

Design and Fabrication of Manually Operated Double Wheel Weeder

¹G.SELVAKUMAR, ²S.DHANASEKAR, ²R.GANESH, ²M.MAHESHKUMAR, ²S.GIRIRAJ

¹Assistant Professor, Dept. of Mechanical Engineering, Jay Shriram Group of Institutions. Tiruppur, Tamilnadu, India

²UG Scholar, Dept. of Mechanical Engineering, Jay Shriram Group of Institutions. Tiruppur, Tamilnadu, India

ABSTRACT: Weed control is the one of the most important problem that will reduce the farmer interest to continue cultivation. The aim of the work is to construct and develop the powered weed to provide the best opportunity for the crop (groundnut and tomato at initial level) to establish itself after planting and to grow vigorously up to the time of harvesting. The weeder driven by man to move in forward direction and the blade is attached at rear end is placed at the roots of weeds, once wheel get rotated then the blade starts cutting the weeds and once the operation is completed the weeder is shifted next row, like this the complete land of cultivation is made as weed free. Main advantage is reducing labor cost by reducing the number of labors, less time consumption. The operation is made to be simple that even any can handle, by handling it without any stress.

KEYWORDS: chain sprocket mechanism, groundnut cultivation, weed remover.

I. INTRODUCTION

Every year in INDIA, an average of 1980 Cr of rupees wasted due to weeds. Our country faces the total loss of 33% of its economic from weeds. The losses are due to some of the following reasons; total loss of 23% from crop diseases, total loss 20% from insects and worms, total loss of 6% from rats has been surveyed by India. Some weeds have beneficial uses but usually when they are growing among crops. Weeds decrease the value of land. This can reduce crop production and decreasing income per acre of cultivation, and economic frustration are some of the key factors hurting confidence in continuing farming.

II. LITERATURE REVIEW

1. Development of single wheel multi-use manually operated weed remover by H.S.Sridhar

This Concept involved the development of mechanical weeder, after discovering that tools such as cutlass and hoes require high drudgery, time consuming and high labour requirement. As a solution to these problems, mechanical weeder was designed and developed. 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. An extra attachment of funnel and circular pipe for fertilizing and seeding of ragi after cultivation. The tool developed will be able to fulfill the present requirement for the weed control. Accordingly, the present development is directed to an improved manual tilling, mulching and weeding tool.

2. Design and testing of an intra-row mechanical weeding machine by T.E.Griff, C.Cordill

This concept involved in the development of mechanical weeder with sensor, drive motor, control algorithm. A mechanical weed control machine sensing the arrangement of the required crop rows. The movable blades are aligned according to the sensible distance. Fatal damage occurred when a maize plant was falsely regarded as a weed or when the algorithm did not properly locate the maize plant. There may be minimal damage would most likely not kill the maize plant, but could cause yield loss.

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3. Statement of the problem:

It is concluded by analyzing the above papers found that there is a problem with removing weed such as the design of the weeder machine removes weed only in vacuum land for cultivation. If the sensor is used in the machine, sometimes it may cause damage to the plants when the plant was falsely regarded as a weed. This machine has only the primary cutter called weeder. So it cannot be adjustable to remove the weeds at a distance after cultivation i.e, at the time of plants are growing.

Now, when the machine is having motor it may cause power loss, noisy operation. It requires the power for constant speed torque to shaft and high maintenance. If the machine is having engine to work, then it will consumes more fuel. The engine speed influences the efficiency of weeder and also the heat is generated which affects the growing plants. It is subjected to more weight to push the machine.

III. PROPOSED MODEL

This model is designed to fulfil the present requirements (shown in fig1) and plate is designed as(shown in table1).The chain sprocket mechanism is used in this model for increasing the speed ratio.



Figure: 1 Double wheel weeder

IV. DESIGN CALCULATION

1 .Torque on the shaft

Torsional strength of the shaft was considered by calculating the drive torque of rotating shaft which was subjected to twisting.

