Fabrication of Manually Operated Single Wheel Spray Pump

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Abstract- **In agricultural sector generally farmer uses traditional way that is spray carried on backpack and spraying crop. This becomes time consuming, costly and human fatigue is major concern, these problems can be overcome by using agricultural reciprocating multi sprayer. It facilitates uniform spread of the chemicals, capable of throwing chemicals at the desired level, precision made nozzle tip for adjustable stream and capable of throwing foggy spray depending on requirement. In our project we use slider crank mechanism to convert rotary motion into reciprocating motion to operate the pump, thus the pesticide is spread through the nozzle. This work gives continuously flow of pesticide at required pressure and height. A special arrangement is implemented in this project to adjust the pressure as high or low. We also use a weed cuter in our model for removing unwanted plants. By using agricultural sprayer, spraying time and weeding time, human efforts reduces and results in cost reduction.**

Index Terms- Cost, Nozzles, Pump, Spraying time

I. INTRODUCTION

As on today the whole world is facing a problem of energy crisis. If we want to continue for prolonged use of energy then we must try to save it as much as we can whether it is on large scale or small scale. Today we use various spraying and seed sowing technologies involving use of electrical energy, chemical energy of fuels. This fact makes us know that how large content of energy is getting used at such a places where mechanical energy can be used instead of direct energy sources. This is a reason why we have implemented mechanical sprayer and seed sowing getting powered by human effort. Although these are serving the purpose, their range of working is not enough. They take considerably larger time for spraying and seed sowing. Thus what we have aimed is to design such a technology which will run on mechanical power but requiring less time for spraying and seed sowing than those which are hand operated. Thus considering today's demand, we have come up with mechanically operated spray pump which is purely mechanical. This device is having the advantage of taking less time for spraying and seed sowing once it starts. If we want to decrease the spraying time further we just need to increase size of our piston and no. of nozzles with relative change in effort. In addition to all this we are implementing soil coulter along with spray pump and seed sowing so we can have double advantage. Mechanical energy can be used instead of direct energy sources. This is a reason why we have implemented some mechanical sprayers and seed sowing equipment getting powered by human effort. Although these are serving the purpose, their range of working is not enough. They take considerably larger time for spraying and seed sowing

II. NEED OF PROJECT

For seeking different ways to improve the equipment quality while reducing the direct overhead costs (labor) and capital, the project has been made. Thus, a significant opportunity rests with understanding the impact of a pesticide sprayer equipment in an agriculture field. A pesticide sprayer equipment has to be portable and with an increased tank capacity as well as should result in cost reduction, labor, and spraying time. In order to reduce these problems, there are number of sprayer equipment introduced in the market but these devices do not meet the above problems or demands of the farmers. The conventional sprayer equipment having the difficulties such as it needs lot of effort to push the liver up and down in order to create the pressure to spray. Another difficulty of petrol sprayer is to need

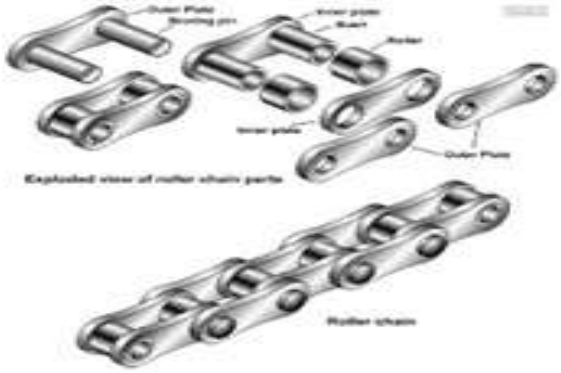
to purchase the fuel which increases the running cost of the sprayer equipment. In order to overcome these difficulties we have proposed a wheel driven sprayer equipment, it is a portable device and no need of any fuel to operate, which is easy to move and sprays the pesticide by moving the wheel. The mechanism involved in this sprayer is reciprocating pump, and nozzles which were connected at the front end of the spraying equipment

III. SPECIFICATION OF COMPONENTS

A. SPROCKET

The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth. We use freewheel and chain wheel for chain and sprocket arrangement.

