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Design and fabrication of sugarcane planting machine

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ABSTRACT

In our country the sugarcane usage is very high, so the most of farmer planting the sugarcane in their land. In 2017 India planting the sugarcane in 4.7 million hectares (MH) and 330 million metric tons (MMT) of sugarcane produced. Normally the Sugarcane planting is a very labor intensive job and involves considerable human power. Cost of sugarcane planting is very high, example the sugarcane is plant in one Acer they need to spend almost 10hrs also they gives 3000RS labour cost for planting .The cost of sugarcane planting by mechanized method is less compared to traditional methods. We design roller with hopper and piling equipment for planting the sugarcane to the soil also we provide a land wheel, the speed of land wheel is automatically adjusted with tractor speed while planting. When we use the machine for planting the sugarcane it plant a large amount of sugarcane in minimum time or short period, and also the investment cost is less for planting. So we can design the fabricate the machine for planting the sugarcane.

INTRODUCTION

Sugarcane planting machine is the agricultural based machine. The olden days the sugarcane planting in the soil is used human power to planting the sugarcane in the farm land. In the method it is difficult to planting because of cost for planting and more labour invested to planting. It well Reduce the profit of the sugar cultivation .and take more time for planting the sugarcane. But usage of sugarcane is increase like

Food product

- Sugar
- Sugarcane juice
- Paper

Nonfood product

- Flue gas
- Filter mud
- Production of ethanol

In traditional method of planting sugarcane set are planted in manually furrows, opened manually followed by conveying manually this is then covered manually or by animal operated blankers.

Thus, the process is very much time consuming and labour intensive. Many manually operated sugarcane planter have been developed but the sugarcane planter which are currently available in the market are large in size and operated with the help of two or more human labour used. so they cannot the operated in smaller lands only.

So the indian institute of sugarcane research and developed the sugarcane planting machine and introduced to the use in the market ,but they will wanted the human power for feeding the sugarcane in to the machine .so we identify the problem and change the design of machine and introduce it will take the sugarcane automatically through from hopper . Our project is a compact sugarcane planter which can be operated in smaller lands and large lands also by tractor thus reducing the labour cost and speeding up the planting process. This automatically operated sugarcane planter the sugarcane will planted in equal distance.

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INTRODUCTION OF SUGARCANE

Parts of sugarcane

Parts of sugarcane shown in fig 1.1

- Node
- Internodes

- Root band
- Leaf scar
- Bud
- Root primordial

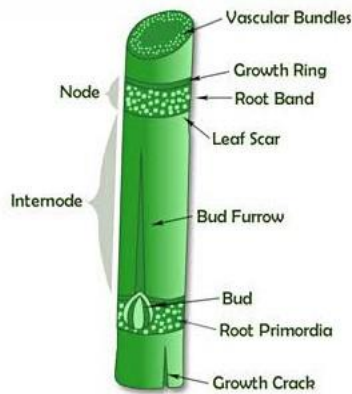


Fig. 1 Parts of sugarcane

Length of sugarcane for planting

The length of sugarcane will manually or machine in maximum length of 20cm to 25cm in

length or 1 or 2 nodes can be cut in one piece of sugarcane for growth the sugarcane is most important for perfect crop growing of sugarcane. Show in fig 1.2



Fig. 2 Cut pieces of sugarcane

Planting distance of sugarcane

Then the distance between the one piece to another piece of sugarcane is will having minimum distance of 15cm and the maximum distance of

25cm is enough for perfect planting. It is very important for cultivating high yield and profit for the farmer. Distance of planting is show in fig 1.3

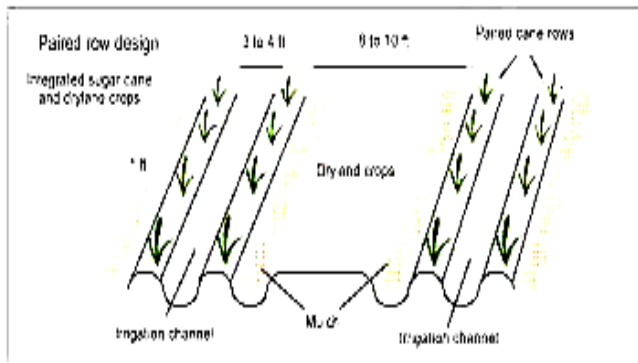


Fig.3 Planting distance

Conventional Method for Planting

Our project the sugarcane will be planted in automatically with the help of Tractor. The special attachment is introduced for planting the sugarcane in automatically. The hopper having a roller it will operate from the additional attachment of a land wheel in the frame it will be used to rotate the roller. The sugarcane is automatically through from the hopper into the surface of the soil. In the gap between the one to another sugarcane is equal to all sugarcane pieces of sugarcane. Then the multi-purpose attachment is attached to the machine for mud the soil and piling the soil in continually.

Limitation of Traditional Method

- Many labour invested for planting the sugarcane.
- More cost and time for planting.

