

Multipurpose Agriculture Equipment

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Abstract- 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. Today we use various spraying and seed sowing 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 a places where mechanical energy can be used instead of direct energy sources. This is a reason why we have implemented mechanical sprayer and seed sowing getting powered by human effort. Although these are serving the purpose, their range of working is not enough. Thus what we have aimed is to design such a technology which will run on mechanical power but requiring less time for spraying and seed sowing than those which are hand operated. Thus considering today's demand, we have come up with mechanically operated spray pump which is purely mechanical. This device is having the advantage of taking less time for spraying and seed sowing once it starts. If we want to decrease the spraying time further we just need to increase size of our piston and no. of nozzles with relative change in effort. In addition to all this we are implementing soil coulters along with spray pump and seed sowing so we can have double advantage. Mechanical energy can be used instead of direct energy sources. This is a reason why we have implemented some mechanical sprayers and seed sowing equipment getting powered by human effort. 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 considering today's demand, we have come up with mechanically operated multipurpose spray pump and seed sowing equipment. As it has huge advantages so this concept should be used in agriculture.

Keywords- Agriculture, seed sowing Machine, sprayers, seeds, Multipurpose, etc.

I. INTRODUCTION

Agriculture is the backbone of India. Paddy and Wheat is one of the new targets in agriculture where still, not many researchers and manufacturers participate. This field faces some problems such as how to maximize the profit, how to increase productivity and how to reduce the cost. In India, two types of agricultural equipment are used, manual method

(conventional method) and mechanized type. Mechanization involves the use of a hybrid device between the power source and the work. This hybrid device usually transfers motion, such as rotary to linear, or provides ample of mechanical advantages such as increase or decrease or leverage of velocity. Agricultural machinery is machinery used in farming or other agriculture. Mechanized agriculture is a process of using agricultural machinery to mechanize the work of agriculture, greatly increasing farm worker productivity. In modern times, powered machinery has replaced many farm jobs formerly carried out by manual labour or by working animals such as oxen, horses, and mules. The entire history of agriculture contains many examples of the use of tools, such as the hoe and the plough. But the ongoing integration of machines since the Industrial Revolution has allowed farming to become much less labor-intensive. The biggest profit of automation is that it saves the labor. However, it also saves energy and materials and to improve the quality, accuracy, and precision. The seed feeding, pesticides sprinkling and crop cutting are the important stages in the agriculture field. The design of multipurpose agro equipment machine will help Indian farmers in rural side and small farm. It will reduce the cost of seed feeding, pesticides sprinkling and crop cutting the field and will help to increase economic standard of an Indian farmer.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Nitin Kumar Mishra, Shashwat Khare, Sumit Singh & Mithun Dabur (2017) [1] "Energy - demand" is one the major need for our country. Finding solutions, to meet the "Energy - demand" is the great challenge for Social Scientist, Engineers, Entrepreneurs and Industrialist of our Country. Applications of Nonconventional energy are the only alternate solution for conventional energy demand. Like other development activities, agriculture sector is one of the major areas, which finds number applications of making it work using non-conventional sources. Solar energy plays an important role in agriculture products and for irrigation purpose for pumping the well water in remote villages without electricity. Mechanization involves the use of a hybrid device between the power source and the work. The paper deals with multi-purpose agriculture machine for seed feeding, spraying pesticides, fungicides, and fertilizers and cutting.

Thorat Swapnil V, Madhu L. Kasturi, Patil Girish V & Patil Rajkumar N(2017)[2]Sowing machine should be suitable to all farms, all types of crops, robust construction, also it should be reliable, this is basic requirement of sowing machine. Thus we made sowing machine which is operated manually but reduces the efforts of farmers thus increasing the efficiency of planting also reduces the problem encountered in manual planting. For this machine we can plant different types and different sizes of seeds also we can vary the space between two seeds while planting. This also increased the planting efficiency and accuracy. We made it from raw materials thus it was so cheap and very usable for small scale farmers. For effective handling of the machine by any farmer or by any untrained worker we simplified its design.

Sheikh Mohd Shahid Mohd Sadik & H.A. Hussain(2017) [3] Agriculture being one of the major occupation in India, Agriculture plays a vital role in the Indian economy. Indian agriculture has registered impressive growth over last few decades. It is very essential to discover and implement new idea in this field, though lot of work has been done in this area. It is unfortunate that, these ideas are not being implemented properly in actual field. This is due to high cost and is complicated for rural people. Multipurpose agriculture or farming machine is basic and major machine involved in agriculture for maximum yielding. The Conventional method of ploughing and seed sowing is a laborious process and hence for that reason there is a scarcity of labours and basically, many farmers in India also use bullocks, horses and he-buffalo for farming operation. This will not satisfy need of energy requirement of the farming as compared to other countries in the world.

