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Design and Fabrication of Compact Multiutility Farming Machine

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Abstract - The design and analysis of a compact multi-utility farming machine customized to meet the diverse needs of small and marginal farmers in modern agriculture. The machine integrates multiple processes, including ploughing, harvesting, power tillering, spraying, weeding, and trolley attachment, into a single compact unit, thereby reducing the need for multiple specialized implements and streamlining farm operations. The design process encompasses a complete review of existing farming machinery, ergonomic considerations, and feedback from agricultural experts and end-users. Utilizing advanced engineering principles and computer-aided design (CAD) software, the machine's components are optimized for performance, durability, and ease of use. Special attention is given to ensuring the machine's compactness without compromising its performance or efficiency. A detailed analysis, including structural integrity assessment, power efficiency evaluation, and ergonomic considerations, underscores the viability and effectiveness of the proposed design. By catering to the specific needs of small farms, this compact multi-utility farming machine aims to revolutionize farming practices, empowering farmers to improve productivity and sustainability in their operations.

Keywords: Small Farm; multiutility; Compact; Implements; Ergonomic

I. INTRODUCTION

A. Introduction to Agricultural Mechanization

Agriculture has been a cornerstone of human civilization, supporting economies, societies, and food systems for centuries. Traditionally, farming has been labour-intensive and requires significant human effort for ploughing, sowing, weeding, irrigation, and harvesting. Although manual farming methods have sustained agricultural communities for generations, they are increasingly becoming unsustainable due to various socio-economic and environmental challenges.

Agricultural mechanization the process of using machinery to perform farming operations has played a transformative role in improving efficiency, productivity, and sustainability. Mechanization not only reduces human labour but also enhances precision, conserves time, and optimizes resource utilization, thereby enabling farmers to cultivate larger areas and achieve higher yields. In many developed nations, mechanized farming has revolutionized agricultural operations, ensuring higher productivity and reducing dependency on manual labour. However, in developing countries, particularly in regions dominated by small and marginal farmers, the high cost and complex operation and maintenance requirements of large-scale agricultural machines have hindered their widespread adoption.

The need for compact, affordable, and multi-functional farming machines has grown substantially in recent years, driven by the desire to bridge the gap between traditional farming methods and high-end mechanization. The introduction of Compact Multi-Utility Farming Machines (CMUFM) serves as a viable solution, enabling farmers to integrate multiple agricultural functions, such as ploughing, seed sowing, spraying, and transportation, into a single, cost-effective unit. This innovation aligns with the global push toward sustainable agriculture, reduced labour dependency, and improved economic stability for smallholder farmers.

a. Challenges in Traditional Farming Practices

Despite advancements in modern agriculture, a significant proportion of the world's farming population still relies on traditional methods. These practices are often associated with low efficiency, increased labour costs, and higher susceptibility to climate-related uncertainties. Some major challenges in traditional farming include the following.

1) Labor Shortages and Rising Costs

Agriculture has historically been a labour-intensive sector, requiring significant manpower for various operations, such as land preparation, sowing, irrigation, and harvesting. However, in recent years, rural-to-urban migration, aging farming populations, and declining interest in agricultural labour have contributed to severe labour shortages in many regions. This shortage has not only led to higher wages for farm labourers, but has also resulted in delays in crucial farming activities, ultimately affecting crop yields and profitability.

2) Low Productivity and Inefficiency

Traditional farming methods often lack precision and efficiency, leading to suboptimal seed placement, uneven fertilizer application, and inefficient water usage. These

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inefficiencies contribute to lower productivity per unit of land, limiting farmers' ability to maximize their yields. In contrast, mechanized farming ensures uniform operation, leading to a higher output and better crop quality.

3) Soil Degradation and Environmental Impact

Conventional farming practices, particularly intensive manual tillage and excessive chemical use can lead to soil degradation, erosion, and reduced fertility. Sustainable mechanization, such as precision-based multi-utility farming machines, can help minimize soil disturbance and optimize input applications, promoting long-term soil health and environmental sustainability.

