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

ABSTRACT

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. The A study was conducted in the Rajpur Tal of Bhagalpur district in Bihar through coordinating institution B.A.C., Sabour, Bhagalpur, Bihar to assess the performance of a till drill. 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 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

Comment [SA1]: I suggest, from the look at your results, a change to this title. Maybe, "Effect of using a zero till drill on seed emergence of wheat in the Tal area".

The current title is over conclusive and it makes the study biased towards the use of the tool, though there are other existing tools. This is unethical.

Comment [SA2]: This is not necessary in an abstract. It should be captured in the introduction.

Comment [SA3]: What is the value of emergence?

Comment [SA4]: I disagree that such factual information does not have a known REFERENCE citation. Please do the research and get the relevant citation to this.

Revolution, the production of wheat has shown a huge increase. The major states involved <u>are</u> Uttar Pradesh, Punjab and Haryana. They account for nearly 70% **percent** of the total wheat production the country. Punjab and Haryana yield the highest amount of wheat because of the availability of better irrigation facilities (Reference??).

Demonstration with Zero Tillage_(ZT) 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 wheat. The soil of this area is heavy consisting clay content <u>of</u> more than 50% **percent**. 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_a these areas 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_a due to high amount of clay and low permeability of soil_a proper tilth is not achieved by ploughing the field. Therefore_a zero till drill, which doesn't expose the soil to a greater depth <u>leading to no clod formation</u>, thats why clods formation is not possible is used. Moreover_a proper aeration is provided for <u>seed</u> germination seeds. This avoids any mechanical obstruction for germination <u>of</u> 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.

MATERIALS AND METHODS

The test was conducted in Rajpur Tal of Bhagalpur district for direct sowing of wheat 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 percent. %. 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.

RESULT AND DISCUSSION

The zero-tillage technology is not <u>only</u> 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 influenced by different method of **Comment [SA5]:** This should go to Materials and Methods

Comment [SA6]: The objective statement was not well captured. Here is a suggestion: Hence, this study was conducted with the objective of assessing the performance and suitability of a till drill tool for sowing wheat under zero tillage.

Comment [SA7]: There's still more to add to this section. Please do for this section is the heart of the work.

Comment [SA8]: This Table 1 should be sent to results for discussion. The materials and methods section ONLY talks about the procedures and tools used for the study, and NOT results.

Comment [SA9]: Is this soil moisture content or seed moisture content? Was this calculated on wet or dry basis? How was it determined?

Comment [SA10]: Are you referring to the traditional manual method? Please explain and specify?

Comment [SA11]: How was the evaluation done? What field parameters were you measuring and how?

Is it possible to show at least a photo or design drawing of this zero till drill to inform your readers? How does it work, what are the parts etc.??

Comment [SA12]: I think this whole section should be part of the introduction and NOT Results and Discussion.

Comment [SA13]: Is this supposed to be 'as' or 'is' ?

sowing at an interval of 7 days and 15 days. The emergence of wheat (No of emergence/m²) 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/m²) 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 of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting of seed and mixing by cultivar and 34.5 up sowing in ploughed field by broadcasting and mixing by cultivator, and 38 up ha by sowing the seed by zero drill, which is relatively higher than other sowing method adopted in the Tal land. Verma *et*

Comment [SA14]: How was the analysis done? This wasn't explained in Materials and Methods. Statistical analysis is very important to such a study before any conclusive statements can be made.

Comment [SA15]: This is a typical Materials and Methods statement.

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 <u>wasis</u> found to be more in case of sowing of wheat by zero till drill.

CONCLUSION

The zero-tillage technology is not <u>only</u> 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. 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 proved most suitable machine for sowing wheat in Tal land, where little time is left for land preparation.

ACKNOWLEDGEMENT

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REFERENCE

FAO (2011) Crop Prospects and Food Situation. Global Information and Early Warning System,

Comment [SA16]: Please present and Tables prior to discussions. It makes it easier to relate with the results.

Comment [SA17]: Any research or policy recommendations based on your results??

Comment [SA18]: I bet to differ on this conclusion. What is the capacity (ha/h) of your machine compared to the other tools?

Comment [SA19]: This certainly can't be anonymous. Pls cite appropriately.

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SI. No.	Properties	Value obtaine d	Method employed				
	Location of soil: Rajpur Tal of Bhagalpur district						
Ι	Physical properties						
A	Particles size analysis						
1	Coarse sand (%)	7.15					
2	Fine sand (%)	16.27					
3	Silt (%)	26.52	International pipette method (Piper, 1966)				
4	Clay (%)	50.99					
B	Bulk density (mg/m ³)	1.28	Core sample method (Dastane, 1967)				
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 (Jackson, 1967)				
4	Available nitrogen (kg/ha)	224.4	Modified kjeldhal method (Jackson, 1967)				
5	Available phosphorus (kg/ha)	32.70	Olsen' method (Jackson, 1967)				

Table 1: Physical and chemical properties of the soil in the experimental site

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Comment [SA20]: How did these results relate to the other study results, especially the performance assessment?

6	Available potassium (kg/ha)	322.60	Flame photometer (Jackson, 1967)
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Table 2: Emergence of wheat as influenced by different treatments

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

Comment [SA21]: You used treatments but there was no experimental design for them. What shows that 152, 178 and 185 are different? It is only when they are subjected to statistical analysis. This was not done, right?

Table 3: Yield attributing characteristics and yield of wheat

Sl.	Treatments	Effective	No. of	1000 grains	Yield (q/ha)
No.		Tiller/sqm	grains/panicle	wt (gm)	
1.	Broadcasting of seed and	208	39	34.8	27.8
	mixing by cultivar				
2.	Sowing in_ploughed field	218	37	36.5	34.5
	by broadcasting and				
	mixing by cultivator				
3.	Sowing by zero till drill	221	41	38.2	38.0