DESIGN AND FABRICATION OF PNEUMATIC SUGARCANE BUD CUTTING MACHINE

Yogesh S. Lingayat, Mechanical Department, S.N.D. College of Engineering & Research Centre, Maharashtra, India.

Dinesh U. Nagare, Mechanical Department, S.N.D. College of Engineering & Research Centre, Maharashtra, India.

Ramesh A. Nagare, Mechanical Department, S.N.D. College of Engineering & Research Centre, Maharashtra, India.

Adinath R. Nagare, Mechanical Department, S.N.D. College of Engineering & Research Centre, Maharashtra, India.

ABSTRACT

Sugarcane is the main source of sugar in Asia and Europe. Sugarcane is the raw material for the production of white sugar, jiggery (gur) and khandsari. It is also used for chewing and extraction of juice for beverage purpose. The sugarcane cultivation and sugar industry in India plays a vital role towards socio-economic development in the rural areas by mobilizing rural resources and generating higher income and employment opportunities. About 7.5percent of the rural population, covering about 45 million sugarcane farmers, their dependents and a large number of agricultural labors are involved in sugar cane cultivation, harvesting and ancillary activities. There are several methods for sugarcane bud chipping. It is by manually, and also by the use of machines. Manual bud chip cutting with hand knife is a common practice. These traditional tools used for bud chipping of sugar cane are unsafe, messy, minimum productive and need skill and training. The risk of injury is also too high. This necessitates the development of an automated sugarcane bud chipping machine. . There is problem of initial growth using the sugarcane bud but it can be over came using the suitable growth regulators and fertilizers. Also this machine faster production rate which make it suitable for the competition with conventional sugarcane bud cutting machine.

Keywords: Cutting Blade, Sugarcane Bud Cutting Machine, cutting Bud.

INTRODUCTION

The main objective of our project is to perform job holding and cutting operations effectively with less human effort by incorporating a machine with the pneumatic power. This also takes less time due to its quick action. This pneumatic sugarcane bud cutting machine aims to provide a better and faster bud cutting operations with less human effort thereby promoting agricultural activities of sugarcane cultivation. Nowadays almost all the manufacturing process is being atomized in order to deliver the products at a faster rate. To achieve mass production, the automation of the predefined tasks is necessary and is made mandatory in the current operating conditions of the industries. One alternative to reduce the mass and improve the quality of seed cane would be to plant excised axillary 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 sowing of buds of grown sugarcane ensures the growth of new

sugarcane thereby increasing the production rate and decreasing the damaging rate of the sugarcanes. The left- over cane can be well utilized for preparing juice or sugar or jaggery.

LITERATURE REVIEW

According to Roshanalal Vishwakarma, this is a grafting tool which could extract plants bud for fresh development of bud as a new plant. It provides an ideal cut in one single punch which makes this process free from potentials loss of time, money and seeds. This implement can remove buds from the sugarcane for plantation purpose to minimize losses as well as time, money seeds by pressing the handle, the unit removes the bud from the node of the sugarcane which is used for planting. The device includes a hemisphere knife actually by a hand operated lever. One can chip 250 buds/hr (average).The experienced labor can even chip 400 Buds/hr. Innovator has won consideration award in NIF's Fifth National Biennial Grassroots technological and traditional knowledge awards 2009.

According to Ningappa H.Kuri, in existing machine people uses traditional process in which hand operated leaver is installed to cut the bud from sugarcane and there is setting arrangement there is chance of occurring the muscle pain ,cramps etc. the injuries while operation performed is also occurs. So to overcome these problems, we proposed the peddle operated machine which deals to reduced manual effort require is less and no muscle pain and cramps is occurred during operation and it can be prevent from the injuries while performing operation. As we install pedal instead of hand lever, according to ergonomics aspects the effort gets reduced. As the hand take much more effort compared with the foot. By using two side cutting tool, two buds cut at same time. The effort requires for cutting operation is reduced. So the time consuming related to cutting operation is also reduced. The machine made by Suraj S. Magdum there is one disadvantage, we found that tool gets blunt after taking continuous cutting operation. So to overcome this problem we used three alternative tool as per the various size of sugarcane. As alternative tool is used the production may not hamper.