4) Lack of Access to Modern Farming Equipment

In many developing countries, small-scale farmers struggle to afford expensive farming machinery such as tractors, harvesters, and sprayers. Additionally, the lack of infrastructure, training, and financial support limits their ability to adopt mechanized farming solutions. This challenge underscores the need for affordable, easy-to-use, multifunctional agricultural machines that cater to smallholder farmers.

b. The Shift Toward Multi-Utility Farming Machines

Given these challenges, multi-utility agricultural machines have emerged as a practical solution to bridge the gap between manual farming and large-scale mechanization. The compact multiutility farming machine is specifically designed to

- Reduce dependency on manual labour making farming more accessible to all age groups.
- Improve operational efficiency by integrating multiple functions into a single machine.
- Enhance affordability for small and marginal farmers, promoting wider adoption of mechanized solutions.
- Support sustainable agricultural practices by minimizing soil disturbance and optimizing the input application.

The development of compact, lightweight, and energy-efficient farming machines is a crucial step toward ensuring food security, economic stability, and environmental sustainability in modern agriculture. With rapid technological advancements and growing global demand for sustainable solutions, multi-utility farming machines have been set to revolutionize the agricultural sector, empowering farmers with innovative tools to enhance productivity and profitability.

II. EVOLUTION OF MULTI-UTILITY FARMING MACHINES

A. The Historical Development of Agricultural Mechanization

Agriculture has played a critical role in human civilization, supporting the growth of societies by ensuring food security, economic stability, and resource management. Over time, the need for increased productivity and efficiency has driven technological advancements in farming. Initially, traditional agriculture relied heavily on human labour and animal-drawn implements, which were highly inefficient for large-scale food production.

The earliest tools, such as hand ploughs, sickles, and hoes, helped improve farming efficiency to a small extent but required significant human effort. As civilizations grew and farming demands increased, innovations, such as ox-drawn ploughs and irrigation systems, were introduced, marginally improving productivity. However, the real transformation of agriculture began with the Industrial Revolution (18th–19th century), which led to the development of mechanized farming equipment, such as steam-powered tractors, mechanical seed drills, and automated harvesting machines. These innovations have significantly reduced the time and labour required for farming operations, allowing large-scale food production.

By the early 20th century, advances in diesel and gasoline engines led to the widespread adoption of tractors, harvesters, and threshers, which drastically improved farming efficiency. These machines enable farmers to cultivate larger areas, reduce manual labour dependency, and achieve higher yields. However, their high costs, maintenance requirements, and fuel consumption make them less accessible to small and marginal farmers, particularly in developing countries where fragmented landholdings and financial constraints remain significant challenges.

While large-scale mechanization provides immense benefits to commercial agriculture, it also introduces some drawbacks. Overreliance on heavy machinery has led to soil compaction, loss of biodiversity, and increased environmental concerns owing to excessive fuel consumption. Furthermore, small-scale farmers, who constitute the majority of the global agricultural workforce, find it challenging to integrate mechanized solutions due to high purchase costs, lack of technical expertise, and limited land area.

These challenges highlight the need for affordable, compact, and multifunctional farming machines that can be used efficiently on small- and medium-sized farms. The concept of multi-utility farming machines has emerged as a practical alternative, offering farmers the ability to perform multiple farming operations such as ploughing, sowing, fertilizing, and harvesting using a single unit, thereby maximizing productivity while keeping costs low.

B. The Emergence of Multi-Utility Farming Machines

In response to the limitations of traditional mechanization, agricultural engineers and researchers have begun developing multi-utility farming machines designed to cater to the specific needs of small- and medium-scale farmers. These machines aim to integrate multiple farming operations into a single, compact,

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and easy-to-use system, reducing operational costs, fuel consumption, and maintenance requirements.

a. Evolution of Multi-Utility Farming Equipment

The development of multi-utility agricultural machines can be traced through various studies aimed at improving farming efficiency while maintaining affordability and ease of operation. Several studies have highlighted the potential of multipurpose equipment for small-scale agricultural applications.

