



Dendro energy for tea industry

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Energy comprises the largest component of processing cost in tea. Both thermal and electrical energy are used in tea processing. Thermal energy is used for withering and drying while electrical energy is used for withering, rolling, roll breaking, drying, grading and packing.

The thermal energy requirement is met by using firewood, diesel oil and furnace oil as fuels. Hydropower is considered to be the cheapest source of electrical energy. However, the available hydropower is not adequate to meet the country's energy demand and hence the demand is augmented by electrical energy from thermal power plants mainly using diesel oil as fuel, increasing both the cost of electricity and tea processing. Therefore, it is important to explore alternative and renewable energy resources, to curtail cost of tea processing. Dendro energy, which will be definitely cheaper, is identified as one such possible option. The thermal energy could be produced from firewood either by direct combustion or gasification i.e. production of gas using a gasifier and burning the gas in an Air Heater. This presentation will focus on ways to generate the required amount of fuel wood in tea plantations, the advantages and disadvantages of using gasifier and their limitations of use in our local tea factories.

Tea industry uses firewood as large logs of rubber/ fuelwood, which is inefficient and non sustainable. The alternative readily available is the fast growing Short Rotation Coppicing (SRC) species, such as *Gliricidia Sepium*, *Caliandra calothyrsus* etc. The trees with coppicing ability are best suited for firewood production, as it is a renewable source of energy having no adverse impact on the environment, has Short Rotation Coppicing (SRC) ability, can be cultivated early and first harvest can be made within 15 -18 months and no replanting required since only the branches/stems are harvested periodically.

Electricity could be produced from fuelwood using either a;

- i. gasifier coupled to a gas engine and an electricity generator. About 2 kg of firewood is needed, to produce 1 unit of electricity, in a gasifier. A minimum capacity of 500 kW may be economically feasible for gasifier coupled system, or a
- ii. steam boiler coupled to a steam turbine and an electricity generator. About 1.2 kg of firewood is required to produce 1 unit of electricity in a boiler. A boiler coupled system may be economically viable only, if the capacity of the plant is 1 MW or above.

However, production of gas using a gasifier for co-generation of thermal energy and electrical energy may not be economically viable, due to high capital and maintenance cost.

Gliricidia, the fourth plantation crop in Sri Lanka, could be successfully grown in low, mid and part of the higher elevations. It could be either grown in tea lands as shade trees (a maximum number of 250 trees per hectare) or as fuelwood plantation in marginal tea lands. A hectare of *Gliricidia* plantation would annually yield about 25 tonnes each of dry sticks and fresh foliage. Wood could be used as fuel to generate thermal or electrical energy. About 4 kg of wood is needed to generate the equivalent thermal energy generated from 1 litre of petroleum fuel.

Establishing/growing of Short Rotation Coppicing (SRC) species in the maximum extent possible in tea plantations would certainly assist in curtailing cost of fuel and hence it should be seriously pursued.