

SUCCESS STORIES

Impact of Frontline Demonstrations On Farm Mechanization in Haryana

Tractor operated zero-till seed-cum-fertilizer drill



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3. Tractor Operated Zero-Till Drill

Rice and wheat are the two major cereal crops of India. Haryana is one of the important rice-wheat growing states of the country and is contributing to the central pool over and above its own requirements. Rice-wheat production in the state has increased many folds since its inception. This has been made possible through increase in area under the crop and through the adoption of new crop production technology. There was 1,92,000 and 7,43,000 hectares of area under rice and wheat crop respectively in the year 1965-66 which increased to 12,10,000 and 24,82,000 hectares in 2008-09 respectively. The feasibility trials undertaken at CCS Haryana Agricultural University, Hisar have indicated that the no-tillage system of planting of wheat crop is very cost effective and the crop yields obtained are quite comparable. Large numbers of farmers in Haryana State has already adopted no-till seed drill and are being benefited. With this in view, the project was undertaken to give a further boost to the no till drilling of wheat crop after paddy and to popularize this innovative technique amongst the farmers practicing paddy-wheat rotation system in the state.

Traditional Practices for Wheat Sowing and Necessity for Development of No-Till Sowing:

Wheat sowing by conventional methods requires large number of tillage operations to prepare a fine seed bed after paddy harvesting. Generally, 6-8 or even more tillage operations are required which cost both time and money for the farmers. Moreover, shortage of time after paddy harvest to wheat sowing creates uncertainty and delay in sowing operation which results in poor crop yields. Besides, there is low lying and water logged areas which never get dried so it becomes difficult to enable the tillage equipment to accomplish the normal tillage operations. This results in delayed sowing of wheat crop or sometimes, even the sowing of crop can not be done. Therefore, keeping in view the limitations of time and high expense of energy required in the conventional tillage system for wheat sowing, the introduction of no-till sowing of wheat assumes significance.

Salient features of tractor operated zero till seed -cum -fertilizer drill: The tractor operated zero till seed-cum-fertilizer drill was initially developed at G.B. Pant University of Agricultural and Technology, Pantnagar and subsequently modified to cater to the site needs. The salient features are described in Fig. 3.1. The specifications of tractor operated zero till seed-cum-fertilizer drill is given in Table 3.1.

Status and adoption level of tractor operated zero-till seed-cum-fertilizer drill: Tractor operated zero-till seed-cum-fertilizer drill was popularized in rice-wheat system and rural youth and farmers were encouraged and motivated to adopt this machine on custom hiring basis as an income generation activity. There was overwhelming response particularly in areas where paddy-wheat rotation is followed specially in water logged areas. The farmers and young unemployed rural youths already purchased 13,594 zero-till seed-cum-fertilizer drills as on 31-03-2010. Interestingly, small and medium farmers have adopted it as an enterprise for custom hiring. The number of machines procured by the farmers in Haryana is given in Fig. 3.2. Out of ₹ 1365 lakhs subsidy disbursed during 2008-09 for the purchase of agricultural implements, 11.35% of the amount was utilized for zero-till seed-cum- fertilizer drill. During 2008-09, under different schemes of subsidy, farmers have purchased 1411 zero-till seed-cum-fertilizer drill.

The number was only 1038 in 2001-02 and its cumulative population has reached 13,594 in the year 2009-10. The area sown by zero-till seed-cum-fertilizer drill has risen from 20,000 ha/year in the year 2001-02 to 1, 00,000 ha/year in the year 2009-10.

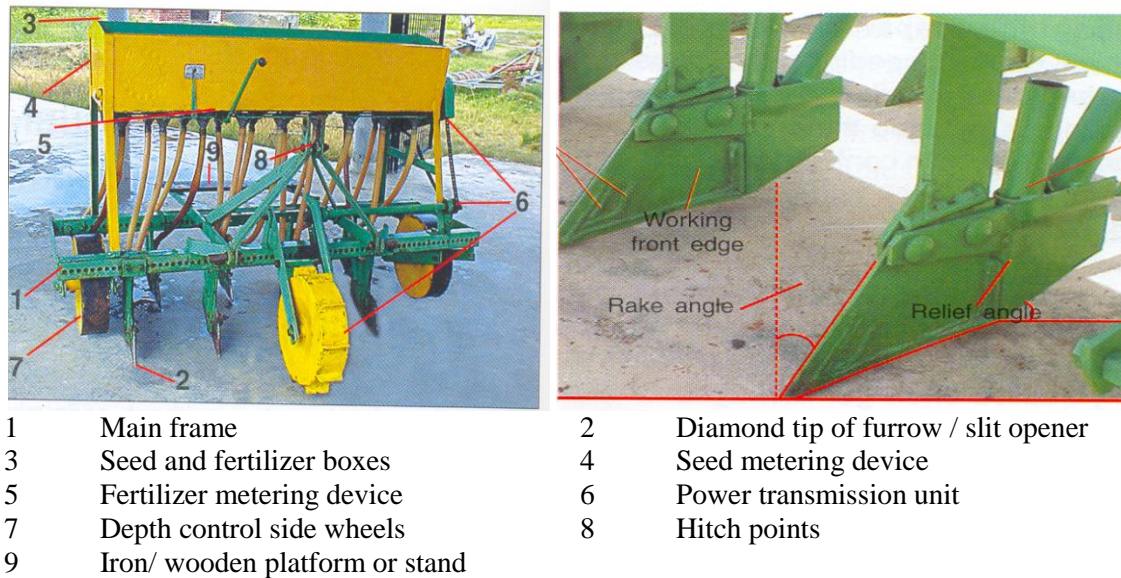


Fig. 3.1: Tractor operated zero-till seed-cum-fertilizer drill and its major components.

Table 3.1: Specifications of Tractor operated zero-till seed-cum-fertilizer drill

Type of drive	Ground wheel through sprocket chain arrangement
Side drive	Single
Type of furrow opener	Inverted T-Type
Cutting portion of furrow opener	8mm thick high carbon steel bit welded
Rake angle, degrees	20.0
Relief / clearance angle, degrees	5.0
Width of machine	11 to 13 tynes
Tractor hp required	35-45
Machine size (LxWxH), mm	1800 x 600 x 1100
Size of frame(LxWxT), mm	65 x 65 x 5
Seed metering device	Fluted feed roller of die casted aluminum. No. of flutes=10
Fertilizer metering device	Forced feed gravity type with adjustable hole and vertical rotor agitator
Ground wheel:	Front mounted – floating type with lugs on wheel periphery. Diameter = 380mm Width = 105mm No.of lugs = 10 Height of lug = 30mm

	Lug angle 90 ⁰
Over all weight, kg	250-260
Field capacity (ha/h)	0.4
Cost of machine, ₹	30,000

