Automation In Cassava Plantation

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Abstract-Cassava is cultivated in Indian about thirteen states with major production in South Indian states of India and Kerala. The cultivators of cassava mainly felt difficulty in manpower. Now-a-days, due to insufficient finance and labours the farmers have experienced a decrease in cultivation and production. The development of technology plays a vital role in agriculture by semi-automating the process of cassava plantation where the machine itself cuts the stem and it is planted into the soil. In our project we implemented the cassava plantation process by developing a product which automatically fetch an individual from a group and the stem enters into roller setup with a high force it will planted into the soil. Thus, it will help the farmers for easy plantation of cassava with reduced labours and amount.

Keywords: Cassava planting machine, Farmers, Cultivation, Semi-automated, Automation.

1 INTRODUCTION

Cassava is a major staple cash crop. It fits well into small holder farming systems, thriving across a wide range of ecological zones and available all year round. Cassava is efficient in starch and carbohydrates and about 70 million people are estimated to obtain more than 500 Kcal per day and more than 500 million people consume 100 Kcal per day from cassava. Additionally, cassava is a perennial food crop and also a cash crop, that produces roots that are reaped in 8-12 months after planting and its leaves are used as corresponding food source rich in protein and as a substitute for higher-priced raw materials such as wheat, and this is an opportunity for small-holders that currently grow cassava only for home consumption and sale in local market.

Cassava is planted each year in about 120,000 hectares of agricultural land and producing about 1.8 million tons of cassava roots. In India Cassava is cultivated in an area of 0.21million hectare in India, with a total production of 7.74 million tons. Considering a 1-hectare commercial cassava plantation, it would be difficult for a single farmer to plant the whole land with cassava cultivars. If the proprietor wishes to finish the planting in a certain period; the production cost would be high since several labourers must be paid to do the job and because they are only estimating the distances between each cultivar, it may result to a low yield of cassava planted in an incorrect relative position. The major uses of the cassava are, it is similar to feed grains, contains starch and is easy to digest so that it is widely used for feeding pigs, cattle, sheep and poultry in tropical areas. The fresh tubers contain about 30 percent starch and percent sugars, and the dried tubers contain about 80 percent fermentable substances which are comparable to rice as a source of alcohol.

Cassava when taken internally is good for hair and skin as it has all the important nutrients. For making the bronzer, mix cassava starch with biological cocoa powder and few drops of pure vanilla. The ratio depends on the skin type, and an effective, allergy free, cheap bronzer can be made in minimum time and in a cheaper manner. The cassava is also used in the treatment of cancer as the preliminary research proposes that linamarin, a compound found in cassava may have cancer-fighting properties and also it contains vitamin C and Calcium.

2 EXISTING METHOD

In the existing method the cassava stakes should be placed in the top of the planter manually and the planter is connected to the tractor. The tractor gives the power to rotate the blades by means of connecting the PTO shaft (Power take-off) shown in the Figure.1. A PTO shaft transfers the power from the power source to the application and the pipe that is used for transporting the stem to the ground. The stakes that are placed at the top of the planter is moved automatically to the pipe that is connected to the cutting section. After crossed the cutting section the stem is planted to the ground, and the sand bed that is to be used for the irrigation purposes can be made by the use of this planter. This work reduces the three works that can be done manually in the present planting systems. This will eliminate the man power and also reduces the time.

![Figure.1: Cassava Plantation using Tractor](https://example.com/cassava-plantation.png)

3 PROPOSED METHOD

To overcome the manual loading system of cassava stem, the proposed method is automatic planter which is made of an
acrylic circular arrangement which allows the individual stem to the roller setup, which provides a high force for planting the stem into the soil. At the same time the circular arrangement locks the stem for providing a delay, so that the planter moves to the next plantation position and the same process continues.

3.1 BLOCK DIAGRAM

![Block diagram of proposed method]

3.2 OBJECTIVE OF THE PROPOSED METHOD

The main intention of this project is to make the planting of cassava plant in an automated method and it is used to reduce the manpower and time. In this method cassava stems are loaded in an acrylic circular arrangement, which contains 10 equal size holes of plate like structure and there will be steel pipe like connector from the circular setup to the roller, the proper matching of any one of the hole with the steel pipe allows the stem to plantation. Whenever the process is started ON the circular setup rotates, simultaneously the proximity sensor senses the appropriate position of hole. Once both the holes met each other the rotation of the circular arrangement stops then the individual stem enters into the roller. Roller is used to provide a force for the stem to enter into the soil. After the stem enters into the roller the circular arrangement moves a little bit so, that holes get locked by which the next stem is prevented from entering into the roller. After planting the one stem into the soil the planter moves to the next location and the process continues on to plant the remaining loaded stem.

4 WORKING PRINCIPLE

The cassava stems are cut into 10cm and loaded into the planter and the fetching of individual stem is carried out by the circular plate arrangement. The circular plate like rotating arrangement consists of almost five holes made of equal diameter and below to that a long steel pipe will be present, that pipe will give the connection for the cassava stem from the circular plate to the roller. After the process is started by pressing a start button the rotating plate starts rotating, when any one of the hole is matched with the hole of the steel pipe and the proximity sensor is sensed it stops off its rotation. Now, the stem moves from the plate to roller and gets planted into the soil. The arduino controller which controls the gear motor which drives the circular arrangement for movement according to the proximity sensor output and the matching of hole in the circular plate with the steel pipe connector. At that time of roller function the rotating plate and the pipe gets interlocked that prevents the stem getting entered into roller during wheel movement for reaching next destination and the process of plantation occurs continuously until the stop button is pressed.

6 PROPOSED PROTOTYPE

The proposed prototype of automation in cassava plantation is shown in Figure.4 and roller function is shown in Figure.3

![Roller Function]

![Proposed Prototype]

7 RESULT AND DISCUSSION

Thus, the cassava stem is planted into the soil using Arduino with the help of proximity sensor, driver module and gear motors. Once, the process is started the wheel motor moves to a specified distance which is already quoted as one feet in the controller. The proximity sensor output is in the form of voltage which is given to the controller which helps in initiation of the planting process. The controller then intimates the roller function for making the cassava stem to plant into the soil. Simultaneously, the LCD will display the corresponding
process which is shown the Figure.5 and the steps are also tabulated

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>DISPLAYED OUTPUT</th>
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<td>Loading of cassava stem</td>
<td>Stick Tuber</td>
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<tr>
<td>Start</td>
<td>Monitoring</td>
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<tr>
<td>Wheel movement</td>
<td>Machine Start</td>
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<td>Roller starts</td>
<td>Roller Start</td>
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<tr>
<td>Plantation</td>
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Table.1: Steps in Proposed Method

8 CONCLUSION
Thus the designed planter is very useful to the farmers, so that it reduces the time consumption and man power. Additionally, there is no need for tractor so that the fuel consumption is reduced. This technology is very simple so that even a lay man can also operate easily.

REFERENCES