

# Design & Fabrication of Semiautomatic Sugarcane Bud Chip Cutting Machine

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**Abstract**— Agriculture is the backbone of India. The need of agriculture product in India has risen due to huge popularity, scarcity of labours in agriculture and increasing labour wages. In today's world there is a demand for Sugarcane and its byproducts. The major state growing sugarcane are Tamil Nadu, Andhra Pradesh, Maharashtra, Uttar Pradesh, now India is the 4th leading producer of sugarcane in world. In today's world, the entire requirements are being fulfilled through automatic system. The demand for reducing the wastage of sugarcane. So the search of easy semiautomatic method is completed by our project on the topic Design and Fabrication of semiautomatic Sugarcane Bud Chipping Machine, which is used for producing Sugarcane Bud for the plantation and growing sugarcane which is helpful to farmer that reduces the initial cost, and increase the yield of production in sugarcane.. One alternative to reduce the mass and improve the quality of seed cane would be to plant excised auxiliary buds of cane stalk, popularly known as bud chips. These bud chips are less bulky, easily transportable and more economical seed material. The bud chip technology holds great promise in rapid multiplication of new cane varieties. The chipped bud cane is placed in fertile soil which is filled in one kg. Polythene bags, small holes made in the bottom portion of polythene bag for aeration, single bud cuttings made from top one third portion of seed cane stalk, planted horizontally with bud position upward in top one fourth soil portion and covered with thin soil layer followed by applying water with a watering can.

**Key words:** Semiautomatic Sugarcane, Bud Chip Cutting Machine

## I. INTRODUCTION

Sugarcane cultivation and the development of a sugar production industry run in parallel to the growth of human civilization and are as old as agriculture. In addition to being the third most important cash crop in India, sugarcane ranks third in the list of most-cultivated crops, coming after paddy and wheat. India is one of the largest sugarcane producers in the world, producing around 300 million tons of cane per annum. The production of sugar is the second largest agro-processing industry in the country, after cotton and textiles. India has more than 566 sugar mills. About 4 million sugarcane and a large number of agricultural laborers are involved in sugarcane cultivation and ancillary activities, constituting 7.5% of the rural labor force. In addition, the industry provides employment to 500,000 skilled and semi-skilled workers in rural areas. The sugar industry thus is a focal point for socio-economic development in rural areas, mobilizing- rural resources, generating employment and higher incomes, and supporting the development of transport and communication facilities.

## II. LITERATURE REVIEW

Sugarcane is an important commercial crop of India and an efficient converter of incidental solar energy into cane sugar. Exploiting the full production potential of sugarcane is much essential for maximizing its production as well as productivity, which is an outcome of adequate and appropriate agronomic management practices. Sugarcane is a one of the exhaustive crop, hence requires huge supply of external inputs and optimum management practices. Suitable nursery production techniques coupled with optimum plant population under sustainable sugarcane initiative (SSI) method are the key factors for productivity enhancement of sugarcane. Field experiments were conducted at the Experimental Farm, Faculty of Agriculture, Annamalai University, and Farmer's field during 2011-2013 to optimizing plant population with suitable nursery production practice for productivity enhancement of sugarcane. The literature falling within the scope of the investigation is reviewed under the following captions.

## III. METHODOLOGY

Before starting any project, the planning is essential. It is the process of thinking before doing and determining the future course of action to be done, while planning a project each and steps should be analyzed carefully with all related things. The design factor should be carefully considered. Detail drawings are necessary for designing and also fabricating the project. Development and modification of the system should be in simplest form. It is difficult to manufacture all the components required for fabrication in the machine shop itself. The decision about particular component whether to purchase it or manufacture it is taken by planning after making study of relative merits and demerits of direct purchase and self-manufacture. Next step of the project is to select the best method of manufacture, So that the wastage of materials, man power and time can be reduced to a greater extent. By comparing various methods, the best method of manufacturing is to be selected. The purpose of necessity of operation and machine tools used to do the jobs are considered while selecting the best method of manufacture. The fabricated and purchased components are assembled together to complete the fabrication process.

## IV. PROCESS DESCRIPTION

This chapter gives a detailed explanation of the various processes taking place in a complete semiautomatic sugar cane bud chip cutting machine.

### A. Block Diagram

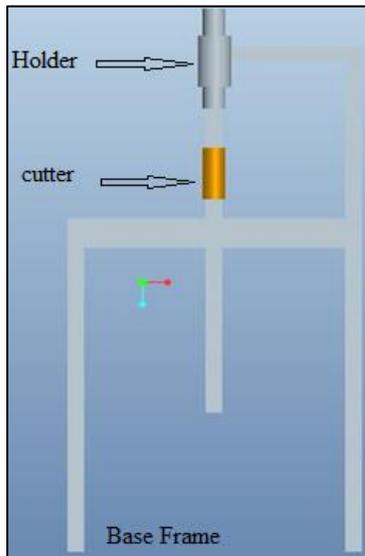


Fig. 1: Setup

### B. Rack & Pinion

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion. A circular gear called the pinion engages teeth on a linear gear bar called the rack; rotational motion applied to the pinion causes the rack to move to the pinion, there by translating the rotational motion of the pinion into linear motion.

