DESIGN AND FABRICATION OF ORGANIC WASTE CRUSHING MACHINE

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Abstract:

Crushing machine may be used to reduce the size, or change the form, of waste materials, so they can be more easily disposed of recycled or reduced the size of a solid mix of raw materials in the short period of time. In all the cities and places, Organic waste is dumped or disposed of in a landfill, which causes public health hazards and diseases. So they Crushing Machine are used for crushing and converting macro organic waste into small or microform and it's used as organic manure. Organic waste crusher designed should perfect to crush all kinds of organic waste products such as food (hotel waste like a banana leaf, kitchen debris, etc.), garden (dried leaves, grass clippings, pine straw), and agriculture (crop residues like sugarcane, paddy, peanut forage). The organic waste shredded will be in small pieces to enable the farmer to make use of it as a feed for manure. And the crusher can be operated with a motor.

Keywords- Crusher, Macro organic waste, Organic manure, Pollution free, Motor.

I. INTRODUCTION

Organic waste, or green waste, is an organic material such as food, garden, agriculture and lawn clippings. It can also include animal and plant-based material and degradable carbon such as paper, cardboard, and timber. Dumping organic waste in landfill is a big problem. Hence first we have to know the necessity for solid waste management.

Food waste is the organic material having the high calorific and nutritive values to microbes, that's why the efficiency of methane production can be increased. In all the cities and places, organic waste is dumped or disposed in a landfill or discarded, which causes the public health hazards and diseases like malaria, cholera, typhoid. Also, it produces unpleasant odor and methane which is a major greenhouse gas contributing to global warming. Agriculture is the major occupation in many parts of the world and producing a range of wastewaters requiring a variety of treatment technologies and management practices. The basic occupation of 70% of the population in India is majorly dependent on Agriculture. A variety of crops are cultivated in India. But after harvesting them the crops wastages are either burnt out or thrown as waste without taking into consideration of their nutritive value.

Hence the crushing machine is used for crushing i.e. converting of macro agriculture waste and food waste into small easily decomposable form, which can be used as organic manure. The small size of waste will decompose faster than the large or macro size waste. This decomposed waste can be used for the crops and this leads to improving in the growth and quality of the crops and also improving the soil chemical properties such as supply and retention of soil nutrients and promotes chemical reactions.

II. LITERATURE REVIEW

Design & Fabrication of Portable Organic Waste Chopping Machine to Obtain Compost - Ajinkya S. HandeVivek.Padole –2015. Fabrication with proper dimensions & consideration of required parameters provides for an efficient "Portable Organic Waste Chopping Machine".It helps the farmers to start small business thereby making them self-dependent. The machine can be used for various purposes like chopping, to obtain animal fodder, bed for poultry birds, etc which makes it a multipurpose machine.

Design and Analysis of Organic Waste Crushing Machine- Arun K A, Arun P Unnikrishnan, Febins PM, Basil Bava, Sreerej T S, Rinto K Anto-2016. They are designing and analyzing a special kind of crushing machine which is connected to the flywheel of a tractor by means of PTO shaft (power takeoff shaft). This machine is intended to crush the organic material such as bio-waste. While the tractor on moving the machine can work through PTO shaft. Thus the degradation and disposal of bio-waste become in a simple manner.

Design and Fabrication of Organic Waste Shredding Machine- Pavankumar S B, Sachin K R, Shankar R, Thyagaraja B, Dr. T. Madhusudhan-2018.Organic waste shredder designed should perfect to shred all kinds of waste products. The organic waste shredded will be in small pieces to enable the farmer to make use of it as feed for manure or organic manure and biogas feed. This shredder can be operated with a motor.

III. OBJECTIVES

1. To create a machine to satisfy the needs of a first level waste management system to reduce the volume of waste being generated.

2. To reduce the bit size of organic waste, thus enhancing the safety of waste sorters and help implement an automated waste sorting system based on waste material density.

3.To make optimum use of an available waste area by reducing the volume of the waste being generated.

4. To prevent and reduce the injuries which are included in waste segregation and management; which lead to level threats.

5. To reduce and improve the waste management system.

IV. METHODOLOGY

- Gathering information about the necessity of the ChoppingMachine.
- Collecting the data from the literature review for the development of a specific mechanism.
- Existing chopping machines to be studied & various modifications required in them are to be focused.
- Identification of mechanisms to be attached & their role in Chopping machine to get the desired outputs.
- Fabricating the portable Chopping machine to overcome various problems in the existing Chopping machines.
- Verification of the design of fabricated portable chopping machine.
- To obtain the final results.

