

# Design and Fabrication of Mini Paddy Cutter Machinery

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**Abstract:** Agriculture is the back bone of India. In agriculture as like yielding, harvesting is also an important process. Harvesting by manual method is time consuming and using other equipment costs more. Thus by using Low coast mini paddy cutter machine we can reduce the cost and timing. It also increases the efficiency. This machine is used to cut the low level crops which less than five feet height. The machine can be easily constructable and it can be easily serviceable. Strong blades have been used in this device for the cutting process by using that we can cut dense. It also reduces the labour cost.

**Keywords:** Consuming low cost, Crop cutting, Easily constructed, Paddy cutter.

## 1. Introduction

On small farms with minimum mechanization harvesting is the most labor intensive activity of growing season. On large farms harvesting uses high cost and sophisticated farm machineries such as combine harvester. The complication of harvesting is end up in the growing session. For harvesting process small paddy reaper machine are used, it used for harvesting rice, wheat, soybean, forage grass and other simple individual plants. It is very essential to apply good harvesting methods and machineries to maximize the grain yield, and minimize the grain damage and quality deterioration. The machineries used for harvesting has to be in good working condition and it should not affect the crop thus it is very important to select an apt machine for harvesting. Combines are used for the cutting and cleaning of cereals and other crops in one operation. Paddy harvesting includes cutting, stacking, handling and hauling process. This can be done individually can be used to perform operations one by one. A harvesting system vary place to place and season to season can be also done by the traditional and nontraditional process. The tractors and other devices are used for long size harvesting process. Also it varies from crop to crop. Based on the process the devices may be semi-automated, automated or manually. by manual method it is time consuming and it is tedious in nature using the apt devices to harvest is the best way to avoid damage to the crops and reduce the time taken in the process, high cost machines

might be effective but it increases the burden to the farmer and might or might not be effective. The agri products are not having the stable price in the markets that's why the farmer needs to cultivate and harvest the various crops at the single season. After the cultivation the life time of the crop varies so he needs a small device for the particular crop for that purpose we can use this device for next cultivation there should a stable and balanced process done on harvesting the cultivation of rice are majorly depend on the soaked seeds on the water so the device has to be used on both land and water it should also be used when water is drained form the fields, there is also a traditional and modern practice of harvesting, nowadays the machines are only used in the modern harvesting, this device can also be used in traditional harvesting methods. This machine is having the economic capable value of fulfilling the medium and small scale farmers, it can be used only for 5 to 6 hours a day it creates a user friendly operation for the farmers.it can be easily transportable and less weighted equipment.

## 2. Literature Review

Wang Jiasheng, Wang Dongwei, Shang Shuqi, Wang Yanyao, Kuai Jie, "Development and experiment on 4LZZ-1.0 type plot grain combine," Transactions of the Chinese Society of Agricultural Engineering, vol. 52, no. 18, pp. 19-25, 2016.

Habib et. al stated that the parameters affecting cutting process are related to the cutting tool, machine specifications and plant materials properties. in 2002.

C. G. Sørensen [1] studied efficiency of different harvesting machines in terms of cost reduction.

P. B. Chavan, et al. Reviewed harvesting methods and different designing a low-cost harvesting machine.

U. V. Kongre et al. To select the suitable cutter and mechanism for multi crop cutter.

Abhishek Pratap Singh, et al., Designed and analysed a crop cutting machine that is used to cut crops like Jawar, tuar, & bajar, e tc. which runs with battery. They found that two workers can be replaced with the designed machine.

Tejaskumar Patel, et al., Fabricated a pedal operated multi crop cutter to cut different types of crops with low cost. This is

helpful for farmers who have less than two acres.

### 3. Aim and Objective

The main objective of the project is to design an affordable mini paddy cutting machine which could make the process of harvesting more effective. The mini paddy cutting machine could reduce the time involved in manual harvesting thereby reducing the manpower and makes the process more effective.

### 4. Methodology

Need of low cost crop cutter for a farmer. 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.

#### A. Survey and Problems

India is an agriculture based country which takes various types of crops. Similarly, in 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, we introduce an innovative concept mainly used in agricultural field which is design and fabrication of mini paddy cutter. In our project we fabricate the paddy cutting machine for the use of agricultural field, to cut the crops in the field. This is an 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 agriculture.

#### B. Main structure and design of the paddy cutter machine

##### 1) CAD design

Models and their workings:

1. Frame
2. Wheels
3. Cutter bar
4. Bearings and belts



Fig. 1. CAD design

##### *Frame:*

The frame is use for supporting the part used in project.



Fig. 2. Frame

*Ground Wheel:* It is used to move the device to another.

*Bearing:* A bearing is a machine element that reduces friction between moving parts

*Belt:* A belt is a looped strip of flexible material used to link two or rotating shafts.

*Blade:* It is a tool used to cut the dense crop and the thick crops



Fig. 3. Blade

##### *Calculations:*

$$\text{Total Power} = \text{Power /Stand of Strand} \\ = 10.14 * 1 = 10.1\text{HP}$$

Length of chain

$$L_p = T_1 + T_2/2 + 2C/P + P*(T_1 - T_2)^2/40C$$

$$C = D_p2 + D_p1/2$$

$$C = 607.1$$

$$L_p = (20 + 50/2) + (2 * 067.12/31.75) + (31.75 * (20 - 50)^2/40 * 607.12) = 74.97$$

$$\text{Corner relief (e)} = 0.125 * p = 0.125 * 31.75 = 3.96 \text{mm}$$

$$\text{Chamfer radius (r)} = 0.54 * p = 0.54 * 31.75 = 17.14 \text{mm}$$

### 5. Conclusion

After the modification of manual operator devise it gives more efficiency than the old machine. It reduces the losses cutting damage crops in the fields. The main objective is to make simple work for the harvesting. The design of the compact is easy to work and operated in friendly manner. The farmers can be used on the various cultivations of lands during their work. This will be helpful to make work faster and proper

manner. The function of this machine is ecofriendly to work.

### References

- [1] U. V. Kongre, "Fabrication of Multi Crop Cutter", International Journal of Innovation in Engineering Research and Technology, vol. 3, Issue 4, April 2016.
- [2] S. Li, "Agricultural Mechanization Promotion in China - Current situation and Future," Bologna, 2005.
- [3] Zhong Ting, Hu Zhichao Gu Fengwei Cao Mingzhu Chen Nanyun Wang Haiou, "Optimization and Experiment for Threshing and Cleaning," Journal of Agricultural Machinery, vol. 43, no. 10, 2012.
- [4] Bharaneedharan Muralidharan "Design and Fabrication of Manually Operated Lawn Mower Applicable for Grass Cutting", International Journal of Innovation in Engineering Research and Technology, vol. 3, Issue 4, April 2014.
- [5] G Maruthi Prasad Yadav, GMD Javeed Basha, "Fabrication and performance test of an Ultraportable Crop cutter", IJRSET, Volume 2, Issue 2, Pages: 13-253.
- [6] Adarsh J. Jain, Shashank Karne, Srinivas Ratod, Vinay Toted and Karan," Design and fabrication of small scale Sugarcane Harvesting Machine" IJMERR, Vol. 2, Issue 3, July 2013.
- [7] Amujula Hythika Madhav, Bhaskar H, "Fabrication of Manually Operated Rotary Lawn Mower", International Journals of Innovations in Engineering Research and Technology, vol. 2, Issue 2, Feb. 2015.