WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Multipurpose Vehicle For Agriculture

Rahul Pise[1], Parth Jadhav[2], Gaurav Patil[3], Patrice Oswaha[4]

Department of Vishwakarma Institute of Technology, Pune 411037

ABSTRACT-

The objective of this paper is enhance "Multipurpose Vehicle For Agriculture". India is fulfill with agriculture. The all peoples cultivated to technology and by this technology we can develop many useful things and gadgets. So we also developed a Multipurpose vehicle for agriculture for those farmers who don't able to work by their's health and for those who not able to buying a expensive gadgets. We developed a not expensive gadget for agriculture. It performs multiple tasks spraying, sowing, ploughing etc. it also consists of multiple nozzles for spraying in multiple directions. Which spray in maximum areas. There is a no need to carry a water spray pump. The effort required for spraying get reduced. Farmers easily can handle multipurpose vehicle. Only push it forward and backward. It reduces human efforts and performs multiple tasks at a time. The time required for performing all this tasks get reduced.

Introduction-

India is an agriculture country in which more peoples depend on outcome of farming. Agricultural plays significant role in overall socioeconomic fabric of India. Financially poor Farmers does not have machines for doing work in farm. Excess efforts required in performing various process separately, Excess time is required, excess of efficiency. Some farmers not able to purchase heavy agriculture machines for their smaller farm lands and financial constraints. The
agricultural machines do work in less time and perform multiple tasks at a time. Conventional methods required much time, much human effort. Multipurpose agriculture vehicle performs multiple tasks and it off course help in increase productivity, costs required for certain particular operation get reduced, reduce the cost of production. This project is modernize the small farms in India. The multipurpose agriculture vehicle has a nozzles to spray water in more area. The many nozzles can help to cover much area for spraying. The plow is tilling the land. The other operations is sowing the seeds. This all operations handle at a time. Farmers not need to hold the sprayer pump on their back. Means back pain of farmers get prevent. By using new technology of farming means using exclusive machines farmer make their agriculture more robust by increasing productivity of agriculture and efficiency. Multipurpose agriculture vehicle make farmers farming easy and provides more benefits. India would be rapidly growing in farming area. Farming is the backbone of India's economy, with a large portion of the population relying on agriculture for their livelihood. Despite the advancements in technology, many small-scale farmers still face considerable challenges in maximizing efficiency due to limited access to affordable machinery. Traditionally, agriculture involves labour-intensive processes such as plowing, sowing, and spraying, which are time-consuming and require substantial physical effort.

This paper introduces a novel multipurpose vehicle designed to help farmers who cannot afford expensive equipment and reduce the strain of manual labor. The vehicle is designed to perform essential agricultural tasks, such as spraying, sowing, and plowing, simultaneously. This innovation is expected to not only alleviate the physical demands on farmers but also reduce the time and cost associated with traditional farming practices.

Agricultural Challenges in India: According to recent studies, around 70% of India's rural population depends on agriculture, and 86% of farmers own less than two hectares of land. Small farmers face financial difficulties when it comes to purchasing expensive machinery that can help improve productivity. This is exacerbated by an increasing shortage of labor in rural areas due to urban migration. The development of low-cost, efficient solutions is critical for improving agricultural productivity in these communities.

Literature Review :

In recent years, several innovations have emerged in the field of agricultural technology. Companies and researchers are developing smart machinery capable of optimizing tasks such as sowing, irrigation, and pesticide application. While developed nations have made significant strides in this area, developing nations still struggle with the adoption of such technologies due to cost barriers.

Existing Solutions: There are various types of machinery available for farmers, including tractors, seed drills, and power sprayers. However, most of these are too expensive for small-scale farmers. In addition, traditional methods of farming, though effective, are time-consuming and require significant manual labor. The introduction of multipurpose vehicles, which combine multiple functionalities, offers a promising solution to these challenges.

The multipurpose vehicle presented in this paper builds upon existing technologies while focusing on affordability, efficiency, and ease of use. By

integrating tasks such as plowing, sowing, and spraying into a single machine, the vehicle provides farmers with a solution that reduces labor costs and increases productivity.

