Development of Trolley Spray Pump – A Review

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***Abstract*- India is said to be an agricultural based country and approximately 75% of the peoples are dependent on farming directly or indirectly. In this agriculture sector there is a lot of field work, such as weeding, reaping, sowing etc. Apart from these operations, spraying is also an important operation to be performed by the farmer to protect the cultivated crops from insects, pests, fungi and diseases for which various insecticides, pesticides, fungicides and nutrients are sprayed on crops for protection.**

In today's world, we use many different spraying technologies involving use of energy like electrical energy, solar energy, and chemical energy of fuels. This fact makes us know that how large amount of energy is getting used at such place where mechanical energy can be used instead of direct energy sources. Farmers are facing enormous problem while spraying the pesticide like tank capacity is very small, high cost and spaying time taken more. In order to reduce these problems many different type of sprayers has been introduced in the market, but these devices do not meet the above problems or demands of the farmers.

To solve these difficulties, we have come up with a new equipment that is mechanically operated trolley spray pump, it is a portable device and does not need any fuel to operate, which is easy to move and spray the pesticide by moving the wheel.

***Index Terms*- Cultivated crops, Fungicides, Insecticides, Pesticides, Portable device, Trolley spray pump.**

1 INTRODUCTION

India is a land of agriculture which comprises of poor, marginal, medium and rich farmers, from which the poor farmers are very interested in manually lever operated knapsack sprayer because of its versatility, cost and design. But these sprayer has certain limitations like it cannot maintain required pressure; it leads to create certain kinds of problems such as back pain, muscular pain, etc to the operator which reduces efficiency of operator as well as increase the mental stresses. These conventional sprayers incur high cost of operation; on the other hand traditional pump require electric power or use of battery to operate, this also increases the power consumption. To overcome these drawbacks of traditional knapsack sprayer, we introduce a trolley spray pump. In trolley spray pump, a trolley is designed for the operation of pump which converts rotary motion into pumping action. This pumping action increases the pressure of pesticide and further it will atomizes from nozzle.

1.1 Objective

- To sprinkle the pesticides over a specified distance with least possible efforts.
- To decrease the cost by selecting type of mechanism.
- To work reliably under different operating conditions.
- To reduce the fatigue, physical and mental stresses.

2. LITERATURE REVIEW

The authors in [1] mentioned that, 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. In today's world, we are using various spraying 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 places where mechanical energy can be used instead of direct energy sources. This is a reason why manually operated traditional knapsack sprayers has been introduced, getting powered by human effort. Although these are serving the purpose, their range of working is not enough as they take considerably larger time for spraying. Thus, what we have aimed is to design such a technology which will run on mechanical power but requiring less time for spraying than those which are hand operated.

The authors in [2] described that, backpack sprayers 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 makes 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. 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 sprayers are also capable of higher pressure spray where required to provide a better coverage. There are many other type of hand operated sprayers that are not widely used throughout the agriculture. Some may be used wide extensively for the productions of specific commodities. 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 sprayer; the only difference is that the component has to withstand high pressure.

The authors in [3] concluded that, insects are largely responsible for the crop destruction. Insecticides or pesticides, a man made or natural preparation are used to kill insects or otherwise control their reproduction. These herbicides, pesticides, and fertilizers are applied to agricultural crops with the help of a special device known as a "Sprayer," sprayer provides optimum performance with minimum efforts. The invention of a sprayer, pesticides, fertilizers, bring revolution in the agriculture or horticulture sector especially by the invention of sprayers, enable farmers to obtain maximum agricultural output. They are used for garden spraying, weed and pest control, liquid fertilizing and plant leaf polishing. There are many advantage of using sprayers such as easy to operate, maintain and handle, 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, light or heavy spray, depending on requirement. Agriculture sector is facing problems with capacity issues, shrinking revenues, and labour shortages and increasing consumer demands. The prevalence of traditional agriculture equipment intensifies these issues. In addition, most formers are desperately seeking different ways to improve the equipment quality while reducing the direct overhead costs (labour) and capital. Thus, a significant opportunity rests with understanding the impact of a pesticide sprayer in an agriculture field.

