Pak. J. Agri. Sci., Vol. 28, No. 4, 1991

EFFECT OF DIFFERENT CULTIVATION TECHNIQUES ON WHEAT PRODUCTION

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Effect of different tillage implements used for land preparation for wheat crop has been studied. Rotavator and cultivator used for ploughing gave the maximum yields as compared with other techniques. The seed bed preparation by cultivator alone was found to be the most suitable as it suits to the farmers resources i.e. low cost and high return, easily available and this method consumed about 14% less irrigation water as compared to rotavator technique.

INTRODUCTION

Wheat being a staple food needs major focus in the farming programme to achieve self-sufficiency and to improve the income of the farming families. The impact of modern technology revealed that the cultivation intensity i.e. number of ploughings and plankings given to a piece of land sown under wheat crop, had negligible contribution towards increase in wheat yield. Sheikh *et al.* (1978) determined that different tillage implements had different effect on the emergence, yield of wheat and different tillage operations had different effects on soil physical properties such as density, moisture content and penetration resistance. With respect to soil characteristics and yield of crop, disk harrow was considered as a suitable type of implement under the conditions used in this study.

Sial *et al.* (1988) found from the results of field experiments a poor performance of a power tiller for wheat crop. Bullocks and a small size tractor of 12 H.P. being uncomfortable, slower, ineffective and were considered inappropriate. A medium size tractor of about 50 H.P. was suggested for wheat cultivation as a suitable mode of power because of its favourable effects on soil strength, seedling emergence and cost of production. The present study aimed at isolating the effect of various methods of seed bed preparation on the wheat yield. It was observed that seed bed preparation by cultivator was found to be the most suitable since it suited to the farmers resources. The cultivators are easily available in the villages. These give higher return with less cost and the field grown with this technique consumes relatively lesser irrigation water.

METHODOLOGY

Five experimental plots of wheat crop were sown in loam soil at the project area Shahkot under different techniques of cultivation. There are various factors such as soil type, cultural practices, seeds, fertilizer use level, irrigation facilities, etc. which influence the wheat yield. In order to see the effect of one factor, the others need to be kept constant and that is only possible when experiments are conducted under control conditions at a farm. The methods of seed bed preparation used were:

i. Single ploughing of rotavator followed by a planking.

ii. Single ploughing of rotavator plus one ploughing by cultivator followed by a planking.
iii. One disc harrow ploughing plus cultivator ploughing followed by a single planking.
iv. Single ploughing by cultivator followed by a planking.

The above data revealed that the yield in case of second method i.e. one operation by rotavator + one by cultivator followed by a planking was the highest, being 1737 kg per acre. The second yield level of wheat was obtained from the field prepared with single operation of cultivator followed by a planking (1693 kg). Then came the rotavator plus planking (1370 kg) and the lowest was obtained with ploughing by disc plough followed by cultivator and a planking.

Table 1.

Methods of seed bed preparation	Yield/acre (kg)
Rotavator + planking	1370
Rotavator + cultivator + planking	1737
Disc harrow ploughing + cultivator + planking	1280
Cultivator + planking	1693

All the fields were sown by automatic rabi drill and the data were recorded at the spot. The other factors such as soil type, cultural practices, variety of wheat, sowing method, fertilizer application and management, etc. were kept constant. The variable seed bed preparation methods were recorded and their influence on wheat production was isolated. The data pertain to the crop year 1989-90.

RESULTS AND DISCUSSION

Wheat yields: The wheat yield realized from the four experimental fields is given in Table 1.

Production cost: Dhiman and Sharma (1986) found the maximum wheat grain yield with the best treatment having six tillage operations by harrowing and triphali. They also found that energy requirement and expenditure on sowing operation was maximum (49.6 k Wh/ha and 222.2 Rs/ha) in six tillage operation whereas these figures were 18.2 k Wh/ha and 80.7 Rs/ha for zero tillage treatment. Obviously more tillage operations required higher energy consumption and thus more expenditure. The grain production cost in zero tillage was almost

Table 2. Cost incurred on various methods

Methods	Seed bed preparation (rupees/acre)	Total variable cost (rupees/acre)
Rotavator + planking	120	1081
Rotavator + cultivator + planking	155	1206
Disc plough + cultivator + planking	155	1116
Cultivator + planking	55	1031

less than half of that with best treatment.

Production cost included the variable items such as cultivation, seed, sowing, fertilizer, irrigation, harvesting and threshing cost. The seed bed preparation cost as shown in Table 2 was assessed on the prevailing hiring rates of operation per acre of the implements used in the experiments.

The cost was found to be maximum in case of rotavator plus cultivator (Rs. 1206 per acre as against Rs. 1116 in case of disc plough plus cultivator), Rs. 1031 in case of cultivator and Rs. 1081 for a field prepared with rotavator only. The difference in the cost per acre was mainly due to land preparation, harvesting, threshing, etc.

Gross income: The gross income was arrived at by multiplying the grain yield with the farm gate price. The details are presented below:

Table 3. Returns from various methods

Methods	Variable cost (rupess/acre)	Total income (rupees/acre)	Gross margin (rupess/acre)	Return: investment ratio
Rotavator	1081	2970	1889	1.75
Rotavator + cultivator	1206	3908	2702	2.24
Disc plough + cultivator	1116	2880	1764	1.58
Cultivator	1031	3809	2778	2.69

The gross margin was the highest in case of a method where seed bed was prepared with cultivator followed by a planking and the return to investment ratio was 2.69. In case of seed bed prepared by rotavator plus cultivator, the income received was very close to it i.e. Rs. 2702 and the return to investment was 2.24. The disc plough used in preparing the seed bed for wheat sowing did not give encouraging results, may be due to uneven placement of seed and of poor germination. The return to investment ratio with this method was found to be 1.58 which was much less as compared to that with cultivator. The choice of selection of a seed bed preparation method, depends on the availability of implement, draught power and the custom hire work in the area. Irrigation supply also played important role in making this decision.

Irrigation: Irrigation water supply during the rabi season limits the acreage to be sown under wheat and the type and extent of seed bed preparation practices to be followed by the farmers. In view of specific relationships, the data of irrigation were also recorded by using cutthroat flume. In total, three irrigations to each field were given which got supplemented with four rains received during the crop production period. The actual quantity of irrigation water received by each field was minimum in case of seed bed prepared by cultivator (13.5 acre inch), while it was maximum (15.7 acre inch) in case of a field prepared with rotavator. Next to it was the field prepared with rotavator and cultivator (14.9 acre inch).

Irrigation water being a limiting factor for wheat production, will popularize a seed bed preparation method which consumes relatively lesser quantity of water. Although some methods are not scientific but they are very popular among the farmers, may be these fit better into their existing technology

framework. A low cost technology, which is readily available, is simple in operation and suits the farmers' resources, will be rapidly accepted by the farmers even if the technology may not fulfil the scientific requirements.

The seed bed preparation by cultivator alone was found to be the most suitable method as it suited the farmers resources being low cost, easily available, yielding high returns and consuming 14% less irrigation water as compared to the rotavator technique.

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