V. WORKING PRINCIPLE

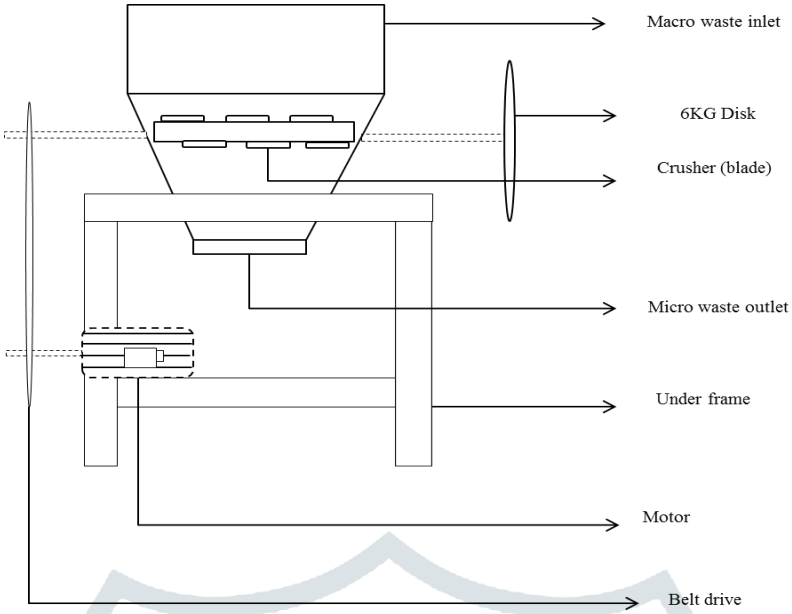

Fig.1 2D diagram of organic waste crushing machine

In this fig.1 crushing machine, the Organic waste like Agriculture waste, Kitchen Debris, etc is fed into the machine vertically through hopper on to the cutters. Cutters (Blades) are mounted on a shaft supported by bearings which are mounted on the machine frame. One main shaft is driven by motor through a guide of belt transmission. The motor is rotated at a certain speed 1440 rpm and with it coupled with the flywheel to reduce the speed and to increase the torque. When the crop residue or waste come in contact with the rotating cutters or blades then the shearing action takes place. Due to this shearing action, the large size waste converted into small micro size. This small size wastage will decompose faster than the macro size... The chopped organic waste comes out of the machine and undergoes decomposition.

These stationary blades are fixed at a particular distance by means of studs. The stationary knife blades provide for the same purpose of shearing whereas the stationary hammer blades provide for the hindrance effect to the rotating crop residue. When the crop residues come in contact with these three members then the shearing action takes place. The clearance between the rotating and stationary blades can be varied according to the size of the crop residue. The shaft is rotated through the electric motor by means of pulleys & is supported by means of bearings pillow block and flange which are mounted on the machine frame. Pulley cover is provided to cover the pulleys from a safety point of view. The sieve consists of concave holes from which the chopped organic waste comes out of the machine. There is a clearance provided between the rotating blades and the sieve on which the size of the chopped organic waste depends. The size also depends on the concave hole diameter of the sieve. The sieves of different hole sizes are used i.e.12mm & 15mm. In this way “The Organic Waste Crushing Machine Works”.MATERIAL SPECIFICATION

DESIGN CALCULATION

DESIGN OF BELT ON MAIN SHAFT:

As a motor having 0.84 HP & having rotational speed is 1400 rpm producing shear force.

Selected motor 1hp, 1400 rpm

Length of belt,

L = 1.3metre

No. of belt, n = 1

Type of belt drive – v-belt drive

DESIGN OF BLADE:

Length of blade, L = 150mm

No. of blade, n = 3

Thickness of blade, t = 6mm

LOAD CARRYING CAPACITY OF BLADE :

W = 7.85× 0.0006 ×0.15 × 0.09

=0.00063585 N/m2

Load carrying capacity of blade = 0.00063585 N/m2.

ADVANTAGES & DISADVANTAGES OF ORGANIC WASTE CRUSHING MACHINE

ADVANTAGES:

Optimum waste space utilization.

Easier waste handling.

Easy of application in any and every area.

Easy to access.

DISADVANTAGES:

The processing or holding the waste should be done manually.

High power requirement.

Difficult to replace cutting parts.

IX. CONCLUSION

After the preparation of the model, we conclude that atomize machine is better option to shred the organic waste instead of using manually operated crusher. In this, we designed the machine by considering the various factors into consideration. The machine is made for small businessman; therefore the work carried out by this machine is less. The following are the important points drawn from our work, Machine cost is less compared to another crushing machine,Compact size easy to mobilize, Easy to assemble and disassemble, Highly skilled labors are not required.

X. REFERENCES

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