Research Article

Inventorization of Briquetting Units and Utilization of Raw Materials for Biomass Briquette Production in Tamil Nadu

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Abstract

The study was carried out on the inventorization of biomass briquette units and their raw material procurement and composition. The structured interview schedules were used for data collection from the Briquetting Industry. The number of briquetting industries present in Tamil Nadu was in studied different agro climatic zones. Among the all zones Western Zone had highest number of units (55.55%). The raw materials are procured from different sources viz., Saw mills, sugar mills and farms. Saw dust was found to be predominant component for biomass briquette production in all agro climatic zones.

Keywords: Raw material, Biomass Briquette

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Introduction

Briquetting is the technology to utilized convert all types of agricultural and forestry wastes into solid fuel. Briquettes are formed in cylindrical logs using high mechanical pressure without the use of chemicals or binders. The product is a replacement to conventional fossil fuels and can be used across various manufacturing industries such as boilers, furnaces and kilns. Bio-Briquette is an eco-friendly solid biofuel which helps to reduce pollution, contributing to greener environment and save worthy foreign exchange. Briquetting works on the basic concept of "Wealth from Waste". More than 60 % of the briquetting plants are located in the states of Gujarat, Punjab and Tamil Nadu, and only 30 percent plants are located in Uttar Pradesh, Maharashtra and Karnataka and the rest in Madhya Pradesh and Andhra Pradesh [1]. The most common raw materials for heated-die screw-press briquetting machines are Saw dust and Rice husk. Some other raw materials, e.g., Coffee husk, Tamarind seeds, Tobacco stems, Coir pith and spice waste have also been used in India [2]. On establishing the facts on inventorization of briquetting industries, composition of briquettes, it would be easier to ensure smooth linkages from the producer – consumer through public-private partnership arrangements. Considering all these aspects, the study on inventorization and utilization of raw materials in biomass briquette production has been taken up.

Materials and Methods

Collection of Primary Data

The structured interview schedules were used for data collection from the Briquetting Industry. The schedule was pre-tested to make necessary modifications by deleting irrelevant and ambiguous questions. These pre-tested schedules were thus finalized and used for the collection of required data from the briquette manufacturer. Concerted efforts have been taken to collect essential data by administering repeated questions and cross checks made for getting quality data.

Collection of Secondary Data

Secondary data on number of briquetting units available across different districts of Tamil Nadu were accessed from development department and the Government institutions of industrial importance through the practice of firm to firm inquiry approach.

Tabular Analysis

For making simple comparisons, details on general characteristics of the briquetting industries, sources of procurement, composition of raw material for biomass briquette making were analyzed through simple percentage analysis.

Results and Discussion

Inventorization of briquetting industries in Tamil Nadu

Tamil Nadu as a whole was taken up for the study. Tamil Nadu is blessed with 7 Agro climatic zones and that are classified as North Eastern Zone, North Western Zone, Western Zone, Cauvery Delta Zone, High Rainfall Zone, and the Hilly Zone, in which Cauvery Delta Zone and Hilly Zones have no briquetting industries. The number of briquetting industries present in different Agro Climatic Zones are delineated in the **Table 1**.

Table 1 Briquetting Industries Located in Tamil Nadu

Zone	Name of the Zone	No. of Industries	Total percentage
I.	North Eastern Zone	6	11.11
II.	North Western Zone	10	18.51
III.	Western Zone	30	55.55
V	Southern Zone	5	9.25
VI.	High Rainfall Zone	3	5.55
	Total	54	100

Totally, there are about 54 briquetting units in Tamil Nadu, out of which 55.55 per cent of the industry were located in the Western Zone alone. North Eastern Zone accounted for 18.51 per cent of total briquetting industry available in Tamil Nadu, all the 54 briquetting units were selected for the study. There are at least 500 briquette manufacturers across the country, giving direct and indirect employment to 100,000 people. About 200 of these are in Gujarat, the other major producers are in Maharashtra and Rajasthan, along with other northern states [3]. About 70 % biomass briquetting machines were installed in India by 1995; since then briquetting has been gaining acceptance slowly but steadily. By 2007 the number of briquetting plants increased to 250. As the technology is locally mastered and economically viable, the number is increasing annually [4].

