

Design and Fabrication of Multipurpose Harvesting Machine

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Abstract: Ginger is a potential agricultural commodity to be developed in India. When the harvest comes, people still use a very simple method for harvesting ginger by using hoes, pick-axe and other farming equipment. The farmers complain for the need of so many work forces for harvesting while the labor cost is getting increased and the time spent for harvesting process is too long. Although there is an alternative of imported ginger harvesting machines, those machines are not compatible with the farming environment in India, having a high initial and maintenance cost. This machine can be used in any farming condition in India and can be prepared at village level. This project is focusing on design and fabrication ginger harvesting machine. The machine will not only separate ginger from soil but also not let the ginger get harmed, and the ginger can be collected in the collector box. Turmeric is a very important spice in India, which produces nearly the world's crop and uses 80% of it. Harvesting is the process of gathering ripened crops from the field. The general practice of harvesting is to dig out the rhizome manually with the help of hand tools. The type of harvesting causes damage to rhizomes. It is a difficult task for the farmers to get the required labor force during the harvesting season. Delay in the harvesting process results loss in the yield and also the quality of rhizomes is affected adversely. So, it is necessary to develop a suitable mechanical harvester for turmeric, which helps farmer to harvest turmeric with minimum losses within a specific time by reducing the human effort as compared to manual effort. This machine consists of digging blade, wheel, motor and blade driving unit. The machine starts moving as soon as the device is powered up. This harvesting technique leads to the development of mini tractor in order to reduce the efforts of human beings and also it increases the digging efficiency. Therefore, the simplest solution we had found.

Keywords: Battery, Slider-Crank mechanism, Motor, Sprocket, Cam mechanism.

1. Introduction

Agriculture is the cultivation of crops with the development of technology and automation. India is categorized as a top 5 world largest harvesting countries. There may be huge economic loss in the harvesting process, if the process carried in manually method. The reason behind the agricultural sector is the development of technology and automation. Therefore, there must be a proper development in the harvesting machine with the less man power consumption and time reduction. In the harvesting process, there is more time consumption in manual

method. So for the demand of world with high rate of production is must. For the proper production, there must be the suitable device for famers with easy operation, so that the machine can be carried easily and the production rate can be achieved.

In 19th and 20th century, the harvesting method of ginger is carried out by manual with bullocks. So this may affect the crop during the production and it is a more time consuming process with the bullocks. For the higher production rate, it is required to scrutinize the bullock and human. Therefore, it is a required one for the harvest independently without any support. The independent harvest comes only with an automation of machine. These leads to increase in production of products without any loss to the crop. The main view of our project is to overcome the problem faced by farmers and give a proper solution for the harvesting method. This method provides less human power with more production.

2. Literature Review

S. Sathesh., et. al describes, it is a manual operated machine with DC motor and consists of a digger for loosening the soil. The rotation of blade may affect the turmeric. The production may be high but there is a huge loss to the farmers. It is an electronic embedded system for the speed control. There is a separate speed control unit for wheel movement and blade movement. If the blade switch is ON, the digging blade is activated through pulley (chain and sprocket) attached to the motor and it starts uprooting the turmeric and the rhizome of the turmeric is left in field.



Fig. 1. Front view of mechanical setup

Kawale Nagendra., et.al describes they have used high speed electric motors with tractor. Hence it is required High fuel consumption and it pollutes the environment. There is a high wastage of ginger or crops because of the pressure created on the soil and it affect the ginger rhizome.

B.O. Aderemi., et. al describes that the method consisted of two basic unit grating and pulping. After the cutting process there is a flow of ginger in the hopper. The cutting process is done with a fast moving blade and the electric motor runs with the belt drive for the harvesting process. But this process a lot of time with more energy consumption

Naresh Babu., et. al describes that the method is based on the manual method of cutting the above crops and removal of rhizome with ginger. All the activities are done by manual method and there is more time consumption with high man power. The cutting process are done with traditional equipment such as spade, blade etc. There is no any automation for the high production

Dagninet Amare., et. al During the traditional potato harvesting practice consists of two harvesting techniques namely using traditional plow and by using hoe were found being implemented. This method is a traditional practice with small equipment's and the production is low with more time consumption.