Several studies have focused on developing multipurpose agricultural machines that combine different farm operations and reduce the need for separate equipment [1]– [6].

Further studies explored multifunctional agricultural machines for operations such as sowing, fertilizer application, digging, and seeding, highlighting their potential to simplify farm operations [7]–[12].

Ashwin Chandran et al. developed a multipurpose farming equipment capable of performing operations such as seed sowing, fertilizer spraying and grass cutting. Their work emphasized simple construction, ease of operation and economical implementation for agricultural use [13].

Chandana et al. presented an advanced solar-operated multipurpose agricultural equipment concept aimed at addressing labour shortages and improving the application of automation in agricultural operations [14].

Dilip Radkar et al. developed a multipurpose agricultural machine that combines several farming operations into a single system, with emphasis on reducing machinery costs and improving accessibility for farmers with small landholdings [16].

b. Key Features of Multi-Utility Farming Machines

Multiutility farming machines incorporate several essential features that make them versatile, efficient, and suitable for small-scale farming. Some key features include the following.

Multi-Functionality

– These machines are designed to perform multiple agricultural tasks, such as tilling, seed sowing, fertilization, pesticide spraying, and harvesting This eliminates the need for separate equipment.

Compact and Lightweight Design

– Unlike large-scale tractors and combine harvesters, multi-utility machines are compact and easy to manoeuvre, making them ideal for small farms, orchards, and fragmented landholdings.

Cost-Effectiveness

– The integration of multiple functions into a single machine reduces the initial investment, making mechanization more affordable for small and medium-sized farmers.

User-Friendly Operation

– Designed for ease of use, these machines require minimal training and technical expertise to ensure accessibility to farmers with limited mechanization experience.

Energy Efficiency and Sustainability

– Many modern multi-utility machines incorporate solar power and fuel-efficient engines, minimizing environmental impact while reducing operational costs.

III. ADVANTAGES OF MULTI-UTILITY FARMING MACHINES OVER TRADITIONAL EQUIPMENT

A. Improved Efficiency and Productivity

By integrating multiple agricultural functions into a single unit, multi-utility farming machines enhance overall efficiency and reduce the time required for farming operations. Unlike traditional methods that rely on separate machines for ploughing, sowing, fertilizing, and spraying a single multi-utility machine can perform all of these tasks with minimal human effort, significantly increasing productivity.

B. Cost Savings and Economic Benefits

One of the most significant advantages of multiutility farming machines is their cost-effectiveness. Traditional mechanization requires farmers to invest in multiple machines, fuel, maintenance, and labour costs, making it economically unfeasible for smallholders. In contrast, multiutility machines consolidate multiple functions, reducing investment and operational costs.

C. Suitability for Small and Medium-Sized Farms

Most small-scale farmers operate on fragmented landholdings where large tractors and heavy machinery are impractical. Multiutility farming machines are specifically designed for such environments, offering the following:

The compact size and lightweight structure, make it easier to maneuver.

Adaptability to diverse crops and terrains.

Lower maintenance costs to ensure their long-term usability.

D. Environmental Benefits and Sustainability

With an increasing global focus on sustainable agriculture, multiutility farming machines are designed as follows:

Reduce soil compaction and erosion by minimizing heavy machinery usage.

Optimize fertilizer and pesticide application, thereby reducing

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chemical overuse.

Incorporate renewable energy sources, such as solar panels, to reduce fuel consumption.

