

## Battery Operated Weeder & Sprayer

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**Abstract** - 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. One of the problems in crops and vegetables production is poor weed control; hence there is need of mechanical weeder to increase the production of these products. The cost for employing a Labour force when using simple tools is very high in commercial farming system. This can be reduced using mechanical weeder. The aim of the paper is to design, construct and test manual weeder, to provide the best opportunity for the crop to establish itself after planting and to grow vigorously up to the time of harvesting.

**Key Words:** Weeder, Sprayer, commercial farming,

### 1. INTRODUCTION

Agriculture plays a vital role in Indian economy. Around 65% of population in the state is depending on agriculture. Although its contribution to GDP is now around one sixth, it provides 56% of Indian work force. The share of marginal and small farmer is around 81% and land operated is 44 % in 1960-61. As far as Indian scenario is concerned, more than 75 per cent farmers are belonging to small and marginal land carrying and cotton is alone which provide about 80 % employment to Indian workforce. So any improvement in the productivity related task help to increase Indian farmer's status and economy.

The current backpack sprayer has lot of limitation and it required more energy to operate. The percentage distribution of farm holding land for marginal farmers is 39.1 percentage, for small farmers 22.6 percentage, for small and marginal farmers 61.7 percentage, for semi-medium farmers 19.8 percentage, for medium farmers 14 percentage and for large farmers 4.5 percentage in year 1960-61. Clearly explain that the maximum percentage of farm distribution belonged to small and marginal category.

The principles of motion of trolley which transmit its rotary motion from chain and sprocket arrangement and reciprocating piston into the cylinder for pumping the pesticides which is used to the manually operated organic fertilizers cum pesticides sprayer[1].

Generally used low cost Knapsack sprayer having major drawbacks as back pain and exertion of the user due to its heavy Weight and manual pumping. Manually operated

pumping are not constant they generate uneven pressure inside the spray cylinder. When Pressure in the tank fluctuates, it causes flow to become turbulent which is highly undesirable. When the pressure inside the cylinder increases, the width of spray increases, therefore causing the wastage of pesticides. In I C engine sprayer (Power Sprayers) uses an engine instead of manual operation.

The drawbacks include-The I C engine cause high vibrations, noise this could result in number of health problems. Due to heavy weight back pain causes. The tractor mounted sprayers are very expensive, not useful for small space and all type of crop. It suitable for heighthed crop in large amount.

### 1.1 Spraying methods:

Different types of spraying methods are:

#### 1) Hydraulic Sprayer:

It contains hydraulic nozzle it was mixed water and pesticide sprayed with atomize form. It is old technology still this used by most of farmers.

#### 2) Knapsack (Backpack) Sprayer:

Operating principle of this is hand operated lever create a pressure difference in which pesticides and liquid is forced through nozzle in fine droplet form. The pressure of this sprayer approximately 7 kg/sq cm. and capacity of storage tank is less than 20 liters..

#### 3) Motorized Mist Blowers:

This motorized mist blower is designed and developed for spraying the pesticides on tall trees like cocoa capsids. This is also used to improve horizontal spray and penetration into crops. The kioritz DM9 is being used to apply a fungicide against rice sheath blight in Vietnam.

#### 4) Tractor mounted equipment (Lite-Trac):

The Lite-Trac name comes from "lite tractor", due to the patented chassis design, facilitating the leaving machines manufactured by company to have lite footprint for mineral soil compression. This is Europe's largest lite tractor Manufacturer Company. Large storage and high spraying

**5) CDA/ULV Application Equipment:**

CDA means controlled droplet application and ULV means ultra low volume. Rotary nozzles are normally used to achieve to CDA. The reliable way of applying pesticides at ULV rate of application. This is hand-held cheap equipment and reliable.

**1.2 Weeding methods:**

**1) Weed mat:**

For preventing weeds from growing to the surface fibrous cloth material, bark or newspaper laid on top of the soil is a weed mat also called artificial mulch.

**2) Boiling water:**

If we pour boiling water at base of weed, they will rapidly change to green and then die in few hours. It is best suited for weed in cracks or hard to reach locations.

**3) Ploughing:**

Tilling of soil, inter-cultural and summer ploughing all comes under ploughing. Tilling of soil means uproots of weeds which causes them to die. Ploughing is done during deep summers helps in killing pests.

**4) Crop rotation:**

Crop rotation with such that kill weeds by choking them out as hemp, Mucunapruriens, etc can be a very effective method of weed control. So there will be no use of herbicides, and will gain the benefits of crop rotation.

**5) Soil solarization:**

The basic principle behind soil solarization is that light received from the sun is in the form of electromagnetic short waves, which easily pass through the transparent colorless polyethene films and reach to soil.

**6) Mechanically tilling around plants:**

Tillage is the manipulation of soil with tools and implements for loosening the surface crust and bringing about conditions favorable for the germination of seeds and growth of crops.

