

Fabrication of Agro Plastic Sheet Spreader

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Abstract— Mulching is the process of covering soil around the plant root area with a view to insulate the plant and roots from the effect of extreme temperature fluctuation. Organic mulching reduces weeds on rows of fruit trees and improves the chemical-physical characteristics of the soil. For this purpose it is possible to use materials obtained by pruning fruit trees and urban greenery maintenance suitably shredded. To make this practice feasible it must be mechanized. In order to reduce the costs connected with mechanizing this operation, a piece of equipment has been set up that can be installed on a manure spreader normally used on the farm and operated by the hydraulic circuit of the tractor. This device can distribute the mulching material along the row, crossways in relation to its direction of travel. It reduces human effort to a certain limit in the field. This project will be highly valuable to the farmers and makes their work simple and easier.

Keywords—mulching, component, formatting, style, styling, insert (key words)

I. INTRODUCTION

Reducing weeds on the row of fruit trees is the main purpose of the use of mulching. It can be done with plastic materials or using organic products from various sources. The latter also help to improve the physical and chemical characteristics of the soil. If the use of vegetable refuse is not possible or convenient for energy purposes, the mainly woody ones from urban greenery maintenance and the brushwood obtained from pruning fruit trees may be used conveniently for organic mulching. They are shredded to small sizes using different types of machines. Distribution of the final material is economically justified if carried out efficaciously and at low costs. The reduction of the distribution costs of the covering material described are considered possible by mechanizing the operation adapting a machine already present on farms for this purpose. The intention of this work was to verify the validity of a piece of equipment for distributing organic materials of various nature suitable for mulching that can be installed on a traditional manure spreader towed by a tractor.

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1.1 NEED FOR EQUIPMENT

- ✓ To minimize the time consumption of various human activities in the field
- ✓ To reduce the heavy work load on humans and reduce their effort
- ✓ To make the work simple and easier
- ✓ To support the agricultural development

1.2 OVERALL VIEW OF EQUIPMENT

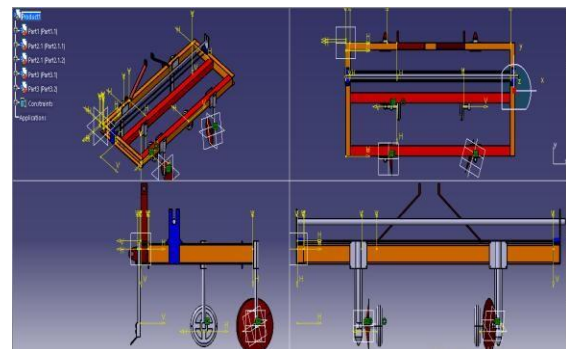


FIG 1 Overall view of equipment
DESCRIPTION OF COMPONENTS

2.1 FRAME

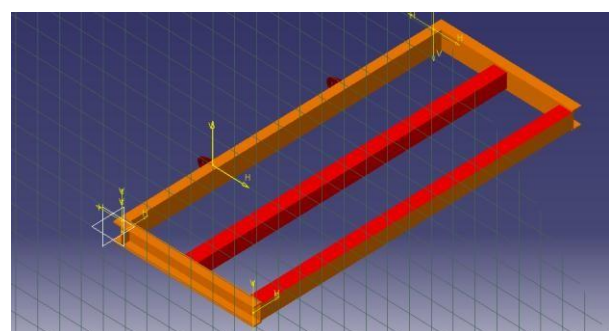


FIG 2 FRAME

The frame of the vehicle is made up of structural steel material. The frame is constructed as a channel section since it has a higher resistance to bending and torsional loads. The chassis of the vehicle consists of conical plough blade, ploughing blade, roller, adjuster and holder. The two main side members of the frame were designed and welded with the cross members so that the members act as a single unit. Required provisions and slots were given for the assembling of various parts. Density of material is 7.8 kg/m³, young's modulus 200Gpa, Poisson's ratio 0.32, yield strength 250MPa and tensile strength 550MPa.

