

*Eucalypt plantations intimately integrated into a tea estate. It is far cheaper for tea factories to cure tea through fuel wood than to buy furnace oil. The shrubs in the foreground are *Hakea salicifolia* used as windbreaks or hedges. (Photo KFS)*



# Calling on small-holders

As tea factories switch to firewood from furnace oil, the tea sector offers massive opportunities for tree growers

By Joshua Chebotwo

The tea sector is a major agricultural activity in Kenya and contributes to both the gross domestic product (GDP) and foreign exchange. The sector consists of smallholders affiliated to the Kenya Tea Development Agency (KTDA) with 65 factories (constituting 60 per cent of the Kenyan tea output) and the large-scale segment affiliated to the Kenya Tea Growers Association (KTGA) with 29 factories (accounting for 40 per cent).

The KTGA affiliated factories led the way in switching from furnace oil to firewood after becoming aware of the cost-saving potential of the move. The saving per kilogram of processed tea is estimated at Ksh 9, using 2010 prices.

KTDA factories started the conversion from furnace oil to firewood in 2000 and currently almost all the factories use firewood. Firewood use has triple benefits, for it increases profitability of the factories by cutting costs, saves foreign exchange and increases incomes to tea growers

that supply firewood to affiliate factories.

In addition, the tea sector uses tree products in two forms - firewood and timber, mostly for making pallets for packaging tea. The large tea estates are generally self-sufficient in firewood and timber for most have sufficient land under trees, compared to smallholder-affiliated factories (KTDA) that have no land for such purposes. Hence, the smallholder factories purchase all firewood and timber from the market. And therein lies the opportunity for smallholders.

## The tea sector's demand for firewood and implications on the forestry sector

The total firewood demand in tea processing depends on several factors including the total tea crop production, the boiler efficiency, quality of firewood and energy conservation measures in the processing systems. The quality of wood concerning calorific value will have an effect on

the quantity of the firewood used because low calorific or wet wood will produce less energy per unit weight as compared to high-density and dry wood.

In 2010, Kenya produced a total of 398 million kg of black tea. Long-term experience from the tea sector shows that 250 kg of processed tea requires an equivalent of one m<sup>3</sup> of stacked firewood<sup>1</sup>, translating into 0.7 m<sup>3</sup> of solid wood. The current factory gate price of stacked wood is Ksh 1,500/m<sup>3</sup>, or Ksh 2,140/m<sup>3</sup> of solid wood.

The firewood demand in the tea sector is estimated at 1,114,400 m<sup>3</sup> of solid wood or 1,592,000 steres, corresponding to an estimated value of Ksh 2.4 billion (see table 2). The KTDA factories are located mostly in central Kenya and the Rift Valley highlands. The commonly used firewood is from eucalyptus species mainly *E. grandis* and *E. saligna*. At the current level of management on farms, the estimated mean annual increment is about 30 m<sup>3</sup> per hectare and a rotation age of 10 years is considered reasonable. The total annual area to be clear-felled is about 2,290 hectares.

To sustain the demand for firewood by KTDA affiliated factories would require a total of 22,290 hectares of forest plantations to be developed in

<sup>1</sup> Note of the technical editor: One m<sup>3</sup> of stacked wood is called one stere (1m x 1m x 1m). One stere is about 0.70 m<sup>3</sup> of solid wood.

Table 1: Some facts on the Kenyan tea industry

Cost of processing (Ksh/kg)	Firewood: 5	Furnace oil: 14	Savings: 9
Sector	KTDA	KTGA	TOTAL
No of factories	65	29	94
Output in 2010 (kg)	238,800,000	159,200,000	398,000,000
	60%	40%	100%
Savings opportunity (Ksh)	2.149 billion	1.433 billion	3.582 billion

Table 2: Potential consumption of wood by the tea industry, in volume (m3) and value (Ksh)

Firewood	Factors	KTDA	KTGA	TOTAL
1. Firewood demand (steres)	250 kg/stere	955,200	636,800	1,592,000
Firewood demand (m3)	1:1.43 (0.7)	668,640	445,760	1,114,400
Firewood value (Ksh)	2,140	1,430,889,600	953,926,400	2,384,816,000
Land required (ha/year)	300m3/ha	2,229	1,486	3,715
Total land demand (ha)	10 yr rotation	22,290	14,860	37,150
<b>2. Timber pallets</b>				
Tea production (kg)		238,800,000	159,200,000	398,000,000
No. of pallets (rounded)	1:1300kg	183,700	122,460	306,160
Timber volume (m3)	0.0497m3/pallet	9,130	6,080	15,210
Timber value (Ksh)	25,000 Ksh/m3	228,250,000	152,000,000	380,250,000
Land required (ha/year)	600m3/ha	15	10	25
Total land demand (ha)	25 yr rotation	375	250	625
<b>3. Timber for farm structures (Ksh)</b>				
	Same as for pallets	228,250,000	152,000,000	380,250,000
<b>Total timber demand (Ksh)</b>		<b>456,500,000</b>	<b>304,000,000</b>	<b>760,500,000</b>
<b>Total wood demand (Ksh)</b>		<b>1,887,389,600</b>	<b>1,257,926,400</b>	<b>3,145,316,000</b>

the country, with an equivalent annual output value of Ksh 1.4 billion.

### Timber requirements

The tea sector uses pallets to pack tea for transportation from the factories to the auctions in Mombasa and for export. The quantity of timber required for making pallets is estimated

to be 10,973 m<sup>3</sup> and similar amounts are needed for construction and maintenance of farm structures. At a rotation of 25 years and an estimated mean annual increment of 24 m<sup>3</sup>, the quantity of timber could be sustainably sourced from 1,250 hectares of plantations with annual estimated value of over Ksh 760 million.

### Conclusions

The tea industry has the potential market for wood grown on the farms in two forms - sawn timber and firewood. The total potential market for the two products is worth about Ksh 3.1 billion per year. However, the large-scale tea farms/companies are self-sufficient in terms of firewood, unlike KTDA factories. Thus, the potential demand that smallholder tree growers can penetrate is valued at Ksh 1.9 billion. In this era of rising fuel prices, this figure is likely to be conservative.

The KTDA firewood market can be served well through a reliable source of firewood based on sustainable production. The KTDA factories can form the basic unit to organise production, processing and marketing of commercially produced firewood from farms located in the areas where the factories are located. The same can be extended to sawn timber from the farms.

The plantations managed by the public sector have in the past supplied most of the industrial wood requirements and this has overshadowed the development of appropriate production, processing and marketing systems for farm-based production. To meet the future demand of wood requirement in a sustainable way, a review of the technical packages for production, processing and marketing of wood grown on the farms is required.

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