Annals of R.S.C.B., ISSN:1583-6258, Vol. 24, Issue 2, 2020, Pages. 184 - 189
Received 24 October 2020; Accepted 15 December 2020.

# Engine Powered Modified Earth Auger Machine

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**Abstract**: Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers have to implement the new techniques which will not affect the soil texture but will increase the overall crop production. Conventionally digging a deep holes or larger diameter holes requires more work and rime.so in order to reduce this losses we are planning to design a post hole digger machine Post hole digger machine is used to reduce the man work and time for digging holes. These holes can be used for fixing engine and different plantation such as rubber plant, coconut, sugar cane etc.

**Keywords*:*** *Plantation, 50 CC Petrol Engine, spring,Wheels, Auger bit*

## I. Introduction

The soil digging machine which is used for plantation of smaller saplings. This machine uses the principle of auger drilling machine which is used in pile foundation during construction. The auger drill is made of required size by scaling down its original size as per the requirement. The engine serves as a power source for digging the soil.

The rotor can be rotated in anti-clockwise direction. This makes the auger to drill hole in the soil. This machine is designed for a preliminary aim of avoiding the use of shovels & levers in plantation of saplings thereby enhancing the plantation process by making it facile.Production of agriculture is one of the mostly discussed problems as a significant part of our population. Agriculture plays a pivotal role in Indian economy. We have inequalities of poverty and unemployment in health, education and agricultural sectors. Small scale farming which is the subject of this paper is important for increasing the growth in agriculture and food security. It may be noted that Indian agriculture is home to small and marginal farmers [80 percent],Agriculture census shows that in India there are about 121 million farmers, about 99 million are small farmers. Here the main purpose of this project is to reduce farmer's work and time consumption.

The auger drill is made of required size by scaling up and down its original size as per the requirement. The machine can be transported easily since there are wheels which are provided at the front of the frame. The machine is made of mild steel material since it should withstand a higher impact loading. The engine power is brought down to the shaft using spur gear arrangement. The greater advantage in this machine is that it digs only the required area and also does the same in very minimum time.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 24, Issue 2, 2020, Pages. 15636 - 15644
Received 24 October 2020; Accepted 15 December 2020.

**Fig. Shovel operated dig**

**Fig. Tree plantation**

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## I. Objectives

The objectives of fabrication a system for Engine Powered Soil Digging Machine is:

1)To make a portable machine with the use of Engine as a power source.

2) Low cost as compare to existing engine operated machine.

3) To Improveand optimizing the presentprocedure to simplicity and availability.

4) Minimize the time and effortrequired by arranging simple mechanical mechanisms.

5)To Developed machine which will require less labour and which can be operate with unskilled operator.

6)Minimize the time required by using simple mechanical mechanisms.

In short objectives are:

- Efficient
- User-friendly
- Transportable
- Cost-effective
- Reduce repetitive task
- Functional requirement of proposed system

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## II. Methodology

- Considering various problem identification and study of current system find alternative method of making dig in soil.
- Study of the Literature for the soil digging machine.
- Considering the ergonomics and aesthetics factor in mind, Select the shape and size of project.
- Our focus on to make this machine portable, we are trying to eliminate excess parts of machine and make it less bulky and light in weight.
- We are trying to keep its operation as simple as possible.
- Selection of material and components utilized in fabrication such as 50 CC Engine, spring, Wheels, auger bit, frame etc.
- Selection of size of equipment as the requirement.
- Finding the different components for experimental set up according to design.
- Performance on the experiment set up.

