



**“Value addition to food-crop processing:
converting banana plant-waste to cooking fuel”**

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Abstract

The purpose of this project is to demonstrate rural development through improvements in agricultural productivity and rural living standards, by integrating: efficient farming practices and thereby increased harvests among subsistence farmers, processing of the crop-residues for a renewable-energy source, generating clean fuel from this renewable source and delivering it as cooking fuel to rural homes, with the integration ensuring the long-term sustainability of the system. Here, the waste of newly-established banana plantations is being used to generate biogas for fuelling stoves.

Banana cultivation was initiated on plots of land owned by small farmers (in Ramanagara district in South-east Karnataka). This involved land preparation, the provision of efficient irrigation through shared access to water and drip micro-irrigation systems, and the provision of banana saplings. It is intended that the costs of these facilities will be recovered in instalments over about 7 years, from a share of the net banana sales revenue. As bananas yield within a year, the first crop has already been harvested and sold and the new crop is awaited.

Simultaneously, two large digesters have been constructed in the village where families were interested in purchasing gas for stove-fuelling, and pipeline connections have been drawn to the houses. Biogas (chiefly $\text{CH}_4 + \text{CO}_2$) has calorific values between about 17 and 24 MJ/m^3 , and with adequate supply can effectively meet stove-fuel needs.

While the available waste organic material (dung, crop waste) with most households is inadequate for generating enough gas for their cooking-fuel requirements, banana plants emit additional “pseudo” stems around the main fruit-bearing stalk; these have to be chopped down to preserve nutrition for the fruit. Hence, banana waste is adequate for fuelling gas generation throughout the year. Fuelling of the digesters consists of daily input of chopped banana stems, carefully weighed and mixed with the required amounts of water.

The renewably sourced fuel replaces biomass burning (and its adverse impacts) and also obviates the need for state-sponsored LPG. The N_2 -rich effluents from the digesters are being used as field manure. While the farm-owners have increased earning from banana sales, the labourers (at the farms and at the digesters) have benefited from increased employment.

Keywords: banana plantation waste, renewable energy source, biogas, cooking fuel, village energy system

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