Eucalyptus

The most powerful argument in favour of the expansion of Eucalyptus is that it is faster growing than all indigenous alternatives. This is quite clearly untrue for ecozones where Eucalyptus has had no productivity due to pest damage. It is also not true for zones with poor soils and poor water endowment, as the reports on yields make evident. Even where biotic and climatic factors are conducive to good growth, Eucalyptus cannot compete with a number of indigenous fast growing species. When tall scientific claims about the growth rate of Eucalyptus were being used to convert rich natural forests to Eucalyptus monoculture plantations, on the ground of the improvement of the productivity of the site, the Central Silviculturist and Director of Forestry Research of the Forest Research Institute (FRI) had categorically stated that 'some indigenous species are as fast growing as, and in some cases even more than, the much coveted Eucalyptus.' In justification he provided a long list of indigenous fast growing species which had growth rates exceeding that of the Eucalyptus which under the best conditions, is about 10 CuM/ha/yr and on average is about 5 CuM/ha/yr (Table 2). Indigenous trees are those trees which are native to the Indian soil or are exotics that have been naturalised over thousands of years.

This data based on forest plantations does not include fast-growing farm tree species such as *Pongamia pinnata, Grewia optiva* etc. which have been cultivated for agricultural inputs to farms but have not been of interest in commercial forestry. In spite of being an incomplete list of fast growing indigenous trees, the forest plantation data on yields adequately reveals that Eucalyptus is among the slower growing species even for woody biomass production. The Eucalyptus hybrid, the most dominantly planted Eucalyptus species, has different growth rates at different ages and on different sites as shown in Table 3.

The points that emerge from Tables 2 and 3 are:

i) In terms of yields measured as mean annual increment (MAI) Eucalyptus is a slow producer of woody biomass even under very good soil conditions and water availability.

ii) When the site is of poor quality such as eroded soils or barren land Eucalyptus yields are insignificant.

iii) The growth rate of Eucalyptus under the best conditions is not uniform for different age groups. It falls very drastically after 5 or 6 years.

Table 2

Some indigenous species which are comparatively fast-growing

Name of Species	Age (Yrs)	MAI (CuM/ha)
Duabanga sonneratioides	47	19
Alnus nepalensis	22	16
Terminalia myriocarpa	8	15
Evodia meliafolia	11	10
Michelia Champaca	8	18
Lophopetalum fibriatum	17	15
Casuarina equisetifolia	5	15
Shorea robusta	30	11
Toona ciliata	5	19
Trewia nudiflora	13	13
Artocarpus chaplasha	10	16
Dalbergia sissoo	11	34
Gmelina arborea	3	22
Tectona grandis	10	12
Michelia oblonga	14	18
Bischofia javanica	7	13
Broussonatia papyrifera	10	25
Bucklandia populnea	15	9
Terminalia tomentosa	4	10
Kydia calycina	10	11

Table 3

Yield Table for Eucalyptus hybrid

Site Quality	Age	MAI CuM/ha (OB)	Current AI CuM/ha (OB)
Good	3	8.1	–
	4	11.3	10.6
	5	13.5	22.3
	6	14.4	18.7
	7	13.9	11.3
	8	13.5	10.6
	9	12.9	8.0
	10	12.3	6.7
	11	11.6	5.2
	12	11.0	3.5
	13	10.4	3.6
	14	9.9	3.7
	15	9.4	1.9
Poor	3	0.1	–
	4	0.4	1.4
	5	0.7	1.7
	6	0.8	1.7
	7	0.9	1.2
	8	1.0	1.4
	9	1.0	1.0
	10	1.0	1.3
	11	1.0	1.1
	12	1.2	0.7
	13	1.0	0.8
	14	0.9	0.8
	15	0.9	0.4

OB = Over Bark; MAI = Mean Annual Increment

Scientific evidence on the biomass productivity does not support the claim that the Eucalyptus is faster growing than other alternative species or that it grows well even on degraded lands. Under rainfed conditions the best yields achieved for Eucalyptus has been 10 tons/ha/yr. On the other hand:

According to Dr K S Rao and Dr K K Bokil (unpublished reports) one hectare of Prosopis yields 31 tons of bone dry firewood per year. At Vatva in Ahmedabad district, Gujarat state, annual production of firewood from Prosopis was recorded as 25 tons/ha/yr under rainfed conditions.

A comparison of growth rate of 10 species by the Gujarat Forest Department shows that the Eucalyptus emerges at the bottom of the list. The Eucalyptus, quite clearly, will not fill the gap in the demand of woody biomass more effectively than other faster growing species which are also better adapted to the Indian conditions.

Forests and trees have been producing various kinds of biomass, satisfying diverse human needs. Modern forestry management, however, came as a response to the demands for woody biomass for commercial and industrial purposes. The growth rate of the species that is provided by modern forestry is, therefore, restricted in two ways. Firstly, it is restricted to the increment and growth of the trunk biomass alone. Even in this restricted spectrum, Eucalyptus ranks very low in terms of growth and biomass productivity.

Human needs for biomass are, however, not restricted to the consumption and use of woody biomass alone. The maintenance of life support systems is a function performed mainly by the crown biomass of trees. It is this component of trees that can contribute positively towards the maintenance of the hydrological and nutrient cycles. It is also the most important source for the production of biomass for consumption as fuel, fodder, manure,

fruits etc. Social forestry as distinct from commercial forestry, to which it is supposed to be a corrective, is in principle, aimed at the maximisation of the production of all types of useful biomass which improve ecological stability and satisfy diverse and basic biomass needs. The appropriate unit of assessment of growth and yields of different tree species for social forestry programmes cannot be restricted to the woody biomass production for commercial use. It must, instead, be specific to the end use of biomass. The crisis in biomass for animal feed, quite evidently, cannot be overcome by planting trees that are fast growing from the perspective of the pulp industry, but are absolutely unproductive as far as fodder requirements are concerned.