Girishkumar G S ,Vivek C S, Ravichndra N, Vivek B C, Sahar Bhusgunde (2018) [4]Agriculture plays an important role in the life of economy. It is the backbone of our economy system. In this project work focused on seed sowing processes and tried to solve the problem. In this seed sowing machine each complete rotation of rotating wheel there is seeds falls from this seed drum and the seed plantation process can take place smoothly as well as without wastage of seeds. This system provides all the facility which can work efficiently.

III. SCOPE OF THE PROBLEM or OVERVIEW

Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:

Multifunctional agriculture vehicle mainly focus on basic problem faced by fellow farmer's. i.e. seed sowing, pesticide's spraying, cultivation and digging. We are looking

this project as a revolution in small farmers in india, which is most uncovered area in this sector is cost and more efficient way. There could be continuous supply of pesticide generated for sprinkler. The solar panel unit could be enhanced supply. Moreover, the electricity could be stored; to be used at night or in no sun condition. A more with greater efficiency could be used. More equipment like soil testing tasks could be added to this project. In the multipurpose farming machine in place of petrol engine, the diesel engine and other gasoline engine can be used for improving performance and the environmental friendly. In multipurpose machine in addition to ploughing and seed sowing, the arrangement for fertilizer and manure can be made. In this machine instead of sowing in two rows it may be increased further. In our machine farmer is walking with machine during seed sowing and ploughing, providing seating arrangement into the machine will be beneficial.

A. Ploughing: this is the mechanism used in all the agricultural fields to maintain the fertility of land, due to forward movement of the equipment the plougher is attached to the front of the equipment with predesigned number of teeth and teeth depth.

B. Sowing: As the equipment moves the ploughing process takes place, the chain sprocket is attached to the rolling wheel and this is directly connected to shaft which in turn connected to storage box, the shaft has teeth which revolve due to rotary motion produced in previous attachments. Hence seeds are sowed via pipes connected which are aligned to the ploughing teeth

C. Pesticides spraying: spraying of Pesticide is accomplished by help of a storage tank provided with stirrer and a nozzle attached to it.

D. Digging of soil: By providing blades on the periphery of the rolling wheel digging is carried out and soil becomes softer for more cultivation.

DETAILS OF DESIGN, WORKING AND PROCESSES

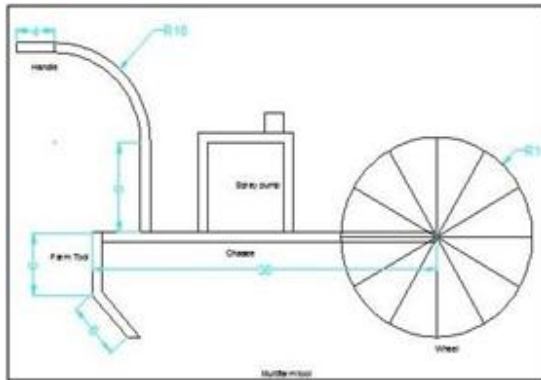


Fig. Structure Design

India is a country where farming is main occupation and culture then also in India most of farmers attempt suicide reason behind this is machine , as in India 10-20% offarmersarerichbutrestoffarmersdon'thavemuchsourcetopurch aseheavyequipment and machines. So we have decided to design a machine which can fulfill basis need of farming and price of machine should be very less as compared for market .Main objective of machine is drilling, fertilizer spraying , seed sowing &cultivating .For solving this purpose we have designed this type of machine

- When engine is started the auger bit drill tool will activated to drill hole for seed sowing after that operator press lever for drop a seed from hopper then the digging and sowing operation will be completed. The sowing operation can be done by semi manual.
- Cultivating tool is easily assemble and dissemble .This operation is done by the manual force. For spraying operation motor ,battery and switch is given. When switch is on fertilizer pump from the motor and enter to the sprayer nozzle then it spray with high velocity to the crops. In above 3d model of machine we can see in front of machine we have used 24 cc petrol engine from bottom of that engine we will place auger bit for drilling purpose on bottom side of engine we can see sprayer which is having 4 nozzles and we can adjust height of that nozzles these nozzles are connected through pipe with pump and water tank, water tank is shown at end of machine
- We have used hopper for seed sowing and that hopper is connected to lever at handle so handler can press lever to drop seed.

