Advance Mulching Paper Laying Machine

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Abstract—We know that avoiding growth of the weed on farm is very costly and time consuming task. Also in dry areas maintaining moisture in soil is very important for crop life. Mulching the plastic paper film near the root area of plants is for eliminating the rise of weeds also to retaining water and avoid de-moisturizing the soil but this process requires lots of capital and time. So ‘Drip irrigation pipe and Mulching paper laying machine’ will reduce the labor cost and time. It will do both the jobs i.e. laying irrigation pipe and mulching paper on the ground at a time. By using various mechanisms, this machine will lay the irrigation pipe and mulching paper at the same time it will make the holes on the paper to provide plantation area after laying the drip irrigation pipe and mulching paper. Another mechanism is used for covering the paper with the soil on its either side edges to avoid the deflection of paper from its position because of various reasons such as disturbance from wind, working labors etc. This machine may powered with the diesel or petrol engine or with Battery and motor system.

Key words: Cylinder Size, Cylinder Number, Implement Speed, Operating Air Pressure

I. INTRODUCTION

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 this will be one of the method which will help for improving it. ‘Drip irrigation pipe and Mulching paper laying Machine’ will be able to do the laying the irrigation pipe as well mulching paper simultaneously.

“A pneumatic dibbling machine for plastic mulch”, American society of agricultural and biological engineers, applied engineering in agriculture.

Laying the drip irrigation pipe and mulching paper requires lots of labors 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.

II. PROBLEM STATEMENT

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This will avoid the wages of labors used for laying the irrigation pipe and mulching paper. Also conventional method is not that much accurate and easy as compared with this method.

It is very difficult to maintain the weed rate on farm; this is the most favorable method to avoid this problem. It results to avoid the large amount of wages wasted on the labors to clean the farm. We can see in fig 1.3 that weeding is most tiresome and boring work to do.

Fig. 1: Conventional Method of Mulching Paper Laying

Fig. 2: Manual weeding

A. Objective

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. Making a compact system of laying the mulch paper and irrigation pipe which will suit Indian small size land conditions.

Typically, 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. Paper such as old newspaper and old packaging board has been used for long by home gardeners. Use of reel paper for mulching started in early 30’s. The use remained limited and practically died down as the low cost plastic mulches became available for the farmers in late 50’s. Also use of plastic mulches remained quite low for decades until rapid growth of use started in 80’s /1,3/. According to A. Reynolds, every year over 80000 km2 of agricultural lands are covered with plastic mulch films. Covering of such area by paper mulches, the realistic basis weight being 60 – 100 g/m2, would mean 4.8 – 8.0 million tons annual paper mulch demand. This can be compared with the total paper and board production in Finland being around 11 million tons in 2011.

Methodology

Fig. 3: Conceptual Design of Mulching Machine
a) We have decided this above concept of structure as shown in figure. Various obstacle are present on farm so we will try maintain specifically large ground clearance of the machine.

b) By surveying market we will decide which material to be used and collect various ideas that can be applied on machine for its better performance.

c) We will first conclude that what amount of power required to drive the whole assembly and as per that data will decide whether to use petrol or diesel engine or motor and battery system.

d) At very first the frame will be designed and then another systems will be installed on it such as power assistance system.

e) Irrigation pipe roll, mulching paper roll, guide rolls, paper cutting wheel, power transmission mechanism etc

f) By taking help of design data we will decide the optimum design conditions which are satisfying all the requirements of the machine for its better performance

g) The model will contain a structural frame on which the various assemblies and components will be mounted.

h) The beds of the soil will be pre-formed by the tractor and then this machine will follow the path on that bed.

i) The mulch roll and the bundle of irrigation pipe will be mounted on the top of the frame and below that guide rolls are installed which will guide the plastic film along the bed.

j) The paper cutting wheel will mounted on front axle of machine

k) This will make hole to provide planting area on the bed.

l) The power plant will install near to the C.G. of the frame of the machine.

m) The cover disc mechanism will fitted between front and rear wheel. This will be used to cover the paper edges with the soil

n) Handling system will be connected at rear end of the machine to provide easy handling the machine.

o) We know tensile strength of the plastic paper is higher so the paper firstly attached below the front tyres and then machine starts and paper continuously pressed under the tyre and at the same time irrigation pipe is covered under the plastic paper.

