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PERFORMANCE OF WEEDING TOOLS IN CAULIFLOWER

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ABSTRACT
Experiment was conducted in cauliflower during Rabi season. The weeding implements were selected on the basis of their field utility, availability, economic conditions of farmers *etc.* Treatments was kept 4 *i.e*. T_1= Farmers practice, weeding by khurpi, T_2= Weeding by grubber developed by KVK, Sheohar, T_3= Weeding by CIAE, grubber, T_4= Weeding by wheel hoe and size of the plot was 500 m^2 with seven replications. The overall performance of T_2 showed better results in B: ratio and Economics.

KEYWORDS: weeding tool, farmers practice, performance, economics.

INTRODUCTION

Vegetable crops are important among horticultural crops in India. Most of these crops are slow growing and have poor canopy development during the early stages. This habit makes them susceptible to competition from weeds, which adversely affect yield and quality of these crops. Generally, farmers do not understand the negative implications of weeds in term of yield losses and the cost of its control (Roberts 1976). Weed control has been observed as one of the most important practice in crop production because good weed control will ensure maximum yield and high quality of farm produce (Njoroge 1999.)

Weeds compete with crops for water, nutrients, space, light and oxygen resulting into delay in maturity and low yield. Generally, these losses occur as a result of reduced yield, quality, harbouring of pests or diseases, Research studies demonstrated the yield losses of up to 66% in beetroot, 28-78% in carrot and 60% in garlic (Leela 1987, 1993, Sandhu et al. 2002, Kumar et al. 2001) Thus, to get maximum returns from inputs applied to these horticultural crops, there is a great need of proper weed control measures in these crops. Weed control is especially important early in the season when weed competition can substantially reduce overall yield. The period from emergence to four weeks has been found to be critical in the competition of weeds in many row crops including vegetables. Only a few vegetables are good competitors with weed flora because they quickly cover the soil, topping the weed growth like potato, transplanted brinjal and cabbage. Thus, if weed control is not carried out timely, there will be no production at all. Weed competition is more severe when a direct seeded vegetable is grown. The methods used for controlling weeds have been divided into two broad categories, non-chemical and chemical. Weed management should start with non-chemical strategies. The aim should be to manage the weed population below a level that reduces economic return. In some instances, the cost of controlling weeds may be more than the economic return obtained from any yield increase. This situation occurs when a few weeds are present or the weeds germinate late in the season. In this case the best strategy may be to do nothing. Mechanical removal of weeds is both time consuming and labor-intensive but is one of the most effective methods. Mechanical weed management starts with seedbed preparation. Second step is often rotary hoeing for managing weeds mechanically.

Type of weeds, their intensity, time of occurrence and rate of removal determine the extent of losses. Due to sufficient moisture availability, weed infestation is a great problem in vegetable crops. Weeding accounts for about 25% of total labour requirement (900-1200 man-hours/ hectare) during a cultivation season (Yadav and Pund, 2007). Weeding operation is performed mostly with khurpi which is tedious and time consuming and requires higher labour input. Mechanical method to eradicate weeds is very effective in vegetable crops due to the reason that it has more row to row and plant to plant distances, which facilitate easy movement of mechanical tools.

Keeping in view the above facts, the experiment was conducted to evaluate the field performances of grubber and wheel hoe for inter culturing operation in cauliflower, the most common vegetable crop in Bihar. Performances of grubber, wheel hoe were compared with those of khurpi. The experiment was conducted in farmers fields at 7 different locations in Sheohar district of Bihar.

MATERIALS AND METHODS

The experiment was conducted in cauliflower during Rabi season. The weeding implements were selected on the basis of their field utility, availability, economic conditions of farmers etc. Number of treatments was kept 4 with seven replications.

T_1= Farmers practice, weeding by khurpi

T_2= Weeding by grubber developed by KVK, Sheohar
T_3= Weeding by CIAE, grubber
T_4= Weeding by wheel hoe
Size of plot= 500 m^2

OBSERVATION

1. Weeding efficiency/ % Weed mortality
   Number of weeds was counted before and after the operation
   % Weed mortality= $(W_1-W_2)/W_1$ X100
   Where W_1= Number of weeds before operation
   W_2= Number of weeds after operation
2. Damage factor, DF (%)
   DF (%) = (A / B) x 100
   Where,
   DF = plant damage, %
   A= No. of injured plants (Cut or damaged) in 100 m length
   B= Total No. of plants in 100 m length
3. Time required for weeding, h/ ha
4. Field capacity ha/ day
5. Economics

