

Review paper on “Various aspects of Weeders for Economical Cultivation”

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ABSTRACT : In Indian agriculture, it's a very difficult task to weed out unwanted plants manually as well as using bullock operated equipments which may further lead to damage of main crops. More than 33 percent of the cost incurred in cultivation is diverted to weeding operations there by reducing the profit share of farmers. This review paper is a small work towards analyzing weeding-cum-earthingup equipment aspects for economical cultivation which will help to minimize the working fatigue and to reduce labour cost.

Keywords: Cultivation, drafts, weeders, weeding aspects, weeding methods and materials.

I. INTRODUCTION

The 33 percent cost of cultivation is spent on weeding alone when carried out with the manual labor. The complicated operation of weeding is usually performed manually with the use of traditional hand tools in upright bending posture, inducing back pain for majority of laborers.

In India, farmers mainly follow the hand weeding though chemical weeding is slowly becoming popular, in spite of it being costly. Use of herbicides will have residual affect and change in the quality of soil. Flaming produces intensive heat and more expensive equipment is needed. Hand weeding requires more labor, consumes more time leading to higher cost of weeding. An estimate of 400-600 man hours per hectare is the normal man-hour requirement of hand weeding which amounts to Rs.2200 per hectare, which also depends upon weed infestation. Availability of labor is also a main issue. Among all the weeders, the animal drawn blade hoe recorded maximum values of average actual field capacity and minimum number of man-hrs requirement while the maximum value of weeding index and man-hrs requirement were observed for weeding operation by hand khurpi.

II. CHALLENGES IN WEEDING OPERATIONS

Weeds are mostly removed from the field in a manual process as they are seen more as a negative factor for crop growth. The various aspects of weeding equipments consists of ergonomical considerations, it's easy working and easy handling by unskilled farmers, less damaging nature to crops, the distance between two crop rows, maximum efficiency, its important components like blades, critical design areas and the most important from all above is its cost of purchase. Every equipment which is used for weeding like hand khurpi, animal drawn blade hoe, power weeder, single-multiple row weeders etc are certainly possessing some inherent drawbacks which results in unnecessary time consumption, extra labour cost, more power requirement (manually as well as mechanically). Weeding was considered a major constraint in crop production. Most farmers experienced a serious labour bottleneck at weeding time. Extension workers considered that competition from weeds led to major losses and they estimated the yield reduction was over 10%.

Some issues which were identified in weeding operations/weeders are:

1. Should have some arrangement to avoid mud sticking in between the teeth/blades, tyres, wheels,
2. Needs to have built-in adjustability to change the width of working,
3. Need of safeguarding the operator,
4. Should be simple in design so that it can be easily built with less weight
5. Should be made all weather-proof and durable, and
6. sold at cheapest price

III. DISCUSSIONS

To ensure a high-quality equipment or easy weeding operations, we need to give more stress on working posture of labour (different ergonomical constraints for male and female labour), A motorized version should be developed to lessen fatigue/workload on the operator, more concentration should be on vibration constraint when we implement engine to the equipment because it leads to reducing stability. Petrol engine is having more vibration problem as compared to diesel engine, Lack of proper understanding among farmers on the intricacies of weed management, some research studies have amply demonstrated that there is positive correlation between weeder use and crop yields.

In the experiments conducted during 2001 – 2002, Senthilkumar (2003) compared the use of rotary weeder (five times with ten days interval from 20 days after transplanting till booting stage) with the conventional hand weeding (three times) for wet season and chemical weeding and two times hand weeding for dry season. Animal-drawn weeders work between crop rows; weeds left within the rows may be removed manually. The straight blades of traditional hoes can remove weeds within the working width of the blades, but straight blades tend to become clogged with soil and weed debris, which reduces their efficiency. There is therefore a need to develop and use improved blades. Triangular shaped blades, sweep

blades, straight blades can be used according to their efficient working in different conditions. A best combination would be sweep blades and triangular blades which help in maximum removal of weeds from soil. From discussions with farmers and extension workers it became obvious that weeding tools and implements to be promoted should not only be effective in weed control, but also fairly cheap, durable, locally repairable and easy to use. The technology related to the use of the implements should be in line with farmers' Knowledge levels and aspirations.

IV. MATERIALS & METHODS

Various types of materials and methods used for weeding are as follows:

1. Manual weeding or Hand weeding
2. Chemical weeding
3. Flame weeding
4. Mechanical weeding
5. Animal drawn blade hoe weeders
6. Tractor drawn weeders
7. Power weeders
8. Khurpi
9. Push type weeders etc.

Above discussed materials and methods comparison with each other depends upon different constraints such as efficiency, time consumption, damage prone areas, ergonomically standard specifications, economically acceptable, adaptable nature in every situation, simple and easy maintenance.

V. AVAILABILITY OF WEEDERS



Fig.1 Slim and long sweep blades



Fig.2 Hand Khurpi

Figure 1, 2, 3, 4, and 5 shows the availability of weeders commonly. They are:

- ❖ Slim and long sweep blades (fig.1), Hand khurpi (Fig.2), TNAU made power weeder (Fig.3),
- ❖ Animal drawn weeder (Fig.4), Hoes (Fig.5).



Fig. 3 TNAU made power weeder



Fig. 4 Animal drawn weeder



Fig. 5 Hoes

VI. WEED CONTROL PRACTICES

It includes various types of weeders such as animal drawn blade hoe weeders, power weeders, khurpi (made up of handle of wood and a steel blade which is curved in shape), push type and pull type weeders having roller with pegs, handle and blade. Methods include hand weeding, chemical weeding, flame weeding, mechanical weeding etc. Although these material and methods are being used as weed removal techniques, they possess some drawbacks. Hand weeding needs more cost, labour, causes fatigue and stress. Chemical weeding is slowly becoming popular but costly and health problems may occur if proper care is not taken. Flame weeding causes extreme heat in surrounding and safeguards needed. Mechanical weeding has its different problems like it can be expensive, difficult to operate, maintenance, weight, its components, difficult for farmers to understand its working, may be not suitable for various types of soils e.g. Vidarbha region has black soil having completely different properties when compared with Marathwada region as the soil contents are different. So it is not possible that equipment used for cultivation in Vidarbha region should be as same as equipments used in Marathwada region.

VII. TRANSFER OF WEEDING TECHNOLOGY

To take weeding technology to a new dimension, we need to concentrate on previous technologies some areas of interest. These areas are:

1. Work capacity
2. Crop yield
3. Energy consumption
4. Cost of operation etc.

Work capacity is the total time needed to complete the desired task; crop yield indicates the crop growth in various techniques; energy consumption shows fuel requirement for the equipment; and cost of operation means the total cost incurred to farmer for one acre or hectare of weeding operation.

VIII. CONCLUSION

The main aim of this review paper is to have a proper understanding of different aspects or constraints of weeders as well as different weeding techniques to reduce the efforts which were put in by farmers in terms of money, labour, time, physical efforts for economical cultivation. Above discussed parameters definitely provides the basic ideas associated with weeding. Sincere efforts must be made to design a suitable weeding equipment or method, in order to provide more profit, stability in terms of economical considerations. There are certain limitations for engine operated equipment. Like vibration. Vibration cannot be eliminated completely as it is needed to provide thrust (positive or negative) to take out unwanted weed. If we completely eliminate the problem of vibration, then it is not possible for equipment to perform the desired task of weeding. Adjustable blades, rotary blades can definitely influence the performance of weeder. Design consideration of equipment also has a greater impact over the performance of weeder.

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