Sugar Cane Planting

Sugarcane is the main crop cultivation in India. They have many usages in food products and other products raw material.

Need for Sugarcane Planting

Mostly using daily wages people for planting it required more energy to plant sugarcane from the field. Due to planting using daily wages people, wages for planting is accurate more it affects their profit. Existing model is an attachment which is attached to the tractor it prevents damage of the sugarcane. So we make this machine which plants the crop without damaging the sugarcane. So it helps to increase their profit.

Sugarcane Planting Technology

The arm goes under the ground at 20 to 25 cm and piles the soil like a bed. Then the sugarcane planting equipment through the sugarcane piece in the bed in soil. Then finally the piling arm piles the small amount of soil on the sugarcane for growth.

Aim and Scope of Study

To improve the knowledge of small and marginal farmers on packages of practices to raise profitability through training and demonstration.

LITERATURE SURVEY

[1]. Sugarcane planting is a very labour-intensive job and involves considerable human drudgery. Cost of sugarcane planting by

mechanized method is less compared to traditional methods. It also reduces drudgery involved in unit operations of sugarcane planting. Thus, recently developed sugarcane cutter planters are getting very good acceptance amongst sugarcane growers. Generally planting of any crop is very much important as far as the crop growth and yield is concerned. This paper describes regarding the design refinement of a sugarcane cutter planter and its prototype development. In this machine, the complete sugarcane, which is fed by the labourers sitting on the machine, is cut automatically into pieces before dropping into furrows. It also opens the furrows, applies fertilizer, chemical and fungicide and also covers the sets and presses it automatically. It is operated by 35 hp tractor and has 2 units. The performance of the planter was evaluated in the field. Its field capacity was 0.2 ha/hr with a field efficiency of 80.0 percent at an effective working width of 1.35m and forward speed of 1.85 km/hr at 2nd low gear. The set length was 31.8 cm with an average overlap of 6.48 cm observed at the speed of 2.5 km/hr. The seed rate capacity of the machine was found 5.55 tonnes per ha.

[2]. Sugarcane planting costs were estimated for four types of planting systems: hand planting, whole-stalk machine planting and one-row and three-row billet planting. Planting ratios and labour requirements were determined from data collected from growers using the various planting methods. Whole-stalk planting ratios were 7.5/1 for hand planting and 5.5/1 for machine planting, while planting ratios for billet planters were 3.0/1. Total planting costs per acre of plant-cane planted were estimated at \$579 for whole-stalk hand planting, \$578 for whole-stalk machine planting, \$712 for one-row billet planting and \$673 for three-row billet planting.

Calculations reveal that increasing the planting ratio for billet planters could significantly reduce planting costs. Opportunity costs of increased seed cane acreage were found to be a significant economic factor in the evaluation of billet planting. The aim of this study was to examine direct and indirect input energy in per hectare in sugarcane production alone in plant farms. The study was performed in Debel khazai Agro-Industry situated in the southern region of Iran. Total energy expenditures were 148.02 GJ/ha and energy output was 112.22 GJ/ha in plant 11 farms. The output/input energy ratio was 0.76. The energy

intensity lies about 1.59 MJ kg and is one of the 1 highest among sugarcane producing countries. Irrigation is the most energy consuming operation with about 43% of total energy inputs. Electricity, fertilizers, fuel and machinery are the main energy inputs. The influence of the different inputs is discussed and practical measures for energy saving and environmental conservation based on energy analysis are discussed.

[3].Tractor mounted site-specific, real time developed e herbicide applicator was for variable rate herbicide application between sugarcane rows. Using the software based machine vision system, the picture frames captured by the web camera were processed and the quantified greenness level due to weeds was used to actuate the controllers of a sprayer pump system. The pulse width modulation (PWM) drive motor speed control was correlated with the percentage of greenness to vary the application flow rate by adjusting the duty level of PWM motor. The software developed could be reprogrammed and the threshold levels could be adjusted according to the user preference. At five operation speeds tested, the prototype could spray on green targets correctly. The error of green colour output from image processing was about 0.31% at SD +0.25. The application flow rate accuracy was about 91.7%. The laboratory performance evolution revealed that this variable rate method could be

used to decrease the herbicide quantity by 20.6%. A sugarcane planter which cheaply and efficiently plants seed cane is disclosed. The planter has a metal bin with two outwardly sloping sides and a deck extending transversely between the sides. Transverse bulkhead means mounted for longitudinal movement in the bin is provided for delivering an inclined mass of cane stalks to differential conveyor means which seizes the cane stalks from the inclined mass and maneuvers them individually to a programming means.

