parent. The ultimate major objective of any forage breeding programme will aim at high green and dry fodder production. The parents Co-7, ICMV 87111, TNSC-1 and L 72 registered very high positive significant gca effects for both these characters and would be very valuable in pedigree breeding programmes. For increasing crude protein content, AFB 48-1 and PCB 87-24 would be the best parents.

The specific combining ability effects of the hybrids are given in Table-2. Six of the hybrids ie. AFB 48-1 x PCB 87-24, AFB 48-1 x HC 4, APFB 2 x Co-7, HC 4 x PCB 87-24, HC 4 x TNSC-1 and ICMV 87111 x TNSC-1 recorded highly significant and positive sca effects for both green and dry fodder yield. Among these, AFB 48-1 x HC 4 also recorded significant sca effect for leaf-stem ratio. The hybrids APFB 2 x HC 4 and AFB 52-12 x Co-7 were the best with regard to sca effect for crude protein content. The hybrids APFB-3 x Co-7, TNSC-1 x Co-7 and ICMV 87111 x L 72 also recorded high positive sca effects both green and dry fodder yields.

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CHARCOAL RECOVERY FROM *Prosopis juliflora* FUELWOOD AND ROOTSTOCK

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ABSTRACT

Studies on charcoal recovery from fuelwood billets of different dia classes (<2.5 cm, 2.6 to 4.5 cm, 4.6 to 6.5 cm, 6.6 to 8.5 cm, 8.6 to 10.5 cm and >10.5 cm) as well as from the rootstocks (10.5 cm dia) of *Prosopis juliflora* (Swartz) DC revealed that charcoal recovery increased with the increase in diameter of fuelwood billets. Comparing the charcoal recovery per cent between the fuelwood billets and root stock of *P.juliflora* of the same dia class (>10.5 cm), the charcoal recovery was more from rootstocks than fuelwood billets.

KEY WORDS: *Prosopis juliflora*, Fuel wood, Rootstock, Charcoal, Recovery

More than 1.5 billion people in the developing countries depend on fuelwood and charcoal for cooking and heating (Arnold and Jongma, 1978). This dependency on fuelwood and charcoal has affected reserve forest to a reater extent. This problem could be tackled through encouraging green wood cover in the wastelands with fast growing leguminous multi purpose tree species such as *Prosopis juliflora*. The fast growing *P. uli ora* has been recommended all over the world to meet the fuelwood demand (FAO, 1977). The merit of *P.juliflora* as fuelwood is its high calorific value of 8050 BTU per pound (Singh, and Singh, 1993).

Charcoal making from *Prosopis* fuelwood and rootstock has become a cottage industry in southern Tamil Nadu as it provides employment opportunity for the rural mass to the tune of 6.34 and 7.03 million man and woman days, respectively per annum (Kondas, 1992). *Prosopis* charcoal is very much wanted fuel in houses, besides its varied uses in carbide and ferrosilicon industries. The pieces of broken charcoal and its powders are mainly used for manufacturing incense sticks (Kondas, 1992). Hence an adhoc study was conducted at Manikattienthal hamlet of Kamarajar district of Tamil Nadu to understand the charcoal recovery from *P.juliflora* fuelwood through a local kiln method called *karimootam*.

MATERIAL AND METHODS

Fuelwood billets of about 75 cm length were sorted out into six different dia categories *viz.*, (i) less than 2.5 cm, (ii)2.6 to 4.5 cm, (iii) 4.6 to 6.5 cm, (iv) 6.6 to 8.5 cm, (v) 8.6 to 10.5cm and (vi) >10.5 cm. *P.juliflora* rootsocks of more than 10.5 cm dia were also included in addition to the above categories for this study. In each category, 200 kg dry matter was taken. They were subjected to thermal degradation under controlled atmospheric condition following the local charcoal making process called *karimoottam*. In this process, the fuelwood billets/rootstock were staked in heaps with a provision for firing. The heaps were covered with paddy straw and the whole mass including the layer of paddy straw was covered with mud to keep air-tight, facilitating controlled air combustion which is vary much essential for *Karimoottam*.

The charcoal recovery percentage interms of utilisable charcoal and non-utilisable (broken) charcoal was assessed. Recovery of ash as well as total loss of material from the fuel wood/rootstock was also recorded (Table 1).

