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"Design & Fabrication of Adjustable weeds removal machine"

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Abstract: Weeds are one of the major causes of loss of agricultural produce. Weeds compete with crops for essential nutrients. More than 33 % of the cost incurred in cultivation is diverted to weeding operations there by reducing the profit share of farmers. Its main objective is to reduce the manpower as in today's scenario labours are very hard to find as well as it reduces the working time. Hence mechanical weed removal is necessary to reduce the labour force. Environmental degradation and pollution caused by chemical is reduced by the use of Mechanical weed removal. Low effective operation, low work effort and high time requirement for different types of hoe or cutlass, can be overcome with the use of mechanical weed removal.

In the machine two adjustable rotors are connected with the small engine by the help of flexible coupling ; a plurality of teeth extend radially from the periphery region of the unit, for the progressive removal of weeds during advancement along the agriculture soil, as a consequence of the rotation of the unit, and of the teeth, about the central axis.

In this adjustable weeds removal machine, we can adjust the gap between two rotors according to the size of the crop. So because of this adjustable mechanism we can use this machine in the multicrop.

Keywords: adjustable, weeds removal, multi rotor, multicrope, flexible coupling

Aim and objectives of the project

AIM: "To removing weeds very efficiently and quickly by the help of machine**"**

Objectives: This machine reduces man efforts and reduces the cost of removing weeds with great efficiency and accurac y with reducement in labor requirement**.**

INTRODUCTION:-

Agriculture is the backbone of Indian economy. India being developing nation agriculture and industries based on agriculture products has prime importance in the national economy.

India is the world's largest producer of many fresh fruits and vegetables, milk, major spice, select fresh meats, select fibrous crops also. Majority of the Indian population depends on agriculture and agro based industries and businesses.

Lack of mechanization or automation is one of the major roadblocks to improving the productivity of agriculture. Weeds ar e one of the major causes of loss of agricultural produce. Weeds compete with crops for essential nutrients.

In agriculture, it's a very difficult task to weed out unwanted plants manually as well as using bullock operated equipment which may further lead to damage of main crops Applying automation to agriculture has assist create numerous improve elements to the industry while helping farmers save money and time.

More than 33 percent of the cost incurred in cultivation is diverted to weeding operations there by reducing the profit s hare of farmers.

Problem Identification

- The following steps are to be taken to identify the problem
  - I. The first step is to go the farmers and find the problem faced by them.
  - II. The next step us to choose a problem.
  - III. The further step is to collection of data regarding to removing weeds by farmer interview and literature review.

- The drawbacks of existing machines are:
  I. It is very large and it is operated by the tractor.
  II. Use in the only one type of crop.
  III. It is work between two raw of crops

LITERATURE SURVEY

1) **Pandit Shamuvel V, Patil Kedar K, Bhosale Swati G,Mithari Ranjeet, Pravin Rajigare** worked on MECHANICAL PORTABLE POWER WEEDER MACHINE. In which they are use six different blade shapes viz., convex, concave, 1200 V shape, 1600 V shape, serrated edge and Tyne cum blade were compared with straight blade. Maximum draft of 450 mm wide blade harrow was 286N. Power requirement of the blade harrows was 0.20-0.27 kW for removing weeds from the row. They run the machine by the help of 4 stroke petrol engine. The weeder is supported by two wheels.so it is easy to handle. From this research paper we find that soil resistance for finding the power required to remove weeds. [1]

2) **Sridhar.H .S** worked on DEVELOPMENT OF SINGLE WHEEL MULTI USE MANUALLY OPERATED WEED REMOVER. In which they made single wheel weed removal, which is use as multipurpose. One for to remove weeds and another one is for mulching. The machine has only one wheel so it can easily handle when it is in working.it is lighter in weight. The new thing is, it is not running by the help of prime mover so it saves the fuel. 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. from this research we find comparison between removing by the help of labor and by the help of mechanical weeder.[3]

3) **K Sripriyan , K Anantharuban**, worked on "EXPERIMENTAL ANALYSIS OF FORK TYPE SEMI-AUTOMATED WEEDING MACHINE IN PADDY FIELD" in which they work in paddy field. They use remote control unit for automation. For this analysis they use mainly these component in the machine:- Cultivator (Weeding tool), Battery, V-belt and pulley, High torque DC, motor, Cage wheel, Lead screw, Remote control unit. In this machine they use DC motor so it is run with the electricity so there is no need of fuel. New thing is cag wheel is which is very useful. Because of cag wheel the gripping between wheel and field is good.so it can easily work in the field. From this research paper we find the calculation of belt and pulley which is useful in our machine.[4]