Methdology-

The main objective of this paper develop a multipurpose agriculture vehicle. Which perform multiple tasks like sowing, plowing, spraying etc. it not required any type of fuel to run. Only push forward and backward. By pushing forward it performs water spraying operation and plowing and sowing. It has no need to do much efforts for working. Farmers efforts get reduce by this multipurpose agriculture vehicle. Figure 1 is shown the methodology of in multipurpose agriculture vehicle. Figure 2 is shown the prototype of the model.

Vehicle Design

The multipurpose agriculture vehicle is designed with a sturdy chassis made of mild steel, which provides structural integrity while ensuring the vehicle remains lightweight and easy to makeover. The vehicle operates using a simple chain-drive mechanism, which powers the various components such as the spray pump and seed

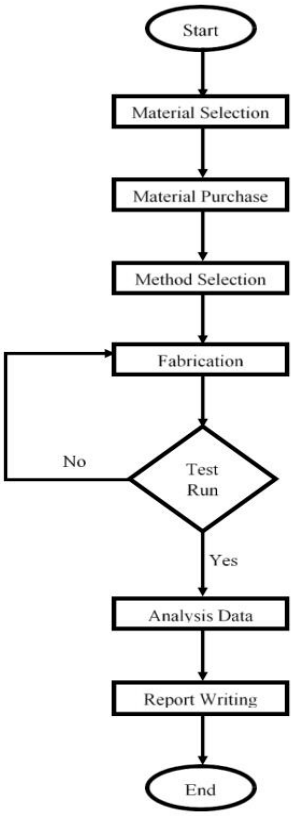

Figure 1: block diagram of multipurpose vehicle

Figure 2: Prototype model of multipurpose agriculture vehicle

i. Chain Drive mechanism

The different diameters of two sprockets are used. They are coupled together using chain drive. By managing appropriate distance between two sprockets set the chain length. By pushing multipurpose agriculture vehicle forward chain is rotating around sprockets and sprockets also rotate and starts the further operations of agriculture. The big sprocket has hole for holding a thin rod it helps for spray water. The thin rod one end is connected to the big sprocket and other is connected to the spray pump which placed on chassis of vehicle. When chain drive mechanism is rotting then rod also moves up down and it further helps for spraying.

ii. Seed sowing unit

The funnel is fixed on the chassis. Seeds are directed through a pipe which is small in size and attached to the end of funnel which directs the seeds to the soil. It sowing the seed one by one.

iii. Water supplying unit

When push the multipurpose agriculture vehicle forward chain drive is working. The connected thin rod to the big sprocket get rotate and other connected end to the spray pump piston move up and down by this motion water travelled from a connected thin tube which is connected to the nozzles which sprays the water in all directions. By increasing speed of multipurpose vehicle spraying pressure also increased.

iv. Plowing mechanism

The plow is connected the bottom rod of the chassis. Plow can easily replace by removing screws and nuts. At a time of plowing connect the plow by using screws and nuts. When plowing is happen at that time sowing also happen. The seeds are sowed into the plowed path of the soil. Both tasks are done at a time.

v. Chassis

It a mechanical frame of vehicle which is made up of mild steel. The rods are connected in rectangular cross-section. On the rectangular rods the water spray pump is placed and it fixed on the rectangular rods. Other two edges of the rectangular rods connected two straight rods. This rods are in a shape of handle. By holding this handle can push multipurpose agriculture vehicle forward or backward. In rectangular rods fixed the two sprockets. The front one is mounted on the transmission output shaft and is smaller in size. There is a one wheel which connected to the small sprocket and other sprocket is big which connected other hand. There is a support provided for balancing. It presented at a bottom of rectangular rods where on upper side handle is presented. This two supports connected a plow which by connecting screws and nuts and can replace it also and can apply other agriculture tool which is fitted at that place which is useful in agricultural operations. at the small rod on this rod in middle connected a straight rod which is in a T shaped on this T shaped rod fix a nozzles for spraying.

