

# Design and Implemented of Tiller and Weeder Machine

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## ABSTRACT

Comparative study for portable weeders and power tillers in the Indian market is discussed. Various methods used for weed removal in crops are also discussed. Main focus of this is to study various equipment's used for mechanical weed removal. This study revealed that most of the Indian farmers, majority of which are small scale farmers can afford only portable weeders. These small scale farmers as such don't use mechanical weed control methods. Chemical and manual weeding is predominantly used by these small scale farmers. The literature survey indicated that portable weeders are relatively less expensive in operation and maintenance but are also less versatile. Power tillers are considerably more expensive but are also very much more versatile and can operate in variable soil conditions. Due to these constraints most smaller farmers resort to chemical and manual weeding. These methods are labor intensive and as such a major constraint in crop production. Research has been carried out in many countries to involve technologies such as image analysis, GPS navigation, etc. in mechanical weeding machines. But most of these efforts are yet to leave a lasting effect in market place. Hence it is necessary to develop more efficient and cost effective methods of mechanical weeding so as to lessen the use of chemical and manual weed removal methods.

**KEYWORDS:** Motor, Battery, Shaft, Casing, Bevel gear, Roller, Handle

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## I. INTRODUCTION

Weed is an everyday term usually to describe a plant considered undesirable. The word weed is commonly applied to unwanted plants in human-controlled settings, such as farm fields, gardens, lawns, and parks. Weeds compete with the beneficial and desired vegetation in crop lands, forests, aquatic systems etc. and poses great problem in non-cropped areas like industrial sites, road/rail lines, air fields, landscape plantings, water tanks and water ways etc. Weeds are an important factor in the management of all land and water resources, but its effect is greatest on agriculture.

The losses caused by weeds exceed the losses caused by any other category of agricultural pests. Weeds may be unwanted for a number of reasons. An important one is that they interfere with food and fiber production in agriculture, wherein they must be controlled in order to prevent lost or diminished crop yields. Other important reasons are that they interfere with other cosmetic, decorative, or recreational goals, such as in lawns, landscape

architecture, playing fields, and golf courses. Similarly, they can be of concern for environmental reasons whereby introduced species out-compete for resources or space with desired plants. Weeds have long been a concern, perhaps as long as humans have cultivated plants.

Weed removal is one of the major activities in agriculture. Chemical method of weed control is more prominent than manual and mechanical methods. However, its adverse effects on the environment are making farmers to consider and accept mechanical methods of weed control. Chemical weeding is the most extensively used method of weed removal.

But these chemicals used for weeding are harmful to living organisms and toxic in nature. Research has been carried out to use some combination various methods of weeding. The need of replace the use of herbicides with more sustainable weed control techniques encouraged the definition of innovative physical weed control strategies. Mechanical and thermal means were used to control weeds.

Weed removal by mechanical method is one the methods frequently used these to remove weeds from the agricultural fields. Research has been conducted on economical methods for weed removal without damaging the crops. Weeding Machines designed and developed with intent of being operated in specific crops like tomatoes, corn, and rice. These machines are mostly intra row weeding machines which remove weeds within multiple crop rows at once.

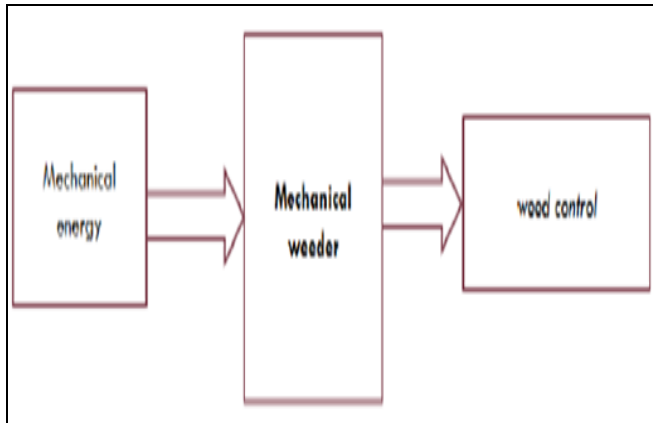


Fig.1: Block Diagram of System

Weeding machines like three row walking type one were developed and successfully to remove weeds from rice. Sensors like laser sensors are used some machines to differentiate the weeds from crops and increase the effectiveness of weeding. Various plant-recognizing systems like light interceptors, vision based systems are being researched for intra-row weeding. Some of these machines even use advanced algorithms to identify the various types of weeds. Number of novel techniques like GPS, RTK (real time kinematics) was incorporated into weeding machines to control and operate the machine.

The rate and effectiveness of weed removal depends on number of parameters related to machine performance parameters and soil properties such as types of cutting blades used, machine efficiency, moisture content, etc. Studies have been conducted on the effect of moisture content and the type of cutting blades like flat blades, spike tooth blades and curved blades on the performance of weeding machines. Mechanical weeding was found to be less effective when soils are wet during or after the weeding operation.

