

KITE SPRAYER

**NAGRAJ R.G, Sangamesh Sirsgi, Mohammad Ashfaq Hussain,
Gangadhar Biradar**

Guru Nanak Dev Engineering College, Bidar

Abstract

To meet the growing needs of the farmers who wish continuously to improve the profitability of their farming by using more efficient materials and machineries. The use of different spraying techniques in agriculture is increasing day by day to growing the importance in increasing the crop yield. It is also one of the best methods to spray the pesticides, fertilizers, etc. To improve the process of crop treatment. The working and parameters of Kite sprayer machine for minimizing the human efforts and increasing productivity of crops.

1 INTRODUCTION

Sprayer is a machine used to apply liquid chemicals on plants to control pest and diseases. It can also be used to apply herbicides to control weeds and to spray micronutrients to enhance plant growth.

The main functions of a sprayer are:

- Breaking the chemical solution in to fine droplets of effective size.
- Distributing the droplets uniformly over the plants.
- Applying the chemicals with sufficient pressure for positive reaching the plants
- Regulating the amount of liquid

applied on plants to avoid excessive application.

A good sprayer should posses the following qualities

- It should produce a steady stream of spray material in desired droplet size so that the plants to be treated may be covered uniformly.
- It should deliver the liquid at sufficient pressure so that the spray solution reaches all the foliage and spreads uniformly over the plant body.
- It should be light in weight yet sufficiently strong, easily workable and repairable.

DIFFERENT SPRAYERS AT AGLANCE:

Hand held sprayer:



Backpack sprayer:



Knapsack Hand sprayer:



Stainless steel and Brass Knapsack sprayer:



Stirrup sprayer:



Rocker sprayer:



Knapsack power- sprayer:



Tractor mounted field sprayer:



Benefits of Kite sprayer:

- More effectiveness.
- Less Labour.
- More work in less time.
- Different variations in spraying to protect crops.
- Safe to use.
- Can cover a large area in less time.
- Farmers can use it under any farming.
- Comes under every field for maintenance.

Components of a sprayer are as follows :

- a) Pump
- b) Chemical tank
- c) agitator
- d) Air chamber
- e) pressure gauge
- f) Pressure regulator
- g) valves
- h) Strainer
- i) suction line
- j) delivery line
- k) nozzles

2. LITERATURE REVIEW

- The Food and Agriculture

Organization (FAO) has defined pesticide as: Any substance or mixture of substances intended for preventing, destroying, or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances that may be administered to animals for the control of insects, arachnids, or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit. Also used as substances applied to crops either

before or after harvest to protect the commodity from deterioration during storage.

- Shivaraja Kumar Parameswaramurthys et al. paper on design and development of wheel and pedal operated sprayer - It is a portable device and no need of any fuel to operate, which is easy to move and sprays the pesticide by moving the wheel and also peddling the equipment. Literature survey shows that every author has tried to reduce the efforts while spraying the fertilizer on the crops. To reduce the efforts they have used various options to achieve the function of spraying. It can be by achieved using robotics or it can also be achieved by using pedal operated vehicle. No any author has incorporated use of slider crank mechanism using chain drive. So we have gone for the use of slider crank mechanism and chain drive to achieve the goal of fertilizer spraying with ease and maximum efficiency.
- Sandeep H. Poratkar, Dhanraj R. Raut et al. "Development of Multinozzle Pesticides Sprayer Pump"- India is a land of agriculture which comprises of small, marginal, medium and rich farmers. Small scale farmers are very interested in manually lever operated knapsack sprayer because of its

versatility, cost and design. But this sprayer has certain limitations like it cannot maintain required pressure; it lead to problem of back pain. However this equipment can also lead to misapplication of chemicals and ineffective control of target pest which leads to loss of pesticides due to dribbling or drift during application. This phenomenon not only adds to cost of production but also cause environmental pollution and imbalance in natural echo system. This paper suggests a model of manually operated multi nozzle pesticides sprayer pump which will perform spraying at maximum rate in minimum time. Constant flow valves can be applied at nozzle to have uniform nozzle pressure.

- Varikuti Vasantha Rao Sharanakumar Mathapati Dr. Basavaraj Amarapur et al. "Multiple Power Supplied Fertilizer Sprayer" In this paper, the design and implementation of multiple power supplied fertilizer sprayer has been presented. The proposed system is the modified model of the two stroke petrol engine powered sprayer which minimizes the difficulties of the existing power sprayer such as operating cost, changing of fuel etc. The two stroke petrol engine has been

replaced by a direct current motor and operated by the electrical energy stored in the battery attached to the unit. The battery can be charged by solar panel during the presence of sun. It could also be operated on direct current during rainy and cloudy weather conditions. This system can be used for spraying pesticides, fungicides, fertilizers and paints. The proposed system has been tested and compared with theoretical values of current and charging time. From the results it is found that the time taken to charge the full battery of capacity 12V, 7Ah has required 16.67 hours. The fully charged battery could be used to spray 575 liters pesticides. Which is approximately covers 5-6 acres of land. It is also found that, if we charge the battery for a day, then it covers approximately 200 liters of pesticides which in turn covers 2 to 2.5 acres of land. The developed systems initial cost is little more as compared to conventional sprayer but the running cost of the system is all most zero in other words minimum.

