

SUCCESS STORIES

Impact of Frontline Demonstrations On Farm Mechanization in Haryana

Tractor operated Bt. Cotton planter (Inclined plate with Cell)



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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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4. Tractor operated Bt. Cotton Planter (Inclined Plate Type)

Several factors that influence the field emergence of seed and field plant population are the quantity of seed planted, viability of seed, treatment of the seed with chemicals to kill soil micro-organisms, use of fuzzy seed or delinted seed, planting depth, type of soil, moisture content of the soil, types of seed dropping mechanism, size of cell in planting plate, level of seed in seed hopper, distribution of the seed, type of furrow opener (runner or shovel), width of furrow opener, prevention of loose soil getting under seed, uniform seed coverage, type of covering device, pressing or firming the soil around the seed, type of press wheel or device, placement of fertilizer in relation to seed at planting time, type of seed bed, time of planting in relation to season, and experience and skill of the operator. The scattering of seed results in unevenly sown hills, which require an additional work to thin or transplant later. It is generally known that the scattering is caused mainly by improper design of the metering device, seed tube and seed release height. The lower seed release height and straight short seed tubes reduce the scattering.

Inclined cell type Bt. cotton planter places desired quantity of seed without scattering at regular intervals within the rows. Therefore, metering devices for the cotton planter holds desired quantity of seed per hill and drop them on the ground at almost equally spaced intervals. Planting of cotton and other bold seeded crops like pulses are generally done by inclined plate type planters where row to row as well as plant to plant distance is maintained. The seeds are sown in line at the depth of 30-40 mm with two seeds per hill maintaining the desired spacing between row and plants. This technique results in uniform plant spacing, seed depth and helps further mechanization of intercultural operation that reduces the total cost of cultivation. In inclined plate type planter seed sowing produced more consistent row to row distribution of seeds and reduction in plant stand variability.

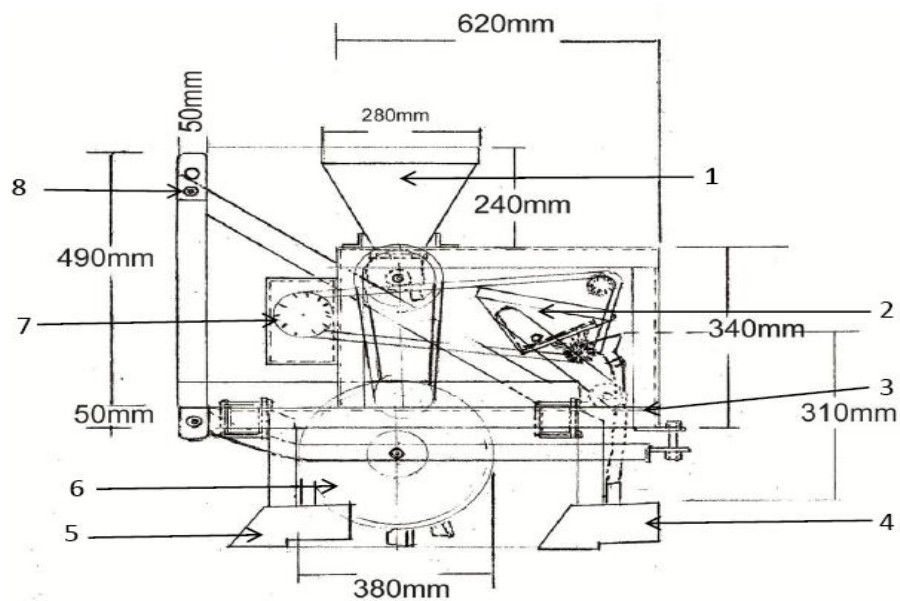
Constructional details: The machine consists of a main frame, ground wheels, seed and fertilizer hoppers, furrow openers, power transmission system, and three point hitch (Fig. 4.1). The metering of Bt. cotton seed is done with the help of inclined plates with cells on periphery (Fig. 4.2). A view of cotton crop sown by Bt. Cotton planter is given in Fig. 4.3. The seed metering mechanism was kept near to ground level to avoid scattering of seeds. Fertilizer is metered with the help of fluted rollers. Ground wheel provides drive to the metering shafts through the chain and sprocket arrangement (Fig. 4.4). The depth of planting can be adjusted by lowering or raising ground wheel. The major specifications of planter are given in Table 4.1.



