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# Effortless Cassava Planting Technology

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**ABSTRACT**: The abstract of this work is to develop the cassava planter that operates in an automated way. Agriculture is the backbone of our country. Cassava is one of the major staple crops in India and the plant is drought resistant. The planting process needs more time and it is difficult to maintain the human wages for the farmer for a huge cultivation area. The time consumption is also high if it is planted manually. The stem must be perfectly cut and it should plant to the ground without causing any damage to the stem. In our work we designed to move the stakes automatically that is not available in the present planting systems. This will eliminate the human power as it is one ofcrisis in the field of agriculture and also this work reduces the time consumption of the farmers.

**KEYWORDS:** Cassava planter, cutting unit, stake, PTO shaft

## I.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 markets. Cassava peels are usually used as food for animals such as cows, goats, and pigs. The skins and leaves are useful in feeding animals in addition to grass or fodder. Cassava leaves are also a good source of iron and beta carotene and are eaten by many people as a food relish. This could serve as a food source for farmers. The cassava peels can be used to make compost which in turn could be used by farmers to restore the fertility of the soils. The method of planting plays an important role in the production of cassava. There are three methods of planting, vertical, horizontal and inclined to some angle(say $45^{o}$) from the ground. The horizontal method produces more cassava tubers and the inclined methodproduces the tubers in one side only. In this work we have designed the vertical planter that is most suited for both planting and harvesting. The stem of the cassava that is to be planted is of about 20-30 cm in length. This work cuts the stem of 30 cm in length and the distance between the two adjacent plants is of about 1m.In this work we used the rotational energy from the shaft of the tractor to power up the blades that is used to cut the stakes. The PTO shaft has the rpm of about 650 rpm; therefore there is no need of using the additional source to power up the blades. It is important to cut the stakes with proper speed because it may cause damage to the stakes that may cause a major problem in the plant's growth.

## II.USES

The major uses of the cassava tuber are given as follows:
1. Cassava in composite flours:In many developing countries such as Egypt, Nigeria, Iraq, etc, there is an increasing dependence on imported wheat for their bread consumption as the dependence is continually expanding. Most of these countries grow staples other than wheat that can be used for bread. Some of the people produce various starchy roots such ascassava, yam and some others grow cereals such as maize, millet or sorghum. It would be economically

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beneficial for those countries as the imports of wheat could be reduced or even eliminated and the demand for bread could be met by the use of domestically grown cereals and tubers instead of wheat. In 1964 the Composite Flour Program was initiated by the Food and Agriculture Organization of the United Nations, it considered mainly to make bakery products from locally available raw materials, particularly in the countries which could not meet their wheat requirements. Although the bakery products that are producedfrom composite flour were of good quality, similar to the wheat-flour bread, but the quality and deliciousness of the composite-flour bakery products were different from those made from wheat flour. Bread made up of non-glutenous flour has the crust and crumb structure of cake rather than bread and may not be acceptable by people who are familiarized to conventional bread. Because the bread which is made up of wheat flour is evenly spread and the soft crumb characteristicare due to the swelling properties of wheat-flour gluten in water. If pure starch from another cereal or tuber is used, the bread is considerably more rigid and its surface is irregular because the gases are insufficiently retained in the bread. Therefore, if thickeners that do not contain gluten-making proteins are used, a swelling or binding agent must be added during the preparation of the bread to bind the starch particles such as egg white, gums, glyceryl mono stearate. Efforts have been made in many countries to produce bread by conventional methods in which other flours such as cassava flour were added with the wheat flour in some proportions. Bread of allowable quality was obtained by the use of 30 percent of either cassava or corn starch with 70 percent of wheat flour. The results of using only non wheat flours suggested that the combination of cassava flour and cassava starch can be used in bread-making and the bread that is made from cassava flour and defatted soybean flour was of good quality. From the dietary point of view, the protein content of both the cassava-soya and the cassava-groundnut breads was higher than that of common wheat bread. In India, a new product called cassava macaroni was developed by adding a small amount of specially prepared groundnut meal and wheat semolina to cassava flour. The mixture that is prepared is treated, baked and consumed in the same way as food grains. The protein content is comparable to that of wheat and the macaroni is nearly twice as nutritious as rice. This will help the human to maintain the dietary and the cassava tubers has some medical properties also such as reducing the sugar level in our body and helps in the treatment of cancer.

