

Design And Fabricate Crop Cutter Machine: A Review Paper

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ABSTRACT

The small scale farmers who have land area of less than 1 to 2 acres this machine will be beneficial for them. This machine is compact and can cut various crops at a time. It has cutting blades which cut the crop in a trimmer type of motion. It runs on electric DC motor of 250 w , this power from engine, is provided through pulley and gear box arrangement to the cutter. A crop collecting mechanism is provided for the collection of crops to one side of it after cutting. The pulley and belt arrangement is to provide power to this mechanism. It is easily repairability as this compact harvester is manufactured using locally available spare parts. This harvester might be the solution to the problems faced by a small scale farmer regarding labor fulfillment and cost. After testing this machine in farm it is found that the cost of harvesting using this harvester is extensively much less as compare to manual harvesting. Key word: productivity, Crop cutting, harvester, reaper, trimming action, Fabrication etc.

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

1. INTRODUCTION

Recently ruler has seen a shortage of experienced labor available for agriculture. Because of this shortage the farmers have development to using harvesters. These harvesters are available for purchase but they are not cheap because of their high costs, however, agriculture groups make these available for rent on an hourly basis. But the small holding farm owners i.e. generally having land less than 1 to2 Acers generally do not require the full-featured combine harvesters. Due to financial or transportation

reasons these combine harvesters are not available in all parts of rustic area. Thus, there is a need for a shorter and efficient blend harvester which would be considerably cheaper and also more accessible. The mission is to create a compact, low cost mini harvester and user-friendly. These problems gave us the primary idea about what was required in the current situation. The idea was to create a machine which will reduce the labor required to harvest crops and which is cheap. This machine has the capability and the economic value for fulfilling the needs of farmers having small land holdings which is less than 1 to 2 acres. This machine is cost effective and also clear to maintain and repair for farmers.



Fig.1 manually crop cutting

Today, India ranks 2nd among other countries across the world in farm output. Agriculture and related sectors like fisheries and forestry accounted for 13.7% of the GDP in 2013, about 50% of the labor pool. The commercial contribution of agriculture to India's GDP is decreasing steadily with the country's broad-based economic growth. According to WHO (world health organisation), Slow agricultural growth is a interest for policymakers as 2/3 of India's people depend on rural employment for a living Agriculture is the backbone of Indian economy. In India agriculture has facing serious challenges like scarcity of agricultural labor in peak working seasons of farming but also in normal time of working.

2. METHODOLOGY

Review with the local farmers who have small scale land holding and enquire about the harvesting practices and the crops produced and emerging trends in crop harvesting.

- Review with the agricultural equipment manufacturers to get information about various equipment that are available and are in demand
- Refer various international papers in small scale harvesters produced earlier. Design and fabricate the machine part.

Expected Solution Over The Present State Of Art : An expected solution over the present state of art is being explained through this article. A solution is the evolution of the rare machine, which would run with the help of human power. A simplified diagram is shown in the figure 2.1. It is a step behind type of harvester which is powered by the 250watt, electric DC motor. With the use of V-belt, drive power is transmitted to gearbox. As the needed rpm at cutter is as less as 100 rpm, a spur gearbox and a bevel gearbox is used. Here bevel gear is given to change the direction of drive in the gear system by 90°. One end of this output shaft is attached to slider crank mechanism which converts rotary motion of shaft into reciprocating motion of cutter blade. Reciprocating cutter blade slides over fixed blade and creates trimming action important for cutting the crops. Collecting mechanism consist of flat belt with collecting plates bound on it. Collecting belt simply carry and cut crop sideway.

3. LITERATURE REVIEW

We have studied different literature review as per the project criteria. So we have come up with the successive and helpful literature reviews. 1. As per G. Maruthi Prasad Yadav, Agriculture especially in India we need to focus on some aspects such as how to increase productivity and profit, how to reduce the cost, and how to solve the problems which arises. It is basically low cost and lightweight". With this Crop Cutter where the ultimate aim is that it should be easy to fabricate and test the performance of the prototype of a crop cutter for harvesting the crop. 2. Laukik P. Raut, in his paper stated that this machine focuses on small-scale farmers who have a land area less than 2 acres. They achieve that the harvesting cost using crop cutting machine is considerably less than compared to manual harvesting. The harvesters which are available in the market are suitable for large farms, so this can be the best alternative machine for farmers with a small land.3. Indian Government Analysis was the inspection done by the Indian Government in the fiscal year of 2012- 3. This overlook was intended to analyze and collect the data related to the problems and difficulties faced by the Indian farmers from where the need was properly explained. 4. N. S. L. Srivastava researched on the interest and needs of farmers and the complication which they face while harvesting

and keeping the agricultural field. This paper was thus a bottom study of farming conditions, of farmers and their basic problem.

