SRISTI UNICEF SUMMER SCHOOL'17

PROJECT NAME: **Cold Pressed Oil Extractor**

TEAM MEMBERS: **Government Polytechnic Porbandar College**

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SUMMARY:

Mahua seeds are used to extract oil, which is primarily used for cooking purposes and the wastage is generally used as manure . Flowers of mahua are used to make alcohol which also helps improve blood circulation. People either had to travel really far to get the oil extracted or use a traditional method which involved crushing the seeds by placing it in between the two wooden sticks. Three people are needed for this process. One to boil the mahua seeds, second to crush the seeds by using torsional force and third to collect oil. The amount of oil that is extracted is directly proportional to the amount of energy applied along with how ripe the seed is. Riper the seed, more oil can be produced. This method involves a lot of energy and some oil is wasted since the wooden sticks absorb the oil. They might even break in cases where a lot of force is applied. In the mills, they use high HP motors and maintenance costs are high since the load is high. The pulp that is generated after the oil has been extracted have to be manually removed when the machine is still on, which is a serious health hazard. During the team's field visits, they found that the life of a mahua plant is 200-300 years, onset of flowers' happen after 6-8 years of sowing. From 1 kg of seeds, 400-450 gms of oil is extracted on an average. For 15 kg of seeds, 15min are required for the extraction to be complete. Oil cannot be extracted efficiently from the seeds and the wastage is sold to farmers as manure for Rs. 2-4/kg. The prototype the team has designed is a hand operated machine whose sub components comprise a base, cylinder, lead screw and nut, jhaali, handle and an oil outlet.

The Lead Screw as depicted by the image can be removed completely, mahua seeds are filled in the cylinder and the lead screw is tightened. The plate attached to the other end of the lead screw helps crush the seeds when rotated, the oil generated then passes through the filter and is collected in the container below the jhaali. This machine as depicted by the prototype can be operated by single person and involves less energy that the traditional two stick approach. It can prove helpful for household and small scale industry requirements. The machine can be used by women comfortably and hence would help them make livelihoods.

PROBLEM DEFINITION:

The team visited Chhota Udaipur on 29th May, we looked at Mahua seeds which are called Doli in the local language, oil is extracted from Mahua seeds which can be used for cooking purposes. The area we visited is sort of isolated and to extract the oil from the seeds collected, Aaddivasi have to travel far. Some Aaddivasi who extract oil themselves use very old techniques in which, boiled mahua seeds are crushed between two wooden sticks. The oil extracted is directly proportional to the force applied. More oil is extracted if the seeds are ripe relative to raw seeds. Large amount of physical energy is involved in the process and some part of oil gets wasted as it gets absorbed by the wooden sticks. If too much force is applied, the sticks might break. There are three people involved in this process of extracting oil, one to boil the mahua seed, second for collecting the oil and third to operate the tools by tying rope around it to create torsional force.

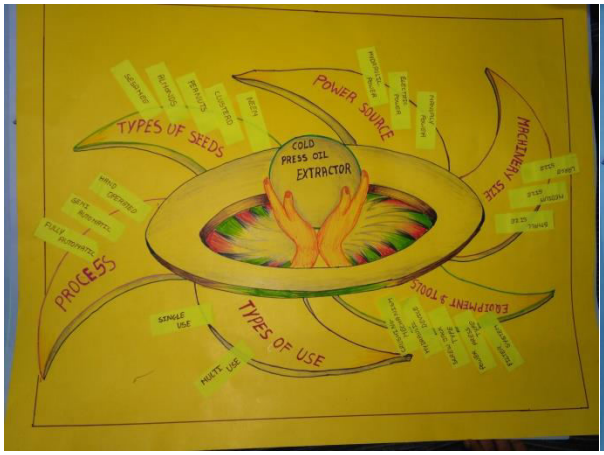
The mills that crush the mahua and extract oil use very high horse power motors and since the load is high , maintenance is also high. In the process of crushing, the waste that is generated has to be removed when the machine is still running which is very risky to operate.

MIND MAP:

There are 6 main branches in the mind map, which are discussed as below.

- Process:
  The process could be hand operated, semi-automatic or fully automatic
- Types of Seeds:
  Most popular seeds from which oil is extracted such as Neem seeds, castor seeds, peanuts, almonds and Sesame seeds.
- Power Source:
  Machines could be manually powered, electric powered or hydraulic powered.
- Machinery Size:
  Machine could be small, medium or large sized.

- Equipment and Tools:
  Equipment involves crushing mechanism, screw-jack, power press type, filter system and hydraulic device.
- Types of Use:
  Machine could be used for oil extraction for a single type of seed or multiple seeds.



FIELD VISIT:

Day 1

Visit 1: Chhota Udaipur(29/05/2017)
Contact Person: Gulaam Rasool
Contact Number : 9427899137
Name of the Mill : Mansoori Oil Mill

We entered the mill with a lot of questions and Rasool Bhai answered all of them with a lot of patience. Some of the questions we asked him are listed below.

- Where did he buy the machine and where all is it available? He bought if from Rajkot and the machine is available in a lot of cities in Gujarat.
- Does some oil get wasted or oil can be extracted completely from seeds? Some part of the oil gets wasted, he quickly answered.

