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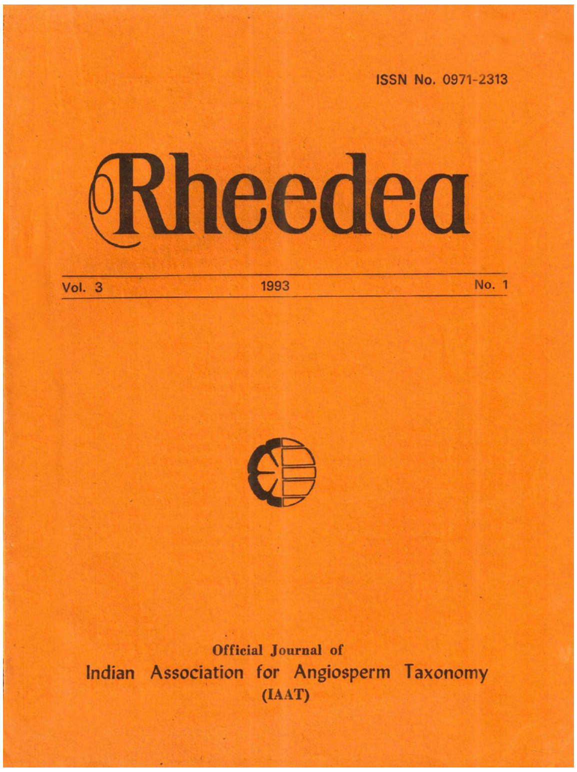

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SPECIAL COMMUNICATION

Biomass studies and the present fuelwood crisis

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The fast depletion of fossil fuels and large scale deforestation are posing serious challenges particularly to the developing countries where people mostly depend on biomass for their energy needs. The management of fuelwood resources in the past had not received adequate attention even though 80% of the population depends on fuelwood as their primary source of energy.

The demand for fuelwood, for domestic use has grown faster than supply. An analysis of the major forms in which energy is used in rural India, reveals that about 80% of energy needs of rural sector was met through non-commercial sources comprising fire-wood, animal dung, and agro-residues and agro-industrial wastes. Firewood accounts for 68.5% of the non-commercial sources of energy. On the one hand, the possibility of reversal of this trend, for obvious reasons, seems to be remote and, on the other, the gap between supply and demand of fuelwood is widening year after year which, in turn, poses serious challenge to the nation.

The annual demand of fuelwood has increased from 132 to 166 million tonnes per year during 1975 to 1992. However, the availability of fuelwood has decreased from 49 to 28 million tonnes per year. The present net deficit has increased to 138 million tonnes per year (Table-1). Thus, the situation is truly alarming and India is in the midst of a fuelwood crisis. Because of scarcity of fuelwood, considerable quantities of animal dung and agriculture residues are also burnt as fuel which otherwise could have been meaningfully used in restoring soil fertility and increasing food production. The fuelwood comes mainly from forests. The ever-increasing demand for fuelwood has resulted in fast depletion of forests. Today only 19.44% of the geographical area is under forest. Dense forest accounts for only 11.7% of the total geographical area (Table-2). The existing forests would be unable to bear any more pressure. For environmental security a minimum of 33% of the land area under tree cover is essential.

The average productivity of fuelwood from forests is only 0.5 tonne per ha. per year (reported by Ministry of Environment and Forest). Considering the existing average productivity level of the trees in natural stands, India needs to

Table 1. Fuelwood Scenario*

80% of energy needs of rural sector met through non-conventional energy sources.
Fuelwood accounts for 68.5% of the non-conventional energy sources.
Fuelwood demand has increased from 132 to 166 mt/yr during 1975 to 1992.
Fuelwood availability has decreased from 49 to 28 mt/yr during 1975 to 1992.
The net deficit has increased to 138 mt/yr.

*Source: Report of the Fuelwood Study Committee, Planning Commission, New Delhi (1982).

divert the entire geographical area under fuelwood plantation for meeting the present fuelwood demand, which is not possible. However, scientists and specialists are of the firm view that the productivity of the fuelwood trees can be increased manifold with the help of concerted scientific inputs. It is possible to increase the productivity of fast growing short rotation fuelwood species suitable for plantation under a given set of soil and climatic conditions to around 40 tonnes per ha. per year. Encouraging results have been obtained from initial experiments which indicates that about 25—35 tonnes of biomass per ha. per year can be obtained from growing improved high yielding plant species on waste/degraded lands in the country (Table-3). In the light of results obtained, it is possible to meet the present fuelwood deficit and surplus wood can be used for generation of thermal and electrical energy which, in turn, would conserve/replace conventional energy sources.

