"Sustainable Agriculture Machine for Enhancement of Crop Yields"

Harish. S. Salunkhe1, Pradip B. Pawar2
1Scholar, Fabtech Technical Campus, College of Engineering and Research, Sangola, Maharashtra
2Department of Mechanical Engineering, Fabtech Technical Campus, College of Engineering and Research, Sangola, Maharashtra

---

Abstract - *Agriculture remains the back bone of many economies, particularly in rural and developing regions. However, traditional farming practices often involve labor-intensive and time- consuming tasks. The Multipurpose Agriculture Machine is designed to address these challenges by integrating multiple agricultural operations into a single, cost-effective, and efficient system. This machine is capable of performing essential functions such as ploughing, seed sowing, fertilizing, and pesticide spraying with minimal human intervention. Powered by a fuel-efficient engine or renewable energy sources, it is suitable for small to medium-sized farms. Its modular design allows for easy customization and maintenance, enhancing productivity while reducing the dependency on manual labor. The innovation promotes sustainable farming practices, minimizes operational costs, and increases crop yields ultimately contributing to the modernization and mechanization of agriculture.*

Key Words*: *HARVESTING, PLUGGING, SOWING, WHEELCHAIR, AUTOMATOR

1. INTRODUCTION

1.1 Background and History

Agricultural activities Relates to the mechanical structures and devices used in farming or other agriculture. There are many types of such equipment, from hand tools and power tools to tractor sand the farm implements that they tow or operate. Machinery is used in both organic and non-organic farming. Especially since the advent of mechanized agriculture, agricultural machinery is an indispensable part of how the world is fed. Agricultural machinery can be regarded as part of wider agricultural automation technologies, which includes the more advanced digital equipment and agricultural robotics. [1]While robots have the potential to automate the three key steps involved in any agricultural operation (diagnosis, decision-making and performing), conventional motorized machinery is used principally to automate only the performing step where diagnosis and decision-making are conducted by humans based on observations and experience. The concept of the emerged from the growing need to address the challenges faced by small and medium-scale farmers, particularly In rural areas. Traditionally, farmers have relied on manual labourer multiple expensive machines to carry out basic agricultural operations such as ploughing, sowing, harvesting, and transporting goods. This not only increased production costs but also made farming less efficient and more time-consuming.

1.2 CONTEXT

Due to the fact that agriculture plays an important role in the development of the economy of our country, some problem are still associated with the production of agriculture. The attitude of the farmer towards production of crops, little did they know about new technology of modern farming. It is essential to increase the productivity of agriculture and farming processes to improve yields and Cost effectiveness with this technology, so we are introducing this multipurpose agriculture machine. Generally, cultivation of any crop involves various steps like sloughing, harvesting, sowing, and irrigation. It is essential to increase the productivity of agriculture and farming processes to improve yields and cost effectiveness with this technology, so we are introducing this multipurpose agriculture machine. Generally, cultivation of any crop involves various steps like plugging, harvesting, sowing, and irrigation. It is essential to increase the productivity of agriculture and farming processes to improve yields and cost effectiveness with this technology, so we are introducing this multipurpose agriculture machine. Generally, cultivation of any crop involves various steps like plugging, harvesting, sowing, and irrigation. Farmer has to use various agricultural equipment's and labours for caring out these steps, our purpose is to combine all the individual tools to provide farmers with multipurpose equipment which implements all the scientific farming techniques and specifications, suitable for all type of seed to seed cultivation with minimum cost as possible. All this can be done in this same machine. This multipurpose agro machine is designed and fabricated as multipurpose equipment which is used for agricultural processes like plugging, sowing seeds and sprinkling. This innovative machine combines several essential tasks such as fodder cutting, feed mixing, water pumping, manure collection and basic field preparation into a single unit. Designed to operate on dairy farms where both crop cultivation and livestock management go hand-in-hand, it significantly reduces manual labor and operational costs.