EXPERIMENTAL SETUP

Through observation, this work was good for farmers and small scales Agro-base industries that need a better treatment and operations carried out on farms. As show in figure 3.1

The weight of the frame can be increased by using heavyweight materials put the steel bar for withstand heavy load. Since the planter was designed for low cost, the plough was made manually. But it can be placed in bottom side of hopper and the roller is rotated using land wheel. The roller was used for throughout the sugarcane from the hopper to the surface of the soil. By using some advanced attaching mechanisms, the time required for assembling can be reduced for additional attachments.

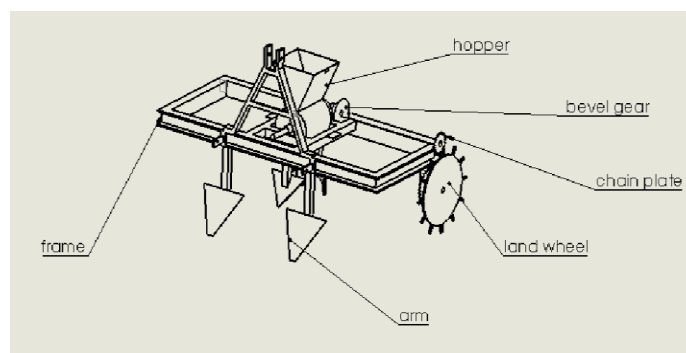


Fig.4 Experimental Setup.

WORKING PRINCIPLE

The bottom side of the frame is attached the plough arm .it is used for mud the soil and produce the pit in the soil .then the sugarcane is cut into the small pieces and it is fill into the hopper in the attached in the frame. Inside of the hopper having an roller for feeding the sugarcane into the soil from the hopper . the roller is attached from the land wheel for maintaining the correct speed . the

speed in based on tractor moving speed .The land wheel rotate the roller in the hopper is rotated the sugarcane is through out from the hopper to the pit produced in the soil. Then the soil piling attachment in the back side of the frame .it will pilling the soil on the sugarcane .the sugarcane is planted in the soil in the sugarcane planting machine. Through observation, this work was good for farmers and small scales Agro-base industries

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SOLID WORK MODELING

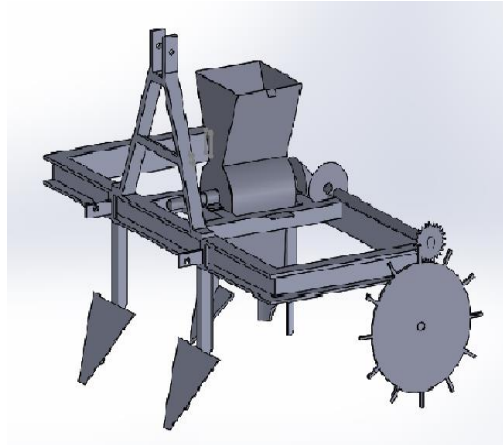


Fig. 5 CAD Modeling Front view

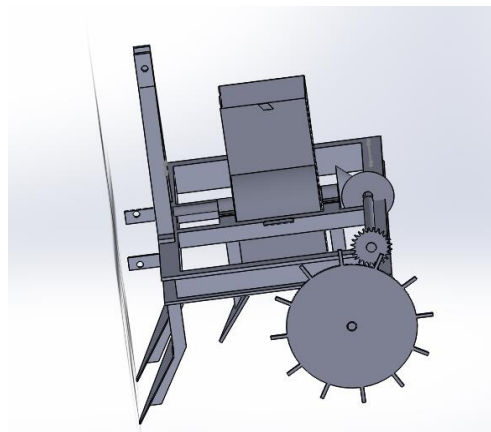


Fig. 6 CAD Modeling Side view

RESULTS AND DISCUSSIONS

Subsequently the after effect of the higher effectiveness is 96.28% in 12rpm. So we need to

choose the speed of the 12 rpm to plant the sugarcane with higher efficiency.

Table 6.1 calculation of efficiency

Speed of tractor (rpm)	No. of blade in roller	No. of revaluation in hr (roller) (revs)	No. of sugarcane piece from hopper in 1 mit	No. of sugarcane loaded in hopper in hrs (input)	No. of sugarcane from hopper in hrs (output)	% Efficiency
12	6	561.6	56.16	3500	3370	96.28
10	6	468	46.8	3500	2808	80.22

CONCLUSIONS

In this present work, to replace the conventional method of sugarcane planting into semi automated planting was designed and fabricated. Now a days, labour problem are in the agriculture field, in order to overcome from it, farm equipment are required to fulfil it. The designing of sugarcane planting machine was created by using solid work software. The aim present work is to reduce the plantation time and labour cost. In this work we created the semi automatic sugarcane plating machine that is

attached with backside of the tractor. The sugarcane was loaded into hopper, when land wheel is rotating with help of the power gear, then land gear is connected with belt conveyor through shaft. The sugarcane planting machine will plant the sugarcane automatically through out to planting without uses of human power. It will be increase the profit to the farmer and it will reduce the cost and time for planting the sugarcane in the farm. In future work, as per the designing of sugarcane machine will be analysed and fabricate.

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