It is possible to obtain yield of about 25 tonnes per ha. per year from tree-growing in wastelands in the country. In India, various types of wastelands are available (Table-4). However, it is essential to identify most productive non-forest wasteland in the country. An estimate indicates that about 20 million ha. of productive non-forest wastelands are available in the country. The present fuelwood deficit can be easily met by using 6 million ha. of wastelands.

The task ahead in growing fuelwood on waste/marginal/degraded lands is not so simple. Concerted scientific inputs are needed to increase the productivity of fuelwood trees manifold. It is essential to identify, screen, test, select and evaluate potential fuelwood species and to evolve package of practices for fast growing short rotation (5—6 years) fuelwood species most suitable for plantation

Table 2 State of India's forest*

+ Total Forest Cover	:	63.91 m ha (19.44%)
Dense Forest	:	38.50 m ha (11.71%)
Open Forest	:	24.99 m ha (7.60%)
Mangrove Forests	:	00.42 m ha (0.13%)
+ Per Capita Forest	:	00.09 ha.
+ Existing Fuelwood Productivity	:	0.50 t/ha/yr

*Source : The State of Forest Report, 1991
(Ministry of Environment & Forest)

Table 3 Biomass yields of selected plant species in India

	Name of Species	Age (Years)	yields (T/ha/yr)	Source
1.	*Cassia siamea*	5	82.50 RPRC.	Bhubaneswar
2.	*Trema orientalis*	3	54.00	—do—
3.	*Leucaena leucocephala*	3	110.40 MKU.	Madurai
4.	*Hardwickia binata*	3	100 50	—do—
5.	*Erythrina indica*	3	79 80	—do—
6.	*Albizia lebbeck*	3	60.00	—do—
7.	*Samania saman*	3	80.10	—do—
8.	*Prosopis juliflora*	8	96.49 NBRI.	Lucknow
9.	*P. juliflora*	8	187.00 NARI.	Phaltan

under given set of soil and climatic conditions. India has 15 distinct agro-climatic regions and 60 sub-agro climatic zones, the soil and climatic conditions of which are quite different. Specific R & D work has to be taken up on the major areas required for optimising bioproductivity ot fuelwood.

There is now an urgent need for standardising methodologies and to develop package of practices suitable for different soil and cliamatic contitions. Emphasis has to be given to undertake R & D work on production of improved quality planting materials, both seeds and seedlings on mass scale, with a potential of producing 40 tonnes per ha. per year or even more. Scientists may undertake R & D work for development of suitable methodologies for standardising nursery technologies and mass propagation techniques; adaptability, productivity, selection and silvicultural studies including soil fertility changes; identification, characterisation, selection and response of efficient strains of Rhizobia and Mycorrhizae on fuelwood species; studies on insect-pests disease of fuelwood species and to develop suitable control measures etc. Particular attention has to be given to tree improvement methodologies so that improved quality planting materials can be made available to the user organisations and other beneficiaries. It is also equally important to establish a number of nurseries for production of quality planting materials on regional basis and establish germplasm banks and seed orchards and to develop extension material including package of practices to the user organisations and beneficiaries.

Tabla 4 India's Wastelands*

Total Geographical Area	:	328.72 m ha
Degraded Forest Land	:	157.10 m ha (10.91%)
Non-Forest Degraded Wasteland	:	93.69 m ha (28.50%)
Saline & Alkaline Land	:	7.15 m ha (7.65%)
Wind eroded Land	:	12.92 m ha (13.79%)
Water eroded Land	:	73.60 m ha (78.56%)

Source: Wasteland Development Board, New Delhi

The reversal of the trend of the increasing gap between demand and supply of the fuelwood warrants national priority involving all sections of the society, particularly the scientific community. In this context, plant taxonomists have a substantial role to play. The exploration of the indigenous flora of each distinct agro-climatic zone of the country could reveal what are the plant species that are likely to succeed if planted for meeting the local fuelwood demands. Identification of the fast-growing fuelwood species having the various desirable characters, suitable for the local needs, is the most essential factor for the success of this programme which is important for the national welfare in several aspects. Attention and active participation of plant scientists involved in floristic and taxonomic studies are invited to these pressing problems.