



## Conceptual Design of Mechanism for Wheel Driven Fertilizer Sprayer

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### ABSTRACT

In agricultural sector generally farmer use traditional way, sprayer is carried on back for spraying fertilizer on crop. This becomes time consuming, costly and human fatigue is major concern, these problems can be subdued by using wheel driven fertilizer sprayer. It facilitates lesser human effort, uniform spread of the fertilizer, capable of spraying 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 crank mechanism to convert rotary motion into reciprocating motion to operate the pump, thus the pesticide is spread through the nozzle. This work gives continuous flow of pesticide at required pressure and height. A special arrangement is implemented in this project to adjust the pressure as high or low.

Keywords : Agriculture Sector, Human Fatigue, Sprayer, Reciprocating Pump, Science And Technology.

### I. INTRODUCTION

Most commonly farmers use the traditional way that is sprayer is carried on back and spraying of crop is done this becomes time consuming, costly and human fatigue is major concern. Present day in agriculture the sprayers play an important role in spraying pesticide. Although sprayers vary like motorized, hand operated. Spraying pesticide is an important process in farming. Now days, there are many types of pesticide sprayer already in market.

For the different types of pesticide sprayer there are have a different shape, sizes, method to carry it but the function are same. The current idea on sprayer in our project is to utilize effectively for reducing time of spraying, human efforts and cost of spraying.

The conventional sprayer having some difficulties such as it needs lot of effort to push the lever 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; it produces more vibrations and noise that irritates the farmer and so he refuses to do

such work repeatedly. In order to overcome these difficulties, we proposed a wheel driven sprayer. 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 involve in this sprayer is reciprocating pump, and nozzles which were connected at the front end of the spraying equipment. A special arrangement is implemented for adjusting the pressure as low and high with the help of adjusting the nut. Also, the weeding is done by this equipment. 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. We have to make economic machineries so that farmer can purchase it. Present scenario in agricultural field in India related

to sprayer is that farmers are using hand operated sprayer or motorized sprayer. According to idea in our project we are making a small agricultural reciprocating multi nozzle sprayer which is mechanically operated by a single slider crank mechanism. One vertical arm is attached in front of cycle and one horizontal arm at top of the vertical arm. Nozzles are fitted to this arm so that it can spray pesticide both the sides. As more no of nozzle are there hence spraying is done rapidly and time and money is saved.

## II. WORKING OF MECHANISM

In this project all the arrangement are mounted on the trail & is moved by the rotation of wheel. In these arrangements there is use of one wheel for moving the trail, by using the crank mechanism the rotary motion of wheel is converted into reciprocating motion with the help of chain drive mechanism. With the rotation of wheel, chain drive operates the crank mechanism and due to this arrangement the connecting rod moves upward and downward which reciprocate the piston and results in pressure rise in the tank which force the pesticide or liquid to come out and gets sprayed through the nozzles.

### A. Details

Capacity of tank – 16 litre

Diameter of wheel – 508 mm

Stroke of pump – 108mm

Length of connecting rod – 490 mm

Radius of crank – 27 mm

Teeth's on sprocket – 44 no.

Teeth's on freewheel – 18 no.

Velocity ratio of chain drive – 2.4

No. of nozzles – 6 no.

Stroke at one revolution – 2.5

Volume delivered per stroke – 90917.11 mm<sup>3</sup>

Length of ground sprayed per litre – 5317 mm

## III. ADVANTAGES

- Multiple nozzles can be used.
- Wide area of spray can be covered.
- Required pressure can be built up.
- Less expensive in comparison to other sprayers.
- Electricity and fuel are not required
- It eliminates the detrimental effect of backpack sprayer on body.
- It consumes less time and saves money as compared with conventional spraying.
- Low maintenance, since it does not require any fuel or power.
- When not in use the sprayer tank can be disconnected from wheel.
- The risk of back pain is reduced. This pump can be used for multiple crops. The model has provided with multiple nozzles, which has continuous spray over crop and this process takes less time than other sprayers for spaying.

Name of Component	Dimensions	Material	Quantity
Tank	16 litres	Plastic	1
Shaft	D-20mm, L-254mm	Mild Steel	2
Wheel	D-506mm	Rubber	1
Crank Plate	D-127mm	Mild Steel	1
Frame	38 mm	Mild Steel	1
Nozzle	PL D-5	Stainless Steel	6
Chain	4- Figure 1.	Alloy Steel	1
Sprocket	18 teeth	Cast Iron	1
Pedestal Bearing	240 UCP (20mm)	Hardened Steel	4
Freewheel	18 teeth	Cast Iron	1

Table 1.

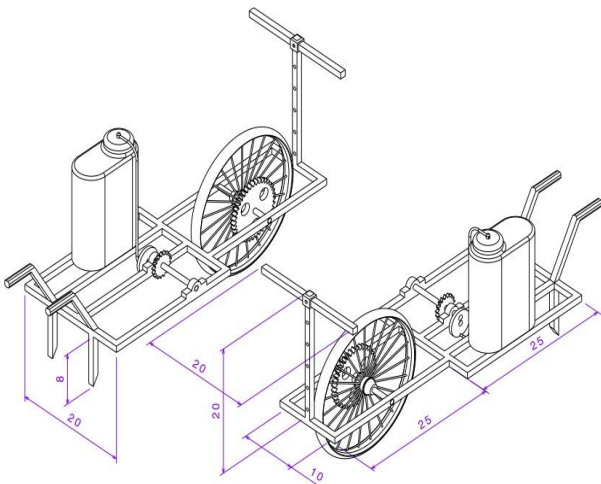


Figure 2.

#### IV. CONCLUSION

A proposed design of mechanism is suitable, efficient and time saving. The pressure developed in the tank is as per the requirement and thus has resulted in the optimum working pressure hence, this has significantly reduced the efforts to operate the sprayer. This alone pump can used for multiple crops.

#### V. REFERENCES

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