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Fabrication of Soil Tiller for Weeding process

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ABSTRACT:-

The project is related to Agriculture industry. When we observe the Agricultural industry economically, farmers facing so many problems to purchase tractors and cultivator related costly equipment's. These type of problems can avoid by encouraged us to do the project based on the specific works of soil tiller equipment.

In this equipment we have made some design modifications and analysis in commercially available(existing) tillers by applying our Mechanical Engineering and Technological knowledge. The development of equipment can be used as a tool for different various soil conditions.

Keywords:- Two Stroke Power Engine Powered tiller,Small scale forming equipment ,house gardening, tools, blades, etc.

I – INTRODUCTION :

Now a day's farmers are unhappy to spent money for weeding process, because of one reason raises in Laboure costs. To overcome this problem, we made an soil tiller for weeding process ,It is a Engine operated mechanism .The soil tiller is mainly used in agriculture sector for preparing a weed removing process. Weeding is one of the important and Laboure intensive agricultural operation which affects the yield of the crop. The weeds are undesirable, unwanted plants, which grows plentifully in the field and possess competition to the crop for nutrients, moisture, space and solar radiation. Delay and negligence in weeding operation affect the crop and increase Laboure cost . In the weeding operation is carried out with indigenous hand tools like hand hoe and spade. Straight blade hoes and triangular blade hoes made by black smiths and village artisans are traditionally used and penetration of advanced method of weeding is still yet to be practiced. In spite of many tools available, the farmers are still practicing the manual uprooting of weeds, which is Laboure intensive and costly. The most common methods of weed control are mechanical, chemical, biological and cultural methods out of which mechanical weed control involves weeding the whole crop area, or it may be limited to selective inter-row or intra row weeding.

Therefore, the present work has been planned with the following specific objectives:

1. To develop an economical small-scale power operated weeder suitable for small farm holder in Egypt.
1. Study the performance of the weeder and its new designed vertically rotating blades as new concept for mechanical weed control.

Weeding is the removal of unwanted plants in the field crops. Mechanical weed control is very effective as it helps to reduce drudgery involved in manual weeding, it kills the weeds and also keeps
the soil surface loose ensuring soil aeration and water intake capacity.A weed is essentially any plant which grows where it is unwanted. A weed can be thought of as
any plant growing in the wrong place at the wrong time and doing more harm than good .It is a plant that competes with crops for water, nutrients and light. This can reduce crop production. Some weeds have beneficial uses but not usually when they are growing among crops.
Weeds decrease the value of land, particularly perennial weeds which tend to accumulate on long fallows; increase cost of cleaning and drying crops (where drying is necessary). Weeds waste excessive proportions of farmers' time, thereby acting as a brake on development.

Cultivator Functions are:

- To inter-culture the soil.
- Remove the unwanted plants in the field.
- To increase Aeration of the soil for higher yields.
- To Preserve moisture content by mulching the soil.
- To sow seeds when it is provided with sowing attachments.
- To avoid surface evaporation.

II-LITERATURE SURVEY

The fabrication of a soil tiller for the weeding process would involve reviewing existing research, patents, and industry practices related to agricultural machinery design and weed management. Here are some key areas to consider:

1. *Weeding Techniques:* Investigate different weeding techniques such as mechanical weeding, thermal weeding, and chemical-free methods like precision cultivation. Understand the advantages and limitations of each technique in terms of effectiveness, cost, and environmental impact.

2. *Existing Soil Tiller Designs:* Study existing soil tiller designs, including rotary tillers, power harrows, and specialized weeding implements. Analyze their features, performance in weed control, and adaptability to different soil types and farming practices.

3. *Innovations in Agricultural Machinery:* Look for recent advancements in agricultural machinery related to weed management. This could include developments in robotic weeders, sensor-based technologies for weed detection, and integrated systems for precise and automated weeding.

4. *Materials and Manufacturing Processes:* Explore materials used in soil tiller fabrication, such as steel, aluminum, and composite materials. Evaluate manufacturing processes like welding, machining, and 3D printing for their suitability in producing cost-effective and durable tiller components.

5. *Cost-Effective Solutions:*

Identify studies or case studies focusing on cost-effective solutions for small-scale farmers or community-based agricultural projects. Consider factors like affordability, ease of maintenance, and scalability of the fabricated soil tiller for different farming contexts.

