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FABRICATION OF MULCHING AND DRIP LAYING MACHINE

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ABSTRACT

This paper will flash on the history of mulching, current methods and operations with the individual costing compared to conventional methods. Reducing the input cost and increasing the output is the main motto of agriculture now a days. But due to rainfall problem and draught in some areas, it is essential to conserve the water and make optimum use of it. Hence, the best way of optimization of water is the Mulching and Dripping method. Mulching is the effective method to reduce the rise of weeds around the plants and make optimum use of water by conservation of moisture. The initial cost of mulching and dripping by manually is very high and it should be reduced. For that purpose we are designing and fabricating such a machine that it will perform several operations like- bed formation, drip pipe laying on bed, mulch paper laying, covering the mulch paper and finally making holes on the mulch paper simultaneously in one pass of the machine.

Keywords*: Mulch Paper, Drip laying, Moisture Conservation, Retaining Water, Eliminating Weeds*.

I. INTRODUCTION

What is Mulching and Drip laying?
Mulching is the process of covering the soil with any paper to avoid the evaporation of water from soil and to reduce the weeds which affects for the growth of the plant. Dripping is the process in which drip pipes are used for circulation of water to plants. Using dripping method there is optimize use of water.

Previous method:
In conventional method, laying the drip irrigation pipe and mulching paper was manually and it requires more time and cost. Due to this it is not beneficial for large areas.

Need of the project:
This project will provide less effort to be taken by farmer due to reduction in the capital cost and time for laying the mulching paper using the most convenient method. To accomplish these tasks it is essential to fabricate the machine and get the required results in less effort.

It is very effective technique to improve the yield and germination of plants but, the conventional method of mulch lying is very costly and is not easy to handle.

The rare certain problems while handling the mulch paper like- tearing of mulch paper, skirring away the paper due to wind. Hence to overcome this problem the automatic mulch and drip laying machine is fabricated.

The drip irrigation is the type of micro irrigation which has the potential to save water by evaporation and to give extra nutrients to plant. The go a list o drip water directly into root zone and minimize evaporation. The objective of this project is to design and manufacture a small sized portable mulching and drip laying machine with hole making mechanism in it. This machine can be operated manually or externally powered.

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Fig.1. Conventional Mulch Paper Laying

Fig.2. Conventional Drip Pipe Laying.

Fig.3. Conventional Hole Making

II. METHOD & MATERIAL

Fig.4 Block Diagram of work flow

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3D CAD Model:

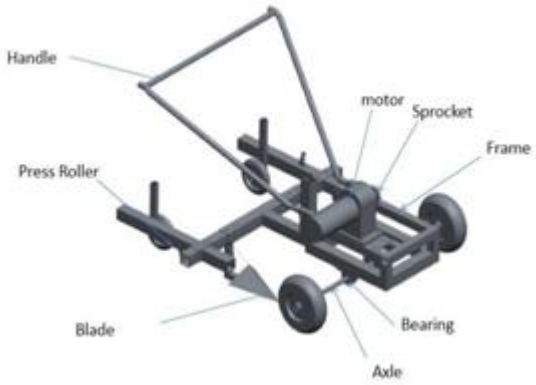

Fig.4. 3D Model

Working principle:

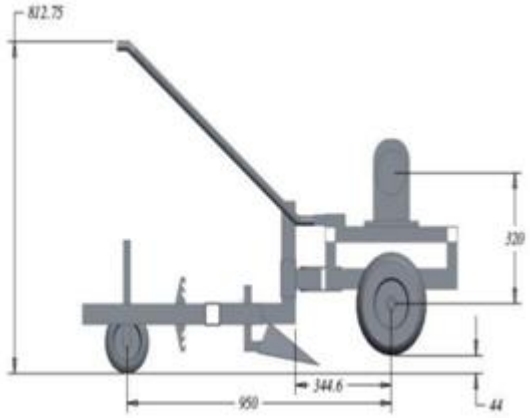

Fig.5. Side view of 3D model

Above diagram shows side view of actual working model. When the machine moves the forward bed will be formed using trough blades and simultaneously drip pipe will be laid on the bed. After that mulching paper will be covered on the bed and there is need to cover the mulching paper with soil so it is done by another circular blade. Rear wheel will press mulch paper in soil. When paper is covered with soil holes are made on mulch paper using tapping mechanism. In this way machine will perform several operation in one pass

Table1. Components and Materials

Sr. No	Component	Material/Property
1	Frame	Medium Carbon Steel
2	Motor	1HP,12V, 3 Phase Induction motor
3	Bearing (Pedestal)	Cast Iron
4	Chain	Metal
5	Sprocket	Cast Iron
6	Roller	Plastic
7	Mulching Paper	Polyethylene

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8	Nuts and Bolts	Carbon Steel
9	Universal Joint	Stainless Steel
10	Handle	Mild Steel
11	Key	Carbon Steel

III. OTHER SECTIONS

CALCULATION:

1) Motor-

Motor power: - 1Hp = 0.7457 KW

$$P = \frac{2\pi NT}{60}$$

∴ Torque = 284.836 N/mm

2) Sprocket-

Teeth (Drive):- 14

Pitch:-12.7 mm

Sprocket Dia. (Drive):- 42 mm

Teeth (Driven):- 27

Sprocket Dia. (Driven):- 109 mm

Speed Ratio (I) = Z2/Z1
= 27/14 = 1.92

3) AXLE:

= 0.3syt = 0.3*650
= 195 N/mm^2

$$\frac{\tau}{} = \frac{T}{}$$

$$\therefore \tau = \frac{284.836\times10^3}{\frac{}{32}\times25^4} \times 12.5$$

$$\therefore \tau = 92.84 \text{ N/}^2$$

Length of Chain: - 902 mm

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Motor Speed: -40 rpm
Tire speed: - 25 rpm

Objectives:
1. To develop a machine, this will reduce cycle time of all the operations.
2. To reduce human effort.
3. To increase the production rate.
4. To minimize miss-operation.
5. To reduce number of worker.

Advantages:
1. A good alternative to costly machines.
2. Bed size can be varied.
3. Distance between two holes can be varied.

IV. RESULT & DISCUSSION

Fig.6. Actual Model.

The results obtained from actual working of machine and cost comparison between conventional methods and by using the designed model are given below in the table. The machine is able to do the same work as by the conventional methods in one pass. Time required for all the operations which are required is about half as compared to conventional method.

Table2. Cost Comparison per Hectare (Rs.)

Sr. No	Operation	Conventional method	Current model	Cost Saving
1	Bed Preparation	3500	5500	6320
2	Drip Pipe Laying	6720		
3	Mulch Paper laying	800		

4	Hole making	800		
	Total	11820	5500	6320

V. CONCLUSION

Hence this machine will be able to do several operations in one take. The machine will form a bed of soil, lay the mulch paper on it for water and moisture conservation, drip pipe for optimize use of water, create holes on mulch paper for seed sowing and finally cover the mulch paper with soil to avert the skirring of paper.

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