The authors in [4] described that, the common techniques that the farmers are using, the traditional methods and same equipment from the past times. In our country, besides that there is large development of industrial and service sector as compared to that of agriculture, farming is done by traditional way. The spraying is done by labor carrying backpack type sprayer. It requires more human effort. The most commonly used sprayers are foot sprayer, knapsack sprayer, hand compression sprayer, garden sprayer. All of these are used by the farmers from the very past times; these techniques are useful but consuming more efforts, more time with very less output.

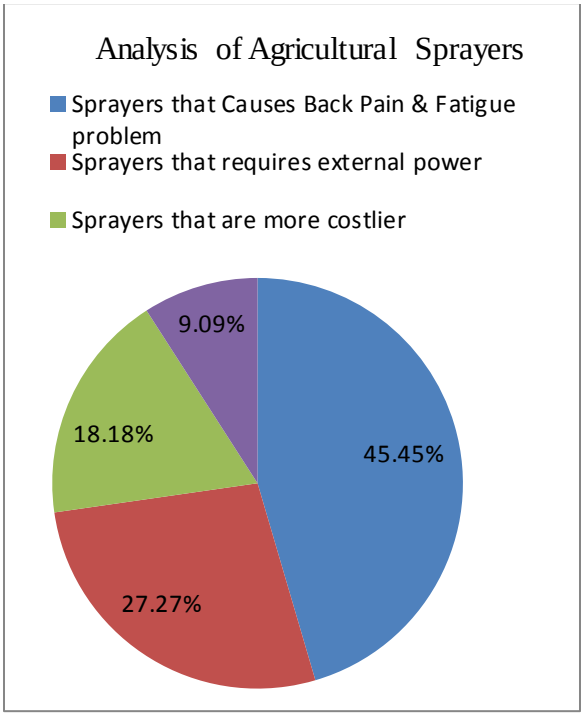
The authors in [5] described that, a pesticide sprayer must be portable and with an improved tank potential as well as should bring about price reduction, labor and spraying time. So one can lessen these problems, there are a number of sprayer added in the marketplace, but these gadgets do not meet the above issues or demands of the farmers. The conventional sprayer having the problems such because it needs lot of attempt to push the liver up and down in an effort to create the stress to spray.

The authors in [6] mentioned that, "Energy - demand" is one the major thread for our country. Finding solutions, to meet the "Energy - demand" is the great challenge for Social Scientist, Engineers, Entrepreneurs and Industrialist of our Country. According to them, Applications of Non conventional energy is the only alternate solution for conventional energy demand. Now-a-days the Concept and Technology employing this Non-conventional energy becomes very popular for all kinds of development activities. One of the major area, which finds number applications are in Agriculture Sectors.

The authors in [7] mentioned that, there are various non conventional energy sources from which the power can be generated. Solar energy, Wind energy, Tidal energy, Biogas energy these are various non

conventional energy sources. Solar energy is widely available in nature throughout the year. So it can be utilized in miscellaneous application like spraying, drying and cooking etc. In agricultural areas spraying is one of the essential tasks. Solar pesticide sprayer has various advantages over conventional sprayers. It also gives information about various components used in sprayer. As it has various advantages it will become popular in agricultural field.

3. CONCLUSION



Our study gives an insight to the different types of sprayers used in agricultural activities. We observed that around 45.45% of existing sprayers available in the market causes back pain & fatigue problem, 27.27% requires external power, 18.18% are more costlier and the rest 9.09% are those which causes less fatigue, works on human effort & are more economical.

4. RESULT

As there are only 9.09% of sprayers that causes less fatigue, works on human effort & are more economical available in market, we are focused on developing a mechanism based trolley spray pump which would be easy to use, cost effective, works totally on human effort, having less maintenance and causes less fatigue to the farmers. It will also help to reduce the physical as well as mental stresses of the farmers to some extent, caused during operation.

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