Zero Till Drill – A Suitable Tool for Sowing Wheat in Tal Area

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ABSTRACT

The study was conducted in the Rajpur Tal of Bhagalpur district in Bihar through coordinating institution B.A.C., Sabour, Bhagalpur, Bihar. Zero Tillage wheat have shown primarily positive impacts on wheat crop management, particularly through reduced input needs combined with potential yield increases. Zero till drill is very useful implement for sowing wheat crop especially is such area where there is a little time for land preparation. In tal areas, water recedes in October and large area of field get exposed for sowing crop at a time. More in such areas due to high percentage of clay and low permeability of soil, proper tilth is not obtained by ploughing the soil which results poor yield of wheat crop. Studies for the suitability of zero till drill in Tal area recorded better performance of Wheat under the system. The maximum emergence was noted in case of zero till drill due to minimum resistance to germinating seeds. The effective tiller per square meter of field, no. of grains per panicle and 1000 grain weight is found to be more in case of sowing of wheat by zero till drill. The yield of grain has been noted 38q/ha by sowing the seed by zero drill.

KEY WORD: Clay, Tilth, Yield

INTRODUCTION

India is the second largest producer of wheat in the world with an average annual production of 80 Mt (million tonnes) in recent years (Anonymous, 2011). It accounts for approximately 11.79 per cent of world's wheat production (FAO, 2011). After the Green

Revolution, the production of wheat has shown a huge increase. The major states involved Uttar Pradesh, Punjab and Haryana. They account for nearly 70 % of the total wheat producton the country. Punjab and Haryana yield the highest amount of wheat because of the availability of better irrigation facilities.

Demonstration with Zero Tillage wheat in the rice-wheat systems have shown primarily positive impacts on wheat crop management, particularly through reduced input needs combined with potential yield increases. Hobbs *et al.* (2003) also supported that Zero Tillage technique reduced input needs for wheat production. Due to the adoption of ZT technology, the number of field operations for wheat crop establishment (including tillage) decrease from an average of seven to only one (Malik *et al*., 2002a). Effects on soils, weeds, pests and diseases in ZT typically improves soil quality in various dimensions, including soil structure, soil fertility and soil biological properties. ZT typically reduces the incidence of weeds in the wheat crop (Malik *et al*., 2002a); (Malik *et al*., 2002b). In fact, ZT reduced the nematodes population and enhanced both the earthworm population and predator diversity and density in wheat (Malik *et al*., 2002a); (Malik *et al*., 2002b).

The most prevalent cropping system of Eastern Bihar is rice-wheat. The soil of this area is heavy consisting clay content more than 50 %. The clay dominates in montmorillonite which is of swelling and shrinking type. The soil forms big cracks and hard clods on drying. Due to heavy rain and water stagnation in the catchment area farmer faces several problems. Water recedes in October and large area of field get exposed for sowing of crop at a time and sowing operation is to be done in very short duration within a week. Due to inundation of water for four months these area remain completely free from weeds. Tillage is generally done to control weed and create a fine tilth for sowing of crop especially wheat. In Tal due to high amount of clay and

low permeability of soil proper tilth is not achieved by ploughing the field. Therefore zero till drill, which doesn't expose the soil to a greater depth thats why clods formation is not possible is used. Moreover proper aeration is provided for germination seeds. This avoids any mechanical obstruction for germination seeds as furrow remains uncovered. The experimental findings on these aspects were observed and described into subsequent heads.

Hence, the present study was undertaken with the objectives of wheat production with zero tillage and quantifying the contribution of technology due to zero tillage in yield production of wheat.

MATERIALS AND METHODS

The test was conducted in Rajpur Tal of Bhagalpur district for direct sowing of wheat (Variety-Local) after harvest of rice. The physio-chemical characteristics of soil have been presented in Table 1. The paddy field was manually harvested and the stubble was left at height ranging 10-15 cm. For accurate seed rate the drill was calibrated like traditional seed drill but in this case seed rate was kept 20 % higher than recommended conventional drilling. The moisture content was 20 %. The other method for sowing of wheat was also carried out in the Rajpur Tal and the suitability of the zero till drill was evaluated. The experiment was laid out in a Randomized Block Design (RBD) with seven replications.