Chemical weeding involves the use of herbicides. Herbicides control weed plants either by speeding up, stopping or changing the plant's normal growth patterns; by drying out the leaves or stems; or by making it drop its leaves. Chemical Control with herbicide application can provide the most effective and time-efficient method of managing weeds. Numerous herbicides are available that provide effective weed control and are selective in that grasses are not injured. Weed removal is one of the major activities in agriculture.

Chemical method of weed control is more prominent than manual and mechanical methods. However, its adverse effects on the environment are making farmers to consider and accept mechanical methods of weed control. Chemical weeding is the most extensively used method of

weed removal. But these chemicals used for weeding are harmful to living organisms and toxic in nature.

Mechanical weeding is the use of powered tools and machinery to manage weeds. It is suitable for larger infestations because it reduces the weed bulk with less manual effort. Mechanical control consists of methods that kill or suppress weeds through physical disruption. Such methods include pulling, digging, disking, plowing and mowing.

Manual control is the use of the hands or handheld tools to deal with weeds. Extensive amount of cheap manual labor is necessary for manual weeding. Manual weeding is commonly employed by smaller Indian farmers for weed removal.

## II. LITERATURE SURVEY

[3] Philip Oguntunde and Olawale John Olukunle<sup>[3]</sup> et. al The operations involved in the crop production cycle include land clearing, land forming/ land leveling, tillage, and crop establishment, harvesting and post harvest operations. Crop establishment is necessary to eliminate the effect of weeds, pests and disease infestation and to provide suitable conditions for optimum yield. More than 3000 species of weeds had been identified all over the world. The cost of weed management is enormous; however the opportunity cost of weed management is higher. Weed control measures must be put in place to check the growth and propagation of weeds. Chemical and manual weed control methods are viable alternatives; however, whereas environmental impact of herbicides made chemical method unsustainable, drudgery limits the size of farm of an individual in sub-Saharan Africa. Introduction of an effective mechanical weeder is expected to encourage subsistent farmers leading to increased production and hence reducing poverty. To achieve this objective, a row crop weeder was developed in the Federal University of Technology, Akure in Nigeria. A row crop Weeder was designed, fabricated and tested at the Department of Agricultural Engineering, Federal university of Technology, Akure. The machine though designed, as a weeder was adapted as a mower for a variety of grasses. The machine performed excellently as a weeder and as well as a mower. It works as a mower when cutting height is between 2 cm and 4 cm; however it works well as a weeder between cutting height of 2 cm below the ground and 1 cm above the ground level. The machine would be very useful for peasant farmers as well as small to medium scale farm holders.

[4] Waghmode R.S.<sup>[4]</sup> et. al The present research has dealt with solar rotary tiller design for the power tiller that is made for using in primary and secondary tillage. Comparative study for portable weeders and power tillers in the Indian market is discussed. Various methods used for weed removal in crops are also discussed. This study revealed that most of the Indian farmers, majority of which are small scale farmers can afford only portable weeders. The soil tiller and weeder is one of the many farm mechanization in promoting soil tiller and weeders especially considering the fact that the majority of farmers are having small land. It reduces human effort. The implements are mostly self guided. Working of the project

is based on solar panel and it generates energy to run this machine which moves the cutter or tiller. It is a great saver of time and expenses on field operations. Thus it will have very effective uses on the farm field either for tiling as well as for weeding. Development of high capacity energy efficient versatile machines and combination machinery for increased labor productivity, reduced unit cost of operation, improved timeliness of operation and suitable for custom hiring. Today in the world fuel prices rises day by and the pollution may also. To control this pollution and to save the petroleum product and bio product this project is design and developed. This system requires heavy initial investment but it gives the energy output for life time with low maintenance etc. In this machine bicycle power tiller is used. In this unit there is a using of manual push type power tiller. There is steady static blade is used at rear side of tiller with shaver blade. But in this machine we modify the tooling system steady into rotary which is driven by electric dc motor of rpm 150 and 7.2 n-m torque. This motor is powered by battery pack. This rotary tool is rotate in reverse direction of entire machine which is effective for earth moving in between two lines of crops in farms.

[5] **M.G. Jadhav and J.K. Sawale**<sup>[5]</sup> India is a largest populated country, which contains 65% population depending on agriculture. Generally Indian farmer use to traditional way that is spray carry on backpack and weeding is done by bulls. Which become times consuming and costly this both problems over come by using multi nozzle pesticides sprayer and weeder machine. For better yield of crop multi nozzle spraying and simultaneous weeding is must this papers attends to design such a flexible sprayer and weeder. This work gives continuously flow of liquid at required pressure, height and gives freedom of easy engaging and disengaging weeder. This paper suggest a model of manually operated multi nozzle spryer with weeder according to crop which will gives optimum results in less time. Pushing mechanism required less effort and three wheel mechanisms gives proper balancing of machine. The principles of motion of trolley which transmit its rotary motion from chain and sprocket arrangement and reciprocating piston into the cylinder for pumping the pesticides which is used to the manually operated organic fertilizers cum pesticides sprayer.

