

Agricultural Mechanization: Multipurpose Cutting Machine

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Abstract—Multipoint cutting tool machine is a very simple and versatile machine used in developing countries, where it can be commonly used for agriculture, nursery & food processing industries. It has an integrated approach that makes it useful for human being with reducing human effort. Multipurpose cutting tool machine have tool changing arrangements for Coconut punching & cutting, to remove sugar cane bud and to cut green mangoes.

As considering India more than sixty percent of the Indian population lives in villages and Agriculture is the main domain of their resource. By considering this condition we have decided to make machine which help to farmer for reducing their efforts. Multipurpose punching & cutting machine is a very useful to farmer in day today life. If you see the farmers they do all the work by machine, such as seed sowing machine, grass cutter etc. by using this machine we can do the process like cutting sugarcane bud, punching & cutting of coconut, cutting green mango. Along with farming, the people in rural India earn through various co-supported activities. Mango trees are very common to them and supply of mangoes to pickle industries can increase their earnings like that the coconut punching & cutting is also similar of mango for earning money.

Keywords: Agricultural and rural mechanization, poverty reduction, integrated design.

1. INTRODUCTION

The frameworks for Maharashtra schools emphasize the need to make education meaningful to students so they can apply what they learn in the classroom to their daily lives. Since all students eat food and wear clothing, one natural connection between academic education and the real world is agriculture. Advances in agricultural technology are continually making headlines and are an excellent way for educators to connect current trends and innovations to the lives of every student.^[6]

Agriculture is an important industry in India, especially in Maharashtra. Maharashtra with an area of 30.77 million ha is the third largest state of the country, constituting 9.36% of the total geographic area.^[1] As more rural areas become urbanized and more challenges exist to maintain and improve the quality of the planet and feed the people of the world, it is extremely important to educate students about their

environment, agriculture, and the current technologies and research that continue to make Earth a viable planet.

The main Cash crops include cotton, sugarcane, turmeric, and several oil seeds including groundnut, sunflower and soya bean. The state has huge areas, under fruit cultivation of which mangoes, bananas, grapes, and oranges are the main ones.

Most of the Growers of Cash crops such as sugarcane and cotton in the state belong to farmer's cooperatives. For example, most of the sugar production in Maharashtra takes place at mills owned by local cooperative societies. The members of the society include all farmers, small and large, supplying sugarcane to the mill. Over the last fifty years, the local sugar mills have played a crucial part in encouraging political participation and as a stepping stone for aspiring politicians.

The Coconut Palm (*Cocosnucifera* Linn.) is supposed to be one of the five legendary Devavrikshas and is eulogised as Kalpavriksha - the all giving tree - in Indian classics. All parts of the palm are used in some way or another in the daily life of the people of the west coast; the traditional coconut growing area. Its fruit is called Lakshmi Phai and is used in social and religious functions in India irrespective of whether palm is locally grown or not. Coconut is grown in more than 86 countries worldwide, with a total production of 54 billion nuts per annum. India occupies the premier position in the world with an annual production of 13 billion nuts, overtaking Indonesia and the Philippines, the other two prominent coconut-growing countries.

The coconut palm exerts a profound influence on the rural economy of the many states where it is grown extensively and it provides sustenance to more than 10 million people. The export earnings derived by India from coconut are around Rs.3000 million, mainly through the export trade in coir and coir goods. The processing and related activities centered on the crop generate employment opportunities for over two million people in India. The contribution of coconut oil to the national edible oil pool is 6%. In addition, the crop

contributes Rs.7000 cores annually to the Gross Domestic Product (GDP). It is no wonder coconut culture is spreading even to non-traditional belts that were, until recently, considered unsuitable for the purpose.

During cutting the coconut for customer there may be chances of injury to coconut cutting person because if there is number of customer is increases there will be chances of injury due to fulfill the customer requirement or if the coconut cutting person is new then there will more chances of injury. Here this machine helps him to get more profit without fear of an accident refer fig. 1 & 4.



fig(1). Coconut Cutting

The average productivity of coconut in the country is 6898 nuts per ha. Among the four major coconut growing states, Tamil Nadu has the highest productivity (11 620 nuts/ha), Andhra Pradesh has a productivity of 8296 nuts/ha, followed by Kerala (5793 nuts/ha) and Karnataka (5204 nuts/ha)^[2].

Mango is the national fruit of India, known as the 'King of Fruits'. It is one of the most important and popular Asian fruits. Cultivation of Mangoes is deeply embedded in Indian history. Mangoes are mentioned in early Atrialkrit literature. Mangoes are widely available year-round, as fresh fruit and in frozen and processed foods. Mangoes thrive in tropical regions, and are cultivated throughout India and even in home yards, along field boundaries and roadside avenues. It is believed that Mangoes originated in northeast India, northwestern Myanmar and Bangladesh. They, later spread to the rest of Asia by themselves and with the help of humans. They have been cultivated, praised and revered since ancient times. Raw fruits of local varieties of mango trees are used for preparing various traditional products like raw slices in brine, amchur, pickle, murbba, chutney, panhe etc. raw fruit of local varieties of mango are used for preparing pickle^[4].