B. CHAIN



The chain is made of steel which is used to transmit power from gear sprocket to pinion sprocket, and it has a no sleep.

C. CRANK

The function of crank is to transfer motion from prime mover to the connecting rod for further operation. Here the circular disc having eccentricity at which rotary motion of crank is converted into reciprocating/linear motion of connecting rod.

D. CONNECTING ROD

The main function of connecting rod is to convert rotary motion into reciprocating/linear motion. Here connecting rod convert rotary motion of crank to reciprocating motion of pump and extension rod.

E. PUMP

It consist of piston and cylinder arrangement, it has a lever to operate the motion of piston in reciprocating direction. The pump generates the pressure of 2 bar and discharge of 2 lpm.

F. NOZZLE

It is a device which converts the pressure energy of fluid into kinetic energy, spray nozzle is a precision device that facilitates dispersion of liquid into a spray. Nozzle is used for purpose to distribute a liquid over an area.

G. WHEEL

Wheel is used to carry the whole assembly and move machine from one place to another by rotary motion of it. A bicycle wheel is a wheel, most commonly a wire wheel, designed for a bicycle. Bicycle wheel is designed to fit into the frame and fork via drop outs, and hold bicycle tire. A typical modern wheel has a metal hub, wire tension spokes and a metal or carbon fiber rim which holds a pneumatic rubber tire. We use a tubeless tire wheel.

H. FRAME

The main function of frame is to carry whole assembly on it so it has to be strong enough to hold it. The frame is made of square pipe and it is formed out of mild steel.

I. TANK

We want our tank to carry as much fluid as it can be along with its self-weight as less as possible. We have taken a tank which is almost 16 liter capacity. A material for tank used is plastic fiber. Plastic fiber is very low in weight as compared to other materials. It also has very low cost.

IV. ADVANTAGE

1. It does not require any kind of non-renewable energy is mechanical, electrical and pressure energy.
2. It reduces the fatigue of operator during the operation.
3. It increases the efficiency of operator.
4. It can cover more area of land during spray.
5. It can adjust the height of spray by using adjustable.
6. Its cost is less than electrically and solar operated pump.
7. It has is less air pollution.

V. APPLICATION

1. It major use in agriculture to spray fertilizer.
2. In city and urban area it can use for spraying water on lawn.
3. It may be exercise device at morning during utilize in lawn.
4. Use from spray chemical Pesticide in plants in farm.
5. It is use for spray painting in industry.
6. It is use for spray water in garden on the plants.
7. It is use for transfer water from one place to its nearer place.

VI. OBJECTIVE

1. The suggested model can remove the problems of back pain, since there is no need to carry the tank (pesticides tank) on the back and solder.
2. We can add more number of nozzles which will cover maximum area in minimum time and at maximum rate.
3. Work reliability under different working conditions.
4. Decrease the cost of machine.
5. Decrease labor cost by advancing the spraying method.
6. Machine can be used in small as well as in large crop area.

VII. CONCLUSION

The suggested model has removed the problem of back pain, since there is no need to carry the tank on the backbone and solder. More no. of nozzle which cover maximum area of spray in minimum time at maximum rate. Proper adjustment facility in the model with respect to crop helps to avoid excessive use of pesticides which result into less pollution. Imported hollow cone nozzle should be used in the field for the better performance. Muscular problem are remove and there is no need to operate lever. This alone pump can use for multiple crops. After having a trial we have found that one finds it easy to operate push type machine. The pump can deliver the liquid at sufficient pressure where output of the nozzle in1min is 0.3 and spray width 0.4m from calculation so that it reaches all the foliage and spreads entirely over the spray surface. It is little heavy but efficiently

working in rough conditions of farm. It is economical therefore affordable for all kind of farmers. It requires comparatively less time for spraying so we can get more fields spraying per day. It is cost effective than the existing spraying pumps available in the market as no direct fuel cost or cost for maintenance is needed for this.

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