



Forage Crops: Mechanical Methods of Weed Management

(*R. Ajaykumar¹ and S. R. Shri Rangasami²)

¹Assistant Professor (Agronomy), Department of Agronomy, Vanavarayar Institute of Agriculture, Pollachi - 642 103, Tamil Nadu, India

²Associate Professor (Agronomy), Department of Forage Crops, Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India

*Corresponding Author's email: ajaykumar.tnau@gmail.com

Mechanical or physical methods dominate weed control in many crops. In general, mechanical methods or physical methods offer the most simplistic and direct weed control options. These methods are considered safe, environmentally friendly, and in most cases can be accomplished by unskilled labour. However, the cost effectiveness of each method has to be considered, and it varies between methods.

Manual Weeding: In manual weeding, the operation is with bare hands (hand pulling) or by the help of some hand implements such as sickles (slashing or sickle weeding) or hoes (hoeing, digging etc.). Whatever be the methods, the basic aim of manual weeding is to dry out the weeds to achieve complete kill or reduction in the vigour of weeds so as to reduce the competition with the crops, and thereby allowing dominance of the crops. Hand pulling, hoeing, digging and slashing are the widely used form of manual weeding adopted by small farmers. Manual weeding has many disadvantages, and it is only cost effective for high value crops or where labour is inexpensive and readily available. It requires a large labour force and is extremely time consuming. Still, manual weeding is the most commonly used weed control method by the small holders of the developing nations.

Hand pulling: Hand pulling or hand weeding is the oldest and the most basic form of weed Control, which remains important even today. It is the usual method of smallholder weed control. Strictly speaking, all the weeding operations using hands such as hand pulling, chipping, hoeing, ,digging or slashing come under the purview of 'hand weeding, but the term is usually used by physical kanoval or pulling out of weeds from the fields by hand or by using certain small devices such as khurpie or trowel. In dry soils, the plant may break leaving some stem and root portions intact, which may allow resprouting.

Hand hoeing: Hand hoeing is an age-old practice in many parts of India. It is an appropriate method to eliminate weeds from the rows of crops. It also helps in stirring the soil for soil aeration. This method is effective in annuals, biennials and shallow rooted perennials. For perennial weeds, instead of hoeing, digging may become necessary as it destroys the top growth only with not much effect on the underground parts. Broad blade chopping hoe (Mammatty), pulling hoe, hand cultivator, digging hooks etc. are the implements used for hand hoeing.

Digging: For removing weeds of a woody nature, simple hand pulling or hoeing may not be effective. The soil along with the root system has to be turned up. This is usually done by a pick or digging hoe (Thoomba/Kodali) or spade. Digging is very effective for the control of perennial wc.ds, as this helps in removing the underground propagating parts of weeds from the sou Digging followed by collecting and removing weeds from the dug soil is the usual

method However, digging is a labour intensive and slow process, and hence, restricted to perennial weed situations only, and that too, when other methods are likely to fail.

Hand slashing: Hand slashing is done by a sickle, machete or scythe. It is sometimes also called 'sickling' or 'sickle weeding'. The top growth of weeds are removed to prevent seed production, and to starve the below ground portions. Slashing is popular in sloppy areas. As the top growth alone is removed leaving the root system and a little stem portion intact to hold the soil in place, possible soil erosion is also prevented. Because of re-sprouting and re-growth, simply slashing the tops of perennial weeds may be ineffective unless they are slashed repeatedly.

Tillage: Tillage is a practical and economical method of controlling weeds. It helps to control weeds by burying the weeds, separating shoots from roots, desiccating shoots, and exhausting carbohydrate reserves of perennial weeds. Tillage also stimulates the germination of weed seeds through soil turn over and exposure to sunlight, which is amenable to control through tillage. It is done with tillage implements drawn by animals or machines. The plough, the harrow and the cultivator are the common implements used in tillage. This method is most suitable for controlling all the annual weeds by burying. However, in the case of perennial weeds, as tillage cannot destroy all the underground parts (but it can disturb the root system of most perennial weeds), complete control is not possible through tillage.

Mowing: Slashing by machines is usually called mowing, and the machines used for this purpose are called mowers. Weeding by machines is possible only on big farms. Apart from mowers, a similar effect to that of mowing can be obtained by some other devices too such as a tractor drawn disc harrow, roller, roller-chopper or weight dragged behind a tractor, which will crush and break the weeds. These practices will allow the pasture to grow over weeds. Mowing or slashing can be used to remove unpalatable or inedible weeds after animals have selectively grazed a pasture, and to prevent them from taking a competitive advantage over the more desirable species in the pasture. Where weeds have out competed pasture species during the pasture establishment phase, mowing may reduce the vigour of weeds and allow sufficient light to penetrate through the emerging pasture species. Mowing can also be used to prevent tall growing annual and perennial weeds from flowering.

Burning: Burning is a useful method of controlling undesirable weed species on roadsides, fallow lands, ditches and other waste places. Burning is generally employed to dispose of the accumulated vegetation, to destroy dry tops of weeds that have matured, to kill green weed growth and to destroy buried weed seeds and other propagating parts. This process also destroys insects and disease pathogens present in the soil and plants. However, burning sometimes exacerbates weed problems because soil surfaces are exposed and this initiates the germination of the major weeds. In a standing crop, therefore, even controlled burning is not advisable.

Management of perennial weeds, especially rhizomatous and stoloniferous weeds, is not easy through cultural methods already mentioned. For them, some intensive strategies must be worked out. The land should be ploughed or dug, and then allowed to rest for two to three weeks so that the seeds of the annual weeds can germinate, and be killed by re-ploughing. Perennial weeds not uprooted during ploughing should be up-rooted by a digging hoe or by a spade during the land preparation. In some situations, perennial weeds may have completely dominated a pastureland to such an extent that the forage species have been almost completely replaced by weeds. In such cases, the most economical control measure will be to plough out the existing vegetation, and replant with improved forage species. In the tropics, it is often not possible to plant into a weed free seedbed irrespective of the number of ploughing or diggings, as high humidity and regular rainfall prevents dehydration of all the weeds.

Conclusion

Mechanical methods offer sustainable and environmentally friendly options for weed control in forage crops. They help reduce weed seed banks, interrupt weed life cycles, and minimize the competition between weeds and forage crops, thereby enhancing crop yield and quality. The successful implementation of mechanical weed management requires knowledge of weed species, crop characteristics, and the timing of operations to maximize efficacy and minimize harm to the crop and soil health.

References

1. Ivanov, S. (2019). Weeds and weed control in forage pea: a review. *Agricultural Science and Technology*, **11**(2):107-112.
2. Woyessa, D. (2022). Weed control methods used in agriculture. *American Journal of Life Science and Innovation*, **1**(1): 19-26.
3. Mohler, C. L., Liebman, M., & Staver, C. P. (2001). Mechanical management of weeds. *M. Liebman et al. Ecological management of agricultural weeds. Cambridge University Press, New York*, 139-209.
4. Das, T. K., Tuti, M. D., Sharma, R., Paul, T., & Mirjha, P. R. (2012). Weed management research in India: An overview. *Indian Journal of Agronomy*, **57**(3):148-156.