

## **Comparative Performances of Power Tiller and Bullock Farming Systems in Hilly Regions of Kashmir Valley**

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### **ABSTRACT**

Experiments were conducted during the year 2003-04 at Wanigambala (Pattan) District Baramulla and New Theed (Harvan) District, Srinagar to compare the performances of 12.5 H.P. power tiller (Mitsubishi make) and bullock operated farming systems. The experiments were conducted for wheat crop with three treatments and four replications. The implements used for sowing and field preparation were zero till drill, Shalimar plough and triangular plough. It was observed that there is a significant saving in cost, time and energy when the seed bed was prepared with power tiller systems as compared with the bullock systems. The cost analysis revealed a saving of 83.6%, 52.3% and 105.2% in cost of cultivation with power tiller as compared with bullock operated systems for the three implements used namely zero tillage seed drill, Shalimar plough and triangular plough.

**Key words:** Agricultural engineering, tillage, farming, hilly regions, Kashmir

### **INTRODUCTION**

Most of the agricultural land in hilly regions of Kashmir valley is under small terraces. The width of terraces at certain places is so small that a pair of bullocks along with implement can hardly turn at end of the terrace. Thus, the need of farm equipments is quite different from that of the plains. In order to increase the agricultural production and productivity through efficient use of farm inputs like high yielding varieties seeds, fertilizers, pesticides and irrigation water, the appropriate level of farm mechanization in hill regions has to be prompted on priority basis.

Topography and size of land holdings are the two major constraints which restrict the introduction of tractors in these areas. About 36% of the total land holdings in India are below 5 ha. which occupies 46% of the total cultivated area (Gupta, 1988). Majority of the farmers having less than 5 ha. of land holdings also cannot afford to own tractors because of their higher initial investment. On the other hand, raising of draft animals is becoming very costly resulting in enhanced cost of farm operations and ultimately decreasing the net return to the farmers. The farmers tend to share their bullocks during ploughing season to reduce the cost of

cultivation as each family only tends to have one bull (Gupta, 1989). In order to overcome the problem light weight power tillers and medium sized power tillers could be effectively used for farm operations. Its use can be diversified by adopting it for a number of farm operations like ploughing, sowing, deweeding, pesticide application, water lifting etc. This will increase the utilization on farms, thereby reducing the cost of operations.

### **MATERIAL AND METHODS**

Two field experiments were conducted out to compare the performance of power tiller and bullock farming systems. Field experiments were carried to compare the performance of power tiller V.S.T Shakti (12 H.P) and bullock farming system for wheat crop with (three row) zero tillage seed drill Shalimar plough and triangular plough (Fig 1-3). The field experiment on wheat crop was conducted during the Rabi season of 2002-03. Irregular shaped plots of size <math>50\text{m}^2</math> and  $50\text{-}100\text{m}^2</math> were utilized for sowing of the crop. The field performance and cost analysis of power tiller and bullock operated implements are given in Table 1. A suitable hitching system was developed for attachment with the power unit. In addition, a depth control mechanism was also developed to control the depth of operation and provide stability to the power tiller during operation.$



Fig1: Zero Tillage seed drill



Fig2: Triangular plough



Fig3: Power tiller

### **RESULTS AND DISCUSSION**

The comparative field performance of power tiller and bullock drawn implements are given in Table 1.

Table 1. Comparison of power tiller with bullock farming system for wheat crop

S.No	Parameter	Power tiller			Bullock drawn		
		Zero-Till Drill	Shalimar Plough	Triangular plough	Zero-Till Drill	Shalimar plough	Triangular Plough
1.	Total area,m <sup>2</sup>	970	510	510	490	480	510
2.	Actual operating time hr	30.0	43.34	39.23	32.13	71.4	87.0
3.	Travelling speed Km/hr	3-5	4-6	4-6	2-3	2-3	2-3
4.	Depth of cut cm	8	14	16	9	15	17
5.	Field capacity ha/hr	0.195	0.0706	0.078	0.0715	0.0301	0.0251

S.No	Parameter	Power tiller			Bullock drawn		
		Zero-Till Drill	Shalimar Plough	Triangular plough	Zero-Till Drill	Shalimar plough	Triangular Plough
6.	Field efficiency %	60-65	70-75	65-70	65-70	70-75	70-75
7.	Human energy (man-hr/ha)	10.27	16.42	17.52	20.71	32.62	36.7
8.	Fixed cost (Rs/hr)	14.74	13.24	13.89	4.62	2.67	3.36
9.	Variable cost (Rs/hr)	37.2	37.2	37.2	30.36	30.07	30.17
10.	Total costRs/hr	51.94	50.44	51.09	34.98	32.74	33.73
11.	No of men engaged	2	1	1	2	1	1
12.	Effective width cm	60.2	30.5	34.7	60.2	30.5	34.7
13.	Total costRs/ha	266.5	714.4	655.0	489.3	1087.7	1343.9

The field capacity of power tiller operated zero till seed drill, Shalimar plough and triangular plough are 0.195ha/hr, 0.0706ha/hr and 0.078ha/hr respectively. The field capacity of bullock operated zero till seed drill, shalimar plough and triangular plough as 0.0715ha/hr, 0.0301ha/hr and 0.0251ha/hr respectively. The total cost of land preparation with power tiller operated zero till seed drill, Shalimar plough and triangular plough was Rs 266.5/ha., Rs 714.4 /ha., and 655.0Rs/ha respectively. The total cost of land preparation with bullock operated zero till seed drill, shalimar plough and triangular plough was 489.3Rs/ha., Rs 1087.7/ha., and Rs 1343.9/ha. respectively. The power tiller besides being used in field preparation can be utilized for performing wide variety of operations like sowing, deweeding, irrigation, pesticide application and thrashing.

### **CONCLUSIONS**

1. There is a significant saving in cost, time and energy when the seed bed is prepared with power tiller as compared to the bullock operated system.
2. No significant differences in yield were obtained under the two systems.
3. The cost analysis revealed a saving of 83.6%, 52.3% and 105.2% saving in cost of cultivation with power tiller as compared with bullock operated systems for the three implements
4. The power tiller can be effectively used for performing other operations like sowing pesticide application, water lifting, puddling, thrashing of manually operated implements

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