Design and Fabrication of Agricultural Sprayer

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***Abstract*- Developed agriculture needs to find new ways to improve efficiency. In order their diet needs the production of food must be increased. Farmers have been mainly using traditional conventional techniques like hand operated and fuel operated sprayer system for spraying pesticides. Fuel is expensive and in many places fuel may not be available. Precision Farming has shown benefits to farmers so we can now move towards a new generation of equipment. The advent of spraying pesticides by the system of electric power gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right thing, in the right place, at the right time in the right way.**

Index Terms- Precision farming, spraying, Pesticides

I. INTRODUCTION

India is agricultural country and most of the people depends on agriculture to earning money and fulfill their needs. Mostly financial condition of India depends on agriculture and farmer economy. Now a day's labour availability is decreasing regularly along with increasing other income source. On the other hand productivity requirement very high. That's why the machine is design to helpful for farmers to recovered labour availability problem. The machine is used for increasing productivity and reduced labour quantity involved specific operation. The machine is move forward direction during that time spraying operation is performed. Some time in agriculture field such operation will be perform by worker that's very dangerous to human being. To avoiding the dangerous work performs by worker such as pesticide and insecticide spraying, we used agriculture machine. The most beneficial agriculture machine include increase production rate, increase working efficiency and improve operation safety. Agriculture robot operates in large areas where environment conditions may change quickly. The agriculture robot faces many difficulties in working field. The most of the current machine depend upon the weather condition just like tractor not work on wet soil. The distance between two rows and two crops in a same column are considered. On that basis the machine is designed.

II. LITERATURE REVIEW

A.A.C.Fernando, and C.Ricardo, Described about the 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 handheld 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 1.1 Hand operated sparyer

D.C.Slaughter, D.K.Giles, and D.Downey , presented 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.

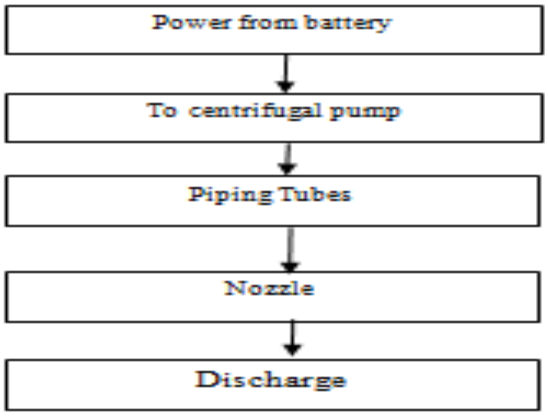
Fig 1.2 Engine operated sprayer

J.R. Rosell and R.Sanz, describe the High pressure sprayers 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 sprayers, 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.

IV . METHODOLOGY

In this project we will generally give the power supply to the shaft and the hopper for feeding pesticides through centrifugal pump is fitted with sprayer it will operated by the battery through on and off switch.



V . WORKING PRINCIPLE

For the spraying mechanism we have used a DC motor pump which is commonly used in cars and for the storage device we have taken a 4ltr container. The pump we have used is a submersible one so we have to insert a portion of pump into the container and the remaining portion is kept on the outer side of the container. This was done by drilling a hole through one side. The pump works on 12V DC supply and so it could be easily connected with the battery.

Photo Graphic View Fig 5.1

VI . COMPONENTS REQUIREMENTS

- BATTERY
- WHEEL
- BEARING
- SHAFT
- SPRAYER
- PUMP

- FRAME
- HANDLE
- POLYURETHENE TUBE

VII . SPECIFICATION

Diameter of Front Wheel	: 0.18m
Diameter of Rear Wheel	: 0.60m
Tank Capacity	: 5 lit.
Pipe Length	: 1.5m
Battery Capacity	: 9 V
Type of Pump	: Centrifugal Pump

VIII . CALCULATION

1. POWER

Power = Energy per second

Battery 9v

Power = V*I

= 9 * 5.6

= 50.4 WH

2. FLOW RATE

$Qn = 28.9 * D^2 * \sqrt{P}$

Where,

Qn = Flow rate of water from sprayer (gpm)

D = Nozzle Diameter (inch)

P = Pressure at sprayer

$Qn = 28.9 * (0.039)^2 * \sqrt{25}$

= 0.21 gpm

Qn = 0.79 lit/min

3. SPRAY PUMP

Type : Centrifugal pump

Liquid Discharge = 2.9 lit/min

Speed = 3600 rpm

Power = 3.5 W

XI. CONCLUSION

This project provides a brief review of research on the agricultural machine about future. This agricultural machine design and fabricated to facilitated the farmer to working in simplicity manner and improve productivity. In this machine we take all the six functions separately i.e. \spraying. This project is reduced worker availability and perform same job in a less human source. That project is acceptable in future by farmer community. This technology may improve the working skill in a field, if the farmer community will apply that. The machine is easy operating for small and large purpose. The agricultural robot performs the spraying alternately and it reduce human efforts. It may become success our project accepted and used by farmer in a field.

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