RESULTS AND DISCUSSION

1. Weeding efficiency

The maximum weeding efficiency was observed with khurpi (100%) because weeds closest to plants could also be removed without damaging plants. Garg and Sharma (1998) also reported that weeding efficiency of khurpi was (82.95%) slightly higher than wheel hoe (76.91%). Next to khurpi was Grubber developed by KVK, Sheohar which showed 95% weeding efficiency. Weeding efficiencies of CIAE grubber and wheel hoe were observed to be 90% and 88% respectively. Keeping in view the damage of plant wheel hoe cannot be allowed to remove weeds from Vicinity of plants. This might be the reason for lower weeding efficiencies of these tools as shown in fig. 1.

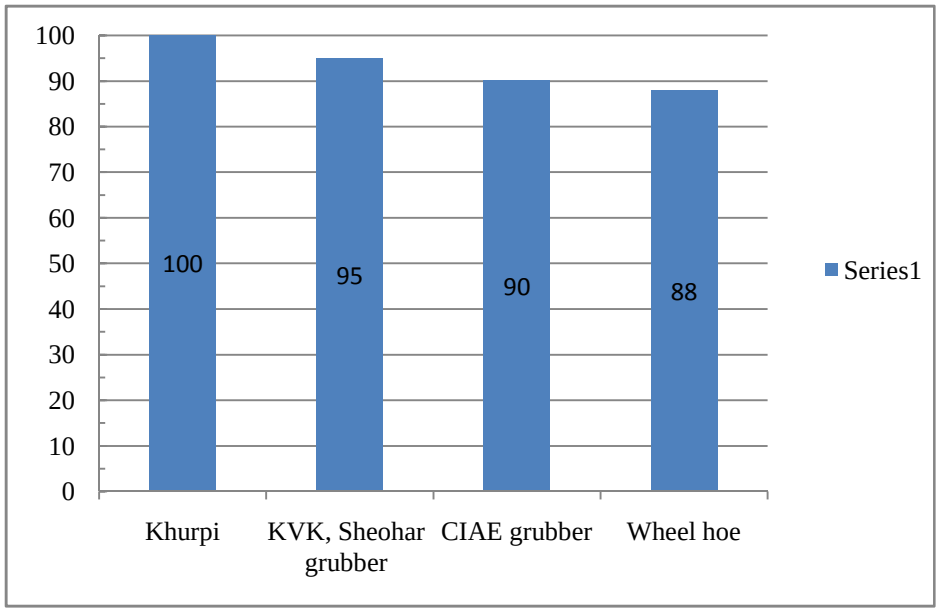

FIGURE 1: Weeding efficiency of different implement (%)

2. Plant damage

Highest percentage of plant injury was found in case of wheel hoe (0.98%) followed by CIAE grubber (0.35%), grubber developed by KVK, Sheohar (0.25%) and khurpi (0%). The reason for higher plant damage by wheel hoe was its larger width of blade.

3.Field capacity

The maximum field capacity (0.1ha/day) was achieved with KVK, Sheohar grubber followed by CIAE grubber (0.09 ha/ day), wheel hoe (0.08ha/day) and khurpi (0.015ha/day). Garg and Sharma also reported that area coverage with wheel hoe in wheat crop was 0.36 ha/ day which was much faster than khurpi 0.064 ha/ day. Sharma et al. (1987) also found similar results. The wide difference in field capacity of different tools/ implements is because of difference in width of soil cutting parts *i.e.* blades of implements as well as forward speed as shown in fig. 2.