Procurement of Raw Material

The raw materials are procured from different sources viz., Saw mills, Sugar mills and Farms. Saw mills provide saw dust and wood chips. Sugar mills provide bagasse and the farm provide Groundnut shell, Tapioca waste, Tamarind shell, Coir pith, Coffee husk and Coco waste etc, (**Figure 1**). The bagasse, saw dust and wood chips were directly supplied to briquetting industries on order, whereas, the briquetting industries procure crop residues through wholesalers and retailers. The details are delineated in Figure 1. Recovery rates of raw material vary with local practices as well as species. After receiving the logs in saw mill, about 12 per cent is classified as waste in the form of bark. Slabs, edgings and trimmings amount to about 34 per cent while sawdust constitutes another 12 per cent of the log input. After kiln- drying the wood, further processing may take place resulting in another 8 per cent waste (of log input) in the form of sawdust and trim end (2 per cent) and planer shavings (6 per cent). For calculation purposes a yield factor of 50 percent has been used (38 per cent solid wood waste and 12 per cent sawdust) [5]. Vast quantities of agriculture residues are available for briquetting. 12,000 tonnes of sawdust is produced in Kigali (Rwanda) by a large number of sawmills and carpenters [6].

The reasons for the crop residues being supplied through intermediaries were bulkiness, farmers are scattered in nature. There is uncertainty in quantity of wastes.