RESULTS AND DISCUSSION

The utilisable charcoal recovery increased with the increase in the diameter of fuelwood billets, while the recovery of broken charcoal, ash as well as total loss of matter decreased with the increase in the diameter of billets. The recovery of utilisable charcoal was highest (50.3%) when the diameter of the billets was more than 10.5 cm. Comparison of fuelwood billets with the rootstocks of same diameter category (>10.5 cm) revealed that rootstocks gave more charcoal recovery (55.2%) than the billets (50.3%). This higher recovery of charcoal as well as lesser yield of ash with increase in diameter of billets and rootstocks might be due to the presence of higher proportion of heartwood. Heartwood had been found responsible for good quality charcoal with lesser ash yield (Kondas, 1992). Based on proximate analysis of logs of *P.julifolora*, the ash content was varying from 0.29 (Verma, 1987) to 0.52 per cent (Guha *et al.*,1970). Because of lesser ash content in *Prosopis* billets, its charcoal had been rate as an excellent charcoal of gun powder quality which is termed as *Arthracits coal* (Verma, 1987).

However, in the present investigation, the ash yield ranged form 3.0 (>10.5 cm diameter billets) to 4.1 per cent (<2.5 cm diameter billets), with higher ash recovery in billets of lesser diameter. This might be attributed to the technical snag in the

Table 1. Mean charcoal yield/recovery from the fuelwood of *Prosopis juliflora* billets/root stocks (kg)*

Diameter of billets/root stocks	Utilisable charcoal (unbroken commercial grade)	Non-utilisable charcoal (broken charcoal)	Ash	Loss
< 2.5 cm billets	57.4 (28.7)	16.4 (8.2)	8.2 (4.1)	118.0 (59.0)
2.6 to 4.5 cm billets	61.4 (30.7)	15.0 (7.5)	7.8 (3.9)	115.8 (57.9)
4.6 to 6.5 cm billets	67.0 (33.5)	14.2 (7.1)	7.4 (3.7)	111.4 (55.7)
6.6 to 8.5 cm billets	74.4 (37.2)	13.8 (6.9)	7.0 (3.5)	104.8 (52.4)
8.6 to 10.5 cm billets	81.0 (40.5)	13.0 (6.5)	6.6 (3.3)	99.4 (49.7)
> 10.5 cm billets	100.6 (50.3)	11.2 (5.6)	6.0 (3.0)	83.2 (41.1)
> 10.5 cm root stocks	110.4 (55.2)	10.0 (5.0)	5.2 (2.6)	74.4 (37.2)

* Refers to uantit obtained from 200 kg dry matter taken for the study. Figures in parentheses refer to the percentage recovery.

local method of charcoal making wherein while opening the *Karimoottam* after incomplete combustion/partial combustion, some of the red hot charcoal came into contact with open air (oxygen) and hence such of those red hot charcoal started burning still further and brought more ash as residue. This situation is further aggravated by dousing with cold water to put off the combustion by the charcoal maker. This resulted in further increase in ash yield besides increase in broken charcoal recovery. This area needs indepth research for designing a better method of charcoal making. It should be remembered that charcoal is the residue of wood as a result of heating it to high temperature in a closed space and allowing it to cool on its own accord without entry of any air. Hence dousing cold water to put off the red hot charcoal is to be avoided.

From the present investigation, it is suggested that fuel wood billets/rootstocks of higher diameter class of *P.juliflora* (>10.5 cm) is suitable for charcoal making with higher charcoal recovery. The recovery of charcoal can be still increased by refining the local method, called *karimoottam.*

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APPLICATION OF REMOTE SENSING TO STUDY THE ENVIRONMENT AND ECOSYSTEM : A CASE STUDY FOR FOREST COVER MAPPING

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ABSTRACT

Remote sensing technique can be better utilised for identifying different types of forest cover in a tropical forest eco-system. Four major forest types and one type of grassland vegetation were identified on satellite imageries. By using aerial photographs, 11 forest types and 4 types of grasslands were identified from the same study area. By integrating the interpreted information of aerial photographs and satellite imageries, it was possible to identify different types of forest and their areal extent by converting the information into a two dimensional forest cover map.

KEY WORDS : Remote Sensing, Environment, Ecosystem, Forest Types, Vegetation Mapping, Satellite Imageries, Aerial Photographs

The vegetation cover over the planet Earth has been reducing at a faster rate, especially in tropical countries, which can not be compensated even at the present rate of afforestation work. The loss of forest cover may be attributed to both biotic and abiotic factors. The heavy demand for food, fodder, firewood, raw materials for industry etc., accelerates deforestation and hence degradation of denudation of vegetation affects our environment and ecosystem drastically. Obtaining a reliable information about our forest types, vegetation cover, wildlife habitat, energy flow etc., are of paramount interest to monitor our environment and eco-system. Obtaining of such information through conventional methods is not only time consuming but also costlier. In this context, the role of remote