According to Sanjay Patil, In another traditional machine there is only single cutting tool is used known as "scooping tool". Though the single scooping tool is used in existing machine slippage occurs and due to that there is possibility to damage and wastage of sugarcane while cutting. To avoid this, we implement clamping device while cutting sugarcane to hold properly. Because of proper holding, the bud is cut in proper shape and size and reduce the wastage of sugarcane. As implementation of holding device leads to reduced injuries. Also we proposed the length of the table. We increase the length of table that support the sugarcane from bending and avoid slippage. Because of this proper shape and size of bud can be cutted from the sugarcane. In another research paper we found that the traditional machine made by the Roshanlal Vishvakarma a former of small village in Madhya Pradesh. in which he used single cutting tool. as the single cutting tool is used productivity of cutting bud of the machine is reduced .in our proposed machine we installed two side chipper tool which is able to cut two bud pieces at a same time from sugarcane at a single notch, that's why the productivity increases by cutting two buds at same time.

According to Kiran Bhange, studied that Sugarcane planting with traditional methods is costly, time-consuming and necessary compression of buds in the field is not achieved easily because of stalk planting in sugarcane. In tradition planting method, great human force and high volume of sugarcane stalk in hectare are required. To solve this problem and mechanizing of sugarcane planting, we suggest the application of machine vision system and Image Processing methods to identify nodes from sugarcane and to plant it as a seed by planting machines.

DESIGN SKETCH

Figure 1. Design of Pneumatic sugarcane bud cutting machine

METHODLOGY

Definition of problem

Collection of information of

available fixtures that could be

useful to find expected solution Analysis of ideas

Development of solution for

pneumatic

Building of test fixture model

Feedback from others and

development in design

Selection of proper parts

Manufacturing of parts

Assembly of setup

Testing of setup on worksite

Output and Result

PNEUMATIC POWER

Pneumatic systems use pressurized gases to transmit and control power. Pneumatic systems typically use air as the fluid medium because air is safe, low cost and readily available. Pneumatic systems operate on a supply of compressed air, which must be made available in sufficient quantity and at a pressure level to suit the capacity of the system. When pneumatic system is being adopted for the first time, however it will indeed the necessary to deal with the question of compressed air supply since air is the source of pneumatic operations. A compressor is a machine that takes in air, gas at a certain pressure and deliver the air at a high pressure. Compressor capacity is the actual quantity of air compressed and delivered and the volume expressed is that of the air at intake conditions namely at atmosphere pressure and normal ambient temperature. Clean condition of the suction air is one of the factors, which decides the life of a compressor. Warm and moist suction air will result increased precipitation of condense from the compressed air.

ADVANTAGE

• Pneumatic systems are simple and economical.

• Control of pneumatic systems is easier.

DISADVANTAGE

• Pneumatic systems exhibit spongy characteristics due to compressibility of air.

• Pneumatic pressures are quite low due to compressor design limitations (less than 250 psi).

WORKING PRINCIPLE The compressed air from the compressor is used as the force medium for this operation. The machine uses a pneumatic double acting cylinder, foot valves. The arm from the compressor enters to the flow control valve. The controlled air from the flow control valve enters to the foot valve. The function of foot valves controls the extension and retraction of air from cylinder at correct time interval. The 5/2 foot valve is used. In one position air enters to the cylinder and pushes the piston so that the cutting stroke is obtained. The next position air

enters to the other side of cylinder and pushes the piston return back, so that the releasing stroke is obtained. The speed of the cutting and releasing stroke is varied by the human foot postion.

CONCLUSION The project carried out by us made an impressing task in the field of small scale industries related to agricultural activities and automobile maintenance shops. It is very useful for the workers work in the lathe and small scale industries. This project will reduce the cost involved in the concern. The speed of the cutting and releasing stroke is varied by the human to human .

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