IV. THEEMERGENCE OF MULTI-UTILITY FARMING MACHINES

A. Features and Functionalities of Multi-Utility Farming Machines

Multiutility farming machines are designed to be versatile, compact, and efficient, making them suitable for diverse agricultural tasks. Some of the key features include:

1. Multi-Functionality

One of the primary benefits of multiutility farming machines is their ability to perform multiple tasks using interchangeable attachments. This eliminates the need for separate equipment and reduces the farming costs. It integrates:

Ploughing and tilling mechanisms for effective soil preparation.

Seed sowing attachments to ensure a uniform seed distribution.

Fertilizer and pesticide spraying systems to optimize the nutrient application.

Transportation trolleys for moving the harvested crops and farm materials.

2. Compact and Lightweight Design

Unlike large tractors and combines, multiutility machines are compact and easy to manoeuvre, making them ideal for small fields, orchards, and fragmented landholdings. The lightweight frame of the CMUFM prevents soil compaction and ensures better soil health and crop growth.

3. Cost-Effectiveness

By combining multiple functions into one machine, multiutility farming machines reduce the need for multiple expensive machines, making mechanization more accessible to small farmers. Additionally, their fuel-efficient and energy-saving design further lowers operational costs.

4. Ease of Operation and Maintenance

Multiutility machines are built with user-friendly controls and simple mechanical components, ensuring that farmers with limited technical knowledge can operate them with ease. The machine has low maintenance and is designed for durability and long-term performance.

5. Sustainable and Eco-Friendly Technology

Modern multiutility machines integrate sustainable farming practices, including

Optimized input usage to minimize fertilizer and pesticide waste.

Energy-efficient designs to reduce fuel consumption.

Future scope for renewable energy integration, such as solar-powered attachments.

By adopting precision-based agricultural techniques, multiutility farming machines contribute to environmentally friendly and resource-efficient farming.

B. Role of Multi-Utility Farming Machines in Small-Scale Agriculture

Bridging the Gap Between Traditional and Modern Farming

Small-scale farmers often struggle to afford high-cost machinery and rely on labour-intensive traditional methods that are time-consuming and inefficient. Multi-utility farming machines serve as the middle ground, offering

A low-cost alternative to expensive tractors and mechanized tools.

Increased farming efficiency by reducing dependency on manual labour.

Customizable attachments, allow farmers to adapt the machines to different crops and field conditions.

Enhancing Crop Yield and Agricultural Productivity

The compact multiutility farming machine plays a crucial role in improving crop yield and productivity through the following:

Precision seed sowing to ensure optimal germination and plant spacing.

Efficient soil preparation, which enhances aeration and moisture retention.

Controlled fertilizer application, minimizing waste, and promoting soil health.

By reducing manual errors and optimizing agricultural inputs, these machines help increase crop yields while lowering production costs, thus making farming more profitable for small-scale farmers.

V. METHODOLOGY

The methodology for fabricating the compact multiutility farming machine is described below. As shown in Fig.1, the flowchart outlines the methodology for fabrication