4) **S. Madhusudhana, D. Kanakaraja, A. Srinivas , M.FayazHussainBaig** are worked on "DEVELOPMENT OF DOUBLE WHEELED MULTIPURPOSE WEED REMOVER" in which they use petrol engine as prime mover. The main components of this machine are 1) Chassis 2) Engine 3) Chain 4) Sprocket 5) Handle 6) Blades 7) Seeding box 8) Shaft and Wheels. In this machine they combine seed sawing machine and weeds removing machine. By the help of this research paper we get idea about the time requirement for removing weeds by the help of machine. We get comparison of time between labour and machine. Also we find effectiveness of machine. We get idea about methodology for the design. Which is useful for design of our machine.[5]

5) **Manish Chavan1, Sachin Chile, Ashutosh Raut, Piyush Salunke ,Digvijay Mahajan ,** are worked on the "Design, Development And Analysis Of Weed Removal Machine", in which they design and develop a weeds removal machine. After that they analyze all components and get results. From that results they find whether the components is safe or not when it is in working condition. after computerized analysis they analyze in the field so it gives actual results of the components. In this research paper they do calculation of gear transmission, stresses on blades, shaft. They show calculation of saving money for removing weeds by the help of machine. From this research paper we do calculation for blades.[6]

Summary of literature survey

From all the literature survey we find that,

- Time taken for removing weeds by the help of machine is less than the by the help of labor
- Cost for removing weeds is reduce.
- Weeds can effectively remove.
- All machine are available in vertical rotary motion so we think about horizontal rotary motion
- Machines are only use in one crop. So we decide design for multicrope
- All machines are work between two raw of crops.
- By the help of this all research paper we find calculation of different components like belts, pulley, shafts, blades etc.

Solution

After referring all the machines and research paper we find that, all the machine available in the market is only use in one crop. Hence we decide develop machine which is use in the multicrop. For use in multicrop we making adjustable arran gement in the machine. All the machine work between two raw of crops. S**o** we decide design a machine which is work o n the raw of crops. So it can easily remove the weeds. Some machines are work on the motor but we use engine because it is necessary that all the farm has electricity.

Component's Material

Sr No.	Component	Material
1	Pulley	Closed grained cast iron of Grad e FG 200
2	Gear box	30C8 forged steel
3	V-belt	Polymer
4	Universal Joint	Steel
5	Shaft	C30(30C8)
6	Guide way	Mild steel
7	Blade	High carbon steel
8	Safety guard	GI sheet
9	Cag wheel	Mild steel
10	Frame	Mild steel
11	Bearing housing	Casting

Table 1: component's material

Design of components

- **Shaft**

Material: C30
Tensile strength: 490 – 588 Mpa
Yield stress: 294 Mpa
Assume F.O.S: 10
Power: 2HP

I. Shear stress:

$$\tau = \frac{\text{Tensile strength}}{\text{F.O.S}}$$

= 500/10

= 50 Mpa

II. Torque calculation:

P = 2 HP
= 2*746
= 1492 watt

$$P = \frac{2\pi NT}{60}$$

1492= 2* π*N *T/ 60

T= 47496.81 N.mm

III. Diameter of shaft

$$T = \left(\frac{\pi}{16}\right) * \tau * D^3$$

$$47496.81 = \left(\frac{\pi}{16}\right) * 50 * D^3$$

D≅ 20mm

Ergonomics consideration

- Pushing or pulling force is applied at that time when elbow is 90^0.
  Which is very efficient
  Man can work long time without rest.
- Maximum height of handle = 1100mm
  Minimum height of handle = 800mm
  Provide for better handle design.