[6] **Olaoye, J. O. and T. A. Adekanye**<sup>[6]</sup> Weed control is one of the most difficult tasks in agriculture that accounts for a considerable share of the cost involved in agricultural production. Farmers generally expressed their concern for effective weed control measures to arrest the growth and propagation of weeds. Chemical method of weed control is more prominent than manual and mechanical methods. However, its adverse effects on the environment are making farmers to consider and accept mechanical methods of weed control. Manual weeding is common in Nigerian agriculture. It is the most widely used weed control method but it is labour intensive. The use of mechanical weeder will reduce drudgery and ensure a comfortable posture of the farmer or operator during weeding. This will resultantly increase production. It is against this background that arotary power weeder was developed. Weeding is the removal of unwanted plants in the field crops. Mechanical weed control is very

effective as it helps to reduce drudgery involved in manual weeding, it kills the weeds and also keeps the soil surface loose ensuring soil aeration and water intake capacity.

[7] **Sridhar.H .S**<sup>[7]</sup> Weeding control is done by mechanical weeding, thermal weeding: flaming, biological control, chemical control, and by farming pattern. It has always been a problem to successfully and completely remove weeds and other innocuous plants. Invariably, weeds always grow where they are not wanted. This work involved the design and construction of mechanical weeder, after discovering that tools such as cutlass and hoes require high drudgery, time consuming and high labour force. As a solution to these problems, mechanical weeder was designed and constructed. The mechanical weeder was made of two implements attachment i.e. the primary cutting edge which is in front to loose soil above and the secondary cutting edge which is behind to do cutting and lifting of weeds. The overall machine field efficiency was 98.67%.

### III. PROBLEM STATEMENT

The bullock implements require the hand and body pressure to achieve depth and alignment of the implement in use, whereas in soil tiller and weeder, the implements are mostly self guided. This reduces human drudgery to a great extent. The comparative higher output of operation by the soil tiller and weeders as compared to bullocks reduces the operational time and achieves timeliness in operation. Cost wise the soil tiller and weeder should be an obvious choice of smaller farmers, if they are intending to have a mechanical power source for farm- operation. Soil tiller and weeder reduce the drudgery of collecting the waste grass between crops in the field during operations as compared to operations by bullocks. The soil tiller and weeder make the manual of that wastage grass by cutting it in small piece and thoroughly mixed with soil during operation.

Hence we the group of engineer has decided to make a system called as mini soil tiller and weeder to reduce the human effort as compared to operation by bullocks.

### IV. METHODOLOGY

The following methodology was used:

- Development of the concept
  - No or minimum damage to the paddy
  - Easy maneuvering on wet fields
- Dynamic analysis and mechanical design
  - Kinematic analysis
  - Power transmission and drive systems design
  - Design of mechanical components
  - Assembly of components
- Fabrication of components
- Field testing and improvements
- The cost analysis

### V. RESULT & DISCUSSION

The result from this project outcomes are assurance of much efficiency, less time consuming, worker friendly machine respective to the conventional method of tilling. It

assures you of maximum work done with minimum work effort.

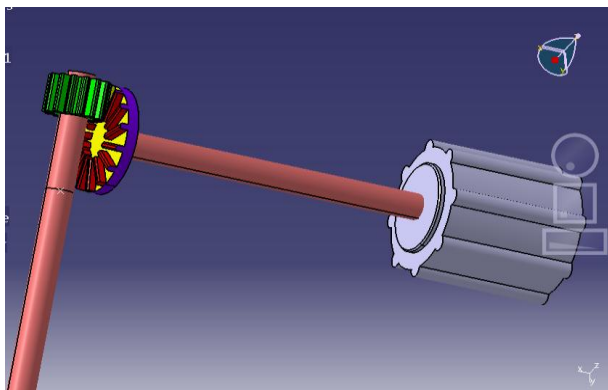
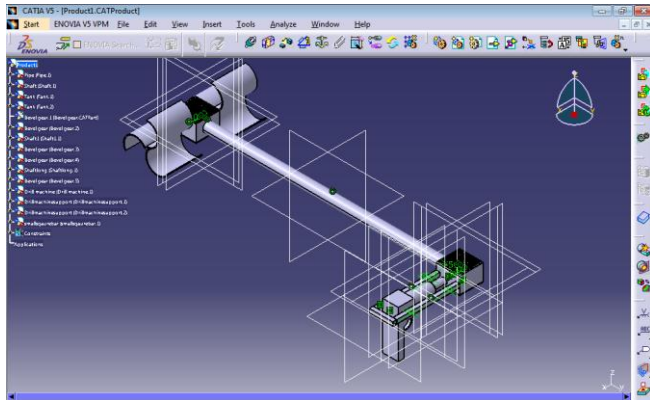


Fig. Cad Model of Mini Soil Tiller and weeder (a)

## VI. CONCLUSION

From above result it is clear that to get full performance we need to choose the motor of higher power. We in a team of four have to work together for the success of our project. It will be a great experience for everyone. We divided the whole project work and will perform individually for given task; at last we combined all work. While manufacturing we will work together. We will learn how to handle pressure while working as a team.

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