4. PROBLEM IDENTIFICATION

As most of the crop cutters are designed for wide farm area and single-crop system. Most of the Indian farmers possess very poor land for crop cultivation in the Indian agricultural system the intercrop cultivation is mostly observed (e.g. soybean, cotton, etc.) according to their crop management. By concentrating on Indian farmer's

Problems

Identified are listed below.

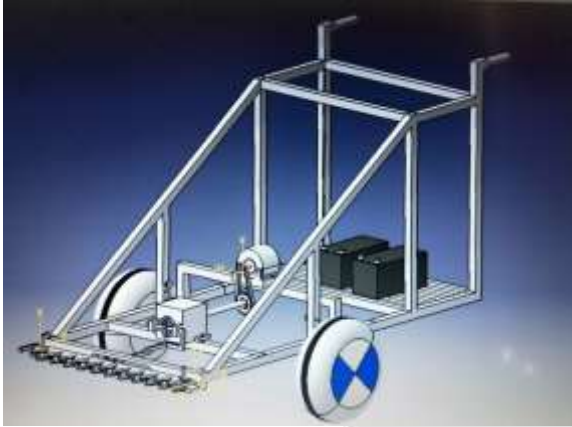
1. The cost of crop cutters is very huge
2. Skilled as well as unskilled labors are not easily available
3. Labor charges are also too high.
4. A mixed crop system is followed.
5. The economic condition of Farmers is not useful.

5. 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 battery operated motor having 250 W power. This is very sufficient for Indian farmers.

6. 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.
- DC motor base is formed on frame by welding square tubes and DC motor mounted on it.
- Smaller and large pulleys are mounted on the motor shaft and transmission shaft respectively and both pulleys connected by v-belt
- 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 edge are produced by grinder.
- Finally all the components are assembled together from base frame, wheel, DC motor, pulley, belt, shaft, fixed blade, and movable blades.



7. WORKING

It is a walk behind type of harvester which is powered by the 250 w, electric DC motor. With the use of V-belt, drive power is transmitted to gearbox. As the required rpm at cutter is as less as 100 to 200 rpm, a spur gearbox used. Here high torque DC motor is used to collecting the crop cut by cutter blade . One end of this output shaft is linked to slider crank mechanism which converts rotary motion of shaft into reciprocating motion of cutter blade. Reciprocating cutter blade slides over fixed blade and creates trimming operation responsible for cutting the crops . cutting crop Collecting mechanism consist of flat belt with pulley arrangement collecting plates bolted on it. We provide input electric supply to the Electric motor when electric DC motor start it transmit the power to the gear box with the help of V belt drive through pulley arrangement the gearbox change the direction of power direction at 90o through shaft . shaft is connected to the scotch yoke Mechanism Scotch yoke mechanism which converts rotary motion of shaft into reciprocating motion of cutter blade. The another high torque DC motor used for the collecting belt of machine. crop Collecting mechanism consist of flat belt with pulley arrangement collecting plates bolted on it. the collecting Mechanism rotate through pulley Arrangement. crop Collecting mechanism collect the crop cut by the cutter Blade.

8. CONCLUSION

Based on the present works the following are some great conclusions have been done. 1.From this work the following completion were drawn For the work to be adept in 1acer area without a machine (crop cutter) or manually, it costs Rs: 4200/- by a minimum of Rs:350/- pereach labor in a day. Whereas, by using an, Multi crop cutter we can accomplished the same work in the same area (1acer) with only one labor (skilled labor), it takes 5-6 hours at a cost of alone Rs:650/- (i.e., fuel Rs:300/- & labor cost 350/-). So by using an ultra compact crop cutter we can reduce the cost up to 80% . The performance through manual cutting cannot be. The same through out the day, as man get constrained,whereas a machine cannot Therefore , 80% of the time can also be saved by using the Multi crop cutter. It is concluded that the device is most economical. 2.The Combined reaper and colleting machine is built to be portable and efficient to cut the crops. The machine was tested on a ground to check its cutting capability and efficiency. 3. The harvesters available in market are applicable for large farms, so this can be the best machine for the farmers with small land. The success of this machine depends on how the farmers obtain this machine as their ally. 4.There are some changes that use to be done on the machine and a final product is to be taken out for sell. 5.From this work the following completion were peaked for the work to be in lacer area without a multi crop cutter or manually, whereas by using a multi crop cutter we can entire the same work in the same area (1acer) with only one labor. The same throughout the day, as man get constrained, whereas a machine cannot.

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