POWER WEEDER

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Abstract: India is an agricultural country. But traditional farming techniques are being replaced by modern techniques which use advanced machines in very simple manner. Weeding machine (weeder) is also one of them. The weeder is used for removing weeds in vegetable gardens, basins of orchard trees and Vineyard plantations. Besides manual, power weeders are getting popular now-a-days for their ease of use feature. In general, diesel engines are employed in them. Also there are variety of attachments available in the market for the weeder making it a multi-purposeful machine

Keywords: Mechanical weeder, weed, cultivation,

1. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. Over the years, agricultural practices have been carried out by small-holders cultivating between 2 to 3 hectare, using human labor and traditional tools such as wooden plough, yoke, leveler, harrow, mallet, spade, big sidle etc. These tools are used in land preparation, for sowing of seeds, weeding and harvesting.

The use of hand tools for land cultivation is still predominant in India because tractors require resources that many Indian farmers do not have easy to access.
2. Objectives:

1. The objective of the project is to design, construct and test automatically operated portable weeder, to provide the best opportunity to farmer’s to easily control and removing the weed from farm.

2. Weeding with the use of tools like cutlass and hoe requires high labour force in a commercial farming system hence mechanical weeder is necessary to reduce the labour force.

3. Environmental degradation and pollution caused by chemical is reduced by the use of Mechanical weeder. Low effective operation, high work effort and high time requirement for different types of hoe or cutlass, can be overcome with the use of mechanical weeder.

4. Presently in India, weeding with simple tools such as cutlass, hoe etc. is labour intensive and intensive and time consuming. Thus, there is a need for the design of manually operated weeder for intensive and commercial farming system in India.

5. For this study we are developed mechanical power weeder by power of vibrator engine.

3. Components of the Portable Power

Weeder Machine various components images used for manufacturing for mechanical power weeder is shown I.C Engine

Engine type: 4 Stroke,

Displacement: 109.7 cc,

Maximum Power: 6.1 KW @7500 Rpm,

Maximum torque: 8.1 NM @ 5000 Rpm Bore x Stroke: 53.5 MM x 48.8 MM,

Compression Ratio: 9.45:1,

Transmission: 4 Speed Constant Mesh, Weight: 27 Kg.
4. WORKING OF POWER WEEDER:

Power weeder offered by us are devices used for removing the weeds, stirring and pulverizing the soil and for loosening the soil after the crop has begun to grow. We manufacture these power weeder using high quality raw materials with the help of latest machines. These machines are widely used for weeding cotton, tomato, tapioca, paddy, sugarcane, pulses and various other plant fields.

This rotary power weeder consists of high speed motors, tiling width of these power weeder ranges from 40-60 cm and the tiling depth ranges from 10-15cm. The motors in this machine are diesel operated and can work efficiently for a longer time. The blades present in this paddy power weeder rotate efficiently for cutting and mulching of soil. This power weeder is self-propelled with a fully functional gear box having one forward and reverse gear transmission with clutch.
These Rotary Power Weeder are easy to operate, the weeding between the rows can be easily achieved since this machine is well suited for inter crop weeding. We offer these power weeder fly in different grades based on the requirements of our clients. Our weeder is widely appreciated in various Indian and international markets for its longer life, durability, higher cutting efficiency etc. Customers can avail this mini power weeder in market leading prices.

4.1. Features of our power weeders:

- 4 stroke engine type.
- High performance.
- Advanced fuel injection system.
- Low fuel consumption.
- Large torque for heavy working.
- Sweep blades and ridges can be fitted

5. LITERATURE REVIEW:

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 method s 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. Weeding machines like three row walking type one were developed and successfully to remove weeds from rice.
6. MECHANICAL WEEDING:

In developed countries like, USA, European Union Countries, Australia and Israel large emphasis has been placed on mechanization of the various agricultural processes. For this number of machines have been developed and successfully implemented. Use of such machines in the Indian Agricultural Scenario is difficult as most the Indian farmers are small scale farmers as area under their control is small. Mechanical weeders range from basic hand tools to sophisticated tractor driven or self-propelled devices. These may include cultivating tools such as hoes, harrows, tines and brush weeders, cutting tools like mowers, as well as implements like thistle-bars that may do both. Two wheeled pedestrian or walking tractors are a smaller alternative that can power a similar range of implements.

Most machines large in size not affordable for medium and small scale farmers. 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.

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.
7. Assembly of Power Weeder Machine:

1. Assembly of machine consist the mounting of engine on the frame & chassis is mounted on wheel. Then the engine is assembled on chassis by using nut, bolt & somewhere by weld.

2. Manufacturing of engine includes following procedure, Blades are cut by grinding cutter & Bending of blade is done manually. These blades are attached with the frame by adjusting setting.

3. The gear box is made according to speed reduction ratio of wheel & then larger pulley is fixed on the frame with engine fitting.

4. Fuel tank of capacity 4 liter is fitted on chassis on the top of engine by using strips.

5. Round pipe is used for the handles with required dimensions & Accelerator is fitted on handle & connected to carburetor by using wire.

6. Switch & electrical connections are made for on/off the engine & Switch is mounted on handle of machine.
8. Calculations for Power Required To Power Weeder Machine:

Power required to weeding blade

Power = Soil resistance × Area × Velocity

Soil Resistance (S.R) = 1.05 Kgf/cm² = N/m² = 103005 N/m²

Area (A) = Depth of Cut (mm) × Width of Cut (mm) = 5 × 0.25 = 27.5 ×10⁻³ m²

Linear Velocity (V) = Where, µ = Coefficient of Friction = 0.1 N = 500 R.P.M.

Linear Velocity = = 0.89117 m/s So,

Power = Soil resistance × Area × Velocity

Power = 103005 × 27.5 × 10⁻³ × 0.89117 = 2524.38 W = hp = 3.3838 hp

Total Power P = = = 4.22 hp

Where, η = Transmission efficiency.

Power required for wheels

Power required for wheels is determined using Air Resistance and Rolling Resistance

So, Power required for wheels is 0.031 hp

Total power required for weeder machine is

, Ptotal = PBlade + PWheels = 4.22 + 0.031 ≅ 4.25 hp

So, maximum power required considering some accessories power and losses,

P total ≅ 4.25 hp
9. CONCLUSION:

1. Based on the overall performance of the machine we can definitely say that the project will satisfy the need of small scale farmer, because they are not able to purchase costly agricultural equipment.

2. The machine required less man power and less time compared to traditional methods, so if we manufacture it on a large scale its cost gets significantly reduce and we hope this will satisfy the partial thrust of Indian agriculture.

3. So in this way we can solve the labour problem that is the need of today’s farming in India.

4. In the Indian agricultural scenario 62 % people hold land below 1 ha covering 18 % of the total area cultivated. 44% of the area of land is divided in pieces of 1ha to 4ha.

5. Only 1% people hold land above 10ha with area covered is approximately 13%. Hence the power tillers are not suitable for Indian scenario.

6. Power tillers are used by many farmers in medium land holding. At lower end with very low land holding farmers use manual weeding methods over any mechanization.

7. Further recent advancement in technologies such as GPS, image analysis is yet to be incorporated into any of the machines available in the market.

8. By integrating these technologies efficiency, productivity and weed removal rate can be increased and crop damage can be reduced.

9. It is hence become necessary to develop a cost effective solution for weeders useful in variety of soil, which can be used by farmers in low and medium holding of land and increase the productivity and yield of the crop. Authors have finalized the design requirements and design and optimization is in process.
10. REFERENCES:


