Mulching Paper Laying Machine For Agricultural Application

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Abstract – To meet the growing needs of the farmers who wish continuously to improve the profitability of their farming by using more efficient materials and machineries. One of the method to achieve this is to use mulching paper technique. The use of mulching paper in agriculture is increasing day by day due to growing importance in increasing crop yield. Mulching paper which is also known as agriculture film is one of the best method to cover the soil and maintain required atmosphere around the crop. Mulching paper laying machine, lay the drip line pipe and mulching paper at the same time. It also will make holes on the paper to provide plantation area after laying the drip irrigation and the mulching paper. Also it will cover the paper with the soil on its either side edges to avoid the deflection of paper from its positions because of various reasons such as disturbance from wind, working labours. This machine will avoid the wages of labours used for laying drip line pipe and mulching paper as compared to conventional method which is not that much accurate and easy. This paper looks at working and design parameters of mulching paper laying machine for minimizing the human efforts and increasing productivity of crops.

Keywords- Mulching paper, Design parameter etc.

Introduction: Mulching (Agriculture Film) is the practice of covering the soil around plants to improve the growing conditions for the crop. The use of plastic mulches results in higher yields, improvement of yields quality and decreased need of irrigation and pesticides and reduced leach of fertilizers to water systems. Plastic mulch film is the primary choice for agricultural application because paper has been found less effective and more costly than plastic. Plastic mulch film is widely used on high value crops, such as Tomatoes, Melons, Cucumbers, Squash, Peppers and Strawberries increasingly on lower value crops such as Corn and Ginger. Mulches act as barriers to movement of moisture out of the soil. They can be either organic or man-made. Besides keeping the moisture in the soil, mulches can also enhance soil temperature; reduce the spread of soilborne diseases; reduce weed growth; reduce soil erosion); and provide nutrients and organic matter. Laying the drip irrigation pipe and mulching paper requires lots of labours cost and time. It will be effort less for farmer by reducing the capital cost and time of laying the mulching paper using the most convenient method as well placing the drip irrigation pipe in one pass of the machine.[1]

Benefits of Mulching:

- Conserves soil moisture.
- Moderates soil temperature.
- Control weeds growth under mulch film.
- Reduces soil compaction caused by equipment and people.
Reduces soil erosion from wind or water.[1]

Present theory and practices:

Mulching area should preferably be equivalent to the canopy of the plant. Then required size of mulch film is cut from the main roll. Clean the required area by removing the stones, pebbles, weeds etc. Till the soil well and apply a little quantity of water before mulching. Required length of film for one row of crop is taken. Round holes are made at the center of the film using a punch or a bigger diameter pipe and a hammer or a heated pipe end could be used. One end of the mulch film (along width) is anchored in the soil and the film is unrolled along the length of the row of planting. Till the soil well and apply the required quantity of fertilizer before mulching. Mulch film is then inserted (4-6") into the soil on all sides to keep it intact. Seeds are sown directly through the holes made on the mulch film. In case of transplanted crops, the seedlings could be planted directly into the hole.[2]

Fig(1): present system

Objective of project:

The major objectives of project are:

1. To develop a machine which reduce cycle time of laying mulch film.
2. To reduce human effort.
3. To increase the production rate.
4. To minimize miss-operation.
5. To reduce number of worker.[2]

Working principle:
Fig. (2) Conceptual dia. of mulch paper laying machine.

Above fig. (2) shows the conceptual diagram of automatic mulch paper laying machine. It consist of main frame which supports the other components. Other components mounted on the main frame which are drip roller, drip line director roller, mulch paper roller, paper pressing roller and joining arrangement to tractor. When machine is pulled forward drip line and mulch paper start to unwind as both are anchored at other end. Drip line guided below the paper by drip line director and at the same mulch paper is placed over the bed by paper pressing rollers.

The working of this machine is very simple just like pulling the machine in a straight line in the farm. This machine is having very simple operation and no skilled operator is required and it makes the work simple and efforts less. Now a days the farmer lay the mulch paper by hand and this will not maintain the uniformity and no proper distance maintain between the mulch films.[3][4]

**Areas of application:**

Mulching is mainly employed for,

1. Moisture conservation in rainfall areas.
2. Reduction of irrigation frequency and water saving in irrigated areas.
3. Soil temperature moderation in greenhouse cultivation.
4. Reduce the rain impact, prevent soil erosion and maintain soil structure.
5. In places where high value crops only to be cultivated.

**Comparison of conventional method with mulch paper laying machine:**

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Parameters</th>
<th>Conventional method (Manual)</th>
<th>Mulch paper laying machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time required to laying the mulch paper</td>
<td>Very high</td>
<td>Comparatively very less</td>
</tr>
<tr>
<td>2</td>
<td>Number of labors required</td>
<td>More(around 8 to 10)</td>
<td>Less(around 2 to 3)</td>
</tr>
</tbody>
</table>
Advantages:

Advantages of mulch paper laying machine are:

1. Easy in operation.
2. Low cost.
4. Less operation and maintenance cost.
5. Easy to setup
7. Easy maintenance.
8. No skill operator required.

Future scope:

Mulch paper laying machine has a good future scope in an AGRICULTURAL SECTOR. The main constraint of this machine is it has low operating costs. This machine will make it pay for itself with in short period of time and it can be a great companion in any field dealing with rusted and unused metals.

The machine affords plenty of scope for modifications such as:

Increasing machine efficiency.

Pneumatic pressure may be used for making holes.

Conclusion:

The study of mulching paper laying machine shows that system will help in laying mulch paper along with making holes and laying drip line pipe thus human effort and labour cost is reduced. Also, time required for laying mulch paper is very less as compared to conventional method. This machine is very useful to farmers.

References:


