

Design & Fabrication of Cow-Dung Spreader

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Abstract: The main aim of this project is to reduce the manual efforts and make a comfort. There is a need of cow dung, for the fertilization of farm. So, to do all this there is a hectic process. Organic manure is considered as eco-friendly bio-fertilizers for highly polluted modern era. Proper application of manure to land is essential to prevent pollution of land, surface water and to prevent loss of ammonia and other nutrients from manure. Organic farming methods are appropriate and adoptable for many types of land used in part of India. Use of manpower for application of organic materials is uneconomical due to high labor cost. Thus, it attracted wide attention in various parts of world. This not only reduces the cost but also protects the environment.

Cow dung spreader machine consist of a trolley, conveyor, centrifugal wheel and a rotating plate. Trolley is manufactured with proper field calibration, by considering width, length as well as height so that trolley can easily move in colony without any collision in field. Conveyor is made to carry manure in forward direction with maximum 100 RPM, for movement of conveyor we take P.T.O. rotation & by ratchet mechanism. Centrifugal wheel is used to give direction to manure towards the rotating plate, the centrifugal wheel also consist of crusher which is used to crush over size manure. it takes P.T.O. rotation & with chain drive it rotates with maximum 135 RPM. Rotating plate is used to through manure in colony with maximum 450 RPM with changing the speed as the speed of tractor or P.T.O. changes.

Index Terms – Cow-Dung Spreader, Conveyor, Centrifugal Wheel, Rotating Plate

I. INTRODUCTION

For fertilizing the field we need to provide cow dung to farm by manually. Organic manure is considered as eco-friendly bio-fertilizers for highly polluted modern era. Proper application of manure to land is essential to prevent pollution of land, surface water and to prevent loss of ammonia and other nutrients from manure. Organic farming methods are appropriate and adoptable for many types of land used in part of India. Use of manpower for application of organic materials is uneconomical due to high labour cost. Thus, it attracted wide attention in various parts of world. This not only reduces the cost but also protects the environment. This all process consist manual working and there is no machine yet available for such operations.

Cow-dung spreader is a machine in which we reduce the hectic process with this trolley which not only reduces man power as well as consumes less time. in cow-dung spreader we load the trolley by manure and provide appropriate amount of Cow-dung to each colony of plants. The spreading of manure can change with change in speed of tractor. Only one operator is needed for all works. This Cow-Dung spreader has small size, specific to use between narrow rows. Manure is localized on the foot of trees, with an adjustable spreading length from 1 to 4 meters. To enter / exit easier to the row, on request, the machine can be equipped with steering mechanic rudder to reduce the operating space (follow tractor track). It can be used with any type of organic fertilizer (manure, compost, digestate, vegetable waste etc.). The quantity of product to be spread is adjustable.

1.1. Background

In many developing countries, animal manure is anaerobically digested, sometimes in combination with human excreta, to produce biogas, which is used for cooking and/or basic lighting. Besides biogas, anaerobic digestion produces a residue, the so-called digestate or bio-slurry, which contains most of the nutrients of the original manure, partially in a converted form. This bio-slurry can potentially be used as an organic fertilizer.

Numerous studies have been conducted on the comparative value of bio-slurry as a fertilizer & its comparative value to farmyard manure. However, these studies do not provide a uniform message. The differences between the results of the studies can be due to several reasons, e.g. Bio-slurry source, storage and handling, crop types, soil and climate conditions, or differences in methodologies to assess the value of bio-slurry as a fertilizer.

1.2. Problem Statement

Organic farming is generally considered as more labor intensive than other conventional farming system. Manure is valuable and renewable resource used as nourishment in crop production. However, in many cases it is applied to crops as method of waste disposal. Organic manure is considered as eco-friendly bio-fertilizers for highly polluted modern era. Proper application of manure to land is essential to prevent pollution of land, surface water and to prevent loss of ammonia and other nutrients from manure. The urgency of using organic manure has been gaining ground in wake of increasing cost fertilizer with every passing year and certain other inherent limitations with use of chemical fertilizers. Indian soils are often deficient in human which is extremely important material formed after decomposition of farmyard manure. The preparation of farmyard manure offers one of the best manure for utilizing farm and other agricultural wastes and simultaneous production of humans.

The increase in labor requirement has been assessed as ranging from 15% to 40%. But it is an economically sustainable form of agriculture. Organic farming methods are appropriate and adoptable for many types of land used in part of India. A major

operation of organic farming is broadcasting of organic materials over the soil. Due to high variability of physical characteristic of organic materials, several technical problems can be observed during its handling and application under field conditions. Use of manpower for application of organic materials is uneconomical due to high labor cost. As a consequence, the farmer tends to adapt to labor situation in a way that might not fulfill the demand of nutrient cycle of farm.

