

Study on bullock drawn and power tiller Operated equipment for land preparation in wheat Under rainfed Diaraland conditions

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Abstract: Diaraland is situated between natural levies are formed by meandering, braiding and course changing of river. There is a time gap scarcity for land preparation because of less time availability between post flood and sowing time of wheat. It is essential to prepare land timely. A conventional 8 hp power tiller as a source of power with its matching equipment was field evaluated for wheat crop and compared with traditional bullock farming system followed in diaraland. Study revealed that the average benefit cost ratio for wheat crop was 2.31 in twice rotatilling and 1.81 in traditional bullock forming system. Energy consumed in land preparation for wheat crop was 1840.86 MJ/ha in twice rotatilling and 1261.37 MJ/ha in bullock farming system. It was found that the power tiller farming system with twice rotatilling gave better field preparation for proper operation of sowing and seed germination and was more economical, but more energy expensive than the other operations.

INTRODUCTION

Diaraland being itself a very typical physiographic of it nature, moisture depleted very fast just after post flood. There is a time gap scarcity between post flood and sowing time of wheat. The less time availability forlandpreparation is a big problem in diaraland. The socio- economic conditons of diara farmers are rather poor. The four wheeled tractors are beyond the reach of these farmers. Therefore, it is visualized that the power tiller may be an appropriate source of farm power for small and marginal farmer of diara area. Under these conditions, it is necessary to evaluate the power tiller farming system in comparision to bullock farming system for land preparation of wheat crop, which is major rabi crop of diara area. Results of these study will help us to asses the feasibility and economic viability for adoption and popularization of power tiller in diara area of eastern U.P.

MATERIALS AND METHODS

Field experiment was conducted in Saryu river's diaraland at Katra in Gonda district during rabi crop seasons. The soil of experimental site was silt loam having sand, silt and clay in 30, 57 and 13 percent respectively. The pH value ranged from 7.73 to 7.77, The treatment followed under bullock V/S power tiller farming system for land preparation were as follow:

Treatment T₁ = Bullock farming system (One pair bullock)

Country plough x 3

Planking x 4

Sowing by broad costing and mixing by country plough followed By planking.

Treatment T₂ = Power tiller farming system (Mitsubishi power tiller of 6Kw)

Rotatilling x 2

Planking x 2

Sowing behind plough followed by planking

The randomized block design (RBD) of experimental plot with four replication was followed in this study. All input and rainfed conditions were kept same in all treatment. Various parameter like operation speed, wheel slip of power tiller, fuel consumption, field capacity, soil bulk density (BD) mean soil clod diameter, grain yield, energy used in land preparation, cost of cultivation, benefit cost ratio were recorded and computed during the study for all the treatments.

RESULTS AND DISCUSSIONS

The average results of the three crop seasons data regarding performance of equipments under bullock V/S power tiller farming system are given in Table 1. The observation shows that the effective field capacity (EFC) of country plough was 0.043 ha/h where as EFC for twice rototilling was 0.093 ha/h. Power tiller wheel ship was negative due to pushing behavior of rotavator. The percentage of decrease in bulk density of soil from initial field conditions to final tillage operation in bullock farming system (T1) and twice rotatilling (T2) were 7.59 and 11.80% respectively.

The percentage decrease in BD of soil was more in T2 than T1 because of well pulverization and increase in air voids in to the soil prepared by twice rotatilling. The mean clod diameter (mm) varried from 19.50 to 23.25 in T1 and 11.20 to 14.46 in T2 treatment, The clod size in T1 was bigger than T2 due to unploughed land left between two successive furrows during first ploughing which gave clod formation when ploughed again and could not be made five using traditional implements as compared to power tiller rotavator. This clearly indicates that the soil environment formed under T2 was better as compared to T1 treatment. The average plant population per population

Table 1: Performance results of bullock and power tiller (8hp) farming Systems for wheat crop production under rainfed diara land.

S. No.	Performance indicator	Treatments	
		T ₁	T ₂
1.	Field capacity ha/h	0.043	0.093
2.	Time required for seed bed Preparation h/ha	78.60	30.14
3.	Saving in time %	-	61.65
4.	Mean soil clod diameter mm	21.05	12.33
5.	Decrease in BD %	7.59	11.80
6.	Subjective assessment	Good	Good
7.	Cost of seed bed preparation Rs/ha	763.29	567.37
8.	Saving in cost of seed preparation %	-	25.67
9.	Crop Yield		
	a) Grain at 14% mc q/ha	21.81	24.11
	b) Straw at 14% mc q/ha	29.13	31.80
10.	Cost of cultivation Rs/ha	3404.30	3020.61
11.	Benefit cost ratio	1.81	2.31
12.	Direct energy use in land preparation MJ/ha	1258.40	1836.67

per m2 at emergence in T1 and T2 treatment were 124 and 169 nos. respectively. The Reason for more population in T2 than T1 were better quality of seed bed preparation. The average wheat crop yield computed onthe basis of three crop seasons data in T1 and T2 were 21.81 and 24.11 q/ha respectively. The reason for higher yield in T2 than T1 was more plantpopulation per unit area at emergence due to comparatively better seed bedpreparation. The average expenditure on land preparation in T2 (Rs. 567.37per ha) was 25.67% lesser than T1 (Rs. 763.29 per ha) treatment. The totalaverage cost of cultivation (Rs/ha) based on the three crop season data was3404.37 per ha in T1 and Rs. 3020.61per ha in T2 treatment. The average benefit cost ratio in T1 andT2 treatment was 1.81 and 2.31 respectively. It was found that the direct energy used in land preparation in T1 and T2 treatments was 1258.40 and 1836.67 MJ/ha respectively. The energy expenditure in land preparation was more in case T2 than T1 treatment.

CONCLUSION

Results of this study are conducted as follows:

1. Twice rotatilling with power tiller gave better field preparation for growing wheat crop with small clode size dia (12.33 mm) as well as aerated seed bed as Compared to traditional bullock farming system with bigger clod size dia (21.05mm).
2. Land preparation with twice rotatilling was more economical in wheat crop production as benefit cost ratio was 2.31.



3. Average expenditure on land preparation with twice rotatilling by power tiller was 25.07% lesser than bullock farming system.
4. Total direct energy required for land preparation in wheat crop was more in power tiller farming system.

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