Aniket U. Dongre., et. al described as a harvesters must move through the direction of crops and adjust the blade according to the crops. There is a disc attached to the frame which is used to the dig the soil. During the harvesting time there is an elevator attached to the frame which is used to remove the vegetables from the underground. The digger is used to loosen the sand and elevator used to remove the vegetables from the land, by removing soil attached to the vegetables. Soils falls through the bottom of the elevator and vegetables move through the elevator. This is the process of harvesting rearward to the top of the harvester; this is the primary separation process.

Simonyan K. J et. al says that, the tool used for cutting the crops must be sharp and there should not be multiple cutting of crops with the cutter. The ginger harvesting is done with the holding the rhizome with the one hand and the tool is passed between the rhizome plant. The process carried out is more tough, risk and may cause damage to plant during the harvesting period.

Shailaja Deshvena et. al describes, the purpose of harvesting is with low cost and maximum efficiency for digging. During the harvesting period there must be a fuel consumption and the separation of soil with the economical cost.

D. Chukwudi Muogbo, et. al describes that The operation speed was carried on the basics of length of the rhizome because for the faster harvesting time. There is a speed in the operational speed of the machine is increase, then the harvesting time increases depending on the length of the length of the rhizome. During the harvesting time, the rhizome gets blocked in the hopper and this may cause to reduce the speed of harvesting

time.



Fig. 2. Field evaluation of turmeric digger



Fig. 3. Field test of the turmeric planter

3. Design of Model

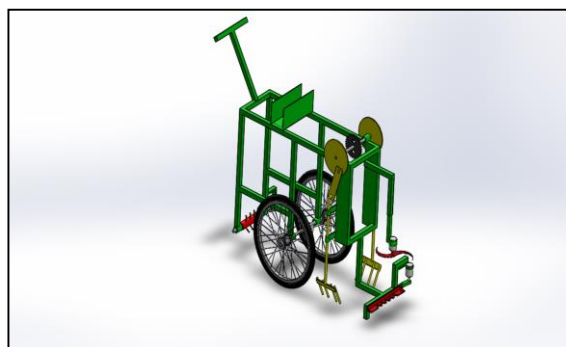


Fig. 4. Design of model

Table 1
Bill of assembly

S. No.	Material	Quantity
1	Mild steel (body)	8
2	Dc motor	2
3	Battery	2
4	Sensor	1

4. Working

The multipurpose harvesting machine can be used for the

ginger, turmeric etc. This machine has a rotational blade at the front for the crop cutter, which cut the above surface crop There is an additional blade for the grass cutter, where it can be used both for ginger or grass cutter. By the cam mechanism, there is a movement of connecting rod for the purpose to loosen the soil. There is a digger provided at the rear side of the machine. This digger used to remove the vegetables form the soil.

The sensor is provided at the front portion for automatic on and off, which automatically detect the crop and make the motor to run. When the grass cutter operates, other two operations are kept constant and the grass cutting blade operates.



Fig. 5. Working model

5. Conclusion and Future Scope

Thus, we have come up with an affordable cost multipurpose harvesting machine. This is an important method and innovation method for the society. The machine consists of both grass cutting and ginger harvesting simultaneously. For the faster harvesting it is made safe, during harvesting process. The

machine is made with less weight, faster cutting of grass and ginger crop. There is only movement of machine by a manual method and the process is carried automatically by a roller, digger and cutter. The energy consumption is increased by using the sensor, which is attached with the machine. The rhizome is not affected with the low speed and faster process. During the digging process there is a movement of sand by digger, which is used to loosen the sand and for the removal. By this method there is a high production with low requirement. The future update is the IOT method with the automatic method harvesting method and seed planting machine.

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