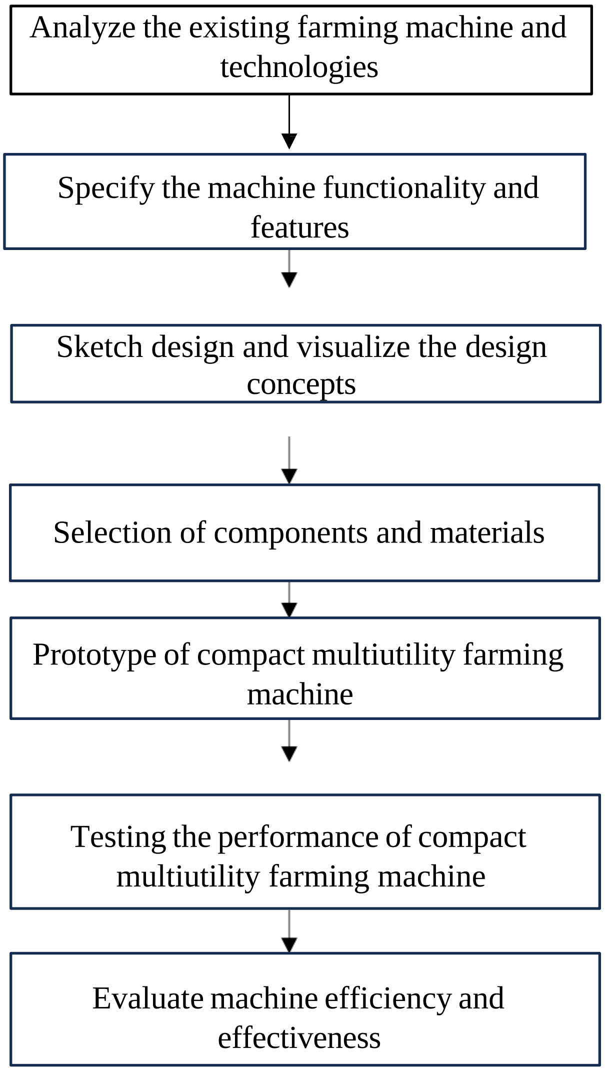

Fig. 1. Methodology for fabrication

VI. RESULT AND DISCUSSION

TABLE I
TILLAGE EFFICIENCY OF COMPACT MULTI UTILITY FARMING MACHINE

Time interval(in min)	Area Tilled (m^2)	Efficiency (m^2/ min)	Efficiency(%) (Compared to 7 Hp weeder)
0-10	110	11	61.11
10-20	120	12	66.67
20-30	100	10	55.56
30-40	130	13	72.22
40-50	90	9	50.00
Total	550	11(avg)	61.11

Final efficiency calculation

Efficiency=550 m^2/50 min =11 m^2

Efficiency percentage=(11/18) x 100= 61% Conclusion

Compact multi utility machine has an efficiency of 61.11% compared to the 7HP petrol weeder.

It covers less area per minute due to the weight-based mechanism.

Efficiency varies with operator weight-a heavier operator may slightly increase tilling depth

Tilling efficiency of Manual power weeder

TABLE II
EFFICIENCY OF MANUAL POWER WEEDER

Time interval(in min)	Area Tilled (in m^2)	Efficiency (m^2/min)	Efficiency(%) (compared to 7 Hp weeder)
0-10	70	7	38.89
10-20	75	7.5	41.67
20-30	60	6	33.33
30-40	80	8	44.44
40-50	65	6.5	36.11
Total	350	7(avg)	38.89

Final efficiency Calculation

Efficiency=350 m^2/50 min=7 m^2

Efficiency percentage=(7/18)x100=38.89%

TABLE III

COMPARISON OF EFFICIENCY

Machine Type	Average Efficiency (m^2 /min)	Efficiency(%) Compared to 7 Hp
Manual power weeder	7	38.89
Compact multi utility farming machine	11	61.11

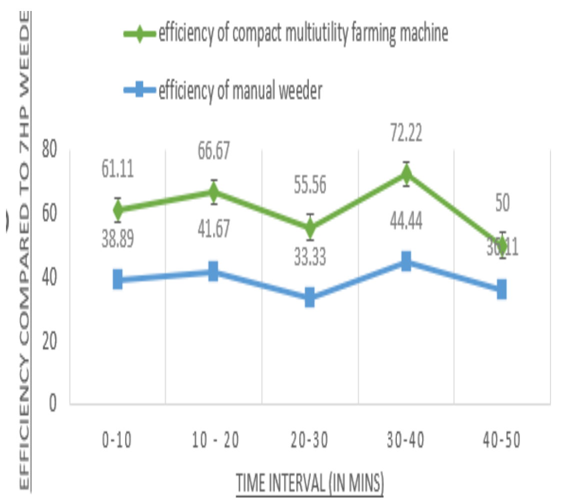

Fig. 2. Comparison of tillage efficiency with time interval

Observations

Compact multi utility farming machine (II m^2/min) is 57% more efficient than a manual power weeder (7m^2 / min).

