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Design of Manual Flame Weeder

S. Kousika[1], A. Madhumitha[2], K. Sudharsanapriya[3], J. Swetha[4]
[1]Assistant Professor, Agiculture Engineering, the Kavery Engineering College, Mercheri, Tamilnadu, India.
[2,3,4] Final year, Department of Agriculture Engineering, The Kavery College Of Engineering, Mecheri, Tamilnadu, India.

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Abstract: *Weed is one of the important factors in productivity loss in agricultural. It is a major problem in both conventional and organic production systems. The presence of weeds in the crop shared all the important nutrients that were required for the growth of the crop. Weed reduces crop production by 31.5% overall, with 36.5% in kharif and 22.7%in rabi. Weed management has become a highly labor-intensive activity, which is the reason for decreased yields and high costs. Moreover, the lack of skilled labor and weed-resistant herbicides severely impact the agriculture sector and food production, hence increasing the need for automation in agriculture. Flame weeding is an alternative method of weed control. Essentially, it is a supplement to other physical and mechanical processes used in organic production. Weed control costs have a large share of the total cost of crop production. This study aimed to investigate hand weed hoeing's cost-effectiveness, accompanied by inter-row cultivation and flame weeding applied in organic maize production using two different machines to determine the economically best solution. For this purpose, the prototype flame weeder and commercial flame-weeding machinery were used.*

Key Word: *Flaming, Flame Weeding, Butane, Weed, Crop, Heat*

I.INTRODUCTION

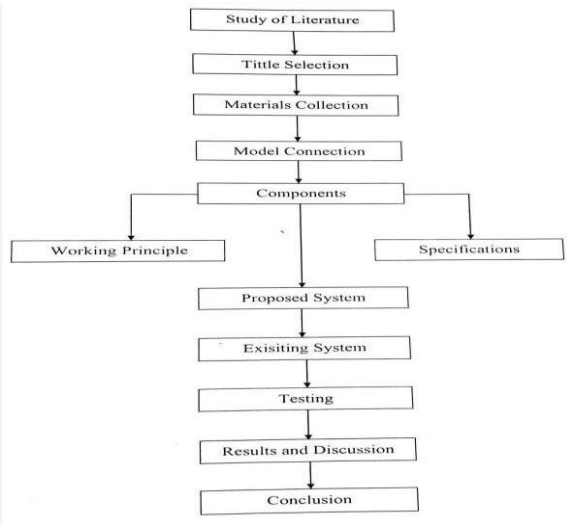
In agriculture, among several constraints like climatechange, insect, pests and weeds, weeds are major reasons for reduction in per unit area yield in India. It is considered that reduction due to weed only, in yield is estimated to be 16-42% which depends upon location and crop, it includes 1/3rd of the cultivation cost (Rangasamy *et al*., 1993). Weed control is the most essential operations done in farm under cropping system, but in agricultural unit operation, it is also equally labour–intensive. To overcome this principles of integrated weed management in order to help in reducing dependence on herbicides and also give organic farmers with an effective method of weeding or weed management. (Upadhyay *et al*.,2022)

The adverse effects of contemporary agricultural production have emphasized the importance of alternative production system. A different approach to the environment inherently characterizes such system. Organic agriculture is an alternative production system considered more beneficial to the environment than conventional production systems.(Milos Rajkovic *et al*.,2021).Organic farmers cite weeds as the most severe production problem they encounter, and total crop lossesfrom weeds can occur under the organic system.(Bond *etal*.,2003).

Thermal weed control methods are the best tool utilized where environmental or healthy issues are significant where offsite damage to non – target plants is a high risk and received increased interest for integration unconventional cropping systems (Dress *et al*.,2016). Thermal weed control involves the use of flaming equipment to crape direct contact between the flame and the plant. This technique works by rupturing plant cells when the sap rapidly expands in the cells. Sometimes thermal control involves the outright burning down of weeds.