1.3. Objectives

1. In conventional process of bio fertilizer spreading all work is done manually. This is a grueling process. So we want to minimize these manual efforts.
2. Spreading by conventional process requires 6 to 8 labors/acre. Now in India huge labor problem is there. So we want to reduce it.
3. To reduce the cost and time.
4. To provide bio fertilizers/ cow-dung with our trolley, not manually.
5. To reduce work load of farmers.
6. '1' person is enough for cow-dung spreader.

II. CONSTRUCTION

Cow-Dung spreader consist of Four main parts

1. Trolley
2. Conveyor
3. Centrifugal wheel
4. Rotating plate

Trolley:

Trolley is manufactured with proper field calibration by considering width, height as well as length so that trolley can easily pass through the colonies without any disturbance. Trolley is made of mild steel & operations like Gas Welding, Leser Cutting & Bending are done on trolley.



Fig 2.1 Trolley

Main parts of trolley:



Fig 2.2 Chassis

Outer Cover of Wheel

Side Wall

Gear Housing

Tyre

- Dimensions of trolley:
 - Length of trolley = 2.50 m
 - Width of trolley = 0.875 m
 - Height of trolley = 0.97 m
 - Capacity of trolley = 1000 kg
 - Volume = 2.1218 m³

Conveyor:

Conveyor is made to carry manure in forward direction with maximum 100 RPM, for movement of conveyor we take P.T.O. rotation & by ratchet mechanism. Material used is Wooden Ply, Big Chain, M.S sheet, Ratchet & Pawl. Operation such as Forming, Bending, Gas Welding. Ratchet Mechanism is used for conveyor so that it will only move in forward direction there will be no backward motion.



Fig 2.3 Conveyor

Centrifugal Wheel:

Centrifugal wheel is used to give direction to manure towards the rotating plate, the centrifugal wheel also consist of crusher which is used to crush over size manure. it takes P.T.O. rotation & with chain drive it rotates with maximum 135 RPM. Material used is M.S sheet & Laser Cutting, Welding & bending operation is done.



Fig 2.4 Centrifugal Wheel

Rotating Plate:

Rotating plate is used to through manure in colony with maximum 450 RPM with changing the speed as the speed of tractor or P.T.O. changes. Bevel gear (Gear Box) is used for its horizontal to vertical rotation transmission. Material used is M.S. sheet & Laser Cutting & Welding is done to make it.



Fig 2.5 Rotating Plate

III. WORKING

1. Initially Manure is filled in the trolley.
2. After filling trolley is moved to colony as it reach the operator needs to starts the P.T.O Rotation to our mechanism.
3. The inlet rotation is given in two mechanism first Chain drive which is used to move centrifugal wheel and output of chain drive is given to '3 belt' pulley drive for rotating conveyor by ratchet mechanism & second single belt pulley is used to rotation of gear box for rotating plate.
4. As the P.T.O. power is given to mechanism all parts of trolley starts moving.
5. Forward motion of manure is done by Conveyor & it takes one step forward as ratchet rotates one full rotation.
6. Centrifugal wheel is used to give direction to manure towards the rotating plate.
7. Rotating plate is used to through manure in colony.
8. The whole operation is done simultaneously and its speed is depended on the speed of tractor.



Fig 2.6 Working

IV. ADVANTAGES OF COW DUNG SPREADER

1. Less requirement of cow-dung.
2. Can be operated by one person only.
3. Less cost than current system.
4. We can provide cow-dung directly to plant.
5. Man power is cut down.
6. Saving in time while providing cow-dung.
7. Less power required for process.
8. Nutrition level of land increases.
9. Can be given on rent and buy with group of farmer.
10. One skilled person can handle whole process.
11. Crop quality increases.
12. Productivity increases which makes more profit.

V. CONCLUSION

The draw of conventional process is totally eliminated with this mechanism with increase nutrition as well as productivity of farm. Mechanism uses the power of tractor so no need of external power sources this makes machine flexible. Application and uniformity graphs are useful in predicting uniformity of the spread pattern when choosing an overlap distance with a given application rate. The actual overlap of each piece of land should be determine individually based on the kind & properties of

manure being spread, nutrients need of the land receiving the manure and also the laws and rules governing application. Mechanism is attachable & detachable to the trolley so trolley can be used for transportation after dismantling the mechanism. Performance of this spreader on farm field gives effective spreading with low cost & reduction of time.

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