## III. Equipment's

### 1) 52 CC ENGINE

| Model | 2.0HP |
|---|---|
| Diamensions | L:270mm,B:220mm,H:915 mm |
| Weight | 11.5KG |
| Full throttle operating range | 4500-5500 RPM |
| Maximum output | 1.8/2.2Kw/2.0HP |
| Idling speed | 1100-1500 RPM |
| Type | Two Stroke |
| Displacement | 52cc |
| Bore X Stroke | 44x35mm(1.73x1.37in) |
| Ignition system | CDI |
| Spark plug | NKG BR7HS-10 |
| Spark plug Gap | 0.6-0.7mm |
| Control system | Tiller Handle |

| Starting system | Manual tilt |
|---|---|
| Starting carburation system | Choke valve |
| Gear position | Forward-Neutral |
| Gear ratio | 2.08 (27:13) |
| Trim and Tilt system | Manual tilt |
| Recomanded fuel | Unlead Gasoline |
| Blended fuel oil ratio | 25:1 |
| Gear oil | 0.075L |
| Fuel tank capacity | 1.5L |
| Torque | 5.5N.m/2500rpm |
| Propeller | 7.25X5-A |
| Fuel consumption | 1.5L/h |
| Packing size | 92*39.5*30CM |

**2) FRAME:** -Square Hollow sections have many characteristics, such as high tensile strength, durability, resistance to corrosion, and efficiency. These materials of high strength are used for construction and other engineering purposes. The hollow sections in steel are available in different shapes, dimensions, and widths and are square, rectangular, and circular. These products are tested using different parameters such as bending, flattening, and drift expansion.

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These hollow sections of stainless steel are made of high-end raw materials and machinery. These products are standard in length and size and can be customized according to customer request. This product has different finishes, including galvanized, polished and lacquered. The hollow sections of the square vary in length between 12 to 40 mm. The processes of manufacture include cold drawing, welding,

TIG / Plasma, and many more. Brief finishing and milling are the basic surface condition. For many business leaders, these products of hollow squares of stainless steel are much recommended. They are produced according to national and international standards of quality.

**Cold Formed Square Hollow Section Specification**

**Standard:** BS EN 10219 - Cold Formed Welded Structural Hollow Sections of Non-alloy and Fine Grain Steels

**SHS (Square Hollow Sections) Sizes:** 25.4*25.4sqmm

**Wall Thickness:** 4mm

**Length:** 1524mm

**Type:** Seamless / Welded / ERW

**Dimensional Tolerances:** (+/- 5%)

1) Low cost
2) Long life
3) High reliability

**3. WHEELS: -**Diameter 457.2mm, Material: - Rim Material: - Steel
While they are most commonly found on children's bicycles, 457.2mm wheels are generally the smallest bicycle wheels you'll see on adult bikes. They are used on some adult folding bicycles in order to offer a compact folded size, but they sacrifice ride quality as a result. While they are perfect for the young ones just learning to stay upright, 457.2mmwheels don't fare well over bumps or rough roads. The smaller the wheel, the more it will be affected by even small debris and rocks, and potholes can swallow a 457.2mmwheel whole.

The handling and feeling of riding a bike with 457.2mm wheels will be considerably different than the full-size adult bike you're used to. The turning radius and wheel base is smaller, which can result in overly sensitive steering. Smaller wheels also require larger gear ratios to get them turning fast enough to keep up with other bikes. This makes hill climbs considerably more difficult.
MATERIAL: Iron, rubber and high-strength steel, anti-shedding rubber tire. Strong and sturdy, offering more security and stability.
Features: Easy to install and remove. Durable and easy to clean.

**4. AUGER BIT:-**The auger drill is usually made out of shaft which has shovel blades surrounding it. The normal auger drill is usually made for a size of 6"whole diameter and 8m depth since it is being employed for pile making purpose.

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In our case the purpose is to make a hole of 152.4mm hole diameter so the auger is scaled up to a smaller size having the diameter suited for the above purpose and a depth of 762mm.
As per requirement of various size of dig the dimensions of auger bit can be scaled up and down.

**5) SPRING**: Type of spring: Helical CompressionSpring, Wire Diameter: 4mm, Diameter: 20mm, FreeLength: 304.8mm.
A spring is an elastic object that stores mechanical energy. Springs are typically made of spring alloy steel. There are many spring designs. In everyday use, the term often refers to springs.