TABLE IV

FUEL CONSUMPTION OF THE MACHINES

Machine type	Fuel Type	Fuel Consumption(l/hr)	Fuel Consumption for 1 acre (Liters)
Manual power weeder	Human /Minimal petrol	0.5-0.8 L/hr(Petrol Powered)	5-8L
Compact Multi utility farming machine	Petrol	1.2-1.5L/hr	7-9L

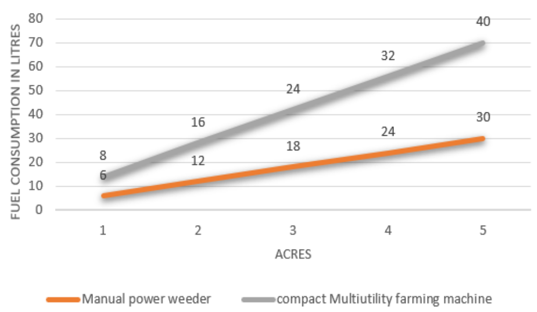

Fig. 3. Fuel consumption per acre Observations

Compact Multiutility farming machine consumes more fuel due to its higher speed and tilling power

A Manual Power weeder is more fuel-efficient but slower, requiring more workers.

TABLE V

LABOR EFFORT COMPARISON

Factors considered

1. Operator Fatigue
2. Ease of use
3. Time spent per acre

Machine Type	Operator Fatigue (1-10 scale)	Labor requirement (Worker per acre	Total Labour time (Hours per acre)
Manual Power weeder	8-9 (High fatigue)	!-2 workers	10.4 hours
Compact Multiutility Farming Machine	4-5 (Moderate Fatigue)	1 worker	5.6 hours

Observations

A Manual power weeder requires significantly more efforts due to normal pushing and guiding.

Compact multiutility farming machine requires nearly 50% less labour time.

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TABLE VI

SEED DISPERSION CALCULATION AND EFFICIENCY COMPARISON

Parameter	Machine sowing	Manual sowing
Speed(km/hr)	25	2-3
Seed dispersion rate	1570.8cm^2/min	300cm^2/min
Labour required	Low	High
Accuracy	Controlled flow	Uneven
Fatigue factor	Minimal	High

1. Data for machine sowing Hopper shape:

Square pyramid Lower opening=2x2 cm

Top opening=15x15 cm Hopper

height =6 cm

Driven pulley: Holes: Two holes,180degree apart

Hole radius: 1cm

Area of one hole A= πr^2=3.14cm^2

Machine speed: 25km/hr

Chain drive rotation is connected to machine shaft.

2. Seed dispersion calculation

The number of seed dispersed per unit time depends on Pulley rotation speed(NN)(RPM).

Seed flow rate through holes. Shaft rotation: N^s

rpm

Gear ratio(G) chain drive reduce ratio Pulley rotation:

NP=N^s GNP=GNS rpm Dispersion per rotation=2xA

Seed dispersion per minute=1570.8cm^2 Seed dispersion

per second=26.18cm^2

1570.8cm^2 of seed area is dispensed per minute, assuming a shaft speed of 500rpm and a gear ratio of 2.

3. Efficiency comparison of machine and manual sowing

Machine sowing is 5x more efficient than manual sowing in terms of seed dispersion rate.

Labour effort is reduced significantly, allowing larger field coverage in less time.

Pulley hole area calculation

Step1:

Each hole on the pulley has a radius of 1 cm, so its area is: A= πr^2

=3.14 x $(1)^2$= 3.14cm^2 A=πr =

3.14x$(1)^2$

A = 3.14cm^2

There are two holes per rotation (180° apart), so total area released per rotation:

Total hole area per rotation = 2x3.14

= 6.28 cm^2

Step2:

Pulley Rotations per Minute Given shaft

RPM = 500 RPM

Given gear ratio = 2 (pulley rotates at half the shaft speed)

Pulley RPM =500/2= 250 rpm Step3:

Seed dispersion per minute =Pulley RPM

×Total hole area per rotation

Seed dispersion per minute=Pulley RPM× Total hole area per rotation=250x6.28

=1570.8 cm^2/min.