- “Smart Pesticide Spraying” Robot - Punit Kanse1 , Kaustubh Masekar2 , Chetan Pokale3 , Prof V. N. Patil et al. The aim of this paper is to create an intelligent spraying robot that will

decrease pesticide use and human health damage, allowing farmers to be protected and labour intensity can be reduced. The robot will have full route planning and navigation systems, as well as driving control, spraying mechanism and system construction and obstacle avoidance with multi-sensor module integration. The spray robot will be designed, including obstacle avoidance, spraying, and sensor integration simulations and analyses. It is used not only to track motion and monitor orientation, but also to compensate for path errors in order to achieve good stability and reliability. Meanwhile, the spraying system will be improved to eliminate leaks and prevent repeated spraying, with automatic sprays varying according to the target. This project proposes a pesticide spraying system which will help farmers in field of agriculture.

- Design and Development of Multipurpose Pesticides Sprinkler and Fertilizer Spreader Machine by Mr. Parmeshwar Paul et al. The main objective of this project is to help the farmers by reducing their efforts and enhance operation speed. Pesticide sprayer pump mounted on a frame with a wheel which is operated

mechanically without using any external source of energy. After completing spraying the pump is removed and replaced by fertilizer spreader. It is a multipurpose model that is efficient in operation. The advancement of this concept prevents the defects of the pump being used conventionally. The farmer has to carry the pesticide in the pump and then spraying which is another rigorous task to be completed. One hand is continuously busy operating the handle and the farmers don't take enough precautions which result in fatal diseases because of direct contact with the chemicals. As spraying of pesticides and spreading of fertilizers cannot be done simultaneously, hence by introducing a detachable setup, the farmer will just have to pull the cart with easy operation.

- A Review Paper on Fabrication of Multicrop Spraying Robot Prof.S.S.Pawar , Harshal R Kitukale et al. The objective of this paper is to present robotic model which is easily operates agriculture operation Now a days it is necessity of automation in agricultural field to reduce the farmers efforts & labor cost To perform operation like spraying hence increases production & saves time. The farmer

can operate robot very easily. Large amount of work completes in less time. For battery charging solar energy is to be used. The rays of the sun can be used for solar power generation. Design and build up a sun powered agro-sprayer framework which depends on sun oriented vitality Also create the model of a similar which would have the capacity to give same outcomes as necessity of plan idea. To test the model with its capacity to work dependably under various working conditions.

- In 1947, Ray Hagie, founder of Hagie Manufacturing, invented the world's first self-propelled sprayer. This revolutionary piece of equipment would change how farmers and professional applicators apply pesticides. Today, self-propelled sprayers make up the majority of the farm spraying market, having largely replaced pull-type sprayers.
- A number of equipment manufacturers make self-propelled sprayers, including John Deere, Hagie, Hardi, Case IH, New Holland, AGCO, and Equipment Technologies.
- Fabrication of automatic pesticide spraying machine by Dhiraj N. Kumbhare et al. This paper suggests

machines which will save time and operational cost. Also saves human from affecting adversely. The machine consists of the main body frame, battery, DC Motor, Nozzles, Pipes, Wheels, Tank and DC Pump. This is the four wheel drive machine. All the four wheels are individually driven by 30 RPM DC Motor. Frame is made up of mild steel. Its width 35 cm, length 50 cm and height is 30 cm. The main frame is covered from all the sides with plywood sheets. Vertical arm is attached at centre of back side of main frame, carrying horizontal arm. The nozzles are fitted to the pipes which are attached with the vertical and horizontal arm. The horizontal arm is movable on vertical arm. The tank is kept at the centre of the body. The DC Pump is kept at the back side of the tank while the battery is kept at the front side of same. The Remote is used to operate the vehicle. Rang of the remote is 50m.

- Smart Solar Powered Agricultural Fertilizer Sprayer Srinivasan Mallan et al. In this paper they have discussed that instead of using fossil fuels like diesel, petrol, etc., for spraying fertilizers solar power is used, where the later proves to be efficient than the former.

- B. Laukik P. Raut et al (2) The authors in their paper bring forth the ability of mechanization towards the conservation of agriculture inputs, losses prevention thereby reducing the labor cost per unit and thus attain the best productivity. The authors also show the disadvantages of the conventional agriculture practices in spraying and weeding and propose a combination machine for the spraying and weeding activity.
- In 2017, John Deere introduced a 123-foot, carbon-fiber boom – its widest boom to date. The new boom was accompanied by the freshly designed CommandView III Cab, which features a hydro handle joystick, a 4600 Command Center display, and a redesigned CommandARM.
- New Holland, AGCO, Hardi, and Equipment Technologies also introduced new sprayer models last year. New Holland introduced the Guardian SP310F and Miller Nitro 7310 – the first since New Holland acquired Miller-St. Nazianz.

