

## A comparison of two types of firewood; Rubber and Gliricdia

Biomass is the cheapest type of fuel available per unit of heat in most of the developing countries and it can be produced from most types of trees. Normally dried wood burn easily but the fuel properties like moisture content, calorific value and density will be vary depending on the type of tree. Therefore a study was carried out to compare the energy content of a most widely used biomass types rubber and Gliricdia.

Gliricdia (*Gliricidia sapium*) is commonly used as a sheltering media for tea and pepper plantations. In most of the countries it is used as a main source of firewood. They use more mature trees split in to small pieces. But the problems are associated with the immature tree branches cutoff from pepper plantations where the tree is used only as a support to the pepper plant.

These tests were conducted in order to check the traditional belief that Gliricdia is low in its calorific value than other fuel woods. Therefore water boiling tests were carried out for Gliricdia and other major fuel wood that is rubber (*Hevea brasiliensis*).

### Test conditions

Aluminium pot weighing 220g with a lid of 170g is filled with water to full weight of 2670g and heated with two types of fire woods till it get boiled.

### Observations

	Rubber wood		Gliricdia wood	
	Trial 1	Trial 2	Trial 1	Trial 2
Initial weight of pot+water /(kg)	2.5	2.5	2.5	2.5
Final weight of pot+water /(kg)	2.48	2.48	2.48	2.48
Amount of water evaporated /(kg)	0.02	0.02	0.02	0.02
Initial water temperature/(°C)	26	29	27	30
Final water temperature/(°C)	98	98	98	98
Firewood used /(kg)	0.42	0.42	0.52	0.46
Time taken/(min)	15	15	15	14

### Calculations

Firewood type	Average temperature	Average water evaporated/(kg)	Average Firewood	Average time
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	difference		used /(kg)	consumed /(min)
Rubber	70.5	0.02	0.42	15
Gliricidia	69.5	0.02	0.49	14.5

$$\begin{aligned}
 \text{Calorific value of Rubber} &= ((2.5-0.22) \times 4200 \times 70.5 + \\
 & \quad 0.02 \times 2260)/0.42 \\
 &= 1607508 \quad \text{kJ/kg} \\
 &= \underline{16.075} \quad \underline{\text{MJ/kg}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Calorific value of Gliricidia} &= ((2.5-0.22) \times 4200 \times 69.5 + \\
 & \quad 0.02 \times 2260)/0.49 \\
 &= 1358320.8 \quad \text{kJ/kg} \\
 &= \underline{13.583} \quad \underline{\text{MJ/kg}}
 \end{aligned}$$

### Conclusions

From the observations and calculations it could be seen that the calorific value of *Gliricidia* is somewhat lower than the rubber firewood which is commercially available in the country; but the time taken for boiling the same amount of water is not different when comparing the two.