When a conventional spring, without stiffness variability features, is compressed or stretched from its resting position, it exerts an opposing force approximately proportional to its change in length (this approximation breaks down for larger deflections). The rate or springconstant of a spring is the change in the force it exerts, divided by the change in deflection of the spring. That is, it is the gradient of the force versus deflection curve. An extension or compression spring's rate is expressed in units of force divided by distance, for example or N/m or lbf/in. A torsion spring is a spring that works by twisting; when it is twisted about its axis by an angle, it produces a torque proportional to the angle. A torsion spring's rate is in units of torque divided by angle, such as N·m/rad or ft·lbf/degree. The inverse of spring rate is compliance, that is: if a spring has a rate of 10 N/mm, it has a compliance of 0.1 mm/N. The stiffness (or rate) of springs in parallel is additive, as is the compliance of springs in series.

Springs are made from a variety of elastic materials, the most common being spring steel. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after fabrication. Some non-ferrous metals are also used including phosphor bronze and titanium for parts requiring corrosion resistance.

## IV. Literature Survey

Several studies were reported and held successfully recently due to the awareness created by Government and Non-Governmental organizations on the importance of green resources and tree plantation and automation in agriculture field.

Amle Kishore E.,Lohote Shiram T., Ghule Vaibhav M.,Bahirat Sagar S. ,Jahind Polytechnic, India, Tractor Operated Auger, IJSRD – In this paper Journal it describes about the methodology used for the manufacturing of Auger machine and material and used for the manufacture. It also describes about the design of auger which includes the calculations like power, torque required, determination of shaft diameter based on strength, resistance to twisting method, transmission of torque approach. In this regard, the project's main objective is to meet the needs of small scale farmers, reduce operating time and manufacturing costs.

Vaibhav Shinde, Akshata Goankar, Mayuri Gavankar, Siddhnath Shetkar, Prof. M.T.Sawant., S.S.P.M college of engineering, Kankavli, Powered Soil Digging Machine, IJTRE- this journal describes about the problems faced by the farmers using agriculture tools.

International Conference on Systems, Science, Control, Communication, Engineering and Technology
20457.2mm [ICSSCCET 20457.2mm] Semi-Automated Soil Digging Machine for Sapling Plantation SaiKrishnan D1, Sakthivignesh K2, Balaji P3, Brailson Mansingh B4 International Journal Of Research In Advent Technology, Vol.5, No.5, May 2017 E-Issn: 2321-9637.

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## V. Conclusion

Innovative soil digging equipment's has exceptional influence in agriculture and sapling plantation. By using this innovative project of soil digging machine we can save more time required for digging process and additionally it reduces lot of labour cost. It is very helpful for large scale tree plantation program and making portable wall compound around the farm. After comparing the distinctive method soil digging and restrictions of the existing machine and from the experimental validation and theoretical analyses it is found that the above project is feasible and can be extensively used in Plantation of Sapling. We have identified the best auger drill design and material such that it operates effectively. During the design process we have intuitively guessed the value of torque required to dig a hole and found the guessed the value to be satisfactory and hence its saves work requirement so as labour cost, labour time and also save parts of energy. Hence it is easily affordable by farmers. So we feel that this project serves something good to this world and we would like to present.

After comparing the different method of soil digging and limitations of the existing machine, it is concluded that this powered soil digging machine is

- User friendly
- Economically affordable

## VI. References

1) Anonymous, (2018b). “Guven Machine Auger Boring Machine”.
2) Ouyang Zi Yuan. Defense Science, Technology and Industry Committee of the People's Republic of China, Lunar Exploration Centre. An introduction to the lunar science [M]. Beijing: China Aerospace Press, 2005.
3) Yan Taining, Bu Jiawu, Wu Xiang, etc. Difficulties and key technologies of lunar drilling and sampling [J]. Geological Science and Technology Information, 2004, 23(04):12-14.
Google Scholar
4) Yan Taining, Ran Henqian, Duan Xinsheng. Universe exploration and drilling technique [J]. Exploration Engineering (Rock & Soil Drilling and Tunneling), 2010, 37(1): 3-7.
Google Scholar
5) Neely W J. Bearing capacity of auger-cast piles in sand [J]. Journal of Geotechnical Engineering, 1991, 117(2):331-345.
Google Scholar
6) Harkness P, Lucas M, Cardoni A. Architectures for ultrasonic planetary sample retrieval tools [J]. Ultrasonics, 2011, 51(8):1026-1035.