	546.9
16.5	540	96.2	97.5	0.02	0.04	1.03	0.2	1.1	570.2
	580	96.4	97.9	0.03	0.05	1.02	0.3	1.4	575.8
	600	96.8	98.0	0.04	0.07	1.01	0.4	1.5	580.0

**List of power thresher manufacturers**

Refer Appendix ‘A’ {S. No. 3, 5, 9, 10, 16, 18, 19, 35, 36, 42, 45, 46, 48, 51, 52, 56, 57, 61, 67, 71, 73, 77, 78, 91, 94, 95}