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A Review on Three Wheel Spray Pump

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Abstract- India is the land of farming. Near about 50-60% of livelihood depends on farmers. In other countries automation of agricultural operations can be done easily but in India it is not possible as the economical condition of majority of farmers is not well to do so. Therefore it is very important to improve such device that will help the Indian farmers to overcome this problem. In India, two types of spraying techniques are used viz, Hand operated and Fuel operated pump. The main drawback of hand operated spray pump is that it cannot be used for more than 5-6 hours continuously as the operator gets tired whereas fuel operated spray pump requires fuel which is expensive and availability of fuel is not easy at rural places. In such situation we should think to move towards non-conventional energy. This review paper tries to develop a new mechanical system which will overcome all the above problems and will help farmers to do efficient farming.

Key Words- Spraying techniques, Hand operated spray pump, push operated pump.

1. INTRODUCTION

1.1 Status of Agriculture in India[1]

India is predominantly an agricultural based country with approximately 75% of population of India is very much dependent on farming either directly or indirectly. The country recorded impressive achievements in agriculture during three decades since the onset of green revolution in late sixties. This enabled the country to overcome widespread hunger and starvation; achieve self-sufficiency in food; reduce poverty and bring economic transformation in millions of rural families. The situation, however, started turning adverse for the sector around mid-nineties, with slowdown in growth rate of output, which then resulted in stagnation or even decline in farmer's income leading to agrarian distress, which is spreading and turning more and more serious. Most of the late developing countries of Asia have the problem of higher population and low levels of land productivity as of compared to the developed nations. One the main reasons for lower productivity is insufficient power availability for the farms and very low levels of farm mechanization. However, demand for agriculture is rising rapidly with increase in population and per caput income and growing demand from industry sector. There is, thus, an urgent need to identify severity of problem confronting agriculture sector to restore its vitality and put it back on higher growth trajectory. The problems, however, are surmountable, particularly when new tools of science and technology have started offering tremendous opportunities for application in agriculture.[1] The Equipment Our equipment is especially made to work in row crops such as cotton pulses etc. of an agricultural field. The economic condition of farmers and the cost of labor, owing to such conditions, this equipment can find its application. The equipment is intended to perform three important operations done in fields, namely, Spraying pesticide, spraying herbicide and applying urea. All the three operations can be performed simultaneously or individually. Application of urea to the crops is not being focused much by various agriculture equipment producing firm and the equipment available are mostly suitable for large field which are in hectors. Moreover, whatever methods are available for applying urea results in high wastage of urea, we have focused on the same.[1]

1.2 Mechanisation of agriculture[2]

Agricultural equipment's and machinery program of the governments has been one of selective mechanization with a view of optimising the use of human, animal and other source of power. In order to meet requirements, steps are taken to increase availability of implement, irrigation pumps, tractors, power tiller, combine harvesters and other power operated machines and also for to increase the production and availability of improved animal driven implements. Special emphasis was given on the later as more than the 70% of the farmers fall in small and, marginal categories. It is usually said that mechanization of small farms is difficult. But

in Japan having average land holding even smaller of than ours, with proper mechanization has led agriculture to greater heights. In order to minimize the drudgery of the small farmers, to increase efficiency and save the farmer time which is taken for the taking up of additional supplementary and generating activities, also for use of modern time saving machines or implements of appropriate size needed to be suitably promoted therein.[2]

2. LITERATURE REVIEW

Since old times, Indian farmers are using old techniques for spraying purpose. The main reason behind this is that the farmers cannot afford latest technology equipments for their work. Various existing methods of spraying used by farmers are as follows;

2.1 Hand operated sprayers (backpack with spray pump)

Photograph 2.1 Hand operated sprayers

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.[2]

2.2 Engine driven sprayers.

Photograph 2.2 Engine driven sprayers

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.[2]

2.3 High pressure sprayer.

Photograph 2.3 High pressure sprayer.

The High pressure sprayer 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 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.[2]

2.4 Motorcycle Driven Multi-Purpose Farming Device (Bullet Santi)

Photograph 2.4 Bullet Santi

In 1994, Mansukhbhai Jagani, developed an attachment for a motorbike to get a multi-purpose tool bar. In which, addresses the two problems of farmers in Saurashtra namely paucity of laborers and shortage of bullocks. This motor cycle driven plough (Bullet Santi) can be used to carry out various farming operations like furrow opening, sowing, inter-culturing and spraying operations. Mansukhbhai's intermediate-technology contraption proved efficient and cost-effective for small-sized farms.[1]

2.5 Aerial Sprayer

This type of spraying technique is generally applied on large farms. In aerial spraying, the spraying is done with the help of helicopter which is controlled by the remote. In this the multi-nozzle sprayer is attached to it and sprayed from some altitude. This kind of spraying technique consumes less time and required less human effort.[1]

Photograph 2.5 Aerial Sprayer

All the methods mentioned above uses some form of energy for their working. Hand operated sprayer requires man power. Engine powered sprayer, high pressure sprayer and aerial sprayer requires certain type of fuel to operate. But most of the farmers in India cannot purchase these high cost equipments as their financial condition is not that good. Taking into considerations all these factors, we had developed this mechanism that requires very little muscular power. It is completely a mechanical device which do not require any fuel for its operation.

