MULTI-NOZZLE MANUALLY OPERATED SPRAYER

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Introduction:

The project is a Pesticide/Fertilizer Sprayer mounted on a Cart which is operated mechanically without any external source of energy. The aim of developing such a concept is primarily because of preventing the 3 major drawbacks of the pump being used currently- Firstly, the farmer has to carry the entire weight of the pesticide spraying (approx. 20+ kg) pump on his shoulder; secondly, he has to continuously use his one hand to pump using the handle; thirdly, reduction in spraying time. All these factors have been taken care of in this project along with being cost effective, light in weight and good in strength. The pump already available with the farmer can be directly used in this mechanism. The handle of the sprayer will be mechanically operated through the rotating shaft of the wheels of the cart using an efficient mechanism. This will result into the reciprocating motion of the piston and hence pumping will be done. The user will now just have to push the cart and the whole mechanism will be operated with ease. This will be a case of Pure Mechanical Automation.

Objectives:

a. Aim of this project is that the farmer need not carry the entire pesticide sprayer pump on his shoulders but just pull/push the mechanism mounted on the trolley to operate the pump and spray the pests. This makes the farmer feel comfortable, relaxed and less tiresome.
b. To reduce human efforts due to the constant pumping action for creating pressure inside the pesticide sprayer and thereby provide a suitable environment for the user reducing the fatigue load acting on the body. As discussed previously, the farmer has to continuously keep on pumping using one of his hands and spray the pests on the crops using the other hand. This at a long run is a tiresome and cumbersome job and the farmer slowly loses interest from it.
c. This project focuses on the problem of health related issues of the farmer (operator). Majority of them don't use any precautions like face-masks and hand-gloves against the hazardous chemicals and work in direct contact with it. Consequently, this harms the farmer as the spray in the conventional method directly hits the face.
d. Multi-nozzle is used and hence larger area of field can be sprayed at faster rate.

Methodology:

The sprayer machine is pulled manually leaving behind the spraying effect, since the

pesticide is hazardous to health, the person is moving ahead and behind him is the spray. Here the wheel driving the spur drives gear which drives the driven gear to rotate. Here the wheel is of 500mm diameter and the drive gear is of 53number of teeth which drives the driven gear with 24 numbers of teeth which gives us the ratio of 1:2.20. here the wheel covering the distance of 500mm x 3.142 = 1571mm during which the pumping is done for 2.20 times so, each stroke is effective at a distance of 1571/2.2 = 714mm travel distance. Next we are having the pump piston of 50mm and the stroke length as 100mm, cranking provided at the crank is 50mm. the tank held on the tank holder which is fixed on the frame, the driven gear driving 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 through the valve provided which is connected through the four way splitters to the four jets which are fixed on the adjustable boom, the adjustment given to adjust for height and also for the rows as required. We are providing four number of jets which are fixed to the polyurethane connectors with 8mm pipe insertion into it which are held on the plates welded to the guide bushes held on the rods on the boom as required.

Result and Outcomes:

The model is spraying the fluid at the pressure of 0.3 MPa from each of the 4 nozzle.

Scope and Future work:

The gear ratio we have used in this project is 1:2.2 which can be varied according to the need and design in order to obtain variety of performances in the sprayer. More number of nozzles can be utilized. Higher capacity bag pack sprayer can be used.