Fig. 4.1: A view of Bt. Cotton planter Fig. 4.2: View of inclined plate with cells



Fig. 4.3: A view of cotton crop sown by cotton planter



(1-Fertilizer box, 2- Seed box, 3- Main frame, 4- Furrow opener of seed, 5- Furrow opener of fertilizer, 6- Ground Wheel, 7-Speed reduction box and 8- hitching point)

Fig. 4.4: Side view of Bt. cotton planter

Table 4.1: Specifications of inclined cell plate Bt. cotton planter

S. No.	Particulars	Specifications
1	Overall dimension, mm	2300 × 1155 × 820
2	Power source	Tractor (up to 35 hp)
3	No. of rows	3
4.	No. of cells on the periphery of plate	6
5	Row to row spacing, mm	1000
6	Furrow openers	Shoe type
7	Seed metering device	Inclined plate type with cells on periphery
8	Fertilizer metering device	Fluted roller
9	Power transmission to metering devices	From ground wheel through chain and sprocket arrangement
10	Speed ratios (seed metering device: ground wheel)	1:3, 1:2.4 and 1:2

Field performance of Bt. Cotton planter: Field performance data of Bt. cotton planter is shown in Table 4.2. The tractor operated inclined plate planter having cells on periphery seed metering mechanism was tested for sowing Bt. cotton at farmer's fields. In year 2006, twelve trials were arranged covering an area of 70 ha. The seed rate was 1.5 to 2.5 kg/ha. The row to row spacing was 1.0 m and plant to plant spacing was 65-70 cm. The average field capacity of Bt. cotton planter was 0.7 to 0.8 ha/h. The field efficiency was 59%. The yield levels were 15-22 q/ha whereas the average yield was 22 q/ha. The farmers were quite satisfied with its performance. Thirty four farmers were contacted who purchased the machine and all were quite satisfied.

In year 2007, 20 trials were arranged for sowing Bt. cotton (variety- Rasi 134) covering an area of 11.6 ha and 14 trials were arranged for sowing Bt. cotton (variety- Mahyco 6301)) covering an area of 5.6 ha. The germination was in the range of 14 to 16 plants per 10 m length. The seed rate was 1.5 kg/ha. The row to row spacing was 1.0 m. The average yield was 21.35 q/ha for Rasi 134 and for Mahyco 6301 it was 13.42 q/ha. The observations on 30 trails conducted by the farmers were recorded for sowing different variety of hybrid cotton at farmer's fields. The farmers covered 108 ha (own area) and 612 ha on custom hiring. The seed rate used was 1.2 to 2.5 kg/ha and the average yield was 19.3 q/ha.

Table 4.2: Performance of Bt. cotton planter

S. No.	Parameter	Improved Bt. cotton planter
1.	Seed rate, kg/ha	1.6- 2.0
2.	Fertilizer rate, kg/ha	80-100
3.	Average depth of sowing, cm	12
4.	Average seed to seed distance, cm	65 to 70
5.	Average depth of soil cover over the seed, cm	5.4
6.	Average germination per 10 m length	14 – 16
7.	Speed of operation, km/h	4.0
8.	Fuel consumption, l/h	2.5-3.5
9.	Time lost per turn, s	35
10.	Theoretical field capacity, ha/h	1.23
11.	Actual field capacity, ha/h	0.73
12.	Field efficiency, %	59

The machine is commercially available and the present cost of machine is ₹30,000. The cost of operation was ₹ 425/ha while with manual dibbling it was ₹900/ha when the cost of labour was taken as ₹ 150 per day. Thus, there was saving of ₹475/ha by using the machine. The benefit-cost ratio is 1.47 and payback period is three year (Table 4.3).