RESULT AND DISCUSSION

The zero-tillage technology is not remunerative but also eco-friendly. It envisages 100 per cent saving in land preparation as wheat sowing is done just after harvesting of preceding rice crop without any ploughing. Thus in zero tillage the soil is left undisturbed from harvest of rice to sowing of wheat. The emergence of wheat as influence by different method of sowing at an interval of 7 days and 15 days. The emergence of wheat (No of emergence/m^2) has been noted

152 by sowing broadcasting of seed and mixing by cultivar and 178 by sowing in ploughed field by broadcasting and mixing by cultivator, and 185 by sowing the seed by zero drill, which is relatively higher than other sowing method after 7 days interval. The emergence of wheat (No of emergence/m^2) after 15 days interval has been noted 170 by sowing broadcasting of seed and mixing by cultivar and 205 by sowing in ploughed field by broadcasting and mixing by cultivator, and 230 by sowing the seed by zero drill, which is relatively higher than other sowing method. The data collected from the field were analyzed and the results of the study in respect of (i) Effective Tiller/sqm (ii) No. of grains/panicle (iii) 1000 grains wt (gm) and (iv) Yield (q/ha) are summarized below:

The Effective Tiller/sqm has been noted 208 by sowing broadcasting of seed and mixing by cultivar and 218 by sowing in ploughed field by broadcasting and mixing by cultivator, and 221 by sowing the seed by zero drill, which is relatively higher than other sowing method. The No. of grains/panicle has been noted 39 by sowing broadcasting of seed and mixing by cultivar and 37 by sowing in ploughed field by broadcasting and mixing by cultivator, and 41 by sowing the seed by zero drill, which is relatively higher than other sowing method. The 1000 grains wt (gm) has been noted 34.8 by sowing broadcasting of seed and mixing by cultivar and 36.5 by sowing in ploughed field by broadcasting and mixing by cultivator, and 38.2 by sowing the seed by zero drill, which is relatively higher than other sowing method. The yield of grain has been noted 27.8 q/ha by sowing broadcasting of seed and mixing by cultivar and 34.5 q/ha by sowing in ploughed field by broadcasting and mixing by cultivator, and 38 q/ha by sowing the seed by zero drill, which is relatively higher than other sowing method adopted in the Tal land. Verma *et al*. (2017) also reported that zero tillage technique was reported higher yield over conventional method of sowing.

The results of this experiment are presented in Table 2 and Table 3. The emergence of wheat as influence by different method of sowing at an interval of 7 days is presented in Table 2. The maximum emergence was noted in case of zero till drill due to minimum resistance to germinating seeds. The yield attributing character is presented in Table 3. The effective tiller per square meter of field, no. of grains per panicle and 1000 grain weight is found to be more in case of sowing of wheat by zero till drill.

CONCLUSION

The zero-tillage technology is an advance technique and eco-friendly. It envisages 100 per cent saving in land preparation as wheat sowing is done just after harvesting of preceding rice crop without any ploughing. The maximum emergence was noted in case of zero till drill due to minimum resistance to germinating seeds. The effective tiller per square meter of field, no. of grains per panicle and 1000 grain weight is found to be more in case of sowing of wheat by zero till drill. The yield of grain has been noted 38q/ha by sowing the seed by zero drill. Based upon the above results, the zero till drill prove most suitable machine for sowing wheat in Tal land, where little time is left for land preparation.

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Table 1: Physio-chemical properties of the soil in the experimental site

SI. No.	Properties	Value obtained	Method employed
	Location of soil: Rajpur Tal of Bhagalpur district		
I	**Physical properties**		
1	Coarse sand (%)	7.15	International pipette method (Piper, 1966)
2	Fine sand (%)	16.27	
3	Silt (%)	26.52	
4	Clay (%)	50.99	
II	**Chemical properties**		
1	Soil pH (1:2.5 soil water)	7.20	pH meter (Piper, 1966)
2	Electrical conductivity (dS/m)	0.35	Conductivity bridge (Jackson, 1967)
3	Organic carbon (%)	0.52	Walkley and blacks wet oxidation method (1934)
4	Available nitrogen (kg/ha)	224.4	Modified kjeldhal method (Jackson, 1967)
5	Available phosphorus (kg/ha)	32.70	Olsen' method (Jackson, 1967)
6	Available potassium (kg/ha)	322.60	Flame photometer (Jackson, 1967)

Table 2: Emergence of wheat as influenced by different treatments

Sl. No.	Treatments	No of emergence per sq. meter	
		7 days after sowing	15 days after sowing
1.	Broadcasting of seed and mixing by cultivar	152	170
2.	Sowing in ploughed field by broadcasting and mixing by cultivator	178	205
3.	Sowing by zero till drill	185	230

Table 3: Yield attributing characteristics and yield of wheat

Sl. No.	Treatments	Effective Tiller/sqm	No. of grains/panicle	1000 grains wt (gm)	Yield (q/ha)
1.	Broadcasting of seed and mixing by cultivar	208	39	34.8	27.8
2.	Sowing inploughed field by broadcasting and mixing by cultivator	218	37	36.5	34.5
3.	Sowing by zero till drill	221	41	38.2	38.0
S. Em (±)		**7.82**	**1.14**	**0.49**	**0.53**
CD (5%)		**17.05**	**2.48**	**1.08**	**1.16**