2. LITERATURE REVIEW

1. **A. Ajithkumar, D. Surender, R Srinivas** describes that their projects works on the Principles of pneumatic mechanism along with micro controllers then efficiency of dumping trailers will increase. The three direction of unloading an material can be done and useful for shipping industry. They have chosen this project for decreasing the man power and time. The combination of pneumatics and microcontrollers can be seen in their project**.**

B **Dr. Sushila Rani** Says that the dumping is a important role of bulky load for carrying construction loads & the materials unloading the particular site of proper direction. Unloading the material is difficult and assigned position in dump of the materials. To overcome these problems some modified designs are easy to dump the materials & pneumatic cylinder are along with a chain sprocket mechanism .In this dumper it structural analysis can maximum equivalent to stress, shear stress Elastics stress and total the deformation of the pneumatic dumper. Has been designed by using the finite element based the ANSYS software.

C **. Atul R Ghuge,Sagar S Abhale , Vishal M Bangale** Describes that the Conventional trolley mechanism an unload materials only at the back side of the trolley using hydraulically operated cylinder which may cause the problems of road blockage in the limited space area. This paper has mainly focused on above difficulty. The Unidirectional trolley is developed and tested for its movement in all possible angle to unload the materials in the trolley. This concept saves time& energy which leads to efficient working.

3. DESIGN OBJECTIVES

a. To reduce labor and time in seed sowing operations
b. To ensure uniform depth and spacing for different types of seeds.
c. To create a compact and portable machine
d. To allow easy adjustment of seed rate and row spacing
e. To ensure affordability and ease of fabrication

4. WORKING

The equipment is connected to the machine, and the engine is started to complete the operation. Initially, the engine must be started, and engine power is transferred to the system via a specially designed chain and sprocket. The digging rotor as well as the wheel receive adequate power thanks to the arrangement and designed speed ratio. The vehicle follows the Wheel's path. A rotor mounted on the vehicle's front side can cut up the soil and prepare the land. This process is used to prepare the soil for seed sowing. It is completed in the primary stage. Seed sowing was followed by a secondary mechanism. The plug creates a passage for seeds that have already been fed into seed containers in this operation. The container has a spike wheel arrangement to follow the rotation of the wheels, which is connected by a chain and sprocket transmission system. This is made to hold a variety of seeds. The proper distance in planting seeds is determined by the mechanism's design. Digging Operation It is a tillage machine that is used to prepare land for seed sowing. In comparison to conventional tillage, it provides a faster seedbed. When compared to cultivator till age, it saved 30 to 35 percent of the time and 20 to 25 percent of the cost of operation. The rotor blade and rotating shaft make up the rotor. The rotor blade resembles a digging component. As a result, it can cultivate the land and loosen the soil, which is beneficial for crop growth and increases water storage capacity.

5. METHODOLOGY

The operation which needs to be perform, the equipment is attached to the machine and by starting the engine the machine will move forward by performing desired work.

1. **Ploughing** : For ploughing we have to attach the equipment to vehicle and start engine by giving acceleration vehicle will move and the plough will take out the sand and ploughing will perform.
2. **Sowing operation** : In the seed sowing operation seeds are placed in soil. This operation is done after the ploughing is completed. Mechanism used for this operation having seed storage box from that seed are get collected with help of gear type collector.
3. **Weeding**: Some machines have features like high ground clearance to allow for operations like uprooting weeds between crop rows. Weeding is the process of removing unwanted plants (weeds) from agricultural fields to prevent them from competing with crops for resources like water, sunlight, and nutrients, which can reduce crop yields. Common methods include manual weeding with hand tools, mechanical weeding using specialized equipment, and chemical weeding with herbicides.
4. **Kolapani operation** : Kolapani is device used to cut the unwanted grass present in between two rows of crops. Sitting on the ground and weeding hurts the knees. This work can be done vertically using improved hand clamps. If the machine is used, better work can be done by reducing the number of workers.

6. FUTURE SCOPE

1. Diesel engines and other gasoline engines can be utilized in place of gasoline engines in multipurpose farming machines to increase efficiency and be more environmentally friendly.