Working Principle:

The operator grabs the handle and pushes the cycle forward as cycle moves forward, the wheel rotate. When the wheel rotates then the gear sprocket mounted on wheel is also rotate at same speed. The chain drive transfers the motion of

gear sprocket to pinion sprocket. The pinion sprocket and crank is mounted on either side of same shaft, the rotary motion of shaft is converted into the reciprocating motion with the help of crank and connecting rod mechanism. The connecting rod is also connected with lever and then the lever oscillates at fulcrum. The piston connected at fulcrum produce reciprocating motion in cylinder and the required pressure is achieved. The pesticide from tank sucks in cylinder and piston forced the pesticide to nozzle through the pipe; the numbers of nozzles are connected to spray the pesticide. We can adjust the pressure, which is required for spraying with the help of special arrangement is to change the length of crank by providing slot on crank. By providing some adjustment at joint of connecting rod and lever free rotation of crank or neutral position can be achieved. Using these adjustments pumping is stop and the wheel rotate freely when you need not spray pesticide. Height, position and angle of the nozzle can be adjustable.



Photo: Actual model of multiform tool

1. Frame: The main function of frame is to carry whole assembly on it so it has to be strong enough to hold it. The frame is made of square pipe and it is formed out of mild

steel



Photo: Frame of Model

2. **Wheel:** The gripper wheel is assembled into Part-1 assembly i.e. main machine. Gripper wheel is fitted to the tyre for preventing or providing grip into soil during ploughing and seed sowing. The gripper wheel is also made up of mild steel.



Photo: Wheel Assembly

Wheel is used to carry the whole assembly and move machine from one place to another by rotary motion of it. A bicycle wheel is a wheel, most commonly a wire wheel, designed for a bicycle. Bicycle wheel is designed to fit into the frame and fork via drop outs, and hold bicycle tyre. A typical modern wheel has a metal hub, wire tension spokes and a metal or carbon fiber rim which holds a pneumatic rubber tire. We use a tubeless tire wheel.

3. **Water Pump:** It consists of piston and cylinder arrangement, it has a lever to operate the motion of piston in reciprocating direction. The pump generates the pressure of 2 bar and discharge of 2 lpm a liquid over an area.



Photo: Water Pump

4. **Tank:** We want our tank to carry as much fluid as it can be along with its self-weight as less as possible. We have taken a tank which is almost 16 liter capacity. A material for tank used is plastic fiber. Plastic fiber is very low in weight as compared to other materials. It also has very low cost.

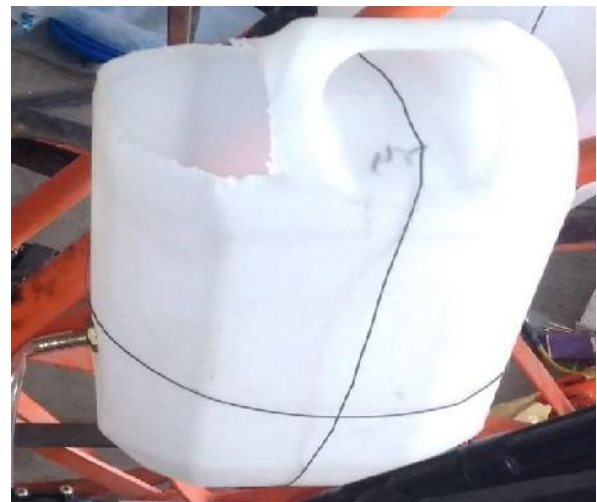


Photo: Tank

5. **Nozzle:** It is a device which converts the pressure energy of fluid into kinetic energy, spray nozzle is a precision device that facilitates dispersion of liquid into a spray. Nozzle is used for purpose to distribute



Photo: Nozzle

IV. CONCLUSION

The top concentration of our design is the cost and operational ease in case of small farm units. This multipurpose agro equipment is thus designed to reduce the cost of harvesting, spraying and seed feeding. In the development of multipurpose agro equipment we utilize the past data and techniques. In this way the design of multipurpose agro equipment is safe. Such human powered machine systems will help to a great extent in improving the production per acre and increase profitability of small and middle class farmers. A new type of multipurpose mechanism is fabricated which is different from other machines and will work on non-conventional energy source which is purely human operated. Such systems are of much importance in Asian countries, as almost all Asian countries are facing electricity and power scarcity which results in twelve to fourteen hours load shedding in rural areas especially in India. Therefore, there is the need to develop a locally, fabricated multipurpose agro equipment's.



Photo: Multipurpose Agriculture Equipment

V. RESULT AND APPLICATIONS

- Significant reduction in numbers of Labor Significant reduction in numbers of Labor (skilled/unskilled).
- Gradual decrease in time consumed.
- Very economical as compared to conventional methods.
- Flexibility in defining the depth of plantation/sowing.
- Avoiding human efforts in spraying of chemical Fertilizers..

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