Tropentag, October 9-11, 2007, Witzenhausen

"Utilisation of diversity in land use systems:
Sustainable and organic approaches to meet human needs"

Availability and Potential of Local Biomass Resources as Fuel for Drying of Tropical Fruits

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Abstract

The Thai economy is highly dependent on agricultural exports, including dried fruits requiring large amounts of energy for processing. The main drying technology used in Thailand so far is the bulk convection dryer operated with petroleum fuel. Small-scale farmers relying on these dryers are being impaired by fuel consumption and the increasing operational costs resulting from soaring oil prices. Renewable energy has recently received increased attention from the Thai government with some promising potential. Biomass is a locally abundant renewable resource, a supply of which for fueling the dryers would be already available from production and processing of the fruits. Organic materials such as wood, seeds, kernels, peels and shells are currently under utilised and could provide a sustainable source of energy. However, the combustion of these resources on a large scale requires that their availability and fuel properties should first be known. Currently, little information exists concerning the potential and characteristics of mango, litchi and longan biomass resources.

The objective of this study was to investigate wood and processing residues of mango, litchi and longan and their potential as energy sources in terms of availability and fuel properties. Structured interviews as well as laboratory analyses of physical and chemical properties of collected samples were conducted. Analyses included moisture, ash, lignin, fixed carbon, volatile and calorific contents, as well as density. The results showed that the studied biomass is widely available, but there is some concern about discrepancies between source and sink locations. Regarding fuel properties, many of the analysed samples had promising potential. Longan wood showed the maximum heating value, due to its high density. Mango wood provided similar values resulting from high energy content of the bark. Mango endocarp was the residue with the greatest heating value, which was related to the high lignin content. Seed and peel samples had lower energy contents, but were still considered adequate to use as renewable energy sources for heating of drying air. Results of the other analyses are given and the potentials for combustion of these biomass resources on a large scale as related to fuel properties are presented.

Keywords: Fuel properties, litchi, longan, mango, renewable energy, residues, Thailand, wood

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