

# TRACTOR MOUNTED TILL PLANTER

## *A SUCCESS STORY*



*All India Coordinated Research Project on*  
**FARM IMPLEMENTS AND MACHINERY**  
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- Year** : **2004**
- Published by** : **Coordinating Cell  
AICRP ON FARM IMPLEMENTS  
AND MACHINERY  
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## Introduction

After combine harvesting of paddy, the farmers face a lot of problems in timely sowing of wheat. Heavier soils normally require 8-12 operations with conventional equipment for proper seedbed preparation. Consequently the sowing of wheat is either delayed or done in poorly prepared seed-bed with reduction in the yield. Hence a need was felt for development of a machine which could help in timely sowing of wheat and manage the stubbles as well. The tractor mounted till planter which is a combination of a rotavator and a seed drill was developed at PAU, Ludhiana centre. It can prepare the seedbed and sow the seeds in a single pass. This machine has proved very useful for farmers for timely sowing of wheat after combine harvesting paddy in sandy loam as well as silt clay loam soil. The number of field operations have been reduced and the yield of wheat crop was also at par with that from conventional tillage and sowing practices.

## Traditional Practices

The traditional practices for sowing wheat after harvesting of paddy with combines include disking 3-4 times, which enables to cut the paddy straw/stubble to some extent and after this, the field is irrigated. The straw/stubble which comes in contact with soil gets decomposed partially. After 15-20 days, the field is prepared using two operations of the disc harrow/cultivator followed by one/two operations of the planker. After preparation of the field, sowing is normally done using seed drills. The turn around period between harvest of paddy and sowing of wheat is of 20-25 days only in normal conditions. In uncertain weather, the conditions become more critical, thus resulting in delay in sowing of wheat.

## Salient Features of the Machine

The machine has 9-row seed cum fertilizer drill mounted on a 1.6 m wide rotavator (Fig.1). The seed drill has fluted roller mechanism for metering seed, and fertilizer is metered with adjustable holes and agitator in the hopper. The drive to the metering mechanism is given by ground wheel through chain and sprocket. The furrow openers for the placement of seed and fertilizer are mounted at the rear of the rotavator in two staggered rows. The row to row spacing has been kept as 175 mm. The rotavator has 36 L shaped blades mounted on 6 flanges and each flange has 6 blades. The drive to the gear box of the rotavator is supplied from PTO shaft of the tractor.

## Evolution / Design Process

The project on the development of till plant machine was initiated in late seventies. At that time, this concept did not get acceptance. In the changing scenario, conservation tillage has been advocated for timeliness of operation without sacrificing yield. In 1998-99 PAU, Ludhiana started project of roto-tillage and sowing in one pass. Initially a seed cum fertilizer drill was attached on one m wide rotavator. To reduce the vibrations, a gang of coulters having 4 discs was attached in front of the rotavator to give vertical cut ahead of the cutting plane of the rotavator blades. One of the coulters touched the rear tyre of the tractor whenever the machine was lifted. The coulter was dispensed with in latter designs. Then new prototype was developed

which consisted of 1.6 m wide rotavator and 9-row seed cum fertilizer drill. The machine was evaluated at departmental research farm and farmer's fields. Based on the feed back, the machine was further refined.

### Performance of the machine

The performance of the machine was found to be better when operated in the fields harrowed once and having a moisture content of about 9-10%. The capacity of the machine was found to be 0.2 ha/h when operated at a forward speed of 2.5-3.5 km/h. Yields obtained from the plots sown with till planter compared favourably with those from conventionally sown plots.



**Fig.1 Tractor operated till planter**

In heavier soils, where conventional equipment require 6-8 operations for soil preparation the till planter offers 30-40% savings in time (more than 10 h/ha), labour and cost of operation (15-20%). Details of field performance results are given in table-1.