2.2 CONICAL BLADE

It consists of steel disc of 60 to 90 cm diameter, set at a certain angle to the direction of travel. Each disc revolves on a stub axle in a thrust bearing, carried at the lower end of a strong stand which is bolted to the plough beam. The angle of the disc to the vertical and to the furrow wall is adjustable. In action, the disc cuts the soil, breaks it and pushes it sideways. There is little inversion of furrow slice as well as little burying of weeds and trashes. The disc plough may be mounted type or trailed type. In mounted disc plough, the side thrust is taken by the wheels of the tractor. Disc is made of heat treated steel of 5 mm to 10 mm thickness. The amount of concavity varies with the diameter of the disc. The approximate values being 8 cm for 60 cm diameter disc and 16 cm for 95 cm diameter. A few important terms connected with disc plough is explained below

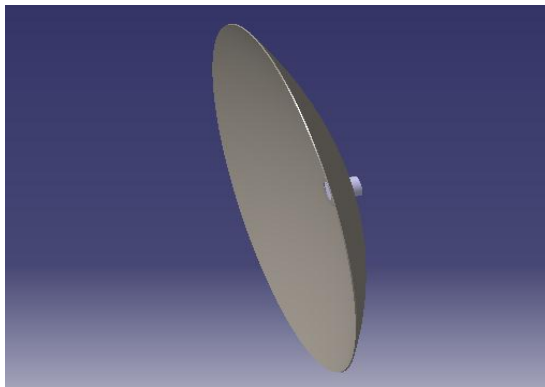


FIG. 3 CONICAL BLADE

Disc - It is a circular, concave revolving steel plate used for inverting the soil.

Disc angle - It is the angle at which the plane of the cutting edge of the disc is inclined to the direction of travel. Usually the disc angle of good plough varies between 42° to 45°.

Tilt angle - It is the angle at which the plane of the cutting edge of the disc is inclined to a vertical line. The tilt angle varies from 15° to 25° for a good plough.

2.3 PLOUGHING BLADE



FIG 4 PLOUGHING BLADE

Implements used for opening and loosening of the soil are known as ploughs. Ploughs are used for primary tillage. Ploughs are of three types: wooden ploughs, iron or inversion ploughs and special purpose ploughs. It is an implement which is made of an cast iron with share point. It consists of body, shaft pole, share and handle. It cuts a V shaped furrow and opens the soil but there is no inversion. Ploughing operation is also perfect.

2.4 ROLLER

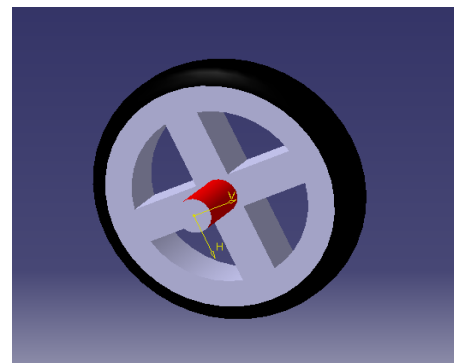


FIG. 5 - ROLLER

It is type of solid tire made up of carbon with rubber. Use for pushing plastic sheet with soil by the method, it help the soil pushes it sideways of plastic sheet.

2.5 PLUMMER BLOCK

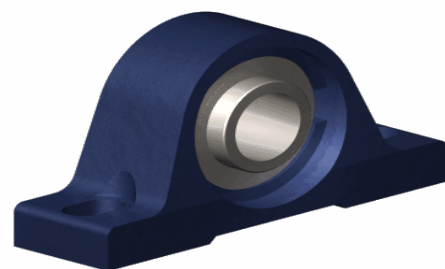


FIG. 6 PLUMMER BLOCK

A Plummer block is a type of rolling-element bearing that uses balls to maintain the separation between the bearing races. The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least two races to contain the balls and transmit the loads through the balls. In most applications, one race is stationary and the other is attached to the rotating assembly (e.g., a hub or shaft). As one of the bearing races rotates it causes the balls to rotate as well. Because the balls are rolling they have a much lower coefficient of friction than if two flat surfaces were sliding against each other. Plummer block tend to have lower load capacity for their size than other kinds of rolling-element bearings due to the smaller contact area between the balls and races. However, they can tolerate some misalignment of the inner and outer races.

2.6 PUNCH MAKER

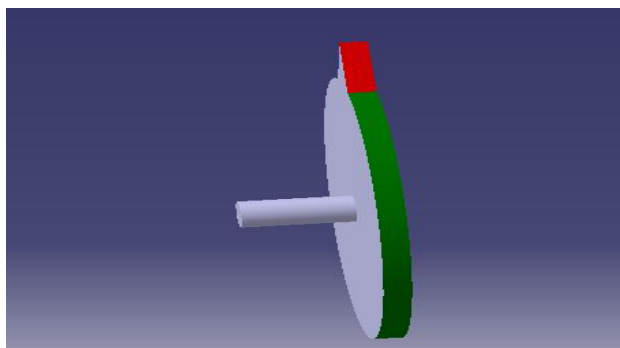


FIG. 7 - PUNCH MAKER

This plasticulture equipment is equipped with spiked wheels. The hole puncher goes over the bed to perforate the plastic mulch film before transplanting bare root or plug strawberries. Wheels depending on the number of rows on the bed. Different sizes of spikes according on the type of transplants (bare root or plug). Choice of spacing between spikes.