3D Design of machine

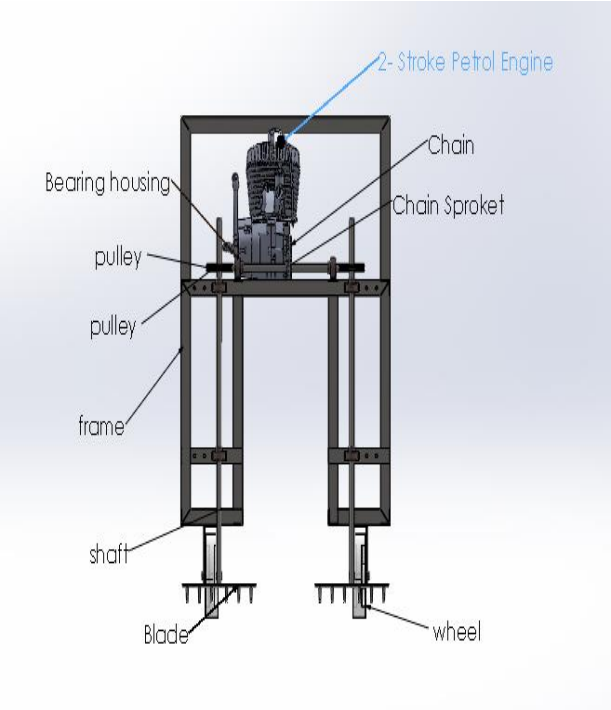

Figure 1: front view of model

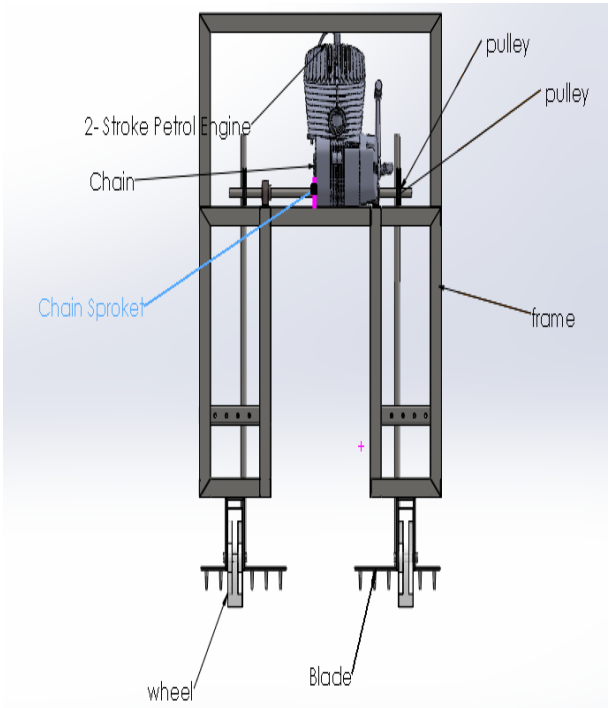

Figure 2: back view of model

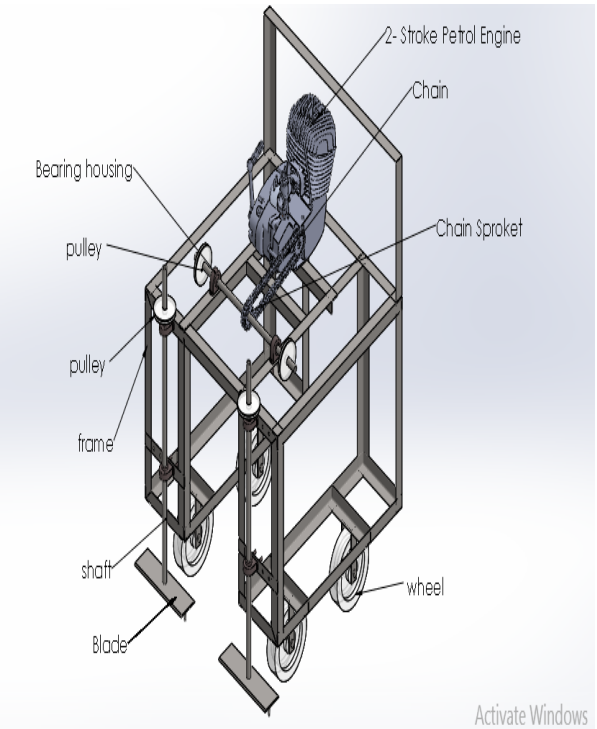

Figure 3: Name of all components in model

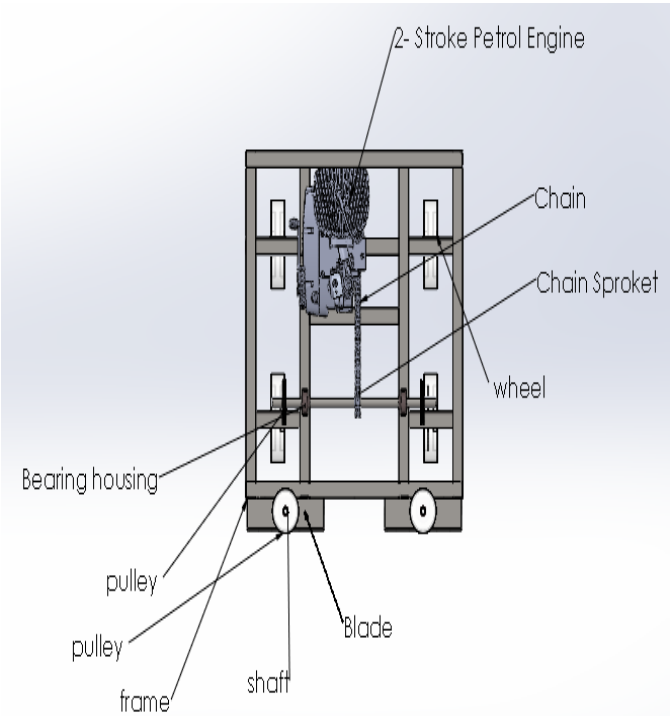

Figure 4: Top view of model

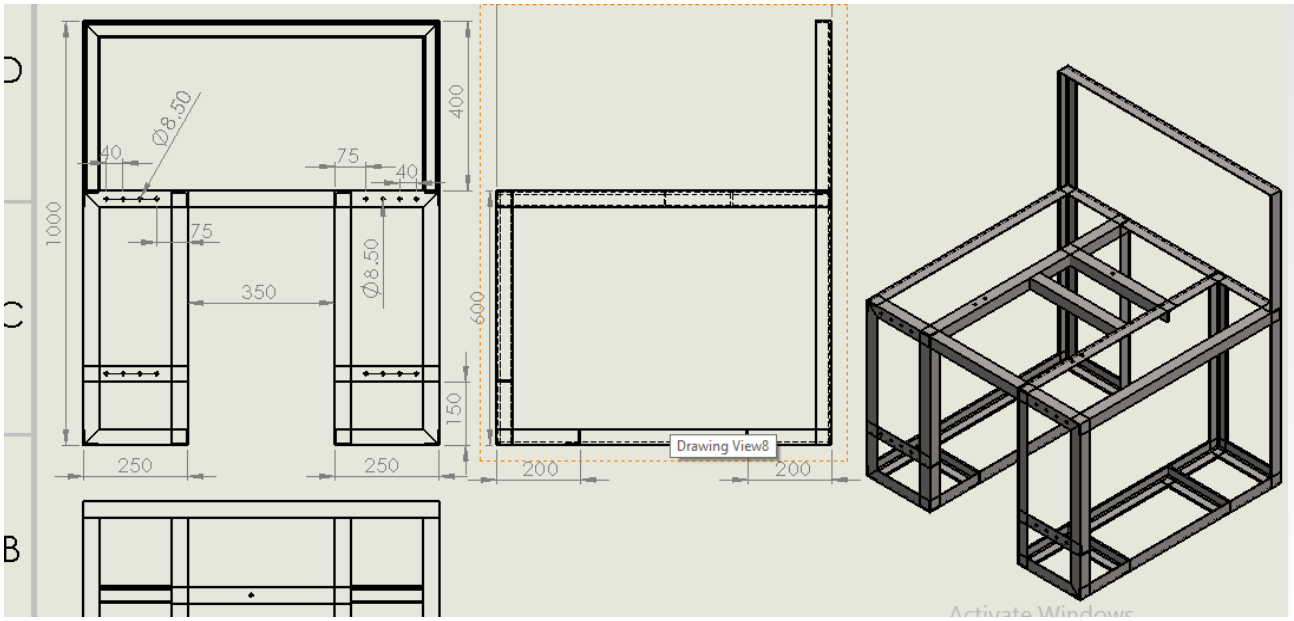

Figure 5: dimension of frame

CONCLUSION

- The literature review has been done.
- Rough design of our machine is ready.
- Some component' dimension is calculated.
- Ergonomically our machine is suitable.
- We introduce about the adjusting mechanism.
- We introduce about machine use in multi crop.
- We use horizontal rotary motion of the blades for removing weeds.

Future scope

- We will design the remaining component.
- We will fabricate this machine.
- We try to find solution about problem when it is in working.
- Labour cost will reduced.

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