2. In addition to plowing and seeding, a multipurpose machine can be used to organize manure and fertilizer.

3. It may be further increased in this machine rather than being sown in two rows.

4. Since the farmer walks beside the machine while planting seeds and plowing, it will be advantageous to have seating within the machine.

7. CONCLUSION

The development and deployment of a multipurpose agriculture machine mark a significant step toward modernizing traditional farming practices. By integrating multiple agricultural operations—such as plugging, sowing, fertilizing, and spraying—into a single, compact, and efficient unit, this machine offers a cost effective and time saving solution for farmers, especially those with small to medium sized land holdings. The machine not only reduces labor dependency and operational costs but also enhances productivity and precision in the field. Its modular design, ease of use, and adapt ability make it highly suitable for diverse farming needs, contributing to more sustainable and efficient agricultural practices. In conclusion, the multipurpose agriculture machine is a valuable innovation that supports the goals of and while addressing key challenges such as labor shortages and rising input costs.

8. ACKNOWLEDGEMENT

It is my pleasure to get this opportunity to thank my beloved and respected Mrs VAGGOLI R G AND Mr RAJAPUT K B who imparted valuable knowledge of multipurpose agriculture machine, specifically related to Vibration based condition monitoring. They was also kind enough to spare his valuable time to guide me in making my paper. I sincerely thank for their consistent guidance, inspiration and sympathetic to work, which I am sure, will go a long way in my life. I owe sincere thanks, more than what I can express, towards them. I also like to grateful my parents for wishes and moral support during the preparation and all concerned for helping and encouraging me. I am grateful for the many useful comments and suggestions provided by reviewers, which have resulted significant improvements in the final report of paper.

9. REFERENCES

[1] "Design and Development of Attachable Wheel chair Automator " by Prasad M. Kulkarni A from International Journal of Engineering and Technology (IJET)(2018),pp.107-111.

[2] "Design and Implementation of a Smart Wheel chair System for Disabled People" by A.R.A. Arifin, N.A. Tuan Besar, and M.S. Idris from International Journal of Engineering and Advanced Technology(IJEAT)(2019), pp. 96-103.

[3] "Are view on intelligent Wheel chair for Disabled People" by N.P. Nair, R.K.Verma , and V.K. Tiwari from International Journal of Emerging Trends in Engineering Research (IJETER) (2017), pp. 38-44.

[4] "Design of an Attachable Wheelchair Automator for Disabled People" by Dong-Woo Son and Sung-Hyun Cho from International Journal of control and automation (IJCA)(2019),pp. 281-290.

[5] Umesh Badakundri , Shashikant Nimbalkar , Manjunath Satapute , "Multipurpose Agro-Power" Engineering and Technology (2017).

[6] Pratikkumar V. Patel, Mukesh Ahuja, "RESEARCH AND DESIGN OF MULTIPURPOSE AGRICULTURE EQUIPMENT" ,International Research Journal of Modernization in Engineering Technology and Science. (July 2020).

[7] Prof. S.N.WAGHMARE, Prof. Rashmi S.Chimote, "MULTIPURPOSE FARM MACHINE" International Research Journal of Engineering and Technology (IRJET) , (Sept 2016).

[8] P. Baladarshini, S. Monika, N. Dhanalakshmi, Dr. A. Asha ,"DESIGN AND FABRICATION OF UNIVERSAL SEED SOWING MACHINE" , International journal of advanced technology in engineering and science (2017).

[9] Prof. P.V. Butet, Shailesh Deshmukh ,Govind Rai, Chetan Patil ,Vishal Deshmukh , "design and Fabrication of multipurpose Agro system", International research journal of Engineering and Technology (IRJET)(2018)

[10] Patil Nikhil, Shaikh Ajaharuddin ,Deore Ganesh, Choure Ganesh, prof.P.G. Tathe "multipurpose agriculture vehicle" International Journal of Advanced research in computer and communication engineering (IJARCCE)(2018).