6. *Environmental Impact:* Examine research on the environmental impact of various weeding and tillage practices. Look for strategies that promote sustainable weed management, reduce soil erosion, and minimize chemical inputs in agriculture.

By conducting a comprehensive literature survey in these areas, you can gain valuable insights and inspirations for designing and fabricating a soil tiller specifically tailored for the weeding process.

III- WORKING PROCESS

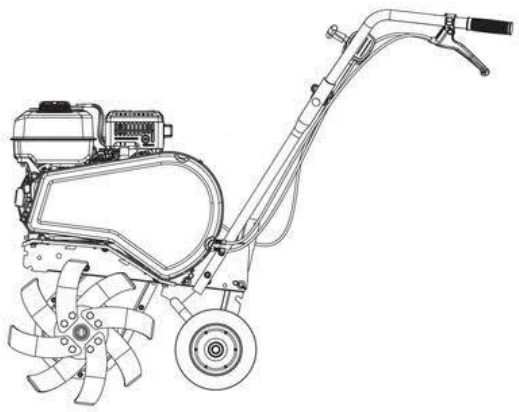
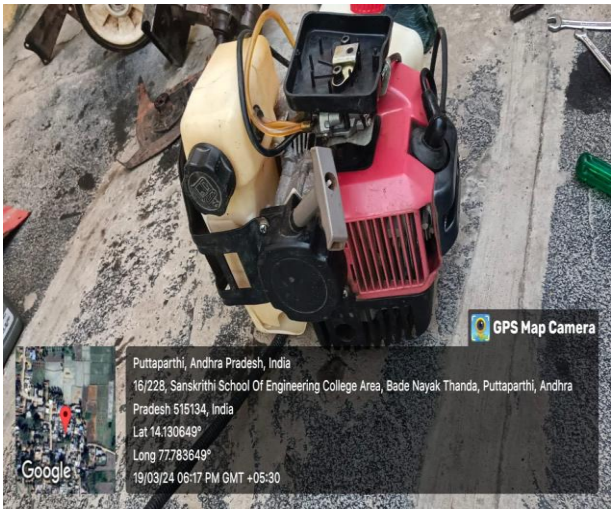


Fig.1- Schematic representation of Soil Tiller

The intercultural blades tap power from the geared Direct power from Engine with 7000 rpm. The rotating blades continuously remove the unwanted plants and the Rotavator is propelled forward with help of Engine. Depth of imbecilitating is adjusted by means of the screw and nut mechanism with the help of the rotor rod. The working diameter of the weeding mechanism should be as small as possible to operate within the crop row. The weeding mechanism should not be required to work at a depth more than 40-60 mm because early growth stage weeds have not penetrated deeply into the soil. Development of equipment which allows different categories of tasks: Removal of weeds, aeration of the root zone, creating soil mulch.

IV-WORKING COMPONENT



Engine;

An engine is a mechanical device that converts various forms of energy into mechanical energy, typically to perform work such as powering a vehicle or generating electricity. It often involves the combustion of fuel to produce power, although there are other types of engines that use alternative energy sources such as electric motors or compressed air. Engines can vary widely in size, complexity, and application, from small internal combustion engines in cars to massive turbines in power plants.

The Engines are crucial components in soil tillers as they provide the power necessary to drive the tiller's cutting or digging mechanisms. Here are some key uses of engines in soil tillers:

1. *Powering Rotating Blades or Tines:* Soil tillers often use rotating blades or tines to break up and cultivate soil. The engine provides the rotational force needed to drive these blades or tines through the soil, effectively tilling the land.
2. *Adjusting Depth and Speed:* Modern soil tillers may have adjustable settings for depth and speed. The engine powers mechanisms that allow users to control how deeply the tiller digs into the soil and how quickly it moves across the ground.
3. *Driving the Tiller:* In self-propelled tillers, the engine also serves to drive the machine forward or backward, enabling operators to maneuver the tiller effectively over the terrain.
4. *Auxiliary Functions:* Engines in soil tillers may also power auxiliary functions such as hydraulic systems for adjusting blade angles, lifting mechanisms for transport, or even electrical systems for onboard controls and monitoring.

Overall, engines play a vital role in soil tillers by providing the necessary power and functionality to effectively prepare and cultivate the soil for various agricultural and landscaping purposes.

B .Frame;

The frame of a soil tiller plays a critical role in providing structural support, weight distribution, vibration dampening, attachment versatility, and safety, all of which contribute to the efficient and safe operation of the machine in various agricultural and landscaping applications.