Prototype Testing: A prototype of the vehicle was built and tested in small-scale farming environments. The tests focused on its ability to handle multiple tasks at once, its ease of use, and its efficiency in reducing human labor.

vi. Technical specifications

- Length of multipurpose agriculture vehicle : 1500mm
- Wheel : dia.304.8mm
- Backpack sprayer capacity of water : 15Litre
- Nozzle size of sprayer : 4000 microns down to 300 microns in diameter

Working of prototype model

This multipurpose agriculture vehicle is used for multiple operations. it consists of sprayer with nozzle we can adding multiple nozzles for sprayer at more areas. The multipurpose agriculture vehicle is supported by one wheel and other side by supports. On the chassis water spray pump is kept. In this water pump a piston is situated and this piston is connected to a thin rod other end of rod is connected to sprocket. When move multipurpose agriculture vehicle forward direction working gets starts. First, sprocket moves this sprocket has connected thin rod and other end connected piston of water pump. Piston starts to rotate this piston help to supply water through thin pipe and end of pipe is connected to nozzle and nozzle sprays the water in farms. At that time the plow also connected at bottom so this also starts to plowing and also at that time sowing operation is also started. The seeds are sowed into the plowed path. At a time multiple tasks can be happened. As per forwarding and backwarding speed the spraying speed depends. Increase speed of forwarding/ backwarding also increase in speed of spraying.

Environmental and Economic Impact

The environmental and economic impact of this vehicle is substantial, particularly for small-scale farmers. The ability to perform multiple tasks simultaneously reduces the need for additional machinery, which in turn lowers the costs associated with fuel consumption and maintenance. Moreover, the reduced labor requirements mean that fewer workers are needed to complete farming tasks, which can be particularly beneficial in areas facing labor shortages.

Sustainability Considerations

By using a manually operated mechanism, the vehicle eliminates the need for fossil fuels, making it an environmentally friendly option for sustainable farming. Additionally, the improved efficiency of pesticide and fertilizer application reduces chemical wastage and environmental pollution.

Economic Benefits

The cost savings associated with the multipurpose vehicle are significant. Farmers can avoid the high upfront costs of purchasing individual machines for each task. This vehicle serves as a single, cost-effective solution that can be used for plowing, sowing, and spraying. Over time, the reduced labor costs and increased productivity will further contribute to the economic well-being of small farmers.

RESULT :

The multipurpose agriculture vehicle it performs multiple tasks at a time. It increase efficiency of production and helps to farmers by reducing efforts. Its cost effective it useful for poor farmers. There is a seeding mechanism which reduces wastage of seeds. Spraying mechanism covered more area for spraying. The vehicle was able to cover more ground in less time, and farmers reported a noticeable reduction in physical effort. Additionally, the use of multiple nozzles ensured that a larger area was sprayed evenly, which would typically require additional equipment.

The efficiency of seed sowing was also improved, with minimal seed wastage due to the controlled flow of seeds through the funnel and pipe system. These improvements directly translate to cost savings for farmers, particularly those with small plots of land.

It can used for different production class.

CONCLUSION :

The multipurpose agriculture vehicle done multiple tasks at a time. This is used for small areas. It beneficial for small farmers. They can easily handle and used. The farmers efforts also get reduce by doing multiple tasks at a time. Otherwise farmers do one operation in agricultural at a time by this efforts required more. It is cost effective small farmers can easily get it. It can be spray water and fertilizers, pesticides etc. by increasing nozzles area of spraying increases. The efficiency of production increases. It helps to explore other new gadgets in agriculture industry. It reduces the labours cost. Certain agriculture task required 4 to 5 labours and more so this tasks can reduced by doing multiple tasks at a time and it also reduce costs of external components required for doing tasks like plowing, sowing, spraying etc.

REFERENCES :

[1] Sudduth K.A., Borgelt S.C., Hou J., (1995) Performance of a chemical injection sprayer system, Applied Engineering in Agriculture, 11(3), pp. 343-348.
[2] Way T.R., Von Bargen K., Grisso R.D., Bashford L.L., (1992) Simulation of chemical application accuracy for injection sprayers. Transactions of the ASAE, 35(4), pp. 1141-1149.
[3] Philip J. Sammons, Tomonari Furukawa, Andrew Bulgin, (2005) Autonomous Pesticide Spraying
[4] Robot for use in a Greenhouse, The University of New South Wales, Australia.