2.7 MULCHING SHEET



FIG. 8 MULCHING SHEET

Sheet mulching is a relatively simple technique for creating gardens rich in organic matter. The basic concept is to place layers of a variety of nitrogen and carbon rich

materials on top of the soil, allowing them to break down naturally over time –in essence, composting right in the garden itself.

2.7.1 TYPES OF MULCH FILM

A wide range of plastic films based on different types of polymers have all been evaluated for mulching at various periods in the 1960s. LDPE, HDPE and flexible PVC have all been used and although there were some technical performance differences between them, they were of minor nature. Owing to its greater permeability to long wave radiation which can increase the temperature around plants during the night times, polyethylene is preferred. Today the vast majority of plastic mulch is based on LLDPE because it is more economic in use.

2.7.2 IMPORTANCE OF PARAMETERS OF THE PLASTIC FILM THICKNESS

Normally the thickness of the film does not affect the mulching effect except when it is used for solonchisation. But some of the recent references do indicate the impact of film thickness on crop yield. Since it is sold by weight it is advantageous to use as thin a film as possible but at the same time due consideration should be given for the longevity of the film. The early mulch films used were of 60-75 micron (240-300 gauge) thickness, and today it is possible to have 15 micron thick film due to advent of film extrusion technology. These films are mechanically weak, as shown by their easy tearing when pulled tension.

WIDTH

This depends upon the inter row spacing. Normally a one to one and half meter width film can be easily adapted to different conditions.

2.7.3 MULCH LAYING TECHNIQUES

Mulch should be laid on a non-windy condition. The mulch material should be held tight without any crease and laid on the bed. The borders (10 cm) should be anchored inside the soil in about 7-10 cm deep in small furrows at an angle of 45°.

BENEFITS

- Earlier planting dates
- Reduction in the leaching of fertilizer
- Improved crop quality
- Reduction in soil compaction
- Reduction in root damage

2.7.4 BIODEGRADABLE

Biodegradable mulch film provides commercial operations the advantage to save time and money by eliminating the need for removal disposal while still benefiting from the same physical and mechanical characteristics as traditional polyethylene plastic but without the harmful environmental impact. Biodegradable mulch film is converted to water, carbon dioxide and natural

substances through humidity, temperature and microorganisms located in the soil, eliminating the for removal and disposal at the end of the crop cycle

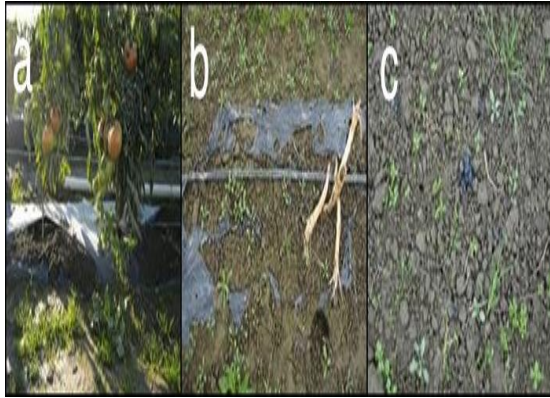


FIG. 9 Biodegradable mulch film

2.8 SQUARE HOLLOW TUBE

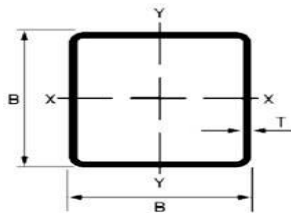


FIG 10 SQUARE HOLLOW TUBE

The square hollow tube is used for support and attachment of disc and ploughing disc. The size of hollow tube is 60*60 and thickness is 2.5mm

2.9 CIRCULAR HOLLOW ROD

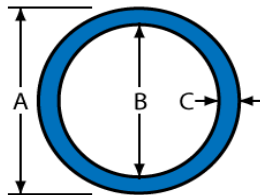


FIG 11 CIRCULAR HOLLOW ROD

Circular hollow rod is used to supporting the mulching sheet and rotates the sheet with Plummer block. The size of rod is external diameter= 27.4, internal diameter= 25.4 and thickness= 2mm

2.10 CHANNEL SECTION

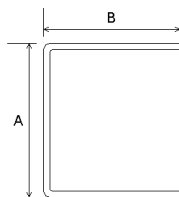


FIG 12 CHANNEL SECTION

Structure steel is the channel section which is mild steel. It is used frame construction with the A*B is 75*40mm and thickness is 5mm.

