

# Integrated Plan for Utilisation of Sugarcane Trash for The Production of Biogas and Particle Board

GOSAVI P. G.\* GHOLE V. S.\*\*, HEGDE M. V.\*\*

## Abstract

Sugarcane trash can be useful for the production of Biogas and Particle Board. This process is controlling air pollution and maintaining smooth Nature's Cycle.

Sugarcane Trash-Semidried leaves stripping from sugarcane field, which are usually discarded by the farmers. It is estimated that the yield of such trash is about 4 to 6 tonnes per acre or 10 tonnes per hectare. The total trash available in 1984-85 from only Maharashtra is 293000 hect.  $\times$  10 tonnes trash = 293 lakh tonnes of trash available per year. This quantity of trash is quite considerable. The information regarding the amount of sugarcane production for 6 years is given in Table 1 and statewide sugarcane acreage for last three years is given in Table 2.

The moisture content of the trash may vary from 5 to 15 per cent (over dry weight basis). It is quite rich in cellulose and hemicellulose about 78 to 80 percent and lignin 20 to 30 per cent. The sugarcane trash contain cellulose fibre which is unfortunately short in length and brittle. The trash has a very poor source of protein, nitrogenous and starchy materials.

Now a days these trash leaves are mainly used for covering the land to reduce the loss of water from the soil. Then dried trash are burnt in the land. These dried leaves are also used to burn in the furnace of Gur and Khandsari.

The Chief constitution of the trash is cellulose and lignin. The cellulose and lignin are not readily biodegradable matter. Hence the manure (compost) from these leaves are of very poor quality. The good quality of manure is possible if it is mixed with urea and other nitrogenous supplements.

In view of the above information and experience of other research workers we thought of alternative use of these trash leaves for biogas and particle boards.

We have conducted successful experiments with water hyacinth, partheniumgrass (Gajar Gavati) banana steps and other green leaves. We feel similar observations can be useful with sugarcane trash and top leaves.

We are suggesting the following steps for the production of biogas and particle board. The flow sheet of the integrated plan has been depicted in Fig. 1.

The moist trash is crushed and juice thus collected is directly fed to the biogas plant. This juice would be rich in nutrients for microbial growth. The whole process of biogas production can be enhanced by adding dung as a starter.

The spent slurry coming out from the biogas plant gets enriched for nitrogen contents and can serve as a good manure. This manure can be used for the growth of algae and plants. In turn algae can be fed to the biogas plant or the supplement to the animal feedings. This process will help to maintain balance of nature and controlling air pollution.

After the crushing of trash the remaining part is nothing but cellulose and lignin. This lignin is working as a cementing material to the cellulose fibres in wood. The paper manufacturers are interested in only long cellulose fibre for manufacturing good quality of thin paper. The paper manufacturers therefore, eliminate the lignin. The lignin is not easily removable by physical method hence it is dissolved in strong alkali and the final yield of cellulose is about 30 percent.

We are suggesting here new method to substitute the boards or plates by manufacturing particle boards by using these short fibre material of cellulose and lignin together.

## (1) Cooking

The crashed material is boiled with minimum

\*Handmade Paper Institute, Pune

\*\*Dept. of Chemistry, University of Poona.

percentage of alkali to obtain partial dissolution of lignin and separation of lignin bonds from cellulose fibres.

## 2) Beating

In this process the fibres are hydrated with water for bonding together. Additional bondings with water molecules known as hydration". This bonding is also enhanced by addition phenol formaldehyde resin.

**Table 1**  
**Sugar Cane Production**

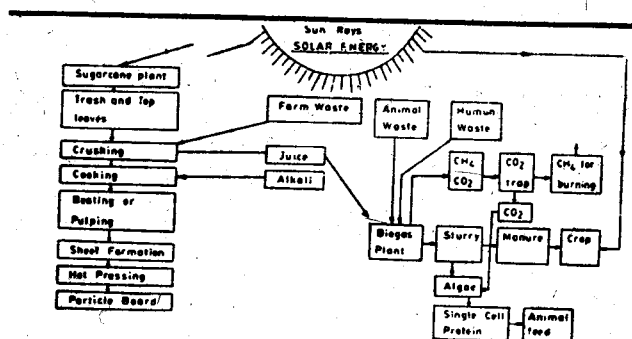
Year	Area under Sugarcane 000' hectares	Production of Sugarcane 000' tonnes	Yield of cane per ha. tonnes
1980-81	2667	154.248	57.4
1981-82	3193	186.358	53.4
1982-83	3358	189.505	56.4
1983-84	3110	174.076	56.0
1984-85	2953	170.319	57.7
1985-86	2862	171.681	60.0

**Table 2**  
**Sugarcane Acreage in India (000 ha)**

State	1983-84	1984-85 (X)	1985-86 (XX)
Assam	53	48	42
Andhra Pradesh	138	132	136
Bihar	112	119	119
Gujarath	103	91	64
Haryana	124	106	128
Kerala	8	8	8
Maharashtra	293	265	245
Madhya Pradesh	45	47	89
Orissa	57	57	37
Punjab	79	78	82
Pondichery	2	3	-
Rajasthan	31	27	25
Tamil Nadu	170	205	178
Uttar Pradesh	1543	1490	1644
West Bengal	13	13	13
Others	12	13	8
	2953	2862	2923

X Final Estimates of 1984-85  
XX Second Estimates of 1985-86.

2



Integrated plan for the utilization of sugar cane trash-for the production of biogas and particle board

## (3) Sheet Formation

As per the desired size and design wire mesh mould can be prepared. Then the required quantity of pulp is spread on the mould to the desired height. The excess quantity of water is drained and thick pulp sheet is prepared.

## (4) Hot Pressing

The thick pulp sheet is pressed under higher pressure of 300 to 500 kgs. per square centimeter at 150°C temperature to set phenol resins between lignin and cellulose fibres. We are here proposing that the lignin is a polyphenolic natural polymer and it can be utilised in polymer formation along with synthetic polymers (phenol formaldehyde). It is then being formed in situ. This work is still in progress in our laboratory but the foreign companies had taken patents for said process. This process they have termed as "Masonite Process".

## Advantages

1. The yield of this Product is almost 100 percent as there is no virtual loss of lignin because the partial dissolved lignin is reused to establish bonds with resins and fibres.
2. The particle boards are hard, stiff and water repellent hence particle boards are superior than wood.
3. The prefabricated boards are as per specification of customer. Hence there will be no loss or wastage as can occur in wooden plates.
4. Now a days there is a tremendous shortage of wood for paper and building material. These short

fibres plants are useful for manufacturing particle boards. Hence we can save forest wood for other better uses as well as it will be helpful in conserving the forest. A group of villages can establish biogas and paper board plant by using local raw materials and utilisation of own biogas and particle board manufacture.

5. If the forest is conserved, it will be helpful to controlling the pollution and increasing the rainfall.

6. Uptil now nobody has considered the potentialities of the green plant juice for manufacturing biogas.

7. This project is helpful for achieving more energy, good manure, best quality of particle boards, controlling air pollution and maintaining smooth nature's cycle.