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Received: 12.05.2022 Revised: 27.05.2022 Accepted:09.06.2022

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Research Article

Characteristics Analysis of Locally Available Agro Residues

M. Rakshana Begum[*1], R. Sowbakiya [1], P. Sandhiyadevi [1]

[1] *Department of Agriculture Engineering, Nandha Engineering College, Erode, Tamilnadu, India.*

Agriculture generates large amount of by-products that could be used to produce energy and reduce the amount of fuel wood required to meet the daily cooking needs, especially in developing countries. The goal of this study was to develop a low cost system to produce biomass briquettes from orange Peel, Pomegranate peel, Cassava peel, Bael leaf, Drumstick Leaf, sapodilla leaf in the context of a rural village. They were dried, grinded and used. The physical properties (density, moisture content, calorific value, durability, and compressive strength) were tested to identify the briquettes with the highest quality, i.e. greatest physical integrity. The briquette formulation did not significantly influence the calorific value. To obtain biomass, the briquettes should possess both physical and chemical properties. The proximate and ultimate analysis are the physical properties. The proximate analysis contains bulk density, moisture content, ash content, volatile matter, and fixed carbon. The ultimate analysis contains carbon, hydrogen, nitrogen, oxygen, and sulphur content. The following report proves that agricultural residues are efficiently used as a low-cost renewable energy source.

Keywords: Agricultural residues, Sample collection, Analyzing samples, Proximate Analysis, Ultimate analysis.

1. Introduction

Biomass is an important source of energy in today's world. The demand for energy is increasing as the world is in a crisis of increasing population. The high cost of fossil fuels and also the shortage of fossil fuels result in the search for any other source of energy. Scientists around the world are trying to find energy from many other resources. The researchers said using wood as a primary source of energy results in deforestation, land degradation, and many other health effects. The research being done using modern biomass, which is less affected by the environment and humans, is limited.

The objective of this paper is to review biomass resources availability and bio fuels potential in the country. Here, we have attempted to assess the various biomass types available for bio fuel production using current biomass conversion routes, particularly, first- and second-generation technologies. The information resulting from this study will serve as a base for further, more detailed site-specific biomass assessments.

2. Methods

The goal of the analysis is to develop and apply a methodology to estimate quantities of agricultural crop residues that can be removed for bioenergy. This will be analyzed using physical and chemical properties by using TGA. We review and analyze the effect of the use as amendments of different agro residues, on physical properties of the soil.

Physical properties includes size fraction, moisture content (wet, dry), true density, bulk density and porosity.

Correspondence should be addressed to
M. Rakshana Begum; rakshu3411@gmail.com

Chemical properties such as proximate analysis using volatiles, ash content, fixed carbon and ultimate analysis using CHNS (Carbon Hydrogen and Nitrogen Analyzer) and calorific value of biomass by dulong's formula.

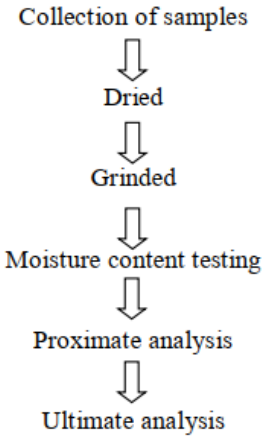

Fig.1. Methodology

3. Sample Collection

The following samples were collected locally from Erode, Tirupur, and Tirunelveli Districts in actual form.

3.1. Groundwork of the Sample

The agricultural residues obtained from the districts of Erode, Tirupur, and Tirunelveli have been left under sunlight for 3 days.

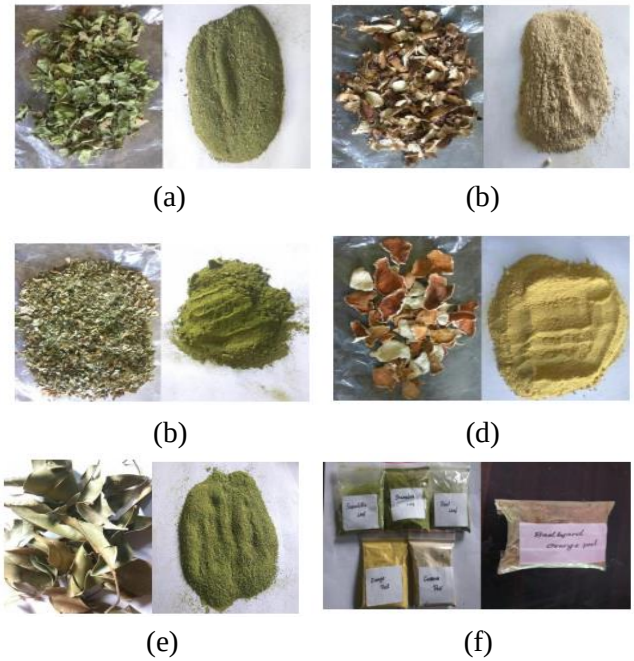

Fig.2. Samples

After the samples are dried, they are grinded well. In this study (a) Bael Leaf, (b) Cassava peel, (c) Drumstick leaf, (d) Orange Peel, (e) Sapodilla leaf and Pomegranate Peel were considered.