Table 4.3: Cost economics of Bt. cotton planter

S. No.	Particulars	Values
1.	Labour requirement, man-h/ha	1.34
2.	Cost of operation	₹/ha ₹/ha
3.	Custom hiring charges, ₹/ha	625
4.	Cost of 3-row Bt. cotton planter, ₹	30,000
5.	Saving, ₹/ha	200
6.	Average area covered by one entrepreneur, ha/year	50
7.	Net profit by an individual, ₹/year	10000
8.	Yearly Benefit cost ratio,	1.47
9.	Payback period, years	3
10.	Total No. of entrepreneurs who purchased Bt. Cotton planter as on 31.03.2010	7750
11.	No. of entrepreneurs who Purchased Bt. cotton planter in 2009-10	2200

On our persuasion, farmers purchased Bt. cotton planter. The year wise Bt. Cotton planter purchased by the entrepreneurs is given in Fig. 4.5.

It is evident from the results that the demand of machine is increasing because it provides an additional source of income generation to farmers. In year 2007, 42 farmers were contacted who purchased the machine and all of them were quite satisfied with its performance. The total cumulative numbers of machines purchased by the farmers/entrepreneurs/unemployed youths were more than 7750 as on March, 2010. The acceptance/adoption of machine is evident from Fig. 4.5 that farmers purchased 6913 nos. of Bt. Cotton planter without subsidy. Out of total machines purchased i.e. 7750, only 837 nos. of cotton planters were purchased on subsidy. It clearly shows the popularity of cotton planter.

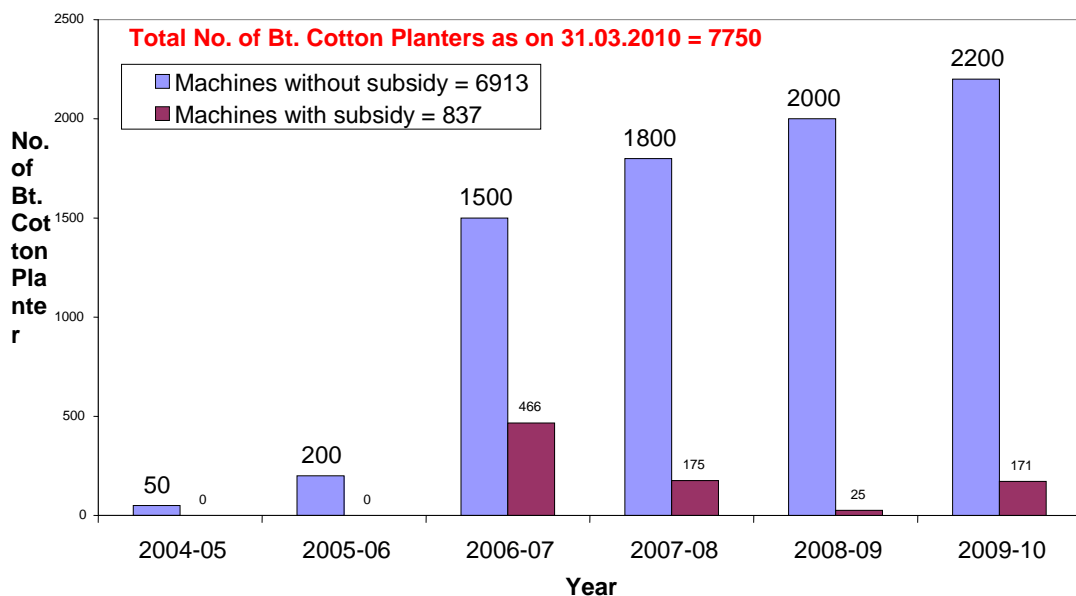


Fig. 4.5: No. of entrepreneurs of Bt. Cotton Planter

Farmer's feedback

- Bt. cotton planter saves costly inputs like seed, time, labour and money.
- Better quality of work in less time as compared to traditional practice.
- Placement of seeds and fertilizer at proper depth and spacing.
- The slit opened by the furrow opener is narrow thus moisture remained conserved for longer period to have better germination even at high temperature (45 to 48⁰C)

List of Bt. Cotton manufacturers

Refer Appendix 'A' { S. No. 21, 34, 50, 65, 72, 76, 86, 88, 90, 93 }