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Multipurpose smart farming equipment

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ABSTRACT

In our country agriculture is one of the lagging fields. The main reason for this is lack of man power and non-availability of modern equipment. In our country separate equipment's are used for various purposes like removing of weeds, spraying at pesticides, spreading of measure, fertilizers which consume more time and man power. Our project mainly focuses on this difficulty, and hence a suitable arrangement has been designed. This technology greatly helpful for small farming community in reducing the cost of pesticide, fertilizing and also for weeding application. The device can be used for spraying fertilizers, pesticides and crop protection products like manure etc., there by greatly reducing the time taken and maintaining the safety precautions for the farmer while spraying fertilizers.

Keywords: sprayer, fertilizer, weeding, reduction in time.

INTRODUCTION

Agriculture is a backbone of Indian economy. It is most important of all the economic activities of man. The human being has been modifying land to obtain food and other essentials from thousands of years. The application of pesticides, weeding and fertilizers in agricultural areas is prime importance of crop yields. The engine power is used to transfer the power from rotator and sprayer. The manual spraying of pesticides and fertilizers are mainly responsible for the increase in the number of chronic diseases. These problems are reduced by this method. Weed is an unwanted plant of any species. The weeding tool is designed to ease the task of removing weeds from cultivated land.

LITERATURE REVIEW

Dhiraj N. Kumbhare et.al, Study involves Fabrication of Automatic Pesticides Spraying

Machine which uses a small 4 wheel kart or vehicle which is electronically operated by a wireless remote which runs on power source using DC battery.

Krol, H. studied and found the soil properties on various plantation sites treated by a beater-type weeder (a rotary flail-type weeder) that the weeder did not cause a lasting change in soil density and did not affect the soil pH and accumulation of all. On many sites the treatment increased the accumulation of organic compounds and Humification.

Mahajan designed and developed a rotary power weeder for soft field conditions. He compared the weeding efficiencies at depth up to 25mm and suggested that working depth of 15mm is good, for weeding. He also found out that percentage increase in efficiency at a depth of 25mm was less than the percentage increase

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DESIGN CALCULATION

Calculation for shaft

Maximum bending moment calculation for simply supported beam with uniformly distributed load along the shaft

$$\begin{aligned} \text{Bending moment, BM} &= (W*L^2)/8 \\ &= (50*9.81*0.62^2)/8 \\ &= (490.5*0.384)/8 \end{aligned}$$

$$\text{Bending moment, BM} = 23.56\text{N-M}^2$$

Maximum shear force calculation for simply supported beam with uniformly distributed load along the shaft

$$\begin{aligned} \text{Shear force, SF} &= (W*L)/2 \\ &= (50*9.81*0.62)/2 \end{aligned}$$

Shear force, SF

$$= (490.5*0.62)/2$$

$$= 152.05\text{N-M}$$

COMPONENTS

Frame

- Length: 101.6mm
- Breath: 63.4mm
- Height: 38.1mm

Uses

A frame is often a structural system that supports other components of a physical construction and/or steel frame that limits the construction's extent.



Fig.1 frame

Bearing

- Bearing size: 25.4mm
- Type: Plummer bearing

Use

A Plummer block or bearing housing is a pedestal used to provide support for a rotating shaft with the help of compatible bearings & various accessories.

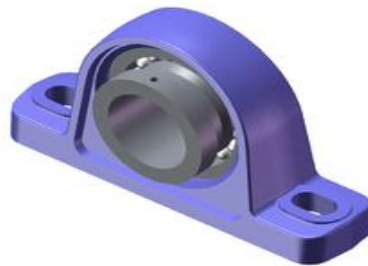


Fig.2 Bearing

Engine

Type: A single cylinder two stroke petrol engine makes 69.9cc of displacement. The power generated by this engine is 3.5 Bhp at 5000 rpm

and the maximum torque produced is 5.0 Nm at 3750 rpm.

- Maximum Power: 3.5 Bhp @ 5000 rpm
- Maximum Torque: 5.0 Nm @ 3750 rpm
- Displacement: 69.9 cc



Fig.3 Engine

Chain sprocket

Sprockets are used in bicycles, motorcycles, cars, tracked vehicles, and other machinery to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc. Perhaps the most common form of sprocket may be found

in the bicycle, in which the pedal shaft carries a large sprocket-wheel, which drives a chain, which, in turn, drives a small sprocket on the axle of the rear wheel. Early automobiles were also largely driven by sprocket and chain mechanism, a practice largely copied from bicycles.



Fig.4 Chain sprocket

Shaft (MS)

- Length: 63.4 mm
- Diameter: 25.4 mm

components of a drive train that cannot be connected directly because of distance or the need to allow for relative movement between them.

Uses

A mechanical component for transmitting torque and rotation usually used to connect other



Fig.5 Shaft

Wheel

Wheels are used as a contact surface between frame and ground surface. There are four wheels are used in this design,

- Diameter: 203.2mmmm
- Thickness: 24.5mm
- Quantity: 4

Uses

A wheel is a round object with a hub and an axle. A tire is the rubber part of a wheel that grips the road. Not all wheels have tires.



Fig.6 Wheel

Hopper

A hopper is a funnel-shaped device used to move material from one receptacle to another. This

type of hopper has nothing to do with hopping or jumping: it's a device the kind you're most likely to see in a chemistry lab for moving substances from one container to another.



Fig.7 hopper

Sprayer

Sprayers are fully integrated, mechanical systems, meaning they are composed of various parts and components that work together to achieve the desired effect, in this case: the projection of the spray fluid. This can be as simple

as a hand sprayer attached to a bottle that is pumped and primed by a spring-lever, tube, and vacuum-pressure; or as complex as a 150 foot reach boom sprayer with a list of system components that work together to deliver the spray fluid.



Fig.8 Sprayer

Square pipe

Square pipe is used for making frame. The two sides of the square pipe has long length when compared to other two sides.



Fig.9 Square pipe

DESIGN

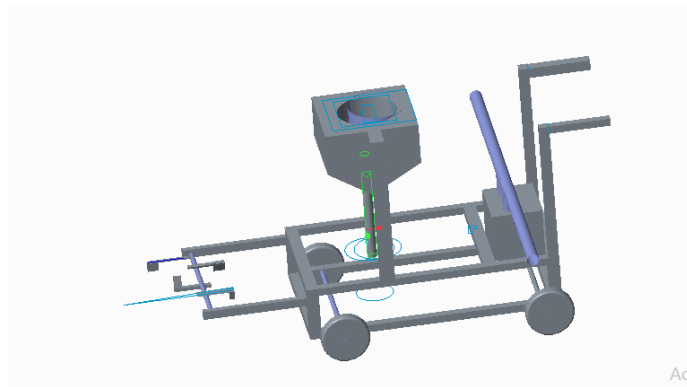


Fig.10 Smart farming Equipment

WORKING

The engine power is connected to the primary shaft. The primary shaft of the power is transferred to the two gears. One gear is attached to the rotator and another one is connected to the rear wheel of the device, So the wheels moving along the cultivated land and also rotator is weeding for the agricultural land. The rotator is designed to make some adjustments in account of farmer choice. The

direct current is the output of engine power. The converter is connected to the engine to convert the D.C to A.C supply. The alternate current is connected to the sprayer pump. So the sprayer sprays the pesticides in the agricultural lands. The hopper is designed to fit to the frame. The hopper is adjusted to the fertilizing process in the cultivated land. At that same time the three processes are done by the single method.



Fig.11 Fabrication of smart farming equipment

CONCLUSION

In agriculture there is only some of the modern equipment is used in our country, but our country is 70% agricultural based country. We made some changes in our manual agricultural methods it brings more national economic improvement in our country. By implementing this technique the time

consumption for spreading pesticides and fertilizers and also weeding can be decreased. The manpower is the main factor affects the agriculture today. This technique greatly decreases the manpower work.

REFERENCES

- [1]. R. Joshua, V. Vasu and P. Vincent Solar Sprayer - An Agriculture Implement, International Journal of Sustainable Agriculture ISSN 2079-2107, 2 (1), 2010, 16-19.
- [2]. R. D. Fox, R. C. Derksen, Visual and image system Measurement of spray deposits using water-sensitive Paper Applied Engineering in Agriculture, American Society of Agricultural Engineers, ISSN 0883-8542, 19(5), 2003, 549- 552.
- [3]. M. A. Miller, B. L. Steward, M. L. Westphalia Effects of multimode four-wheel steering on sprayer Machine performance, American Society of Agricultural Engineers ISSN 0001-2351
- [4]. A Taiwo K. Oje, Development and testing of a swirl Chamber nozzle, Journal of Agricultural Engineering And Technology (JAET), Volume 16 (NO. 1) June, 2008 A reference paper on plant protection Equipment published at journal of Agricultures. A reference paper on Spray Equipment and Calibration AE-73 (Revised)
- [5]. Nitish Das, etc. al., [1], Paper comprises study on Agricultural Fertilizers and Pesticides Sprayers Spraying Methods. Also tells about different spraying methods 1) Backpack (Knapsack) Sprayer 2) Lite-Trac 3) Motorcycle Driven Multi-Purpose Farming Device (Bullet Santi) 4) Aerial Sprayer, 2013.