The weight on the wheels is 12kg

Power output of average human being = 0.76 of Hp

$$= 0.76 \times$$

$$\Theta = 0.070 \text{ rad}$$

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$$T = 70.63 \text{ N-m} = 70.63 \times 10^3 \text{ N-mm}$$

$$G = 0.8 \times 10^5 \text{ N/mm}^2$$

$$J = \frac{\pi}{32} \times d^4$$

$$\Theta = \frac{t \times l}{G \times J}$$

$$0.070 = \frac{70.63 \times 365 \times 10^3}{0.8 \times 10^5 \times \left(\frac{\pi}{32}\right) \times d^4}$$

$$d = 15 \text{ mm}$$

Therefore the required diameter of the shaft is calculated which is 15mm.

Table: 1 Blade Parameters

Sr. No.	Name	Symbol and Unit	Used Values
1	Blade Width	w mm	30 mm
2	Overall Vertical Length	Lv mm	120 mm
3	Overall Horizontal Length	Lh mm	140 mm
4	Blade clearance angle	α°	25°
5	Blade Thickness	t mm	5 mm
6	Max Curvature Radius	R mm	40 mm

V. WORKING PROCESS

0.746 KW

Torque on the shaft, $T = 12 \times 9.81 \times 0.6$

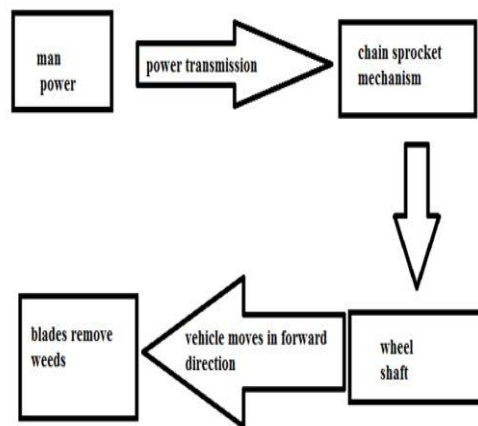
=70.63Nm

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= 0.56KW

$$T/j = G\theta/L$$

$$\theta = T *L/ (GJ)$$

T torque of the shaft

L length of the shaft =365mm

G modulus of rigidity

J polar moment of inertia of the shaft

Figure: 2 Block diagram for working

The block diagram which is shown above represents the cycle of operation: the power from the man is transmitted from wheel shaft to sprocket which is fixed to the shaft with the help of bushes. Then the chain sprocket mechanism is going to actuate and power is transmitted to the shaft. Shaft will rotate then the two wheels mounted on the bearings and fixed by wheel hubs will be driven by the shaft. Vehicle moves in a forward direction and the blades enter into the soil between rows of crops and removing of weeds takes place. By this a huge amount of labor effort can be reduced and within less time more weeds can be removed with less cost and easy operation. Then finally one labor is required to remove the weeds which are not removed by weeder around the plants.

VI. MERITS

- It is faster than the traditional method of removing weed.
- It is reducing labor cost by reducing number of labors.
- Less time consumption.
- The operation is made to be simple that even any person can handle, by just handling it without any stress.

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VII. APPLICATIONS

- This can be applied for controlling weeds purpose.
- Mainly it is used in groundnut field and also other fields where there is a gap of 5-12 inches gap between the plants.
- Other fields such as tomato, cotton etc., can be made weed free.

VIII. CONCLUSION

Conclusion of the project work is that it helps the student to their extended imagination, engineering skills and fundamental knowledge. By selecting above topic we are understand, familiar and know the details of the agricultural technology. This is our little effort to make comfort to our farmer's. this machine is developed to reduce the time and effort require for production up to the great extend also this machine manufacturing cost is less as compared to others. The project also teach the way of working as a unity proper coordination is to be established with students in the project group. It enhance the thinking or filling of mutual cooperation in the project also the projects learn to fabricate any model according to its requirements. All the manufacturing process are carried out with a great concentration; any wrong calculation may have result in the failure of project model.

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