The technology of thermal weed control is bases on heating plant tissues in high temperature media and time exposure as well (Sirvydas *et al*.,2006). Temperature of 15°c and above were lethal for seeds of annual sow thistle, barnyard grass, black nightshade, common purslane, London rocket, and tumble pigweed species. Common purslane seeds were unaffected at 46°c and below tumble pigweed and barnyard grass seeds were unaffected at 42°c and below and black nightshade seeds were unaffected at 39°c . nonlinear models for mortality as a function of duration of heat treatmentwere developed for each species at each temperature at which mortality occurred. (Dahlquisl *et al*.,2007). Therefore, experts attempts to apply this knowledge to develop weed management strategies while using into consideration the economic, ecological and social factors (Upathyaya and Black shaw,2007). During a cultivation season, weeding accounts for 25% of thetotal labours required (9000-1200man-h/ha) (Yadav and pund, 2007) uncontrolled weeds within 10-15 cm on either side of the crop directly influent rolled crop yield. Also repeated cultivation causes loss of soil organic matter, destroy soil aggregate, increase the chance for soil erosion and promotes emergences of now weed flushes. Time consuming and difficult to organic (Friedhoff *et al*.,2008). Propane flaming is one of the most promising alternatives for weed control in organic cropping system (Knezevic,2009).

II. METHODOLOGY



III. OBJECTIVES

The objective of this study is to

- To provide some insights of this innovative agricultural technique for weed control.
- To design standard specification for flaming machine to control weeds in proportion to the cultivated crops.
- To test the machines performance and efficiency in weeds control on some crops.

Figure 1: Flame Weeder Setup

Figure 2: Butane Gas Cylinder

IV.CONCLUSION

Although this study confirmed and justified the use of flame weeding in weed control in organic maize production, it is necessary to extend the research to other crops that are most commonly grown in the organic system and whose weed control costs are high. Moreover, given the small number of studies conducted so far with the prototype, it would be desirable to repeat the research in different natural conditions. The heat applicator machine was efficient incontrolling weeds, being a viable alternative for family farmers who produce organic food. The tire traffic on plants and subsequent heat application showed no effect on the weed control rate.

References

1. *Rangasamy K, Balasubramanian M, Swaminathan KR. Evaluation of power Weeder performance. AMA: AgriculturalMechanization in Asia, Africa and Latin America, 1993;24(4);16-18.*
2. *A Upadhyay, KB Jhala, H Chavda and S Pandey."Feasibility analysis of flame weeding in comparison to mechanical weeding and hand weeding".The pharma innovation journal 2022; sp- 11(12);581-585.*
3. *Rajkovic,M .; Malidza,G.;Stepanovic,S.;Kostic,M.; Petrovic,K.; Urosevic,M.; Vrbnicanin,S. influence of burner position on*

temperature distribution in soybean flaming. Agronomy 2020, 10,391.

4. *Bond,W.;Turner, R,; Grundy,A.A review of non-chemical weed Management ; technical report ; HDRA,Ryton organic gardens;conventry,UK;HRI;wellesbourne,UK,2003;avalible online; https;/ /gardenorganic.org.uk /sites/ www.gardenorganic.org.uk /files/up dated-review-o.pdf (accessed on 2 may 2019)technical report.*
5. *Dress, A.[1] and M.A. Balah[2] Using Flame for Weed Control in Some Crops J. soil sci. and Agric. Eng., Mansoura Univ., 2016Vol. Vol.7(10): 751-756*
6. *Dahlquist RM. Prather TS Stapleton JJ. Time and temperature requirement for weed seed thermal death. Weed science. 2007;55(6):619-428.*
7. *Upadhyay MK. Thermal weed control in non-chemical weedManagement, edited by Mahesh Upadhyay and Robert E. Blackshaw, Oxford shire, UK; c2007. P. 155-175.*
8. *Yadav R. Pund S. Development and ergonomic evaluation ofmanual Weeder. Agricultural Engineering International: the CIGR E-journal. 2007:22.*
9. *Knezeivc, S.Z.(2009). Flaming: A new weed control tool inorganic crops. Crop Whtch, University of Nebraska- lincolnExtension. Web page:(accessed march 12, 2012).*
10. *Srinivas. R (2006). The comparison of thermal and echanical system of weed control. Agronomy research (Special issue). 451-455*