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Design and Development of "Crop Cutter"

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Abstract

India is an agriculture based country which takes various types of crops. Similarly in Maharashtra millet, jowar, wheat, paddy and maize are the main crops. Now days various agricultural machines are available which are very costly .due to this it is not suitable for poor farmers. And all farmers remove crops by hands which has very effort is fully and time consuming process. Some times while cutting or removing crops by hand results into damage due to blisters on hands. Because of this the labours are not available for work, in order to overcome this situation we introduce a new simple but more efficient machine for a farmers.

This machine targets the small scale farmers who have land area of less than 2or3 acres. This machine is compact and can cut up to two rows of wheat, millet, jowar crops. It has cutting blades which cut the crop in a scissoring type of motion. It runs on petrol engine, this power from engine, is provided through shaft, pulley and belt drive arrangement to the cutting blades. This compact crop cutter is manufactured using locally available spare parts and thus, it is easily maintainable. This crop cutter might be the solution to the problems faced by a small scale farmer regarding cost and labour implementation.

Keywords: *Crop cutter, Maize, Jowar, Millet, Blister, Harvesting, Reaper.etc*

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INTRODUCTION

The history of agriculture in India dates back to the Rig-Veda, written about 1100 BC. Today India ranks second worldwide in farm output. Agriculture and allied structures like forestry and fisheries accounted for 13.7% of the GDP (Gross Domestic Product) in 2013, about 50% of the total workforce. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in overall socio-economic fabric of India.

As Per the 2010 FAO world agriculture statistics, India is the world's largest producer of many fresh fruits and vegetables, milk, major spices, select fresh meats, select fibrous crops such as jute, several staples such as millets and castor oil seed.

India is the second largest producer of wheat and rice, the world's major food staples. India ranked within the world's five largest producers of over 80% of agricultural produce items, including many cash crops such as coffee and cotton, in 2010. India is also one of the world's five largest producers of livestock and poultry meat, with one of the fastest growth rates, as of 2011.and these process of harvesting is conventional that consumes mote efforts and cost of crop cutting.

METHODOLOGY

Need of low cost crop cutter for a farmers

Most of the Indian farmers facing the problem of lack of labours, higher cost consumed for a harvesting, manpower and time in harvesting system. Some of the conventional methods require more cost for cutting crops due to its heavy construction as well as more advanced features, and it is have a prices in lakhs which is not suitable for small land owners in India, and due to small area of land farmers are moved towards a conventional method that is more time and cost consuming method

In order to solve the problems of cost of harvesting, time for harvesting should be minimized by using a new machine that increase the profit of the farmers (reducing the cost of harvesting), also overcome the situation of lack of labours. Conventional method result into back pain and blisters on hand. Our aim is to provide the low cost machine that solves these problems.

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Problem Definition

India is an agriculture based country which takes various types of crops. Similarly in Maharashtra millet, jowar, wheat, paddy and maize are the main crops. Now days various agricultural machines are available which are very costly .due to this it is not suitable for poor farmers. And all farmers are remove crops by hand which very effortful and time consuming process is. Some times while cutting or removing crops by hand results into damage due to blisters on hands. Because of this the labors are not available for work.

Solution

In order to overcome this problem we introduce a new innovative concept mainly used in agricultural field which is design and fabrication of crop cutter. In our project we fabricate the crop cutting machine for the use of agricultural field, to cut the crops in the field. This is a new innovative concept mainly used in agricultural field. It is simple in construction and its working is easy. Maintenance should be less due to availability of the components. This machine operates on petrol engine having 1.5 HP power. This is very sufficient for Indian farmers.

CONSTRUCTION

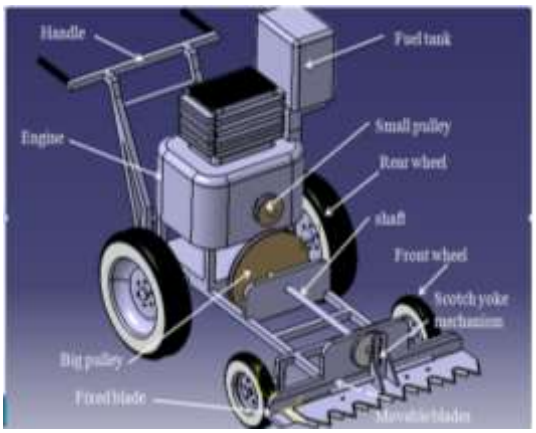

Fig.01 Constructional Details of CROP CUTTER

MANUFACTURING & ASSEMBLY PROCEDURE

- Firstly the frame of crop cutter manufactured as per the designed load by square tubes.
- Wheels are attached to that frame by means of shaft and pedestal bearings.
- Engine base is formed on frame by welding square tubes. and engine mounted on it.
- Smaller and Large pulleys are mounted on the engine shaft and transmission shaft respectively. and both pulleys connected by v-belt.

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- The transmission shaft is supported by using bearings with frame.

- The scotch yoke mechanism is manufactured by using thick metal sheet to transmit power to moving blades.

- The blades are manufactured by using High carbon steel plate and teeth profile is formed by using cutter. And cutter sharp edges are produced by grinder.

- Additional attachment is that the dome of metallic sheet that divide the cut crop into besides of crop cutter.

- Finally all the components are assembled together from base frame, wheels, engine, pulleys, belt, shaft, eccentric disc, fixed blade and movable blades.

Working

It works on principle of scissoring motion of fixed and movable blades. Also like trimmer that used for shaving purpose in daily life.

The petrol engine is used as prime movers that transmit power to a smaller pulley. Smaller pulley transmits power to larger pulley through v-belt. Larger pulley transmits power to eccentric disc through transmission shaft. Then scotch yoke mechanism used to transmit rotary motion of disc to reciprocating motion of movable blades. Blades are slides over each other in definite way to cut crops .and additional attachment is that the dome of metallic sheet that divide the cut crop into besides of crop cutter. When cutter move forward the crop fall on the dome of sheet that collected besides of crop cutter.

CONCLUSIONS AND RESULTS

The purpose of crop cutter is to reduce the cost of labours for harvesting and also to eliminate the situations that faced because of the lack of labours. Due to back pain and blisters on hand labours are not work in harvesting field. In order to overcome this situation, it gives out following benefits

1. This system reduces the cost of harvesting upto 60-70 % as that of conventional method.

2. It is suitable for small scale farmers having 2-5 acres of land area.

3. It is also reduces the 50-60 % timing of harvesting as that of conventional method

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4. Ease of maintenance, ease of operation.

5. Particularly economical operation as it eliminates extra man power.

6. High degree of operational safety.

FUTURE SCOPE

"The crop cutter machine" provides wide range for future advancements. Some of these are as follows:

1. By just changing the teeth size we can use the crop cutter as lawn mover. We can make the crop cutter to work under the different crops as per the loads (Just we have to change the power and blade size).

2. By providing the curved collectors at sides of crop cutter to collect the cutting crops and also the bunch of crops is get tying together by using automation. And throw at backside of cutter.

3. In case to use the machine in case of sugarcane application we can provide more power at prime mover one spring in parallel, let us say 4 parallel springs can be used to increase the capacity.

Table no. 1: Results

Results taken for the one acre of land of jowar crop in farm

Parameter	**For conventional method for 6 labours**	**For crop cutter**
Time required	12 hours	6 hours
Cost spend to harvesting	1.5 days of working 400 salary per day 6*600=3600 Rs.	Petrol required 8 litres 8*85=680+2labours 400*2=800
Total cost spending	3600 Rs	1480 Rs

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