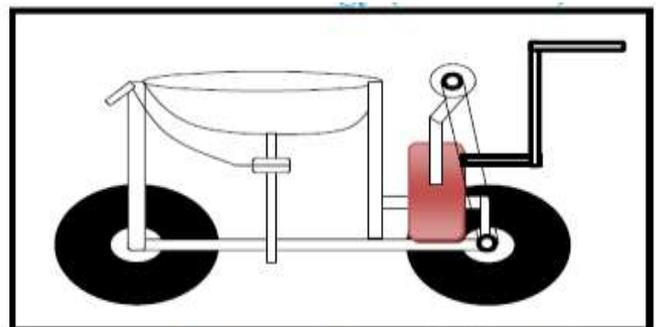
**2. METHODOLOGY**

Indian farmers use traditional method, there is large scope for development in agricultural sector. In traditional method weeding process are done by the bull which become costly for farmers having small farming land its time consuming and requires separate setup. The spraying is traditionally done by backpack sprayer with labor which requires more human effort, it cover small area, time consuming and low storage capacity. Therefore to overcome

above problems, we have design and develop the flexible equipment which will be beneficial to the medium and small scale farmer for the weeding and spraying operations.

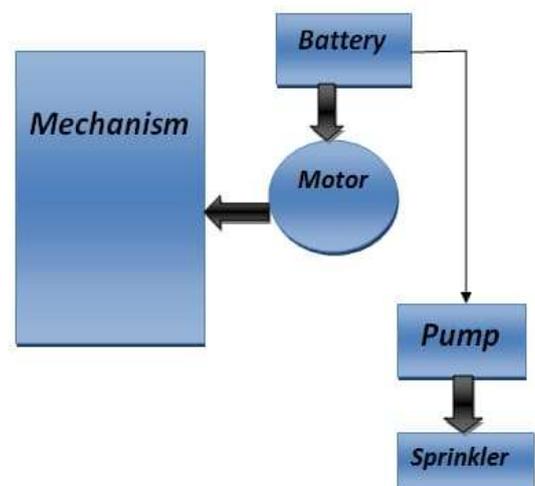
**A. Working of Model**

When the equipment is push forward by using handles, front wheel rotates and the gear is mounted at the axle of wheel is start to rotate and its rotation is then transferred to the pinion through the chain drive. The rotary motion of the pinion is converted into the reciprocating motion by the single slider crank mechanism, due to this arrangement the connecting rod moves upward and downward which then reciprocate the piston of single acting reciprocating pump mounted at the top of storage tank. During the upward motion of the connecting rod the pesticide is drawn into the pump and during the downward motion of connecting rod the pesticide is forced to the delivery valve, the delivery is connected to the pipe carrying the number of nozzles. The fertilizer is stored in bucket and controlled the fertilizer by using clutch mechanism in multiple lines of crops.



**Fig. 1** Block diagram of working model

**3. SYSTEM EMPLEMENTATION**



**Fig. 2** Implementation diagram of working model

Weeder cycle is the equipment used in the agricultural field. In this equipment consist of Handle, Sprocket wheel, Rotor, Planet Gear, Chain, etc. The rotor and wheel are joined by the chain that will be attached to a frame.

The wheel is attached to sprocket wheel and the rotor is attached to planet gear and that sprocket and planet gear is joined by chain. That assembly is mounted on frame. By push the weeder cycle that pushing pressure rotated wheels. Then the rotation of wheel joined sprocket will be rotated. As well as planet gear it will be rotate by the assembly of attaching the chain. The Planet gear is attached to rotor so rotor will be rotated by the rotating of rotor. It enters in field land with its sharp edges teeth. Teeth removed grass and make soft favor which is useful for growth of plant. So this weeder cycle is most useful to farmers.

India is an agricultural based country most of the population is depending on farming. India has a problem of high population and low level of land productivity, low level of farm mechanization, insufficient power availability as compared to the developed nations. Even average land holders in Japan uses proper mechanization for agricultural which led to great achievement for increasing crop productivity. But in India for small farmer's mechanization is difficult even though steps were taken to increase availability of power operated machines, combine harvesters, power tillers, irrigation pumps, solar pumps, dripping system etc.

In Agricultural sector use of cheap and beneficial equipment for effective weeding and spraying for increase productivity which is very important for better contribution for India's GDP.

#### 4. WORKING



**Fig. 3 Model of Our Paper**

The weeder is used to reduce the human efforts. It is very useful device for farming. It helps the farmer to reduce their efforts and get efficient work done

The weeder is operated by battery hence it become portable & handy. The device can be used in two different way are for weeding purpose & other for spraying purpose. The weeder is controlled by motor having 40 rpm revolution & generate good torque by gear mechanism arrangement. The hands of weeder is attached to the motor using nut-bolts & metal plates. When motor runs it rotates its arm which can be used for weeding & digging purpose.

#### 5. CONCLUSION

Agricultural development plays important role as a driver of rural poverty reduction. The effort require to develop a weeder will meet the demand of farmers. The efficiency of weeder should be satisfactory and it is easy to operate. It was faster than the traditional method of removing weed. Less labor needed and it is more economical than hand weeding. Here do not use any fuel and power, Hence maintenance cost is very less. Cost of weeding by this machine comes to only one-third of the corresponding cost by manual laborers. The fabrication of Low cost Weeder is done with locally available material. The overall performance of the weeder was satisfactory.

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