III. CONSTRUCTION

A. Methodology

The frame is designed for the heavy duty operation because it should be able to withstand at high loads, Shocks and the weight of the components which are acting on it. There are various materials available with various sizes and shapes i.e. angles, strips but we selected the Square cross- sectioned MS pipe because of its Strength and ease of machining. The square pipes are available in market at various sizes and we selected the 1 inch square pipe.

The main function of the frame is to support the whole assembly. It is made up of the 1 inch square pipe. Another systems are attached to the frame such as mulching paper rollers, drip irrigation pipe roller, motor, axle and wheels etc.

This is our cross section of pipe used for fabrication of chassis of mulching machine. It is 1 inch and 1 mm thick square cross section pipe of M.S. material.

B. Mulching Paper Roll

It is the plastic film paper rolled in circular shape and available for agricultural use. It is agricultural grade plastic sheet used for mulching operation.
on the support roller. The motion between paper roller and support roller is sliding.

IV. WORKING

The main purpose of the machine is to lay the mulching paper on the beds of the soil as well as the drip pipe with it. reducing the capital cost and time of laying the mulching paper using the most convenient methods well placing the drip irrigation pipe in one pass of the machine.

When the motor start rotating it transmits the rotary motion towards the axle through the chain drive and the whole machine starts moving.

Though the wheels starts rotating and at the same time paper is placed under the front wheels because of that the mulching paper roll is also starts rotating and starts unwound. As machine moves forward the paper is also continues un-wounding and lay on the beds.

As we know the paper cutting wheel is mounted on the front wheel which rotates with the axle it also starts making holes on the paper and as the machine speed varies at the same rate the cutting wheels speed varies and hence the hole are made at specified fixed length at any speed.

The drip irrigation pipe already placed under the mulching paper and as we know it is already fixed at its one end and because of the paper motion the drip pipe is also unwound from its roll and lays on the ground below the mulching paper. Both the mulching paper roll and drip irrigation roll having speed as same rate as of the machine.

The cover disc mechanism is mounted on the both side of the frame just behind the front tyres are collecting the soil and covering the mulching paper under it. The height of the cover discs can be arranged as per requirement as per the amount of the soil. It is the mechanism which is used for covering the mulching paper with the soil to avoid the disturbance of paper from its position. Basically job of this mechanism is collect the soil and cover the paper at its both ends.

The cover disc mechanism is having mainly two parts one is covering disc and another one is the support bars. The bar is having a welded bolt at its one end and at that end the covering disc is mounted on the bolt with the lock nut.

The Drip Irrigation pipe roll is mounted on its position but at the time of laying the pipe it is very important to keep the pipe at its position so the Guide wheels are used to keep the pipe at its place while operating.

Guide wheel is required for guiding the drip pipe to appropriate position during laying drip pipe on floor. This will also keep drip pipe offset position and in proper tension during laying it maintains pipes position such that the paper slot making wheel will not damage the drip pipe during making holes on mulching paper.

V. FUTURE SCOPE

A. More Efficient

- We can implement it on solar for reducing fuel cost required for working to mulch paper laying.
- Automatic Mulch Paper Cutting Mechanism we can provide while it goes to end of sari in the farm instead of Manually.
- So, we can reduce the working cost.

VI. CONCLUSION

In this paper, we designed a “Advance Mulching Paper Laying Machine” application which is in a Agriculture, which is going to Laying a paper with reducing human effort and also cost required for employee for laying Mulch Paper on Bed. This system does not need more human labour, Mulch paper avoid the waste water, and Stop the growth of grass. Also this method we use some Mechanical Mean so the working time is less as compared to the conventional method.

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