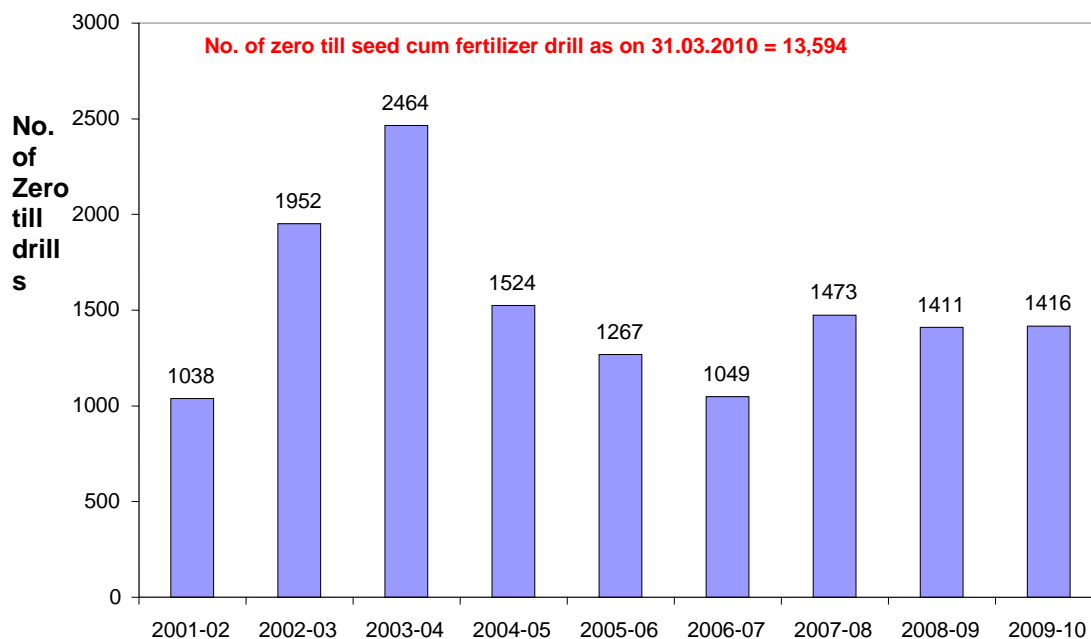


Fig. 3.2: No. of entrepreneurs of zero till seed cum fertilizer drill

Success of zero till seed-cum-fertilizer drill on custom hiring: CCS Haryana Agricultural University has undertaken intensive research and large scale demonstrations of zero-till seed-cum-fertilizer drill at farmer's fields which can accomplish sowing of wheat crop without any tillage operation (Fig. 3.3). Thus, the machine not only saves tillage costs and energy but eliminates time on seed bed preparation. The crop yields obtained are at par with farmer's practice. Weed management of fields planted by zero-till drill was much more effective especially that of *phalaris minor* weed. Zero-till seed-cum-fertilizer drill was operated by 35 hp tractor and covered 4-5 ha/day. The performance and economics of zero till seed cum fertilizer drill for custom hiring is given in Table 3.2. The entrepreneurs/farmers are charging on custom hiring an average ₹ 1000 per hectare. Total earning is estimated to be ₹ 12,500 per year and the pay back period of machine is three years. There is about 70% - 80% saving in fuel. The capacity of machine is 0.4 ha/h. The price of machine is ₹ 32000/-. The average area covered by an entrepreneur is 50 hectares per year. The total area covered by zero-till drill in Haryana was about 1.0 lac hectares in each year starting from 2004 onward. There are about 40 manufacturers who are engaged in the production of zero-till seed-cum-fertilizer drill and marketing in Haryana. There was saving of ₹ 2500/ha in lieu of not doing any tillage operation. Therefore, the benefit-

cost ratio of this machine when used for his own farm was 3.33 whereas on custom hiring it was 1.33.



Fig. 3.3: Zero-till seed-cum-fertilizer drill in operation in paddy harvested field.

Table 3.2: Performance and economics of Zero-till seed-cum-fertilizer drill on custom hiring.

Particulars	Value
Field capacity (ha/h)	0.4
Fuel consumed (l/h)	3.5
Total No. of entrepreneurs who purchased as on 31.03.2010	13,594
No. of entrepreneurs who purchased in 2009-10	1416
Cost of operation, ₹/ha	750
Cost of field preparation in conventional practice, ₹/ha	2500
Rate of custom hiring, ₹/ha	1000

Average area covered by one entrepreneur, ha/year	50
Saving, ₹/ha	250
Net profit by an individual, ₹/year	12,500
Cost of machine, ₹	32,000
Payback period	Three years
Benefit Cost ratio	
• For own use	3.33
• For custom hiring	1.33

Feedback from Farmers:

1. Timeliness in sowing (7-8 days earlier than traditional).
2. Saves 60-75 liters of diesel per hectare which resulted in saving of natural resources and environment.
3. About 30-40% less infestation of weeds.
4. Saves irrigation water up to 10-15% during first irrigation.
5. No crust formation after rains. Hence, no effect of rains on germination.
6. Improvement in crop yield.
7. Improvement in soil structure and fertility.
8. No lodging of crops at the time of maturity in case of heavy rains and winds.
9. Machine is simple and easy to operate.

List of Zero-till seed-cum-fertilizer drill manufacturers

Refer Appendix 'A' {S. No. 3, 7, 8, 11, 14, 17, 19, 22, 31, 33, 34, 38, 39, 40, 43, 46, 48, 50, 58, 61, 63, 64, 65, 66, 68, 69, 70, 71, 74, 75, 76, 80, 82, 85, 87, 90, 91, 92, 96}