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# Agricultural Sprayer Machine

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***Abstract:*** The main purpose of manufacturing this product is to enable farmers and gardeners to form the process of spraying pesticides and herbicides to their gardens become more practical. It helps the gardeners work because they not must carry the tank on their back that may cause their back strain and hurt. This product only must be push to forward similar to how the trolley function so it'll generate mechanically pump by the set of power transmission part by using shaft, bearings and set of sprockets. Energy to pump the tank pump are often reduced. Next, it also comes with a pair of nozzles on the wing. With nozzles on the wing, it can speed up the spraying process because it can spray left and right side at the identical time. In conclusion, this product can help gardeners in terms of comfort during spraying, reducing energy to pump tanks, and effectively utilizing spraying time.

***IndexTerms*** **- : multi nozzle, effort, mechanical energy, cost, time.**

## I. INTRODUCTION

Farming is the backbone of Indian economy. Agriculture sector includes is a lot of field work, such as weeding, reaping, sowing etc. Apart from these operations, spraying is also an another important operation to be performed by the farmer to protect the cultivated crops from insects, pests, funguses and diseases for which various insecticides 837pesticides, fungicides and nutrients are sprayed on crops for protection. India is set to be an agricultural based country; approximately 75% of population of India is dependent on farming directly or indirectly. More than 70% farmers are belonging to small and marginal land holders. It is generally said that mechanization of small farms is difficult. But Japan having average land holding even smaller than ours, with proper mechanization has led agriculture to great heights. In order to minimize the drudgery of small farmers, to increase efficiency and save farmer's time for taking up additional/supplementary generating activities, the use of modern time saving machines and implements of appropriate size of equipment's need to be suitably promoted. Agriculture sector is facing problems with capacity issues, shrinking revenues, and labor shortages and increasing consumer demands. Our farmers are using the same methods and equipment for the ages. E.g. seed sowing, spraying, weeding etc. which is one of the main reasons for low productivity and poor farming, so there is need for development of effective equipment for increasing the productivity. In addition, most industrialists are desperately seeking different ways to improve the equipment quality while reducing the direct overhead costs (labor) and capital. Thus, a significant opportunity rests with understanding the impact of a pesticide sprayer in an agriculture field. The conventional sprayers are having the difficulties such as (more effort to push the liver up and down in order to create the pressure to spray, non-uniform spraying, health hazards, etc. Certain sprayers are working using fuels like petrol which increases the running cost. In order to overcome these difficulties, a new equipment is being developed and it is a portable device, requires no fuel to operate, any chemical can be used for spraying.

- **Problem Statement**: Conventional and contemporary techniques of fertilising a field are available. The sprayer is traditionally carried on the shoulder of the person using it. Using the old method requires a big amount of human work and labour. It'll be more costly since it takes longer to use and requires plenty of energy to fertilise. We use tractor-mounted fertiliser sprayers in the modern fashion, but they are costly and need a large area to be efficient, so not everyone can afford them. Trying to lift big items with one's hands is a challenge. Fatigue of the operator due to heavy lifting. The heavy spray reduces the operator's productivity since it exhausts him. A user's experience is hampered by huge pumps. Inadequate equipment selection and shoddy workmanship Combined with a lack of understanding about the technical features of equipment and poor field use, these issues have resulted in unacceptable environmental and human health concerns.

- **Objectives**: Aside from the fact that utilizing the device reduces the user's back and shoulder pain while they are using it, it also needs a lot less human effort and hence requires less labour. As a consequence of the constant pumping action for creating pressure inside the pesticide sprayer, the user's fatigue load is minimized, consequently making the environment more pleasant for the user.

**Methods and Methodology:-**

- Data collection would be done by literature survey, user study and market study through questionnaires, videos and observation etc.
- QFD generation based on the user requirements and corresponding technical requirements, and PDS would be generated by prioritizing the features in the QFD
- Concepts would be generated by sketching and digital Modeling

- Generate the doodle sketches and come out with five concepts and the digital model will be created with the detailed features using CATIA software.
- Concept evaluated and final concept selected using weighted ranking method
- Working model would be made with detailed features and feedback would be collected.

## II. LITERATURE SURVEY:-

**Sudduth K.A., Borgelt S.C., Hou J., Performance of a chemical injection sprayer system-** Performance of a chemical injection sprayer system, found the time delay of concentrated pesticides through injection sprayers to be significant, and proposed injection at the individual nozzles as a possible solution to shorten delays. Development of an instantaneous nozzle injection system that overcame the concentration variation problems reported by previous researchers. Simulations are wont to compare chemical application accuracies for various designs of injection sprayers. They found that reducing the diameter of the fluid lines near the tip of the spray booms improved overall application accuracy.

**Way T.R., Von Bargen K., Grisso R.D., Bashford L. L., Simulation of chemical application accuracy for injection sprayers-** An autonomous mobile robot to be used in pest control and disease prevention applications in commercial greenhouses. They develop the robot platforms ability to successfully navigate itself down rows of a greenhouse, while the pesticide spraying system efficiently covers the plants evenly with spray within the set dosages. the most application of robots within the commercial sector has been concerned with the substitution of manual human labour by robots or mechanized systems to create the work longer efficient, accurate, uniform and fewer costly.