2.Cassava in animal feed: Cassava is widely used for feeding pigs, cattle, sheep and poultry in tropical areas. Dried peels of cassava roots are fed to sheep and goats, and raw or boiled roots are mixed into a mash with protein concentrates such as sorghum, groundnut, oil-palm or maize kernel meals and mineral salts for livestock feeding. In many tropical regions, the leaves and stems of the cassava plant are considered as waste product. However, diagnostic tests have proved that the leaves have a protein content which is equal to about 17-20 percent of alfalfa. Some experiments showed that the dehydrated cassava leaves are equivalent in feed value to alfalfa. Imports of arid alfalfa in the Far East, mainly in Japan, have reached about 240000 tons a year. Therefore, a large prospective exists for the exportation of dehydrated stems and leaves of cassava. In Brazil and many parts of south-east Asia, large quantities of cassava roots, stems and leaves are chopped and mixed into a silage for the purpose of feeding to cattle and pigs. Thus the usage of cassava is increasing. Cassava, similar to feed grains, contains starch and is easy to digest. Therefore, the roots are mostly suited for feeding the young animals, fattening the pigs and also in the poultry to feed the chicks. The amount of cassava and its products that is fed to animals as crumbs in the tropical regions must be large, but there is no way of estimating it. Farmyard birds, goats and pigs probably consume cassava roots and leaves regularly in many parts of the tropics. The composition of a compound animal feed varies according to the animals like cattle, pigs or poultry as well as to the kind of production such as dairy, meat or eggs. There are many ingredients which can be used to supply the main elements in composite feed, such as starch, protein, fat, minerals and vitamins. Generally, oil cakes are the main elements in the feedstuffs for cattle, while feed grains are the most vital for pigs and poultry. Cassava products were used as a raw material for compound feedstuffs until the Second World War, after that the grains became cheaper than cassava products in Europe; they use the grains to feed the animals. When the grain prices rose again, cassava products were again used widely. The maximum content of cassava products in compound feedstuffs is authoritatively set in many countries. For example in Federal Republic of Germany, it differs according to the type, but is commonly as follows: 10-40 percent for pigs, 20-25 percent for cattle and 10-20 percent for poultry, but for other countries it varies.

3.Cassava Alcohol: Cassava is one of the richest fermentable substances that is used in the production of alcohol. The fresh tubers contain about 30 percent starch and 5 percent sugars, and the dried tubers contain about 80 percent fermentable substances which are comparable to rice as a source of alcohol. Ethyl alcohol is made from many carbohydrate materials. In some countries like Malaysia, many factories are encouraged to use cassava roots, starch or molasses, the type of product depends on the cost of the raw materials. When cassava is used, the roots are washed,

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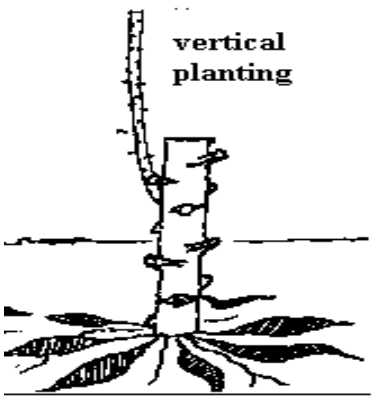
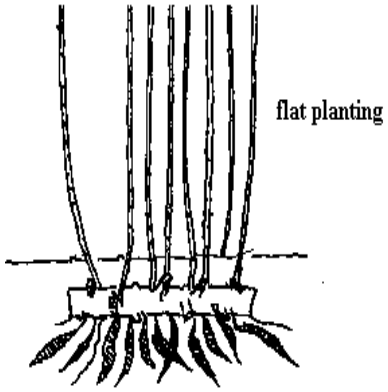
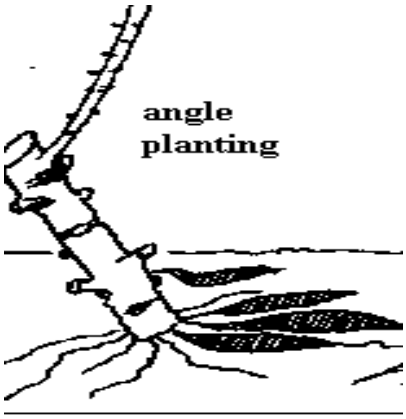
crushed into mash and then partitioned. Saccharification is carried out by adding sulphuric acid to the mash in pressure cookers till the total sugars reach 15-17 percent of the contents. The pH value is accustomed by using sodium carbonate, and then yeast fermentation is carried out for three to four days at a suitable temperature for the production of alcohol. Alcohol is then isolated by heat purification. The yield of transformation is about 70-110 litres of absolute alcohol per ton of cassava roots and it depends on the variety of cassava and the method of manufacture. The crude alcohol that is produced from cassava has an unpleasant odour, but it can be improved if the first and last fractions in the distillation process are rejected. It is usually employed for industrial purposes, in the manufacturing process of cosmetics, solvents and pharmaceutical products. If the production is essential for human consumption,special care should be taken in handling the roots to free them of hydrocyanic acid.