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Updated Load Carrying Efficiency with Operator Weight

1. Data for trolley Load Capacity: 126 kg

Operator Weight: 60 kg Engine Power: 7

HP (Petrol) Total weight on machine:

Total Load=Trolley Load+ Operator Weight

If the trolley is fully loaded (126 kg)

Total Load = 126 + 60

= 186 kg

2. Power Requirement Check

1HP= 746 Watts

7HP= 7x746= 5222 watts

Power needed to move 186 kg depends on rolling resistance and terrain.

Assuming flat terrain, rolling resistance = 0.02 × Weight × Gravity:

F resistance = 0.02x186x9.81

= 36.5N

Power needed to overcome this force at 5 km/h (1.39 m/s field speed):

P = F x v =36.5 x 1.39

= 50.7W

This is much lower than the 5222 W engine capacity, meaning the engine can handle the load comfortably.

TABLE VII

UPDATED LOAD CARRYING EFFICIENCY TABLE

Load type	Trolley Load (kg)	Operator weight (kg)	Total weight	Efficiency (%)
Light seeds	40	60	100	79%
Medium fertilizer	90	60	150	92%
Heavy soil/ sand	126	60	186	95%
Over load (risky)	150	60	210	Over loaded

The engine can efficiently handle the max trolley load (126 kg) + operator weight (60 kg).

Efficiency decreases if the trolley isn't fully loaded, meaning underutilization.

Overloading (above 186 kg) risks structural damage and reduced performance.

VII. CONCLUSION AND FUTURE SCOPE

These multifunctionality farming machines are a total game changer for modern farmers. They are designed to do it all operation, which includes seed sowing, ploughing, and weeding along with trolley attachment. This means the farmer can save time, money, and effort by using this compact farming multiutility farming machine instead of several specialized ones. These machines are especially great for small to medium-level farmers to do their work more easily, as they help increase efficiency and productivity. They are also more cost-effective since you don't have to buy and maintain several different pieces of equipment. They also take up less storage space, which is always the main advantage for a farmer. One of the best things about these multiutility machines is that they are versatile enough to handle a variety of crops and farming conditions. They are built with modern technology that helps optimize the various operations, which is great for the environment and agricultural practices.

The compact multiutility farming machine is a pioneering innovation that consolidates multiple agricultural functions into a single, compact unit, revolutionizing the farming landscape. By seamlessly integrating various farming operations. This machine empowers farmers to optimize their workflow, significantly reducing cost and boosting productivity, where resources and labour are limited, allowing farmers to cultivate their land more efficiently and effectively. Moreover, the incorporation of these operations enables farmers to optimize resource utilization, minimize waste, and promote eco-friendly agricultural practices, contributing to environmental sustainability while enhancing profitability. Ultimately, the compact multiutility farming machine is poised to transform the agricultural sector, offering a versatile, efficient, and sustainable solution for modern farmers seeking to streamline operations, improve productivity, and promote environmentally conscious farming practices.

The agricultural sector has witnessed numerous innovations over the years, but few have created an impact as the compact multiutility farming machine. This revolutionary device has transformed the way farmers approach their daily tasks, streamlining their operations, and boosting their productivity. This not only reduces the need for separate machines but also saves valuable space and resources. The machine's compact design and versatility make it an ideal solution for small to medium-level farms, where resources are often limited. This machine enables farmers to optimize their operations, reducing waste and minimizing environmental impact. This is particularly significant in the increasing importance of sustainable agricultural practices. By adopting the compact multiutility farming machine the farmers can contribute to a more effective production system. The impact of the compact multiutility farming machine extends beyond the farm itself with far-reaching implications for the agricultural sector. By increasing efficiency and productivity. Farmers can reduce costs and improve profitability. This can lead to greater stability and improved livelihoods for farming communities. The future scope of the compact multiutility farming machine is incorporating Artificial intelligence algorithms to enable predictive maintenance, automated decision-making, and real-time monitoring.

REFERENCES

[1] Patel, R., & Patel, R. (2014). Design and development of multipurpose agricultural equipment. *International Journal of Engineering Research & Technology*, 3(4), 500–504

[2] Sharma, S., Gupta, V., & Singh, A. (2015). Development of a low-cost multi-purpose agricultural machine. *International Journal of Engineering Research and Applications*, 5(6), 91–94

[3] Shinde, S., Deshmukh, R., & Kharade, S. (2016). Review paper on multiutility agricultural equipment. *International Journal of Technical Research and Engineering*, 3(10), 1900–1903.

[4] Khan, M. A., Shaikh, I., & Momin, R. (2017). Design and fabrication of multi-purpose agricultural equipment. *International Journal of Innovative Engineering and Research Technology*, 4(2), 112–116.

[5] Gawande, N., Jadhav, P., & Yadav, S. (2015). Fabrication of a multi-purpose agricultural vehicle. *International Journal for Innovative Research in Science & Technology*, 1(11), 112–114.

[6] Kale, M., Shinde, R., & Pawar, A. (2016). Design and development of agriculture equipment for multipurpose use. *International Research Journal of Engineering and Technology*, 3(3), 786–789.

[7] Singh, D., Verma, N., & Sharma, A. (2015). Development of multi-function agriculture machine. *International Journal of Modern Trends in Engineering and Research*, 2(4), 284–288.

[8] Yadav, R., Sharma, A., & Gupta, S. (2014). Design and fabrication of agricultural equipment for seed sowing and fertilizer distribution. *International Journal of Research in Engineering and Technology*, 3(5), 344–347.

[9] Naik, A., Patil, N., & Joshi, R. (2017). Multipurpose farming machine. *International Journal of Scientific Research and Development*, 5(2), 1881–1884.

[10] Bhosale, R., Kadam, R., & Deshmukh, S. (2015). Design and fabrication of agricultural equipment for digging and seeding. *International Journal of Advance Research and Innovative Ideas in Education*, 1(3), 234–238.

[11] Karthick, Kiran Ramanagowda, Manish, Manoj Kumar. ''Design and FabricationofMultiutility motorcycle for agriculture purpose", International ResearchJournalofAdvance research and Innovative Ideas in Education. 2019.

[12] Shivam Rai, Navneeth Rai, Deepesh Yadav.''Multipurpose Agriculture Mac hine".International Journal of Creative Research Thoughts. July, 2021. 4.

[13] Ashwin Chandran, Varun Krishna**,** T.V.Arjun, Vignesh, Nithin Joshua. ''Fabrication of Multipurpose Farming Equipment''. International Journal of Research in Engineering and Science. August 2020.

[14] Chandana N C, Chethan Kumar V U, Mahadeva prasad GB, Shiva Kumar M. ''Advanced Solar Operated Multi-Purpose Agricultural Equipment". International Journal of Engineering and Advanced Technology. 2021.

[15] P.V. Prasad Reddy, M. Yadi Reddy. ''Development of a Multi-Purpose Agricultural Vehicle by using solar power". International Journal of Engineering andTechnology.2021.

[16] Prof. Dilip Radkar, Goraksh Choughule, Abhijeet Desai, Prathamesh Gawand, Pradip Bade, Yogesh Chaudhari. ''Multipurpose Agriculture Machine".

[17] Varshitha , Bharath, Ruchitha S,Sudeep.''Multipurpose Farming Machine Using Solar Energy". International Journal of Creative Research Thought. 2022.\