4. Results and Discussions

4.1. Proximate Analysis

The proximate analysis is done using the proximate analyzer machine. From table (1), we conclude that the drumstick leaves contain 8.83% of moisture content and the pomegranate peel contains 6.93% of moisture content.

Table.1 Proximate analysis of Agricultural residues

Agricultural biomass	Moisture content (g/100g)	Ash content (g/100g)	Volatile matter (g/100g)	Fixed carbon (g/100g)
Orange Peel and bael leaves	7.25	1.32	0.96	3.02
Pomegranate Peel	6.93	3.53	3.32	1.86
Cassava Peel	5.97	0.62	1.03	2.33
Drumstick Leaf	8.83	1.23	2.03	3.27
Sapodilla Leaf	7.82	2.32	1.69	2.93

The ash content, volatile matter and fixed carbon of the cassava peel, Sapodilla leaves, orange and leaves were determined.

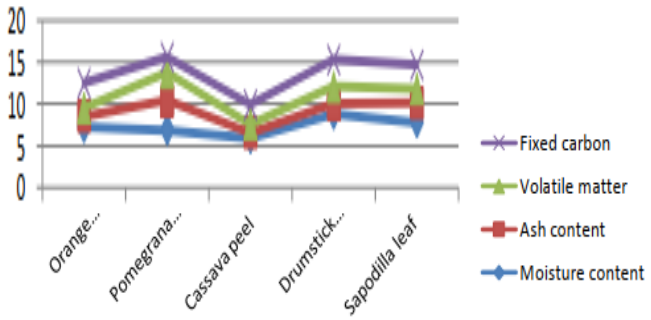

Fig.3. Graph of proximate analysis

4.2. Ultimate Analysis

The ultimate analysis is done using the TGA analyzer. The carbon, hydrogen, nitrogen, oxygen, and sulphur content of the orange peel and bael leaves, pomegranate peel, cassava peel, sapodilla leaves, and drumstick leaves were determined.

Table.2 Ultimate analysis of Agricultural residues

Agricultural biomass	Carbon %	Hydrogen %	Oxygen %	Nitrogen %	Sulphur %
Orange Peel and bael leaves	3.02	2.94	14.3	0.52	3.64
Pomegranate Peel	1.86	1.93	12.3	0.32	2.88
Cassava Peel	2.33	0.93	16.2	1.36	1.72
Drumstick Leaf	3.27	1.24	14.6	2.11	2.36
Sapodilla Leaf	2.93	3.92	15.6	0.32	3.92

It was also found from the graph the sample Sapodilla Leaves has the high Hydrogen content of 3.92% whereas the sample Cassava Peel has the low Hydrogen content (0.19%). Hydrogen is used for electricity, power and heat production. Thus, the sample Sapodilla leaves can be used for generating heat than the other samples.

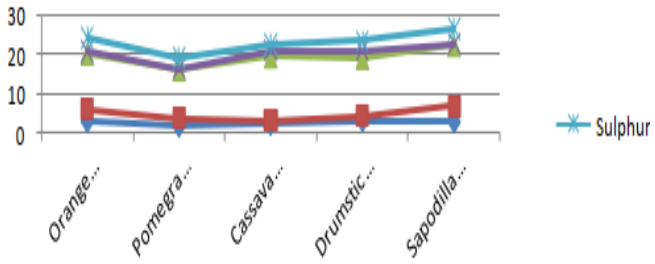

Fig.4. Graph of ultimate analysis

It was also found from the graph the sample Sapodilla Leaves has the high Oxygen content of 15.6% whereas the sample Pomegranate Peel has the low Oxygen content (12.3%).

Higher Oxygen content helps in quicker Combustion. Thus, the sample Sapodilla leaves combusted easily and produces smoke. It was also found from the graph the sample Drumstick Leaves has the high Nitrogen content of 2.11% whereas the sample Pomegranate Peel and Sapodilla leaves has the low Nitrogen content of 0.32%.

It was also found from the Graph the sample Sapodilla Leaves has the high Sulphur content of 3.92% where as the sample Cassava Peel and Sapodilla leaves has the low Sulphur content of 1.722%.

Thus, these samples can be used for rubber vulcanization, bleaching paper, and product making industries as cement, detergents, Pesticides. And some gun powder.

5. Conclusions

The agricultural residues collected from the districts of Tirupur Erode and Tirunelveli were sundried for three days before being ground thoroughly. The physical properties of the residues were determined. The residues were taken for proximate analysis by a proximate analyzer and ultimate analysis by a TGA analyzer. From the study, the residues are found to be less polluting and ecofriendly. There is no need for proper pollution control arrangements because they produce less smoke. And also, the drumstick leaves can be used in large quantities for combustion purposes in small-scale industries.

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