4. Medical Uses: Cooked cassava has a low glycaemic index of 46 which makes it very suitable for comprising the diet of diabetic patients. It is a good idea for diabetic patients to use the cassava flour instead of the wheat flour, as it does not raise the blood sugar level quickly. The way cassava is prepared also makes a difference, it is suggested to have it in the form of pancakes or boiled with salt and stir fried. Cassava when taken internally is good for hair and skin as it has all the important nutrients. Cassava starch can be used as a thickener in home-based lotions and also can be used for making home-based bronzer. 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.

## III.PLANTING METHODS

There are three different methods of planting which are segregated by the table given below

| VERTICAL PLANTING | HORIZONTAL PLANTING | ANGLE PLANTING |
|---|---|---|
| Guard against lodging | For multiple stem production | For ease of harvesting |
| In this method the stem is planted vertically in sandy soils with 2/3 of length of cutting below the soil to harvest deeper lying storage roots for waterfront. | In this method the stem to be planted should be completely buried into the ground to increase the production. Storage roots are many but they arerelatively smaller in size. | In this method the stem should be planted at an angle in loamy soils to produce more efficiently arranged roots |
|   |   |   |

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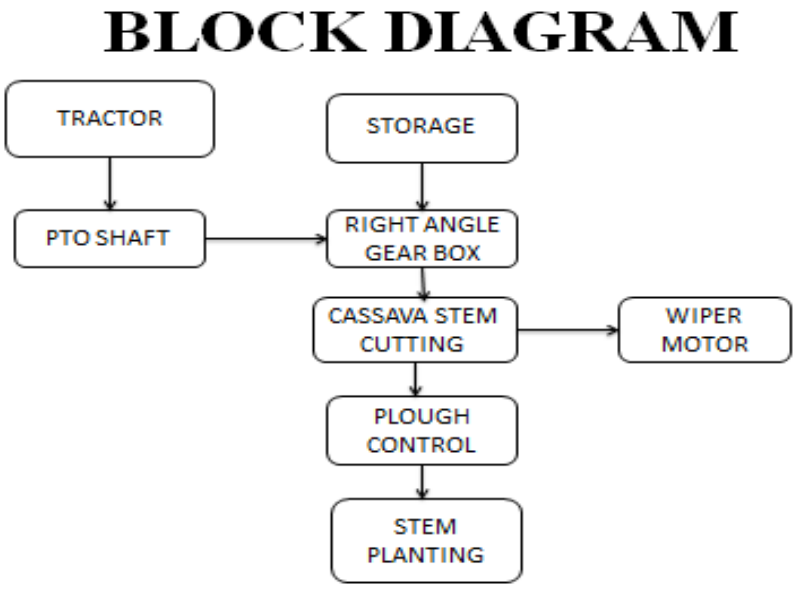
## IV.BLOCK DIAGRAM

As stated above the cassava yield must be efficient if it is planted in the vertical position and therefore in our work we designed for the vertical planting process.

The block diagram of our work is given below:




The following components were used in our work as listed below.

- PTO shaft
- Right angle gear box
- Plough cultivator
- Sheet metals and iron bars
- Wiper motor

The usage of the above listed components was given in brief.

PTO shaft:A power take-off (**PTO**) is one of the methods for taking power from a power source, such as running engine, and transferring it to an application such as an attached implement or separate machines.In our work we use the PTO shaft to power the right angle gear box by using the power from the tractor. This will reduces the usage of external power supply to the cutting section through the right angle gear box and also reduces the space.

