

Review Paper

SAVING HUMAN ENERGY THROUGH THE USE OF MANUALLY OPERATED WEEDERS – A REVIEW

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Abstract: Weeding is an important but equally labour intensive agricultural unit operation. Weeding accounts for about 25% of the total labour requirement (900-1200 man hours/hectare) during a cultivation season. To increase the productivity per unit area of small land holdings and considering the economic condition of Indian farmers, it is quite necessary to have suitable agricultural implements which farmers can use and also allow them to use for custom hiring. Though many manually operated weeders are available they are not popular because farmers feel it to be heavy as compared to conventional hoes. For mechanical control of weeds, mostly human and animal powers are utilized. Manually operated weeders not only uproots the weeds between the crops but also keeps the soil surface loose, ensuring better soil aeration and water intake capacity.

Keywords: Manually operated weeders, saving human energy, time saving.

INTRODUCTION

Ever since man started growing crops, he had come up with the problems of weeds, which are undesirable in the farm. Farmers and researchers are putting up a combined front to tackle the menace of weeds. In the past, there were no mechanical weeders to fight this enemy and farmer had to use his hands to pull them out. Manual weeding is laborious, back breaking and time consuming and hence efficient mechanical weeders are being developed for weeding operation and help to obtain expected yields from the farm. Due to the mechanical weeding, the weeds can be easily removed with less time. The time of weeding is also an important criterion, which may cause reduction in yield. Moreover surface soil is kept loosen ensuring better soil aeration and water intake capacity. Though cultural and chemical weed control practices are effective in controlling the weeds, there are certain constraints like more labour intensive, time consuming in cultural method and with respect to chemical method, there is a shift towards organic agriculture, where the use of herbicides is to be restricted. In the context of

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sustainable agriculture, it is producers endeavour to employ non-chemical weed control methods to manage weed infestations and protect the environment.

MECHANICAL METHODS

Mechanical weeding is one of the oldest, but the most common methods of weed control in upland crops. Although it has undergone a spectacular advancement, yet hand weeding with simple weeders is common. These simple weeders are cheap, more efficient and suitable for farmer's situation to reduce the cost of crop production and improve crop yield to a great extent. It is not only safe to the environment, but also safe to the user. The physiological demand in using weeders was relatively higher than in manual weeding. However the efficiency of the work in terms of area covered was significantly better with the weeder than with manual weeding. The energy demand in manual weeding is only about 27 per cent where as for weeding with different weeders, the energy goes up to 56 per cent. The strain was relatively less in case of wheel hoe type weeder (Rajasekar, 2002).

Effect on depth of cut

Burial to 1 cm depth, and cutting at soil surface are the most effective ways to control weed seedlings mechanically (Jones *et al.*, 1996). According to Pullen and Cowell (1997), cutting action of the blade hoe is used most efficiently when operated at shallow depth and increasing the working depth does little to improve weed kill but a higher forward speed increases soil covering of weeds and may reduce their survival.

Effect on width of cut

Tewari and Datta (1985) reported that cutting force for weeding increased linearly with the width of cut of the blade and the working time to operate the weeders decreased with the increased width of blades.

Effect on time and labour requirement

In terms of labour productivity (time requirement) herbicides are more effective, but they are beyond the reach of most of the farmers. According to Yadhuraju *et al.* (2003), the typical work rates for hand hoe vary from 300-400 man hours ha⁻¹ and operation of push-pull type weeders along with rows under favourable soil condition requires 50-125 man hours ha⁻¹. Wheel hoe utilized lowest weeding time (78.33 hr ha⁻¹) reported maximum area coverage (0.01276 ha hr⁻¹) and minimum cost of operation (Rs.783.30 ha⁻¹) with yield increase of 214 per cent over control (Lidhoo, 2004).

Effect on soil properties

According to Marie-Josée Hotte *et al.* (2000), the rotary hoe breaks the soil crust, thus providing better aeration. It uproots sprouting weeds and works to a depth of 5 cm. Effective weed control is obtained following three cultivations with the rotary hoe.

Effect on field capacity

Singh (1988) reported that improved grubber is suitable for removing small weeds and has a capacity of 75-100 man hours ha⁻¹ depending upon the soil and weed infestation and also stirs soil upto a depth of 200 mm.

Effect on crop damage

Gogoi (1997) explained that the plant damage was more during 40 DAS and maximum was recorded under cultivator and also grubber and twin wheel hoe observed lower plant damage in rainfed wheat. Mohler *et al.* (1997) reported that the rotary hoe reduced corn density by only 6 per cent and different soil conditions affect the extent of corn damage.

Effect on yield

Singh *et al.* (1985) reported that hand weeding in rows after inter-row cultivation resulted in an average yield increase of 0.5 t ha⁻¹. Inter-row cultivation plus hand weeding in the rows may be able to substitute for the highly labour intensive hand weeding presently used by many farmers. Real (1994) suggested that mechanical hoeing was effective in the inter-row but along the row, spring tine machines were essential and partially for effective weed control in maize. Ethiopian farmers reported 20-100 per cent increments in maize grain yield due to use of improved weed control implements. According to Lidhoo (2004) use of improved weeders increased yield from 169.5 per cent to 329.6 per cent over control.

Conclusion

Mechanical control of weeds is probably the oldest method of weed control but has received less scientific attention as compared to the chemical methods. The benefits of using improved weeding tools are reduction in time requirements for operations, reduction in human efforts and to do operations more effectively. The time saved by the use of the implements can be utilized in better care of crops and thus, better yields are achieved.

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