3. Problem statement:

In Indian farms two types of sprays are used: Hand operated and Fuel operated pump. The main drawn back of hand

operated spray pump is that the user cannot use it for more than 5-6 hours continuously as he 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 nonconventional energy. This project tries to develop a new mechanical system which will overcome all the above problems and will help farmers to.

Farmers suffer large financial losses because of usage of incorrect irrigation mechanisms, insect pests and attack of plant diseases, usage of uncalculated amount of pesticides and insecticides, and wrong prediction of weather. Wireless crop monitoring reduces labour costs while also allowing for precise tracking of changes that occur in real time at the field. Farmers must take numerous precautions when spraying pesticides, including wearing proper clothing, gloves, and masks, among others. In such situations, the use of robotics is a very imminent technological solution that increases productivity and efficiency. On the earth 42% of population is dependent on an occupation of agriculture, they have to do a lot of work and more load on them. Spraying pesticides is one of these jobs that is risky and challenging because the chemicals used in these pesticide liquids

are hazardous. It may cause breathing difficulties as well as other physical issues. As a result, we created an agricultural robot that assists farmers in pesticide liquids while reducing workload.

4. Objective:

Sprayer is a device used in agriculture used to spray liquids like water, insecticides, and pesticides in agriculture. They are also used to spray herbicides and fertilizers to crops in agriculture field. In this we are applying the use of non-conventional energy use and advanced technologies for spraying activities that will help farmers to spray on the field crops efficiently. The main objective of this project is to reduce labour cost and reduce the time for spraying of fertilizers and pesticides on the crops and to cover more area in less time using Kite sprayer mechanism.

Agriculture operations are extremely labour intensive and often there shortage of labour and sometimes expensive for small farmers. The pesticide spraying and fertilizer dispensing are prominent of these operations that are done manually. The pesticide spraying is done using a back mounted spray pump whereas the fertilizer dispensing is done using hands. Mechanization of the above two operations if done will likely reduce considerable man

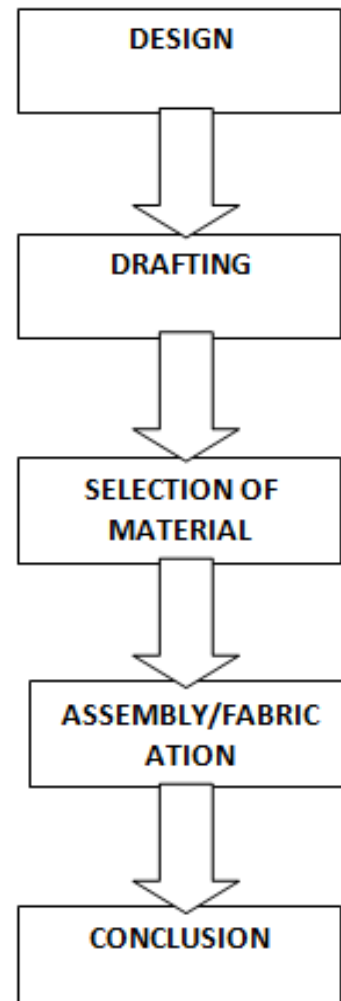
hours and efforts and will be considerable economical. The project discusses this possibility using a singular machine that combines both operations in ergonomic manner.

Some small formers are not able to purchase high cost agriculture equipments, the objective of this project is to provide spraying mechanism to formers which can spray the fertilizers, pesticides and other crop preserving things easily and reduce labour cost and time for spraying the crops.

- To stop manual spraying on the real farm with pesticides.
- This will reduce the plant's excessive use of pesticide.
- To build this machine in such a manner that it can travel through any terrain.
- To determine the weather conditions like temperature and humidity before spraying pesticides.
- To design a mechanism for spraying and managing parameters like area of spraying, deliver a pesticide/fertilizer spraying tank on it and pass across the fields.

- To control remotely pump and rover from mobile application.

5. METHODOLOGY



6. COST ESTIMATION:

SL.no	DESCRIPTION	COST
1.	MATERIAL COST	2000
2.	COST OF MOTOR	7000
3.	COST OF CHEMICAL TANK	2000
4.	COST OF PRESSURE GAUGES AND REGULATORS	2000
5.	COST OF SUCTION LINE PIPES AND DELIVERY LINE PIPES	1500
6.	COST OF KITE MECHANISM	9000
7.	COST OF NOZZLES	1000
8.	COST OF WIRES AND BASE	1500
9.	TOTAL	26000

FUTURE SCOPE:

The Environmental Protection Agency already utilizes drones technology to manage livestock and survey crops. In the future farmers and ranchers could use unmanned aircraft to strategically monitor and spray their crops.

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