2D VIEW OF THE EQUIPMENT

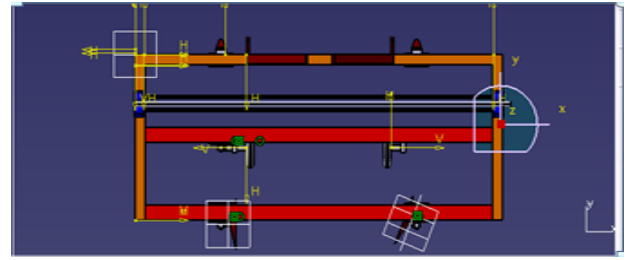


FIG 13 TOP VIEW

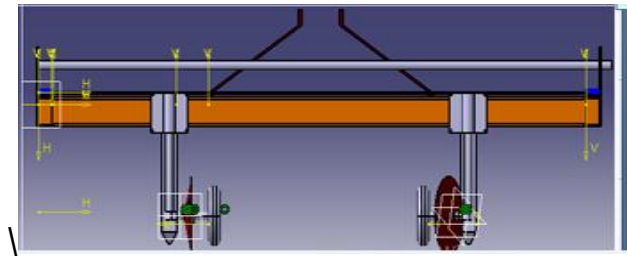


FIG14 FRONT VIEW

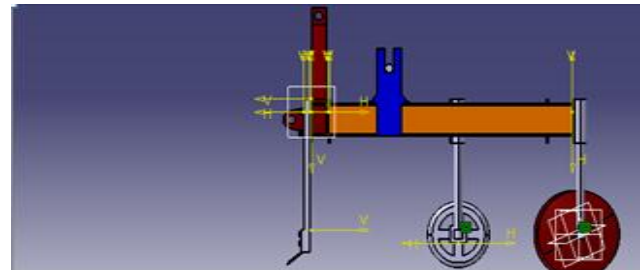


FIG15 SIDE VIEW

SPECIFICATION OF THE VEHICLE

3.1 STRUCTURAL STEEL A36

S.NO	PROPERTIES	
1	Density	7.8kg/m ³
2	Young's modulus	200GPa
3	Poisson's ratio	0.32
4	Shear modulus	75GPa
5	Yield strength	250MPa
6	Tensile strength	400-550MPa

3.2 SPECIFICATION OF EQUIPMENT

S.N O	DESCRIPTION	VALUE
1	Length	1500mm
2	Width	600mm
3	Distance between Conical blade and Roller	300mm
4	Distance between Roller and Plastic sheet rod	150 mm
5	Distance between Plastic sheet rod and Plough blade	150mm
6	Toe bar length	660mm

PRINCIPLE OF WORKING

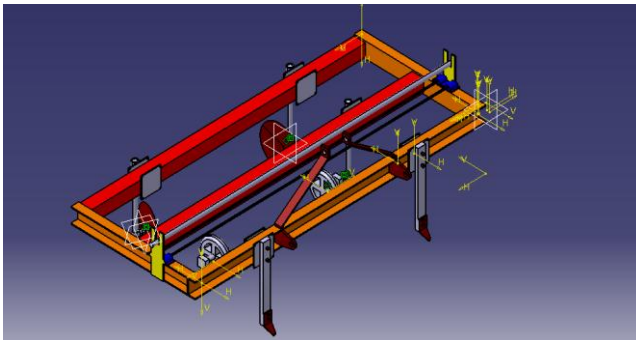


FIG. 16

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5.1 ADVANTAGE

- ✓ To minimize the time consumption of various human activities in the field
- ✓ To reduce the heavy work load on humans and reduce their effort
- ✓ To make the work simple and easier
- ✓ To support the agricultural development

5.2 APPLICATION

Equipment is more suitable in the agricultural field for spreading the mulching film and punching in the films.

CONCLUSION

The vehicle was designed by considering the demand for agricultural tools to increase the productivity. This vehicle reduces the human effort in the fields and makes the work easier. Since the design is very simple and versatile, it can be handled by the operator easily

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