- What is the market price of the oil and at what price does he buy the doli? Rasool bhai says that the price of oil and Doli changes according to the season but on an average, oil is sold for Rs 40-50 per kg and Doli is bought at Rs 15-20 per kg.
- What are the uses of oil? It is primarily used for cooking purposes but also to manufacture soaps.
- Can the wastage be used anywhere? The wastage is used as manure and farmers buy it from the mill.

Visit 2: Harpalpura(29/05/2017)
Contact Person : Mukeshbhai Doriya bhai Rathra
Contact Number : 9978196027

He works at his home and extracts oil using the traditional method mentioned above only for the requirements of his house. We asked him the following questions:

- What are all the uses of Mahua? Same as above
- In which season does Mahua grow? It is grown only in the season that follows Phagun Mahina.
- Are there any uses of the flower?Alcohol is made from the flower which is not as harmful as conventional alcohol and he claimed that when applied over blood clots, it helps with increasing blood circulation.
- When does the flower take bloom and when can we use the seeds for extraction? From the onset of flowering it takes 15-20 days for Doli to be formed and 30-45 days for it to ripe. After the Doli is completely ripe it is left to dry, top layer is removed and oil is extracted.
- What method are you using for extraction? He extracts it in the house using the old mechanism mentioned above which uses the hinge mechanism.
- Does Mahua attract any pests? Yes, it does. Mahua is prone to a lot of pests and the oil is comparatively sweeter if it is extracted from ripen seeds than raw ones which tend to be bitter.
- What other crops are grown in this area? Dangar, Makai and Udad are grown along with Mahua.

Visit 3: Sursi

Contact Person : Ranjith Bhai Mathur Bhai Rathod

Contact number : 7069323088

Ranjith Bhai told us about how a mahua tree is owned and how it is passed on generations down. Mahua tree is owned by the person who planted it despite being someone elses land and it's ownership passes on to their family members after the owner passes away. The fruits and flowers are not plucked but garnered once they fall to the ground and they usually collect them at odd hours. Since it's close to a jungle, he mentioned the problem of tigers and goats that he faces.

Day 2

Visit 4: Rangpur(30/5)

Contact Person: Humanshu Bhai

Contact Number: 9099233741

Name of the Mill : Krushkal Bharti Cooperative Ltd.

Humanshu Bhai told us how flowers have been used for ayurvedic purposes. He claims that they use mahua flowers to help with jaundice. The flower and seeds come after 6-8years of sowing the seeds and the life of a mahua plant on an average is 200-300years.

Visit 5: Bodgaon(30/05/2017)

Person of Contact : Sana bhai

Contact Number : 9726775674

Sana bhai answered our questions about mahua tree, which are similar to other field visits but after that he told us about Charoli tree and he took us to the MP border near the jungle.

Visit 6: Chhota Udaipur(30/05/2017)

Contact Person : Salimbhai Deshwani

Contact Number : 9722940200

Name of the Mill : Deshwaani Oil Mill

We asked Salimbhai about the installation costs and he answered that it goes up to Rs. 2Lakh and the motors he uses are of power 10HP. The wastage generated is sold to farmers for Rs 2-4/kg which is then used as manure.1kg mahua seeds give approximately 400-450 gm of oil. The machine is run for 15min for every 15kg. The working temperature reaches upto 80-100 C. Jhali is the only filter system employed.

PROTOTYPE:

It is a hand operated oil extracting machine. The various parts can be classified as the following subsystems:

1. Base : It acts as a solid foundation for the entire machine and it shouldn't move and is made of square bar which provides the required strength.
2. Cylinder: It is made of MS pipe and has a thickness of 3-4mm
3. Lead Screw and Nut: It is made of Hollow Round bar of a thickness of 2-3mm. Threading system of the screw and nut helps in pressing. Lead Screw is below the plate which has a thickness of 6mm //diameter
4. Jhaali: It is made of MS flat with a thickness of 6mm. This should be of the size of the cylinder and placed right below the cylinder and is movable. Oil comes out of this mesh.
5. Handle: It is made of MS Round bar and is used to tighten the Lead Screw.
6. Oil outlet: It is made of sheet which has a thickness of 2-3mm. It is of the shape of a half-cylinder cone shape.

Before and After image of the prototype.

BILL OF MATERIAL FOR FINAL PROTOTYPE:

1.	Cylinder	Rs. 190
2.	MS plate	Rs. 100
3.	Hollow section round bar	Rs. 300
4.	Square Pipe	Rs. 230
5.	Fasteners	Rs. 30
6.	Paint	Rs. 100
7.	Handle Pipe	Rs 50
Total		Rs. 1000

LIMITATIONS:

- The current design is not suitable for mass production
- Since it is manually operated, 100% oil cannot be extracted.
- The area of the handle is not optimum. It is big.
- The machine has to be fixed permanently.
- The amount of force can be reduced.

ROAD AHEAD:

The team is planning to continue working on the project after finishing the summer school. Focus is going to be on the crushing system and making it economical and efficient.