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## Wheel Driven Spraying Machine

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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 and human fatigue is major concern. These problems can be overcome by using agricultural reciprocating multi-sprayer. In our project we use slider crank mechanism to convert rotary motion into reciprocating motion to operate the pump. This mechanism is free of fuel and its operation is easy and painless.

**Keywords :** Agriculture Sector, Human Fatigue, Science, Reciprocating Multi-Sprayer, Fuel Free.

### I. INTRODUCTION

#### A. Status of Agriculture in India

India is predominantly an agricultural based country with approximately 75% of population of India is very much dependent on farming either directly or indirectly. The farmers have been using the same methods and equipment for ages for example the seed sowing, spraying, weeding etc. operations are carried out by same techniques. There is need for development of an effective spraying machine for increasing productivity levels. Most of the late developing countries of Asia have the problem of higher population and low levels of land productivity as of compared to the developed nations. One the main reasons for lower productivity is insufficient power availability for the farms and very low levels of farm mechanization. This is especially true for India.

#### B. Mechanization of Agriculture

It is now accepted all over the world that in order to meet the food requirements of growing populations and rapid industrialization, the modernization of agriculture is indispensable. It is said that at many farms, production suffers due to no use of farm fertilizers or correct time pesticides and insecticides or improper application of these at required destination area of the affected crop. Mechanization enables conservation of inputs by precision in metering and ensuring better distribution, reducing the level of quantity required for the best response and prevention of loss or wastage of inputs applied. The Mechanization reduces the unit costs for the production by the high level of productivity and by input conservation.

#### C. A new prospect of implementation of Mechanization in Agriculture

In this sector, the effective spraying and weeding with cheap and beneficiary equipment are used for

increase in productivity for better contribution of India's GDP which is very important. The principles of motion of project that transmits rotary motion of chain drive and sprocket arrangement and reciprocating piston pump for pumping and spraying pesticides or fertilizers over the field. Usually cheap knapsack sprayer is carrying certain major drawbacks such as back pain, arm pain due to continuous pumping of fluid and exertion of user due to its heavy weight. Manually operated hand pumping isn't uniform and may generate uneven pressure inside the tank. The flow becomes turbulent due to fluctuation in pressure in tank which is undesirable. As there is an increase in pressure in cylinder, spray width increases. This results in pesticides waste.

## II. LITERATURE REVIEW

### A. Existing Spraying Methods:

#### I. Hand operated sprayers (backpack with spray pump)

Backpack sprayer are fitted with a harness so the sprayers can be carried on the operator back. Tank capacity may be large as 20 liters. A hand lever is continuously operated for to maintain the pressure which make the backpack sprayers output more uniform than that of a hand held sprayers. Basic low cost backpack sprayer will generate only low pressure and lack feature such as high-pressure pumps, pressure adjustment control (regulator) and pressure gauge found on commercial grade units.



**Fig:** Hand operated sprayers

#### II. Engine driven sprayers.

The engine operated sprayers typically produce more consistent sprayer's outputs, cover the sprays swath more uniformly, operate at constant speed and results in much more uniform coverage than the hand spraying. Motorized sprayer are also capable of higher pressure spray where required to provide a better coverage. There are many other type of hand operated sprayer that are not widely used throughout the agriculture. Some may be used wide extensively for the productions of specific commodities.



**Fig:** Engine driven sprayers.

#### III. High Pressure Sprayer

The High pressure sprayer are often called as hydraulic sprayers. They usually operate with a dilute mixture and at different pressure from two

hundred and fifty up to several hundred psi limits. The design of high pressure sprayer is similar to that of low pressure sprayer, the only difference is that the component have to withstand high pressure.

When fitted with boom they can do any work done by the suitable low pressure boom sprayers. These can also be fitted with handgun. The handgun are used for spraying shade tree and ornamental, livestock, orchards, building, unwanted brush, rights-of-way, commercial crop etc.



**Fig:** High Pressure Sprayer

## B. Conclusion from Existing Spraying Methods.

- I. Mechanization for spraying operation is costlier for specialized operations such as High pressure sprayer, Engine operated sprayer.
- II. Skills of labour required depends upon the complexity of the equipment machinery used.
- III. All the pre-existing methods have concentrated on providing feasible easy solutions to reduce cost of production by reducing cost of mechanization and increasing productivity.

1. **Sandeep H. Poratkar, Dhanraj R. Raut (2013)**, the author presents a summary on the development of the multi nozzle. Pesticides spray pump. The agricultural land in India is made up of small marginal, medium and rich farmers. The small-scale farmer of about 30% is used manually. Use of this sprayer cannot maintain

the required uniform pressure. This leads to the problem of back pain. The suggested model has eliminated the problem of back pain, since it is not necessary to bring the tank (pesticide tank) in the back

2. **Varikuti Vasantha Rao, et al(2013)**, the authors studies on the fertilizer sprayer given by different feeders. The layout and execution of multi-nozzle pesticide sprayers and the proposed structure is the two-sort out sprayer balanced with a gas engine that constrains the present inconveniences of the sprayer, for instance, working costs, fuel change, etc. replaced by an electric DC motor set away in the battery related with the unit, which is the authentic source of imperative to restrict regular degradation and agribusiness enhancement. Reasonable power source and cultivating are a triumphant blend. Wind, sun controlled and biomass imperative can be used continually, giving agriculturists a whole deal wellspring of pay. Inexhaustible power source can be used as a piece of the association to supplant distinctive fills or can be sold as cash crops. It is among the most promising and basic open entryways for regard included things in agribusiness.

3. **Alaa Kamel Subr,et al(2015)**, the authors were examined on the practical deviation in the process of sustainable application of pesticides. The use of agrochemical becomes an important practice for modern agriculture, but at the same time endangers human health, animals and the environment. Initial actions to create a balance between this negative impact and the need to use pesticides in relation to the environment, people's living conditions and the economy, these factors are defined as sustainable development. In this article, the calculation for obtaining the ability to sustain the pesticide.

4. **Shivaraja kumar,et al(2014)**, the authors were examined on the design and development of the wheel and pedal sprinkler. The equipment, which is a wheel and foot sprinkler, is a portable device and does not require any fuel to operate, which is easy to move and spray the pesticide by moving the wheel and also selling the equipment. In this equipment an alternative pump is used and an accumulator is provided for the continuous flow of liquid to create the pressure necessary for the spray action. This pesticide spraying equipment consumes less time and prevents the pesticide from reaching the front of the nozzles that come into contact with the person spraying the pesticides.

#### IV. CONCLUSION

From the above literature it is concluded that :

1. An upgraded design of manually operated sprayer is needed.
2. Spraying should be less time consuming and economical.
3. Spraying should consume less elemental use of fuel and electricity.
4. Spraying should be such that, it should not induce back pain and should consume less effort.

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