SCUM REMOVAL MACHINE IN JAGGERY PRODUCTION

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Keywords:
Base, Stand, Hydraulic Jack, Handle, Pinion, Arm, Bevel gear, 12 volts DC Motor, Shaft, Pan, Stove.

Introduction:
Sugarcane (sachurum genus) is a tall perennial grass native to the warm and temperate climate of Asia. It is however to be found in other regions of the world including Brazil, India, Thailand, United states of America, Mexico, Pakistan, Columbia, Australia, Sudan, among other African countries. Brazil is the world’s largest producer followed by India. Sugarcane grows as grass which has stout, jointed, fibrous stalks that are rich in sugar and measure two to six meters (six to nineteen feet) tall. All sugar cane species interbreed, and the major commercial cultivars are complex hybrids. The crop is grown in commercial farms for production of sugar, jaggery and other sweetening compounds due to its high content of sucrose.

Sugarcane is usually processed into sugar in various sugar factories in the region. These factories contract farmers to produce the cane and sell to the factories, but due to bureaucracy and inefficiency the process of harvesting and delivery to the factories is not appropriate hence leads to big losses to the farmers. The losses occur in the form of wastage in the farms due to harvest delays in the farms hence loss of quality and crop wastage when delivering to factories due to poor transport systems and delays before processing. The net result is that the factories are not able to take the crop in time hence the need to look for alternative processors to avoid the losses incurred.

Jaggeries have come up to try and alleviate the problem by milling the excess cane and produce crude sugar otherwise known as jaggery, which can be used as a sweetener in the food industry and beyond. However, the range of products and quality of these products are limited hence the need of this study to come up with a range of products e.g. Cane juice which can improve the profitability and relevance of the jaggery industry in the development of cane and cane products in the Karnataka region.

Objectives:
The objectives of this project are

1. To remove the scum particles effectively, which are formed on the top layer of the sugar cane juice to produce high quality of jaggery.
2. To carry out the filtration process, three stages of filters are used i.e., muslin cloth filter, fine perforated mesh filter and a coarse mesh filter.
3. To reduce the human risk during operation.
4. To reduce the production time and increase the production rate.
5. Ease of handling the scum.
6. It can be operated between the multiple pans.

Methodology:
Material used
1. Mild steel
2. Stainless steel
3. Aluminium

Methods / Procedure
1. It consists of following parts Base, Stand, Hydraulic Jack, Handle, Pinion, Arm, Bevel gear, 12 volts DC Motor, Shaft, Pan, Stove.
2. The stand is mounted on the base and the hydraulic jack is placed on the stand and both pinion and handle is attached to the stand.
3. The arm is attached to the stand and the bevel gear is mounted on one end of the arm.
4. Low speed rpm DC motor is mounted on the other end of an arm, which is used to rotate the scum collector with the help of shaft.
5. After collecting the scum, hydraulic jack is used for raising of arm which results in meshing of gears.
6. By rotating the handle of pinion, arm can rotate up to 180°.
7. By employing the above method, the scum can be removed effectively and results in high quality of jaggery.

Drawings

Isometric view of model
Results and Conclusions

1. Purest form of sugar cane juice can be obtained by implementing scum removal technique for producing jaggery.
2. Human effort can be reduced.
3. Production time can also be reduced which results in faster production of jaggery.
4. Scum can be removed at a faster rate.
5. Highly efficient than manual technique.

Scope for future work

1. The project is designed and fabricated mainly for helping the farmers at an affordable price.
2. By installing this machine, scum can be removed at larger rate which results in the high quality of jaggery.
3. This machine can be installed in all the jaggery parks throughout the world, where the jaggery production takes place.
4. It can work in high boiling temperature (i.e around 120°-150° Celsius) where the human interaction is not possible.
5. Since the installation of the machine is easier and removes the scum effectively, it can be easily affordable by the farmers.
6. Small scale factories for the manufacture of jaggery might be set up and can create employment opportunities.
7. By installing this machine in jaggery parks, it will gain momentum day by day and results in the economic gain to the cultivators.
8. It does not affect to the quality of the jaggery.