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. T1= Farmers practice, weeding by khurpi, T2= Weeding by grubber developed by KVK, Sheohar, T3= Weeding by CIAE, grubber, T4= Weeding by wheel hoe and size of the plot was 500 m² with seven replications. The overall performance of T2 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.
T1= Farmers practice, weeding by khurpi
Performance of weeding tools in cauliflower

T1= Weeding by grubber developed by KVK, Sheohar
T2= Weeding by CIAE, grubber
T3= Weeding by wheel hoe

Size of plot= 500 m²

OBSERVATION
1. Weeding efficiency/ % Weed mortality

Number of weeds was counted before and after the operation

% Weed mortality = \( \frac{W_1 - W_2}{W_1} \times 100 \)

Where W1 = Number of weeds before operation
W2 = Number of weeds after operation

2. Damage factor, DF (%)

DF (\%) = \( \frac{A}{B} \) 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

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 (%)](image)

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.

3. Time required for weeding, h/ha
4. Field capacity ha/day
5. Economics
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 khupi. In cases of grubber and wheel hoe separate earthing 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 khupi (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. T2 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 khupi (255.15q/ha). Cost of cultivation was maximum in case of T1 (Rs 83400) and minimum in case of T2 (Rs 48180). Thus reduction in cost of cultivation was 42.23%. Costs of cultivation in case of T3 and T4 were slightly higher than T2. Net return was maximum in case of T2 (Rs 1, 44,220) and minimum in case of T1 (Rs 82,450). Thus net return was enhanced by 175%. Grubber resulted in maximum B.C. ratio (3.99), whereas khupi resulted in minimum B.C. ratio (1.99).

<table>
<thead>
<tr>
<th>Technology option</th>
<th>No. of trials</th>
<th>Field capacity ha/day</th>
<th>Weed mortality</th>
<th>Cost of weeding 3 times/ha</th>
<th>Yield (q/ha)</th>
<th>Cost of cultivation (Rs./ha)</th>
<th>Gross return (Rs/ha)</th>
<th>Net return (Rs/ha)</th>
<th>BC ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>07</td>
<td>0.015</td>
<td>100%</td>
<td>41490</td>
<td>255.15</td>
<td>83400</td>
<td>165850</td>
<td>82450</td>
<td>1.99</td>
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<tr>
<td>T2</td>
<td>0.100</td>
<td>95%</td>
<td>6180</td>
<td>296</td>
<td>48180</td>
<td>192400</td>
<td>144220</td>
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<tr>
<td>T3</td>
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<td>6500</td>
<td>291</td>
<td>48800</td>
<td>189400</td>
<td>140600</td>
<td>3.88</td>
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<tr>
<td>T4</td>
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<td>7725</td>
<td>286.23</td>
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<td>136250</td>
<td>3.73</td>
<td></td>
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</tbody>
</table>

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

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

TABLE 1: Showing Comparative Economics of different weeding tools
FIGURE 4: Cost of Yield / ha with different weeding tools

FIGURE 5: 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

REFERENCES


