

Fabrication of Pulverized Pesticide Multiple Sprayers

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Abstract: -- Agriculture is the backbone of India. In rural areas, spraying pesticides is done by hand spray or fuel (petrol/kerosene) sprayers. Sprayers are mechanical devices that are specifically designed to spray liquids quickly and easily. They come in a number of different varieties. These require manual operation/fossil fuel for its operation. To address these issues, a novel protocol is developed viz. Pulverized Agro Sprayer is an innovative product developed for rural applications. The knapsack sprayers, generally used by farmers for spraying pesticides, involve continuous pumping by one hand while holding the sprayer with the other. The whole process of spraying is very tiresome and also leads to hand, back and neck pains by prolonged use, for any scale of operation, with heavy backload. The knapsack sprayers require a lot of time to cover the bigger spraying operations, which increase the cost of spraying as well as the hazard of pesticide mist getting into the eyes. Manual labour has also become scarce due to the migration of farm laborers towards cities. Other options, like tractor mounted sprayers, are too expensive and not of much use in small holdings. Since the bicycle wheel requires less space to move, it can be used in a more versatile manner as compared to power sprayers that are mounted on tractors. A labour saving device, it can be used to spray one acre of land in 45 minutes, thus covering more area compared to manual spraying. It serves the dual function of a sprayer as well as a bicycle

of pesticides as excess of it can harm the plant as well as the soil.

I. OBJECTIVE

There are six objectives – laid down after initial research:

- Compact mechanism: Not every plantation can allow bicycle wheel inside the field as it can crush the crops, for example – potato plantation.
- Simple and cost effective design: To practically make this design sustain in a rural market, it is important to make it as cost effective as possible. It should be simple enough for farmers to understand and repair it easily, to avoid extra maintenance cost. Minimizing the use of customized parts in the design will help farmers in finding the spare parts quicker. It is important to make this design durable to make it cost effective.
- Detachable design:
- It should be a kit that can be installed on any regular bicycle wheel. Farmers need not buy a new bicycle or customize an existing one to use this design.
- Pressure control: Too much air pressure inside the sprayer, generated due to constant pulling, can damage or explode the sprayer or parts of it. It is also important to avoid any possible leakage or overflow

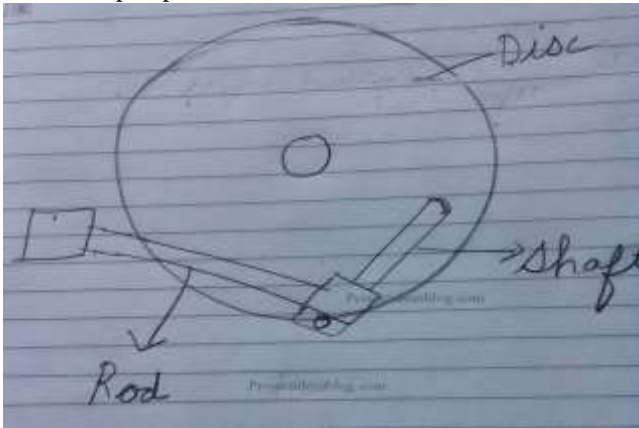
- Weight control: One of the purposes of this design is to reduce or omit the burden of carrying 20 liters of pesticide around the field in a knapsack manual sprayer. The additional weight, of this design on the cycle wheel, should not make it a burden for the farmers.
- Aim and spray: The design should allow farmers to conveniently aim and spray at each crop, while on cycle wheel.

II. WORKING PRINCIPLE

This system works on three important concepts:

1. First is to transform rotational motion into reciprocating motion. In other words, when wheels move in circular motion it should push and pull piston in to and fro motion. To build this system, we need two sprockets (one small and one large), chain, and connectors. We will connect small sprocket (we can get it from any old bicycle or from any store) to the large sprocket using cycle chain. When we move bicycle forward, it moves both first sprocket, which eventually moves second sprocket at the top and this sprocket pushes the piston in to and fro motion as shown in video.

2. This reciprocating motion then pushes piston moves forward and backward in a repetitive cycle.
3. Pesticide pumps out of reservoir:



For better understanding of inner mechanism of reservoir you need to understand basics of spray pump and how it moves liquid from reservoir to top. To pump out pesticide we should know that pesticide must always move outside from reservoir. Fluid must move upward only, in other words, it must be unidirectional. This can be achieved only by one way valve. The most important part for any pumping mechanism is one way valve and in our experiment too, we will use valve which allow fuel to enter but stop it when it tries to exit. Sprocket is connected to the piston pump.

III. METHODOLOGY

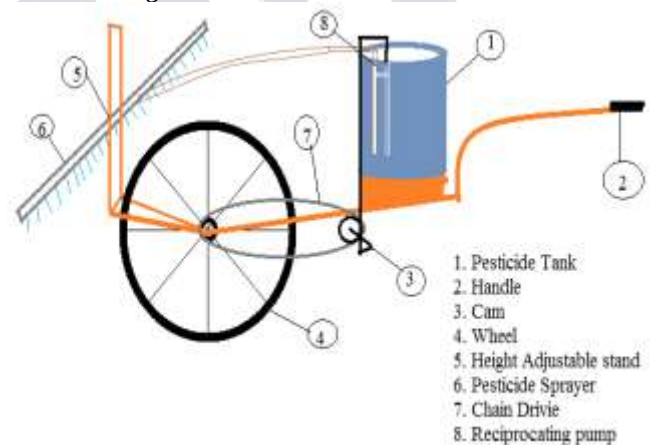
Here we were fabricating a multi nozzle sprayer to spray the pesticide in larger area in a small duration of time.

First step is to choose a wheel, wheel should be thin and correct radius. We are choosing a radius of 15 inches. Then fix a chain sprocket to wheel and arrange a shell for holding another chain sprocket. Here we are keeping a disc and crank shaft for the front chain sprocket. So when wheel moves forward this disc also rotates through chain drive.

To keep pesticide tank we will make a base with less weight ms hollow pipes as shown in the below diagram. In this pesticide tank we will arrange a reciprocating pump. To operate reciprocating pump we require to fro motioning. This rod we will be connecting to the crankshaft which is attached to the disc of front chain sprocket.

To spray the pesticide we require nozzles this nozzle is arranged in the rear. Make a stand with two rods vertically and fix a horizontal hollow PVC pipe to this stand. This horizontal hollow pipe is fixed such that we can adjust the height according to the plants heights in agriculture fields. Horizontal hollow pipe is having holes in equaling distances and we will be fixing nozzles in all the holes. Finally the output of the reciprocating pump is connected horizontal hollow pipe. When we pull the wheel forward disc will rotate in circular motion and crankshaft is converting that circular motion into linear motion. This linear motion is operating the reciprocating pump and output of the reciprocating pump is spraying in agriculture field from nozzle.

Schematic Diagram:



IV. ADVANTAGES

- No need to use any fuel.
- No need to carry weight of pesticide tank
- This sprayer is energy-efficient and easier to operate and maintain.
- As it is a flexible product with adjustable height and width of spraying boom there is greater flexibility for using it for various crops.
- It is easy to assemble and disassemble.

V. APPLICATIONS

- It is useful to spray the pesticides in some of agriculture fields.
- It is useful to spray pest control liquids in industries.
- It is used for soil treatment application .

VI. CONCLUSION

- Aim of this project is to fulfill the tasks spraying chemicals on the plants using non-conventional energy sources.
- As we know 70% of population of our country lives in village & Their main occupation is agriculture.
- Solar operated spray will help the farmers of those remote areas of country where fuel is not available easily.
- They can perform their regular work as well as saves fuel.

