DESIGN AND FABRICATION OF SIMAROUBA GLAUCa SEED DEPULPING MACHINE

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INTRODUCTION: Simarouba glauca DC is commonly known as paradise tree. It is also known as Simaba, Maruba, Lakshmi taru, Aceituno, Dysentry bark, Pitomba etc. in different part of the country. Simarouba is grown in Andhra Pradesh, Maharashtra, Tamil Nadu and Karnataka.
Simarouba belongs to the Family: Simaroubaceae and Genus: Simarouba under the Species: Amara , glauca It is an evergreen multi utility tree that grows up to 15 meters height with tap root system. The simaroubais a source of edible oil. The plant is for almost 70 year the average lifespan of a grown tree.
The medium sized tree with 7-15 meter in height passes cylindrical stem of maximum trunk diameter of approximately 20inches. The young shoot is smooth and reddish brown or green in color. It bears yellow flowers, and oval elongated purple colored fleshy fruits.
Pulp constitutes about 60% of the fresh fruitlet. The freshly collected ripe berries/fruits are dipped in water in a tank or in a pond after packing in gunny bags. The mucilaginous substance is scraped away by rubbing with waste gunny bags.
De-pulping may also be done by using mechanical de-pulper. De-pulped seeds has got a longer life and resulting in extraction of good quality fat & 60-75% oil can be extracted, Seeds are medicinally important.

OBJECTIVE:
The objective of this project is to Design and fabricate of de-pulping machine for separating pulp & seed of Simarouba glauca because the De-pulped Simarouba seeds has got a longer life and resulting in extraction of good quality fat & 60-75% oil can be extracted, also the seeds are medicinally important.
METHODOLOGY

- CONCEPTUAL DESIGN:

All dimensions are in mm.

Fig. 2. Conceptual design

1. Frame  5. Bearing  9. Steel tray
3. V-Belt  7. Steel disc
4. Pulley  8. Steel drum

CONSTRUCTION: The assembly of De-pulping machine mainly consists of following components; Frame, ½ HP Motor, V-Belt, Pulley, Bearing, shaft, Steel disc, Steel drum, Steel tray.

The Frame is made up of angle plates, the steel tray is mounted on the frame, at the centre of the tray, a hole is drilled to allow the shaft to pass through. Shaft is inserted in the bearings, on one end of the shaft, a circular disc is mounted and the other end, a pulley is connected. A steel drum which is supported by two arms is placed over the disc with clearance b/w them. There are two pulleys, one mounted on shaft & the other on motor’s shaft, a V-belt is mounted on these pulleys.

WORKING PRINCIPLE: When motor is switched ON, the torque from the motor is transmitted to the shaft by means of belt and pulley. Since the disc is mounted on the shaft, also rotates and the fruits that are placed over the disc in the steel drum are centrifugally forced against the sharp holes of drum and the fruits gets depulped. The pulp i.e., separated from seeds falls into the tray, which is collected later.

WORKING MODEL:
CALCULATION & RESULT:

Material = Rubber cushion V-belt (A34)
Top width = ½”
Height = 5/16”
Diameter of pulley 1 = 17 mm
Diameter of pulley 2 = 222 mm
Length of V-belt = 863.6 mm

To find the central distance b/w the two pulleys:

\[ L = \pi (r_1 + r_2) + 2x + \left(\frac{(r_1 + r_2)^2}{x}\right) \]

\[ 863.6 = \pi (8.5 + 111) + 2x + \left(\frac{(8.5 + 111)^2}{x}\right) \]

\[ 863.6 = 375.42 + 2x + \left(\frac{14280.25}{x}\right) \]

\[ 488.18 = 2x + \left(\frac{14280.25}{x}\right) \]

\[ 488.18 = \frac{2x^2 + 14280.25}{x} \]

\[ 488.18x = 2x^2 + 14280.25 \]

\[ x = 210 \text{ mm} \]

RESULT: The central distance b/w the two pulleys is 210 mm.

ADVANTAGES

- Pulp is totally separated from seeds in hygienic way.
- Time consumption for de-pulping by machine is quite less when compared to manual de-pulping.
- Simarouba seeds have a life of about 70 years.
- Simarouba tree is not attacked by insects and pests and its wood is termite resistant.
- Simarouba shed large quantities of leaves, which makes soil fertile & its long roots prevent soil erosion.

APPLICATIONS

- Utilization of pulp in medical industries:
  - Effective treatment for fever, malaria and diarrhea
  - As a hemostatic agent to stop bleeding & as a tonic, Simarouba helps in digestion.
  - It is used externally for curing wounds and also used to wash skin sores.
- Utilization of Simarouba for industries purposes:
  - In the manufacture Soaps, detergents, lubricants, varnishes etc.
  - It’s seed contains 65% edible oil, used for preparation of Bio fuel by Transterification
  - It is also used in preparation of Vanaspathi, Cooking oil.

COST DETAILS: The overall cost of the project is Rs.10153 /-

CONCLUSION

By using the Simarouba De-pulping machine, the following conclusions are identified and are presented below:

- The manual de-pulping of simarouba seeds consume more time, so by using the Simarouba De-Pulping Machine, time consumption for de-pulping simarouba seeds is less when compared to manual de-pulping.
- The Pulp is totally separated from seeds in hygienic way
- The Simarouba De-pulping machine is safer to use and can be considered as an alternative method for De-pulping simarouba seeds

SCOPE FOR IMPROVEMENT

The present work can be extended with modification for following improvement

- To De-pulp other type of seeds
- To run machine with different speeds

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