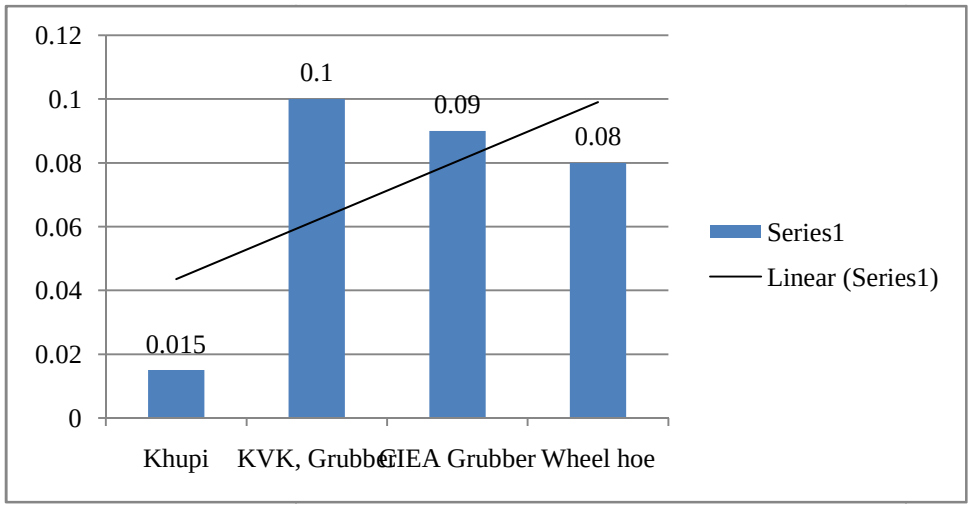

FIGURE 2: Field Capacity of different implements (ha/day)

4. Economics

In cauliflower farmers generally perform 3 weeding operations during whole crop life as well as one earthing operation with spade when they carry out weeding operation with khurpi. In cases of grubber and wheel hoe separate earthling operation is not required. Thus the cost of earthing operation could be saved. It is obvious from Table- 1 and Fig. 3, that maximum cost of operation was in case of khurpi (Rs 41490/ha) and minimum in case of KVK, Sheohar grubber (Rs. 6180/ha). Thus Rs35310/ha could be saved by use of KVK, Sheohar grubber. Cost of operation of CIAE grubber was slightly more against that of KVK, Sheohar grubber. T_2 gave maximum yield (296q/ha) which was at par with that of CIAE grubber (291q/ha), and wheel hoe (286.23 q/ha) and significantly superior to khurpi (255.15q/ha). Cost of cultivation was maximum in case of T_1 (Rs 83400) and minimum in case of T_2 (Rs 48180). Thus reduction in cost of cultivation was 42.23%. Costs of cultivation in case of T_3 and T_4 were slightly higher than T_2. Net return was maximum in case of T_2 (Rs 1, 44,220) and minimum in case of T_1 (Rs 82,450). Thus net return was enhanced by 175%. Grubber resulted in maximum B.C. ratio (3.99), whereas khurpi resulted in minimum B.C. ratio (1.99).

TABLE 1: Showing Comparative Economics of different weeding tools

Technology option	No. of trials	Field capacity ha/ day	Weed mortality	Cost of weeding 3 times/ha	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	BC ratio
T_1	07	0.015	100%	41490	255.15	83400	165850	82450	1.99
T_2		0.100	95%	6180	296	48180	192400	144220	3.99
T_3		0.09	90%	6500	291	48800	189400	140600	3.88
T_4		0.08	88%	7725	286.23	49800	186050	136250	3.73

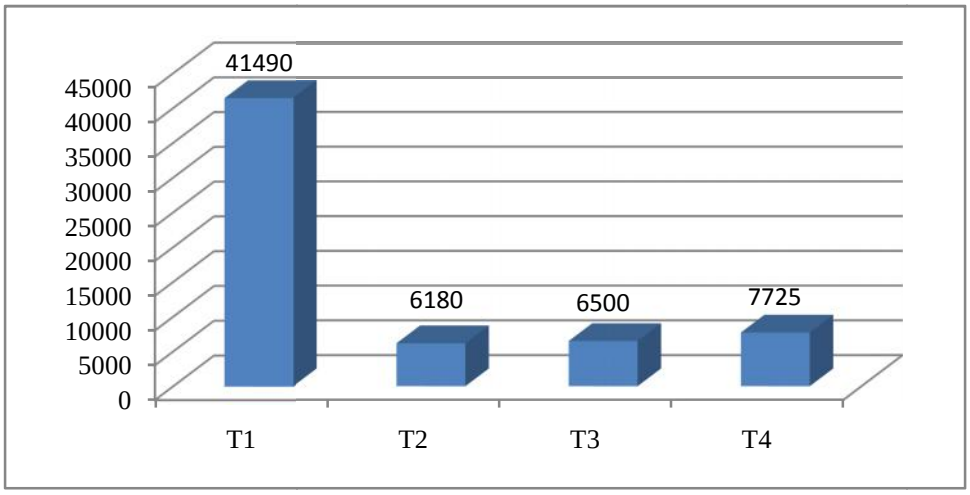

FIGURE 3: Cost of weeding/ ha with different weeding tools (Rs./ha)