**Table 1: Performance results of tractor mounted till planter for wheat**

| Parameters                           | Quantity  |
|--------------------------------------|-----------|
| Depth of sowing, mm                  | 50-72     |
| Speed of operation, km/h             | 2.50-3.50 |
| Field capacity, ha/h                 | 0.18-0.25 |
| Fuel consumption, l/h                | 4-4.5     |
| Germination count/m length, (30 DAS) | 34-39     |
| Yield, kg/ha                         | 4185-4730 |

During 2001 and 2002 the machine was tested both under sandy loam soil and silt clay loam soil for sowing wheat (variety PBW-343). In sandy loam soil condition, collection and entanglement of straw near the tynes was observed at the time of sowing which caused non-uniform dropping of seeds in the furrow. The tractor mounted till planter performed better in silt clay loam soil where one pass of tractor mounted disc harrow was added.

|                                     |  |
|-------------------------------------|--|
| Treatments given in sandy loam soil |  |
| T1                                  | - Partial burning of rice straw + pre-sowing irrigation + till planter for wheat sowing.                   |
| T2                                  | - Stubble shaver + complete burning of rice straw + pre-sowing irrigation + till planter for wheat sowing. |

In silt clay loam soil

T3 - Partial burning of rice straw + Pre-sowing irrigation + till planter for wheat sowing.

T4 - Partial burning of rice straw + Pre-sowing irrigation + one disc harrowing + till planter for wheat sowing.

**Table 2: Performance results of tractor mounted till planter under different treatments**

| Parameters                          | Sandy loam soil |         | Silt clay loam |         |
|-------------------------------------|-----------------|---------|----------------|---------|
|                                     | T1              | T2      | T3             | T4      |
| Variety                             | PBW-343         | PBW-343 | PBW-343        | PBW-343 |
| Seed rate, kg/ha                    | 120             | 122     | 128            | 122     |
| Depth of sowing, mm                 | 56              | 58      | 54             | 51      |
| Speed of operation, km/h            | 2.6             | 1.9     | 1.9            | 1.9     |
| Germination count/m length (30 DAS) | 39              | 30      | 30             | 34      |
| Plant height, mm (60 DAS)           | 301             | 342     | 323            | 334     |
| Number of tillers/m in row          | 67              | 90      | 84             | 88      |
| Yield, kg/ha                        | 3017            | 4730    | 4185           | 4552    |
| Cost of operation, Rs/ha            | 1015            | 1204    | 1014           | 1262    |

### Status of the Technology

Use of the machine results in saving of 15-20% time and 30-40% in cost of operation compared to conventional practice. The yield was also at par. At Jarg village, the machine was operated in 5 ha with yield of 57.5 - 62.5 q/ha which was at par with traditional method followed by the farmers. The machine was also operated at University seed farm, Ladowal which resulted in advancing sowing by two weeks. Two manufacturers have already started production of the machine and supplied 20 units.

### Appendix-I

#### Specifications of Machine

|   |   |
|---|---|
| Type of machine                                       | Seeding attachment mounted on rotavator |
| Source of power                                       | 33 kW tractor                           |
| Type of drive from tractor to rotavator               | Through PTO                             |
| Working width, mm                                     | 1600                                    |
| Number of rotary section                              | 6                                       |
| Number of blades                                      | 6                                       |
| Outer diameter of the rotor, mm                       | 1640                                    |
| Overall transmission ratio from tractor pto to rotary | 28:15                                   |
| Transmission ratio through gear box                   | 15:22                                   |
| Provision for changing the depth of operation         | By adjustable shoes on both the sides   |
| Number of rows of seed cum fertilizer drill           | 9                                       |
| Row to row spacing, mm                                | 175                                     |
| Metering mechanism for seeding                        | Fluted roller                           |
| Metering mechanism for fertilizer                     | Gravity type with agitators             |
| Type of furrow openers                                | Inverted T type                         |
| Machine weight, kg                                    | 582                                     |
| Cost, Rs  | 50000                                   |

**LIST OF MANUFACTURERS**

1. M/s Dashmesh Mechanical Works  
Nabha Molerkotal Road  
Amargarh, District : Sangurur (Punjab)
  
2. M/s ASS Foundary and Agril. Implements  
GT Road, Jandiala Guru  
District : Amritsar (Punjab)