

Design and Fabrication Of multipurpose Power Weeder

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ABSTRACT

In India Weed control in crops is major problem. Generally Indian farmer use traditional way for doing fieldwork that is weeding is done by bulls or workers with the help of khurpi. This method is useful but it is very demanding of labour. To overcome this problem we introducing an alternative solution that is “power weeder”. This power weeder will remove grass between two rows and also do the seed sowing operation. We will use rotary adjustment for doing weeding as well as cultivation which is power operated. With the help of this machine we are trying to reduce human efforts with less maintenance cost. Main benefit is reducing labour cost by reducing the number of labours with less time consumption. The same machine is also used for sowing .The approach of this project is to develop the machine to minimize the working cost and also to reduce the time for seed sowing operation by utilizing engine energy to run the machine.

Keywords: Power Weeder, Weeding Efficiency, Seed Sowing, Row Spacing.

I. INTRODUCTION

Weeds are the most rigid and excessive biological constraint to crop production, and it cause viewless damage till the crop is harvested. The compositions of weeds are dependent on soil, climate, cropping and management factors. Valuable share of farmer’s time is wasted for weeding of crops. A weed is unwanted plant which is grow at wrong place at wrong time and which is harmful to crop. It is a plant that emulate with crops for water, nutrients and light. This can reduce crop production. Weeding is an important but equally labour intensive agricultural unit operation. Presently agricultural sector requires chemical free weed control that gives food safety. Consumers require high quality food products and special attention towards food safety. Weed management is as old as agriculture itself, but the methods and concept of controlling weeds have changed over the years. The process of removing unwanted plants in the field

crops is called weeding. The process of removing unwanted plants in the field crops is called weeding... This project aims in the design and fabrication of a machine which is used to remove the weeds and sowing too which makes it multipurpose.

II. PROBLEM IDENTIFICATION

Weed and seed sowing management is one of the tedious operations in vegetable production. Weeds are normally removed with the help of chemicals which can cause harm to the crops too. Power weeders are available but are not multipurpose.

III. LITERATURE REVIEW

Weed control is becoming an expensive operation in crop production .Mechanical weeding is preferred to chemical weeding because weedicide application is generally expensive, hazardous and selective. Besides,

mechanical weeding keeps the soil surface loose by producing soil mulch which results in better aeration and moisture conservation.^[1]

Kepner et al. (1978) claimed that mechanical method of weed control is the best with little or no limitation because of its effectiveness. Wearing is a general phenomenon in power rotary weeder that arises due to friction between soil and parts of machine. Wearing is observed mainly in rotary blades because it cuts the soil and penetrates into the soil. Mass of blades is taken before and after the performance operation.^[2]

Commonly three types of blade geometries are used as blades for weeders and tillers namely, L-shaped blades, C-shaped blades and J-shaped blades. so they are recommended for penetration in hard field and better performance in heavy and wet soils. The J-shaped blades are used for loosening, destroying the soil surface compaction and giving better ventilation to the soil, generally used for tilling hard and wet soils L-shaped blades are the most common widely used for the fields with crop residue, removing weeds.^[3]

A study was undertaken on performance evaluation of wet land weeder for paddy. The main emphasis of the study was the evaluation of wet land weeder i.e. computation of field capacity, field efficiency, weeding index, performance index, plant damage in percent and fuel consumption.^[4]

This research paper presents design modification in multipurpose sowing machine. In this they present that for sowing purpose we import the machinery which are bulk in size having more cost. To prevent this they design multipurpose sowing machine which consists of hopper, seed metering mechanism, ground wheel, power transmission system, seed distributor, and tiller. In this they design model on PRO-E software. the working is very simple as the blade rotates it directly transmit motion to ground wheel which directly connected through main shaft. . When

the ground wheel rotates the main shaft also rotates with the help of power transmission system. The scoops collect the seed from hopper and leave it inside the seed distributor. The tiller is having very good contact with ground.^[5]

Storage device is one of the important device system. And is designed according to weight sustained by the robot as well as the required capacity for planting. This component is stationary to bottom of this tank seed sowing disc is arranged. This disc serves the function of distribution of the seed, as for each complete rotation of the rotating wheel, only one seed fall from the tank. Also number of seed falling from tank varied according to requirements. This disc evenly opens the way to seed hence planting is done smoothly and accurately.^[6]

IV. OBJECTIVES

1. To design and fabrication power weeder for inter row crops whose distance between two rows is 20 inch.
2. To reduce use of harmful pesticides for weed control.
3. Reduce process time.
4. To fabricate a power weeder with sowing capability which will make it a multipurpose machine.

V. DESIGN CONCEPT

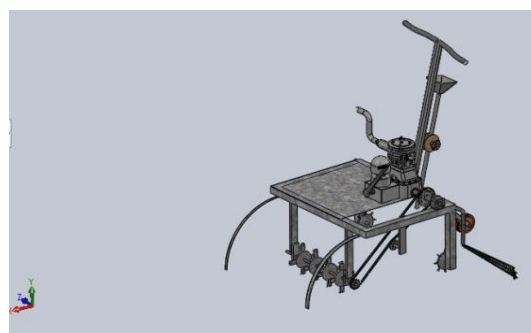


Figure 1

VI. POWER REQUIREMENT

To calculate the power requirement of the weeder, maximum soil resistance is taken as 0.5 kgf/cm². The speed of operation of the weeder is considered as 0.7 ms⁻¹ to 1.0 ms⁻¹. Total width of coverage of cutting blades is in the range of 12 to 30 cm. The depth of operation is considered as 4 to 7 cm, transmission efficiency is 82%.

$$P_d = (SR \times d \times w \times v) / 75 \text{ hp}$$

where,

SR = soil resistance, N/mm²

d = depth of cut, cm

w = effective width of cut, cm

v = speed of operation, ms⁻¹

Hence, power requirement is estimated as

$$P_d = (0.5 \times 8 \times 30 \times 1) / 75 \text{ hp} = 1.6 \text{ hp} = 1.26 \text{ Kw}$$

Total power required

The total power required is estimated as 1.95 hp as follows

where,

P_d = Power required to dig the soil:

η = Transmission efficiency.

Thus, a prime mover of 1.49 kW (2 hp) was required for this weeder.

VII. WORKING

1. Initially start the engine with the help of handle. We used the 2 hp petrol engine.
2. The rotary blades are used for the forward movement of the machine.
3. Chain drive is used to transmit power from engine to rotor shaft.
4. The blades are mounted on the front side of the machine. When blades starts rotating forward motion occurs.
5. Hence weeding is done with less effort and less cost.

6. Hopper containing seeds provides them to seed distribution wheel which drops seed at equal distance as the machine moves forward.
7. Seed distribution wheel is rotated by means of chain drive connected to the rear wheel shaft of weeder.

VIII. CONCLUSION

The main conclusion is as follows:

1. The machine requires one operator for operating the machine.
2. The machine can be used to a minimum 21 inch row spacing.
3. The average depth of operation was 20 mm. effective width of cutting tool is 11 inch.
4. Labour requirement in case of power weeder is least.
5. Overall working of power weeder was satisfactory, trouble free and smooth, there was no breakdown and accidental incident during operation.

IX. REFERENCES

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