The frame of a soil tiller serves several important functions that contribute to the overall efficiency and effectiveness of the machine:

1. *Structural Support:* The frame provides structural integrity and support to the entire soil tiller assembly. It holds all the components together, including the engine, transmission, cutting blades or tines, and any other attachments or accessories.
2. *Weight Distribution:* A well-designed frame helps distribute the weight of the tiller evenly, ensuring stability and balance during operation. Proper weight distribution is crucial for preventing tipping or excessive bouncing, especially when working on uneven terrain.
3. *Vibration Dampening:* The frame may incorporate features such as vibration-dampening mounts or materials to reduce the transfer of vibrations from the engine and moving parts to the operator or other components. This improves comfort for the operator and reduces wear and tear on the machine.
4. *Attachment Points:* The frame often includes attachment points or mounting brackets for various accessories or implements, such as additional blades, seeders, or fertilizer spreaders. This versatility allows the soil tiller to perform a range of tasks beyond basic tilling, such as planting and fertilizing.
5. *Safety:* A sturdy frame is essential for safety, as it provides a protective barrier between the operator and the moving parts of the tiller. It may also include safety features such as guards or shields to prevent accidental contact with rotating blades or tines.

C . Rotary blades;

The rotary blades are indispensable components of soil tillers, playing a central role in soil preparation, weed control, soil mixing, and seedbed enhancement for various agricultural and landscaping applications.

Rotary blades in a soil tiller are essential components that perform several key functions:

1. *Breaking Up Soil:* The primary function of rotary blades is to break up compacted soil and clumps. As the tiller moves forward, the rotating blades penetrate the soil, cutting through it and breaking it into smaller, more manageable pieces. This process is crucial for preparing the soil for planting by improving aeration, drainage, and root penetration.
2. *Mixing and Incorporating Amendments:* Rotary blades can also mix organic matter, fertilizers, and other soil amendments into the soil. By blending these materials thoroughly, the tiller ensures that nutrients are evenly distributed, promoting healthy plant growth.
3. *Weed Control:* As the blades churn through the soil, they help control weeds by uprooting and cutting them. This is particularly effective in smaller tillers designed for garden beds and smaller plots where weed management is essential.
4. *Leveling and Smoothing:* Depending on the design and adjustments of the tiller, rotary blades can contribute to leveling and smoothing the soil surface. This is beneficial for creating even planting beds and reducing surface irregularities.
5. *Loosening Compacted Soil Layers:* In addition to breaking up surface soil, rotary blades can penetrate deeper to loosen compacted soil layers. This improves root penetration, water infiltration, and overall soil health.
6. *Enhancing Seedbed Preparation:* By creating a well-aerated, finely textured seedbed, rotary blades help optimize conditions for seed germination and early plant growth. This is crucial for achieving uniform plant emergence and establishing healthy crops.

V- IMPLIMENTATION :

Fig. plowing equipment

In Fabrication of soil tiller we are implementing the plowing system .by this plowing system we can easily remove the weed in crop rows

plowing in a soil tiller is a critical step in soil preparation, providing a foundation for successful crop production by improving soil structure, nutrient availability, water infiltration, and seedbed quality.

The plowing system in a soil tiller typically involves a set of rotating blades or tines that penetrate the soil to break it up and prepare it for planting. These blades can be attached to a shaft or drum, which is powered by an engine or motor. The depth and angle of the blades can usually be adjusted to suit different soil types and depths.

VI RESULT & CONCLUSION

The soil tiller is a capable to crushing Soil properly in skill agricultural Process. Mainly in small scale agricultural Process.By Using Soil tiller, we remove Unnecessary plants from flow. All types of soils we crushing properly and Make the soil soft.

Soil tiller is Our project is successfully implemented for emphasizes on minimization of harmful efforts of using the manual equipment's.. This system requires less initial investment and it gives the energy output for life time with low maintenance etc. Here in our project, we conclude that by using this machine we reduce the manpower, risk, and cost. Our main intention is to help the farmers.

From the various reference we come to conclusion that Fabrication of Soil tiller is more advantage than other manually operated equipment's. the soil tiller was worked entirely based on Engine 50CC 2HP 2 stroke engine.Hence, we decide to developed the solar powered blade harrow equipment which is beneficial for farmer in their agricultural work.

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