Right Angle Gear Box:Right angle gear box is used to transfer the power from the PTO shaft to the cutting section smoothly with the use of gear arrangement. There are two gears one is of higher diameter and the other one is of smaller diameter. The diameters of the two gears are of the ratio 3:1. The PTO shaft is connected to the small diameter gear and the blade is connected to the large diameter gear. Thus the power needed to cut the stem is reduced.

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Plough Cultivator:The plough cultivator is the one in which all the components are mounted. In the cultivator we fix the plates that are used to prepare the sand bed after planting the stem in the ground. The breadth of the sand bed to be made is adjusted by means of bolts and nuts. In our planter we designed to cut a 5 inch stem, and the length of the stem to be planted is also adjustable.

Sheet metals and iron bars:The sheet metal is used to make the circular blade that is used in the cutting section. The blades are get sharpened around the blade to get a perfect stem to plant in the ground. The iron plates are used to make the sand bed.

Wiper Motor:Wiper motor is a Permanent Magnet DC motor which operates on the principle of the piston. In our work we use this motor to move the stem in a synchronized way.

## WORKING

The cassava stakes should be placed in the top of the planter and the planter is connected to the tractor. The tractor gives the power to rotate the blades by means of connecting the PTO shaft, 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 purpose can be made by the use of this planter. Our 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

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consumption. Therefore, it will help the farmers in in saving both the time and money. The pictorial representation of our work is given below.

## V.RESULTS AND DISCUSSION

In the fig.1, it shows the graph number of acres vs number of hours for the conventional methodand also for our proposed work.

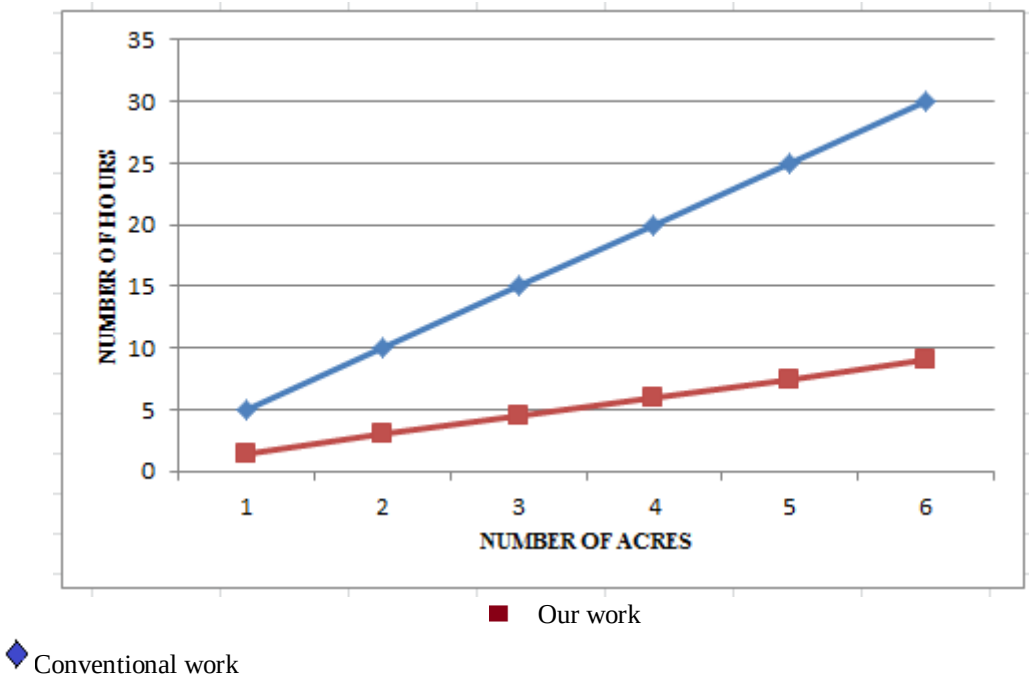


Fig.1 number of acres vs number of hours

The above graph shows the reduction in the time consumption for the farmers. This will also eliminate the wages and also the man power of the farmers.

## VI.CONCLUSION

Thus we designed the planter which is very useful to the farmers, so that it reduces the time consumption and man power. Additionally there is no need for energy so that the energy consumption is reduced. This technology is very simple so that even a lay man can also operate easily. We designed to plant in a single row in the field but in future, it is also possible to plant three rows simultaneously and the length of the stem to be planted can also be varied by varying the blade's height with respect to the ground. In our work, one man is needed compulsorily; in future it may be done by using remote control.

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