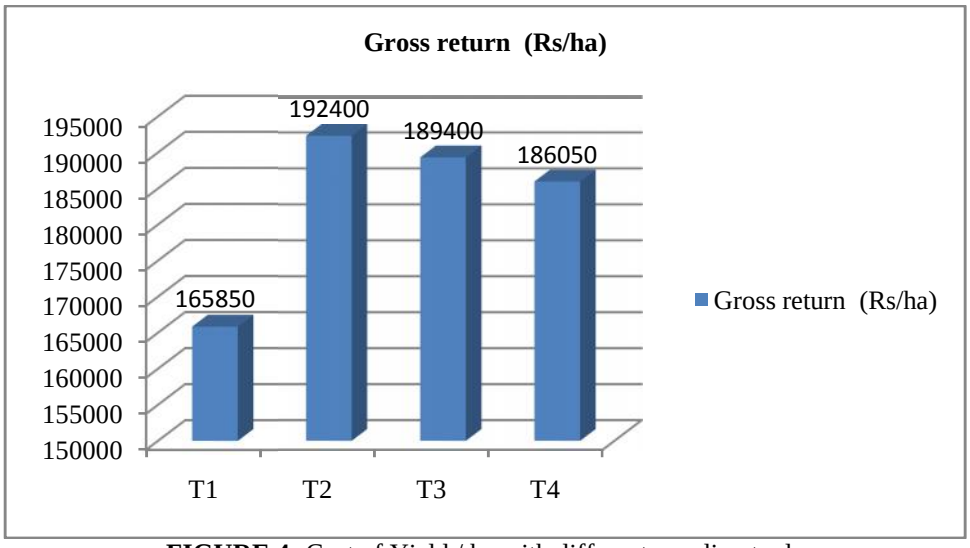

FIGURE 4: Cost of Yield / ha with different weeding tools

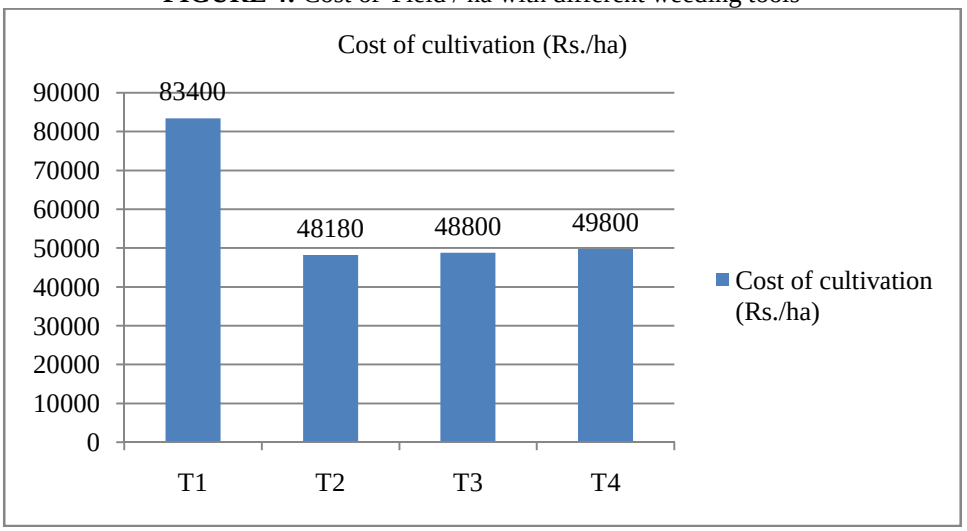

FIGURE 5: Cost of Cost of cultivation (Rs./ha)with different weeding tools

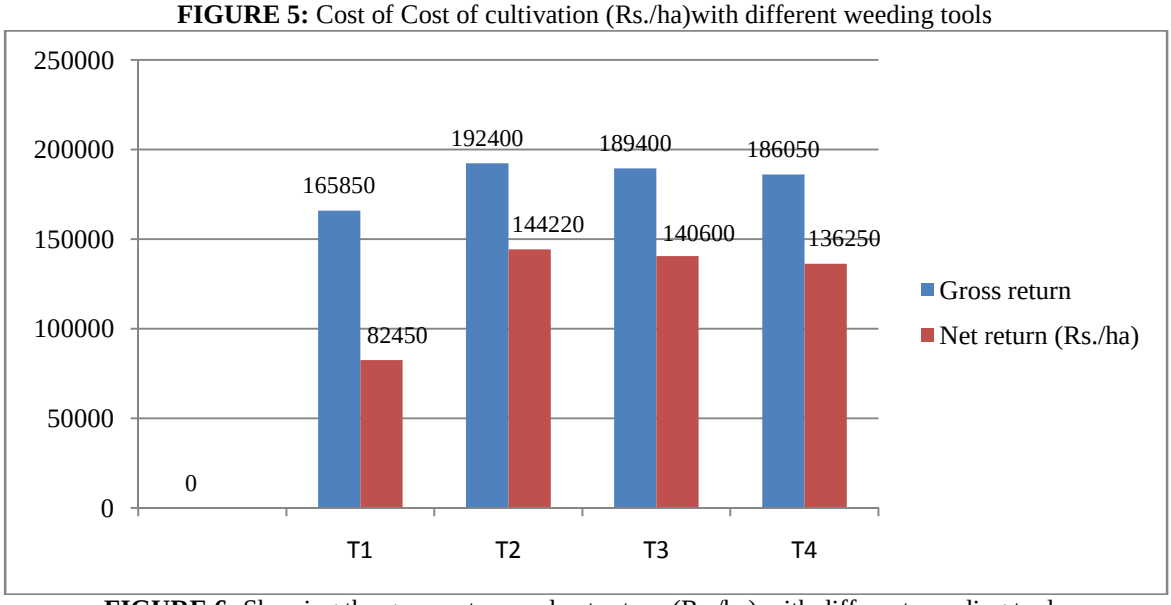

FIGURE 6: Showing the gross return and net return (Rs./ha) with different weeding tools

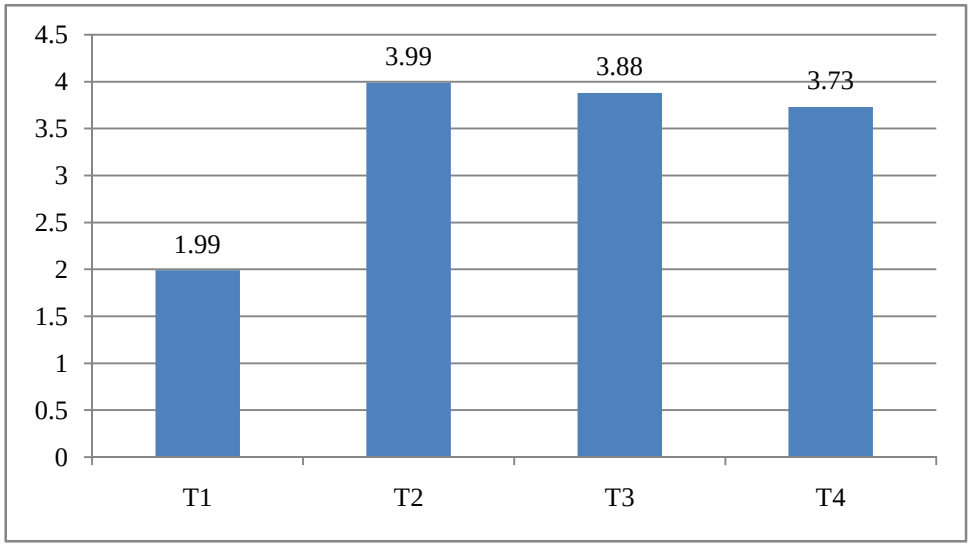

FIGURE 3: BC ratio with different weeding tools

REERENCES

Kumar, P., Tewatia, A.S., Khurana, S.C., Duban, D.V. and Lajpat (2001) Effect of cultural practices and herbicides on the growth and development of carrot. *Haryana Journal of Horticultural Science* **30**(1&2): 97-99.

Leela D. (1987) Weed control by herbicides in knol khol and radish. *Tropical Pest Management* **33**(3): 214-219.

Leela D. (1993) Weedicides for vegetables. *Indian Horticulture* **38**(2):13-15.

joroge, J.M. (1999) Weeds and their control in horticultural crops with special reference to East Africa, pp. 65-71. In*7th East African Biennial Weed Science Conference Proccedings.*

Roberts, H.A. (1976) Weed competition in vegetable crops. *Annual Applied Biology* **83**:321-324

Sandhu, K.S., Singh, D., Sandhu, M.S., Gill, B.S. and Singh, J. (2002) Weed management in seed crop of radish. *PAU Journal of Research* **39**(4): 504-507.