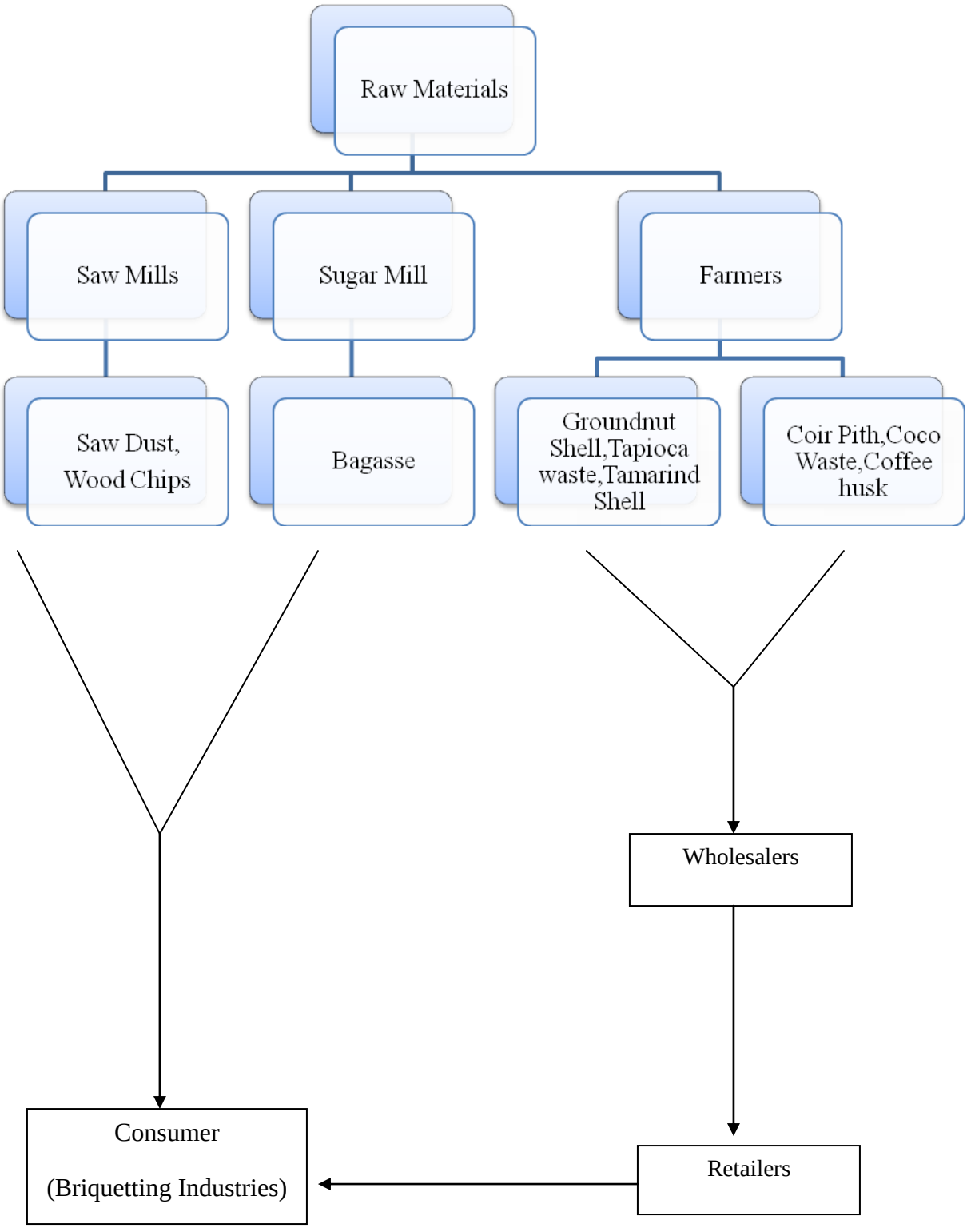

Figure 1 Procurement of Raw Material for Briquetting Industry

Raw Material Composition for Briquette Making

Table 2 revealed that the raw materials used for briquette making varied across the different Agro climatic zones.

On an average 65 per cent of the raw materials used in briquetting units were found to be the saw dust. The principal raw material used for briquette making is found to be the saw dust. In the North Eastern Zone, the Groundnut shell, Tapioca Waste and Tamarind shell were used along with saw dust respectively in the ratio of 20:10:10:60 per cent. In respect of North Western Zone, the composition varied. Hence the Coffee husks, Tamarind shell, Coco waste along with saw dust were respectively mixed in the combination of 15:10:10:65 per cent.

Table 2 Zone wise Raw Material Composition for Briquette Making

Zone	Name of the Zone	Name of the Raw Materials Used	Percentage Composition
I	North Eastern Zone	1.Saw Dust	60.00
		2.Groundnut Shell	20.00
		3.Tapioca Waste	10.00
		4.Tamarind Shell	10.00
		Average Cost/Tonne	100.00
II	North Western Zone	1.Saw Dust	65.00
		2.Coffee Husk	15.00
		3.Tamarind Shell	10.00
		4.Coco Waste	10.00
		Average Cost/Tonne	100.00
III	Western Zone	1.Saw Dust	70.00
		2.Coir Pith	10.00
		3.Groundnut Shell	10.00
		4.Wood Chips	10.00
		Average Cost/Tonne	100.00
IV	Southern Zone	1.Saw Dust	70.00
		2.Groundnut Shell	10.00
		3.Tapioca Waste	10.00
		4.Tamarind Shell	10.00
		Average Cost/Tonne	100.00
V	High Rainfall Zone	1.Saw Dust	60.00
		2.Groundnut Shell	20.00
		3.Cofee Husk	10.00
		4.Tamarind Shell	10.00
		Average Cost/Tonne	100.00

Similar study was conducted by [7] to find the possibilities to use biomass from maple (*Acer negundo*) and black locust (*Robinia pseudoacacia*) sprouts in briquette production. The research included determination of basic qualitative parameters density, calorific value, durability and ash content. Obtained results indicate that briquettes made of wood from the examined tree species meet qualitative requirements specified in applicable standards.

In the Western Zone, Saw dust was used in combination with Coir pith, Groundnut shell and Wood chips mixed respectively in the combination of 70:10:10:10 per cent so as to deliver the briquette. In respect of Southern Zone, the raw material composition is similar to North Eastern Zone but the saw dust used is 10 per cent higher than the North Eastern Zone. In respect of High Rainfall Zone, the raw materials used were Saw dust, Groundnut shell, Coffee husk, and Tamarind shell in respective proportion of 60:20:10:10 per cent. [8] reported that India with different agro climatic regimes produces 250 million tons surplus biomass annually, which is either not utilized or utilized sub optimally. Processing capacity of 200 million tons of biomass in 10 years till 2020 will not only eliminate import of coal but also cut down on liquid fuel import substantially. The main reason behind the different raw material composition was cropping pattern prevalent in the zone.

Summary and Conclusion

The number of briquette units established in Tamil Nadu was found to be 54. Out of which, the North Eastern Zone and Southern Zone had poor representations. It is mainly due to poor technology transfer and lack of awareness. Hence short term training programs on technology transfer, entrepreneurship development in Forest business, may be thought off to create awareness and motivation among the agri entrepreneurs.

The biomass briquette is growing in population as an alternative energy source in India. Identifying the briquetting units and analyzing the various raw materials used in the biomass briquette production can contribute to the sustainable development of the biomass briquette as an alternative energy source.

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