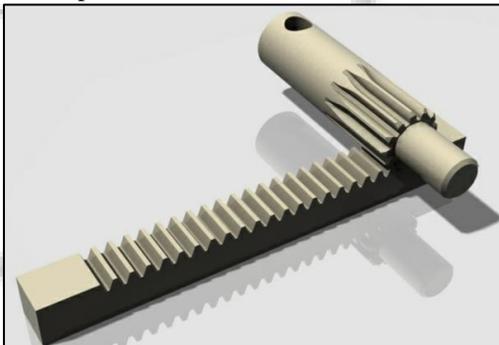


Fig. 2: Rack & Pinion

### C. Bud Collection Box

Bud collection box is used to collect buds which are cut by cutter at supporting plate. So that proper collection of buds can be done. Because of these plate all buds are collected at a one place.



Fig. 3: Bud Collecting Box

#### 1) Cutter

This is the main section of the scooping machine. The scoop cutter is used to cut the sugarcane bud and to get the same

size of sugarcane bud. Because of scooping cutter the wastage of sugarcane reduces and safety of farmer increases.



Fig. 4: Cutter

#### 2) Cut Piece of Bud



Fig. 4.1:

### D. Concept Generation

The steps are useful for overall product development concept

- 1) Clarifying the problem. A machine to punch 400 top 500 sugar cane buds per day Safer Ergonomically Reduction in time from 6 minutes to 2 minutes for the punching sugar cane buds within 4000 rupees.
- 2) Search externally: Gathered information from lead users, experts, literate and related product users.
- 3) Search internally: Used individual and group methods to retrieve and adopt the knowledge of the customers.
- 4) Explore systematically: Organized the thinking of the customers and synthesized the solution fragments.
- 5) Reflect the solution and the process: Identified the opportunity for improvements in subsequent iterations. The concept contains a punching stainless steel tube connected to a rack and pinion mechanism. When the torque lever is moved down, it moves the piercing rod on the sugar cane there by punching out the sugar cane buds. Directly in the field or nurseries may be grown.

### V. WORKING OF THE PROJECT

In this project consider motor and rack & pinion which are used for cutting the sugar cane bud. It has a rack and pinion in which type of linear actuator that comprises a pair of gears and its convert linear motion into rotational motion. A Circular gear called the pinion engages teeth on a linear gear bar called the rack; rotational motion applied to the pinion causes the rack to move to the pinion, there by translating the rotational motion of the pinion into linear motion. The sugar

cane is placed on the table and then sugar cane bud was cutted by using cutting tool in which connected to the rack. The cutted bud can be fall down into the collecting box and then it can be used for planting purpose. In this method producing sugarcane bud is improving cultivate process.

Next step of the project is to select the best method of manufacture, So that the wastage of materials, man power and time can be reduced to a greater extent. By comparing various methods, the best method of manufacturing is to be selected. The purpose of necessity of operation and machine tools used to do the jobs are considered while selecting the best method of manufacture.

#### A. Comparison of Method for Cultivation

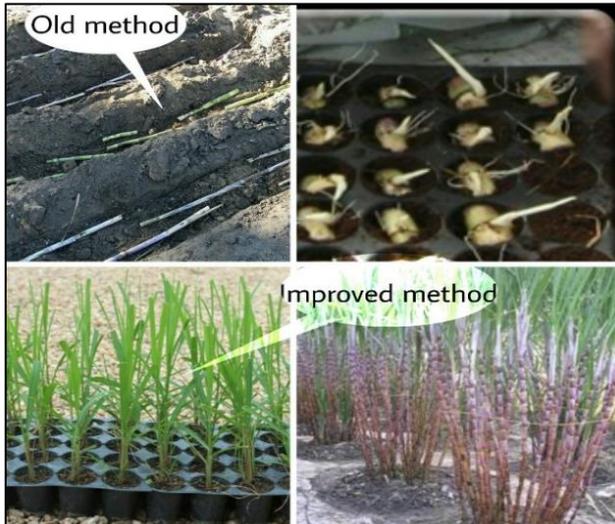


Fig. 5: Methods

#### VI. ADVANTAGES

- Save large amount of sugarcane bud from waste by plant in farm.
- Initial cost of machine is very low
- Easy to handle for unskilled persons for e.g. Farmers and labors related with farm.
- Saved sugarcane bud used for fodder for animals.
- Other costly energy is not required
- Sugarcane bud cutting operation is very fast as compare to traditional system of sugarcane planting.
- Seed cost can be reduced up to 85%

#### VII. DISADVANTAGES

- Sharpness of cutting blades reduces after some weeks for that sharpness requirement is time to time.
- Man force is required.
- It will required less speed motor to operate rack and pinion mechanism
- It required small size battery to run motor.

#### VIII. CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, computing and machining while doing this project work. We feel that the project work is a good solution to bridge the gates

between institution and industries. We are proud that we have completed the work with the limited time successfully. The semi -automatic sugarcane bud chipper is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities.

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