Mango is commercially grown in more than 80 countries. Main Mango producing countries are Brazil, China, Egypt, India, Indonesia, Mexico, Pakistan, Philippines, Thailand and Vietnam.

The green mango cutting techniques refer fig. 2 shows the process carried out by hand with the help of knife. In this process there will chances of injury to finger because of hard inner surface of green mango



fig(2). Mango Cutting

2. MECHANIZATION IN AGRI

The word machine itself is derived from the Greek mechane and the Latin machina. Both loosely translated mean an ingenious device or invention.

"But machines mean much more to us than just easing our daily burden. The really significant thing about a machine is not that it allows a man to do a given job in half the time, but that it can also allow a man to produce twice as much in a given time^[6]."

Henry Ford II

A machine is a device that does work. People appreciate machines because they save time and human energy. Machines are a basic part of our heritage. The human's innate genius for invention and tinkering has resulted in the creation of many machines. Thus, machines have turned people's dreams into reality. Almost everything people do depends, in some way, on machines simple or complex^[3].

After six months visit to farmers, pickle factory, coconut cutting person, the project begin. They want machine to help in many ways as above mention as well as light in weight & cheap. Therefore the target of the machine is to develop the multipurpose punching and cutting machine. Agricultural mechanization embraces the use of tools, implements and machines for agricultural land development, crop production, harvesting, and preparation for storage, storage, and on-farm processing. It includes three main power sources: human, animal, and mechanical. The manufacture, distribution, repair, maintenance, management and utilization of agricultural tools, implements and machines is covered under this discipline with regard as to how to supply mechanization inputs to the farmer in an efficient and effective manner^[5].

Finding solutions to environmental problems in agriculture requires (improved) agricultural tools and machinery, Thus it is now (again) recognized that agricultural mechanization is crucial in the fight against hunger and poverty, and at the same time to address environmental and health concerns. In order to avoid recurrence of the past mistakes such as described in the introduction, formulation of efficient mechanization strategies are required. The term mechanization is unfortunately often very narrowly perceived while its real purpose, namely, enhancing productivity of land and labor is often not well understood. In fact an agricultural mechanization strategy ought to be part of an agricultural technology strategy, which is to be part of an overall agricultural development strategy. In this context, three principal purposes of mechanization may be summarized as follows:

• **Increase in labor productivity:** The introduction of machinery to substitute for labor (“labor- saving”) is a common phenomenon associated with the release of labor for employment in other sectors of the economy or to facilitate cultivation of a larger area with the same labor force.

• **Increase in land productivity:** The purpose of mechanization is here to produce more from the existing land. Machinery is a complementary input, required to achieve higher land productivity, for example, through the introduction of pump sets, or faster turn-around-times to achieve higher cropping intensity. In labor surplus economies, net labor displacement or replacement should be avoided.

• **Decrease in cost of Production:** Introduction of a machine may lower production costs or offset increased costs of draft animals or labor. Hand tool technology is the simplest and most basic level of agricultural mechanization: the use of tools and simple implements using human muscle as the main power source. Mechanical power technology is the highest technology level in agricultural mechanization. It embraces all agricultural machinery which obtains its main power from other sources other than muscular power^[3].

- Mechanization has been very successful, contributing to increased food production, productivity and advancement of rural economies.
- Therefore, the project involves the mechanical design of three modules: -
 - 1) Coconut punching & cutting tool. Fig (5)
 - 2) To removing sugar cane bud cutting tool. Fig (3)
 - 3) To cutting green mango tool. Fig (4)
- The project foresees also the implementation of the control of the machine that needs to be operated by hand. The overall essential requirements the machine has to satisfy are: -
 - Reliability.
 - Safety of operator: 100%
 - Easy to operate.
 - Versatile.
 - Economical.

- Manually operated
- Cost

3. DESIGN & EXPERIMENTATION

A multipurpose punching and cutting machine consist of Stand, Lever, spring, tool holder, and tool. The working of machine is follows.

First of all put the tools in the tool holder & tight the tools and then take the material and put below the tools. After that adjust the position of sugar cane, coconut, green mango as per their sizes and Check the position of tool is correct or not. Then apply the force on lever by using hand. Check the material cut or punched correctly or not. If it is not correct so correct it and repeat the same process illustrated above.



fig(3). Sugarcane Bud Cutting



fig(4). Mango Cutting



fig(5) Coconut Cutting



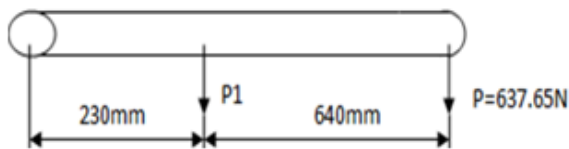
fig(8). Design Of Spring



fig(6). Punchig & Cutting Machine

4. DESIGN

Design of lever



fig(7). Design of lever

5. CONCLUSION

This is versatile machine used for various agri products. It is economical as well as accident free and easy to carry.

The design is simple and ergonomically efficient for any person. For operating machine there in no electricity required because it is operated by hand.

With the help this device a person can remove nearly 100 sugarcane buds in an hour, it can punch 60 coconuts in an hour and it can cut 120 green mangos in an hour.

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