Photograph 2.6 Fabricated Model

The table given below in the conclusion shows that the fabricated model is designed such that it can be used for spraying variety of crops.

There are several methods of spraying pesticides that are used by Indian farmers. All the above mentioned methods are either costly or some causes certain physical problems to the farmers. The following pie-chart shows the percent use of various spraying techniques used by Indian farmers.

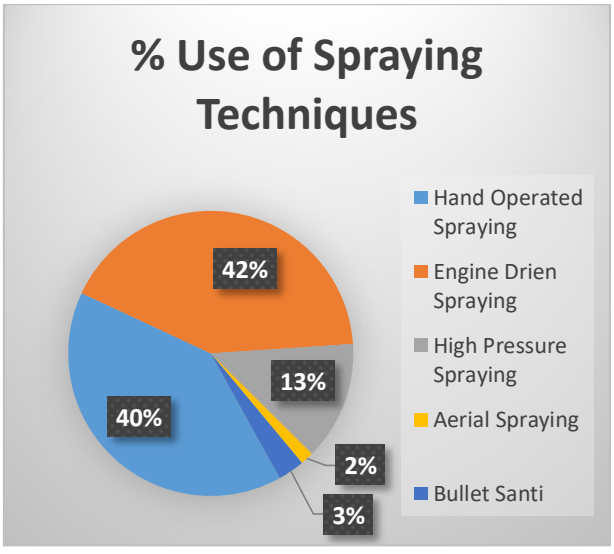

Fig No. 2.1 % Use of Spraying Techniques in India.

Out of the total spraying techniques used in India, nearly 42% farmers use simple hand operated spray pump as it is cost effective and most of the farmers can afford it. Then 40% farmers use engine operated spray pump as it is more reliable than hand operated spray pump. High pressure spraying is very costly and cannot be afforded by poor farmers. So, only13% farmers uses this technique. Aerial spraying is used where large area is to be covered. But Indian farmers occupy small area and

hence only 2% farmers use aerial spraying. Bullet Santi is accounted only for 2% of it's use.

Table No. 2.1 Distance Between Plants & height of crops

Sr. No.	***Name of crop***	***Distance between plants (Horizontal/vertical)***	***Height of crop***
1.	Sorghum	15 inch /3-4 inch	5.5-7 feet
2.	Pearl millet	15 inch /3-4 inch	5.5-7 feet
3.	Sugarcane	15 inch /3-4 inch	5.5-7 feet
4.	Soybean	15 inch / 2 inch	5.5-7 feet
5.	Corn	15 inch /3 inch	5-7 feet
6.	Groundnut	15 inch /3 inch	1.5 feet
7.	Cotton	24-36 inch /24-36 inch	2-5 feet
8.	Pigeon Pea	15 inches / 6 inches	3-4 feet
9.	Wheat	40-50 cm	60-100 cm
10.	Paddy	40-60 cm	60-100 cm

3. CONCLUSION

- The motive behind developing this equipment is to create mechanizations which will help to minimize effort of farming.
- It is suitable for the spraying at minimum costs for the farmers so that he can afford it, of the many product available.
- It is most important to select the most efficient and easy type for your particular needs, whether if it is for applying insecticide fungicides, weed killer, liquid fertilizers or wettings agents. For example, lawn sprayers is made especially for the applications of liquids material to the lawn area.
- The sprayer is are metered to allow quick mixing and the coarse sprays, so it does not takes as long to apply weeds killers, insecticides etc. Also, there is also not as much chances of drifting of the liquids into nearby flowers and shrub bed. The old saying You get for what you pay for does apply to the sprayer.
- Efficiency and accuracy vary very much considerably, especially with the types that attaches to garden hose. Sprayer that are used for weeds killing or for applying any types of soil sterility should not be utilized for any other purposes. In fact, you will find it a very good practices to set sprayer to side just for the lawn areas. Use separate one for flowers and shrubs. It's a good practice to clean out your sprayers immediately after you used it for any type of the spraying. A little soapy water form, swished around and through sprayers, then flushed out with warm the water, does a good job.

So considering the above points related to spraying the project work is focused upon to design and to fabricate such equipment which will be able to perform spraying operation more efficiently and also will result in low cost.

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