**Philip J. Sammons, Tomonari Furukawa, Andrew Bulgin, Autonomous Pesticide Spraying Robot for use in a Greenhouse-** the University of Nairobi develop the system like pump is that the most typical non-positive displacement pump. The output from this sort of pump is influenced by pressure. This pumps ideal for delivering large volumes of liquid at low pressures. A key component of the pump is that the throttling valve. A manual throttling valve on the most output line is crucial for the accurate operation of the pump. The utilization of herbicides has replaced much of the mechanical tillage done formerly. Chemical application is completed with attachments to tillage machines and seeders or with single-purpose chemical application.

## IV. RESULTS AND DISCUSSION

### 4.1 Results of Description

Throughout the project's execution, several adjustments and tests are carried out to ensure that the specified objectives, scope, and restrictions are met. One of the studies was to see how long it took to spray pesticide in a garden. It also has the ability to increase spraying efficiency because it includes many nozzles throughout the spraying process. A wheel sprayer test was also performed to check that the sprayer was working properly. We will have met our objectives when all of the testing on the wheel sprayer has been performed satisfactorily and has exceeded our expectations. The sprayer machine is pulled manually forsaking the spraying effect. Here, the motive force gear drives the driven gear to rotate. The wheel is of 457.2 mm diameter and also the drive gear is of 52 numbers of teeth which drives the driven gear with 38 number of teeth which provides us the ratio of 1:1.37. The wheel covers 1436.33 mm during which the pumping is completed for 1.37 times. Thus, each stroke is effective at 1048 mm travel distance. Next, we've a pump with piston of fifty mm and also the stroke length of 100 mm, with cranking provided at 50 mm. The tank is continued the tank holder which is fixed on the frame. The driven gear drives the crank which pushes and pulls the cranking of the tank pump arm which effects in building the pressure generated into the accumulator which dispenses the pressure through the outlet port and thru the valve provided which is connected through the four-way splitters to the four jets which are fixed on the adjustable boom. The adjustment is given to regulate the peak and for the rows pro re nata. We've got provided four numbers of jets which are fixed to the polyurethane connectors with 8 mm pipe, which are hung on the plates welded to the guide bushes survived the rods on the boom as needed.

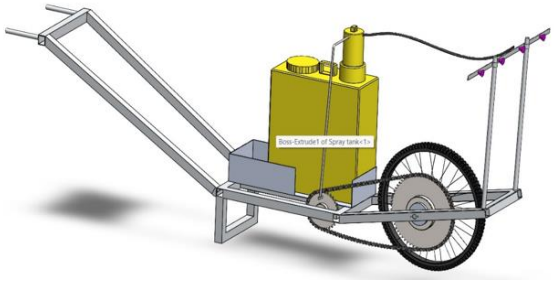

Fig.1: Design of Agricultural Sprayer

## APPLICATIONS

- Its major use in agriculture to spray fertilizer.
- In city and urban area, it can use for spraying water on lawn.
- It may be exercise device at morning during utilize in lawn.
- Use from spray chemical pesticide in plants in farm.
- It is use for spray painting in industry.
- It is use for spray water in garden on the plants.
- It is use for transfer water from one place to its nearer place.
- For the insecticides application to control insect pests on crops and in stores, houses, kitchen, poultry farms, barns, etc.
- For the fungicides and bactericides application to control the plant diseases.

- For the herbicide's application, to kill the weeds.
- For the harmony sprays application to increase the fruit set or to prevent the premature dropping of fruits.
- For the application of plant nutrients as foliar spray.

## CONCLUSION

The suggested model has removed the matter of back pain, since there's no must 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 within the model with reference to crop helps to avoid excessive use of pesticides which result into less pollution. Imported hollow cone nozzle should be utilized in the sector for the higher performance. Muscular problem is removed and there's no have to operate lever. This a pump can use for multiple crops. After having an effort, we've got found that one finds it easy to control push type machine. The pump can deliver the liquid at sufficient pressure where output of the nozzle in 1min is 0.3 and spray width 0.4m from calculation in order that it reaches all the foliage and spreads entirely over the spray surface. it's little heavy but efficiently working in rough conditions of farm. It's economical therefore affordable for all quite farmers. It requires comparatively less time for spraying so we will get more fields spraying per day. It's cost effective than the prevailing spraying pumps available within the market as no direct fuel cost or cost for maintenance is required for this. It consumes less time and saves money as compared with conventional spraying and weeding. This machine doesn't require any fuel or power so maintenance is a smaller amount.

## ADVANTAGES

- It does not require each kind of non-renewable energy is mechanical, electrical and pressure energy.
- It reduces the fatigue of operator during the operation.
- It grows the efficiency of operator
- It can cover wide range area of land during spray.
- It can adjust the height of spray by using flexible
- It has a few pollution

## DISADVANTAGES

- In irregular area of land, it can difficult to control.
- In rainy days in muddy environment it is difficult to operate.
- For irregular crops this pump is hard to work.
- The flow is not uniform, so we have to fit a bottle at both ends.
- The flow is exiguous & cannot be used for high flow operation.

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