The assessment of yields in social forestry must include the diverse types of biomass which provides inputs to the agro-ecosystem. When the objective for tree planting is the production of fodder or green fertilizer, it is relevant to measure crown biomass productivity. India, with its rich genetic diversity in plants and animals, is richly endowed with various types of fodder trees which have annual yields of crown biomass that is much higher than the total biomass produced by Eucalyptus plantations as indicated in Table 4.

Table 4

Crown biomass productivity of some well-known fodder trees

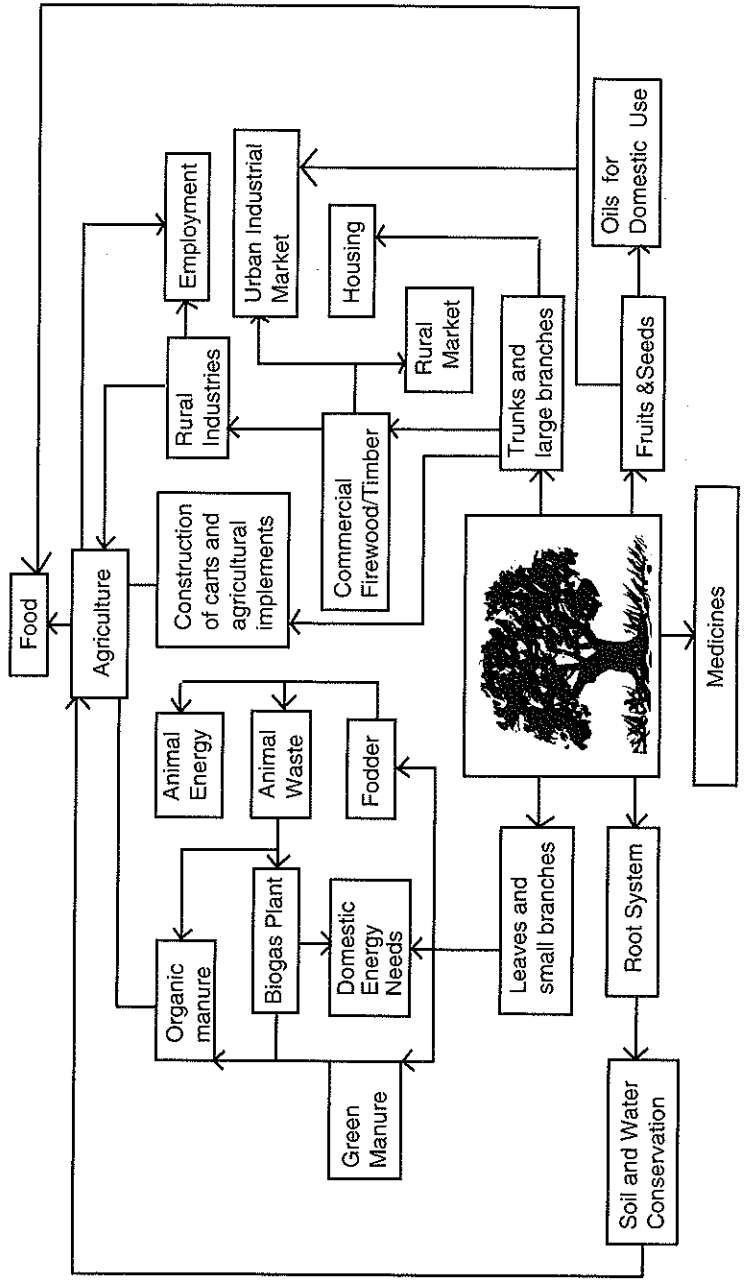
Name of species	Crown Biomass Tons/ha/yr
Acacia nilotica	13 - 27
Grewia optiva	33
Bauhinia	47
Ficus	17.5
Leucena leucocephala	07.5
Morus alba	24
Prosopis sineraria	30

An important biomass output of trees that is never assessed by foresters who look for timber and wood is the yield of seeds and fruits. Fruits trees such as jack, jaman, mango, tamarind etc. have been important components of indigenous forms of social forestry as practised over centuries in India. After a brief gestation period fruit trees yield annual harvests of edible biomass on a sustainable and renewable basis.

Tamarind trees yield fruits for even over two centuries. Other trees, such as, neem, pongamia and sal provide annual harvest of seeds which yield valuable non-edible oils. These diverse yields of biomass provide important sources of livelihood for millions of tribes or rural people. The coconut, for example, besides providing fruits and oil, provides leaves used in thatching huts and supports the large coir industry in the country. Since social forestry programmes in their present form have been based on only the knowledge of foresters who have been trained only to look for the woody biomass in the tree, these important high yielding species of other forms of biomass have been totally ignored in these programmes. Two species on which ancient farm forestry systems in arid zones have laid special stress are pongmia and tamarind. Both these trees are multi-dimensional producers of firewood, fertiliser, fodder, fruit and oil seed. More significantly, components of the crown biomass that are harvested from fruit and fodder trees leave the living tree standing to perform its essential ecological functions in soil and water conservation. In contrast, the biomass of the Eucalyptus is useful only after the tree is felled.

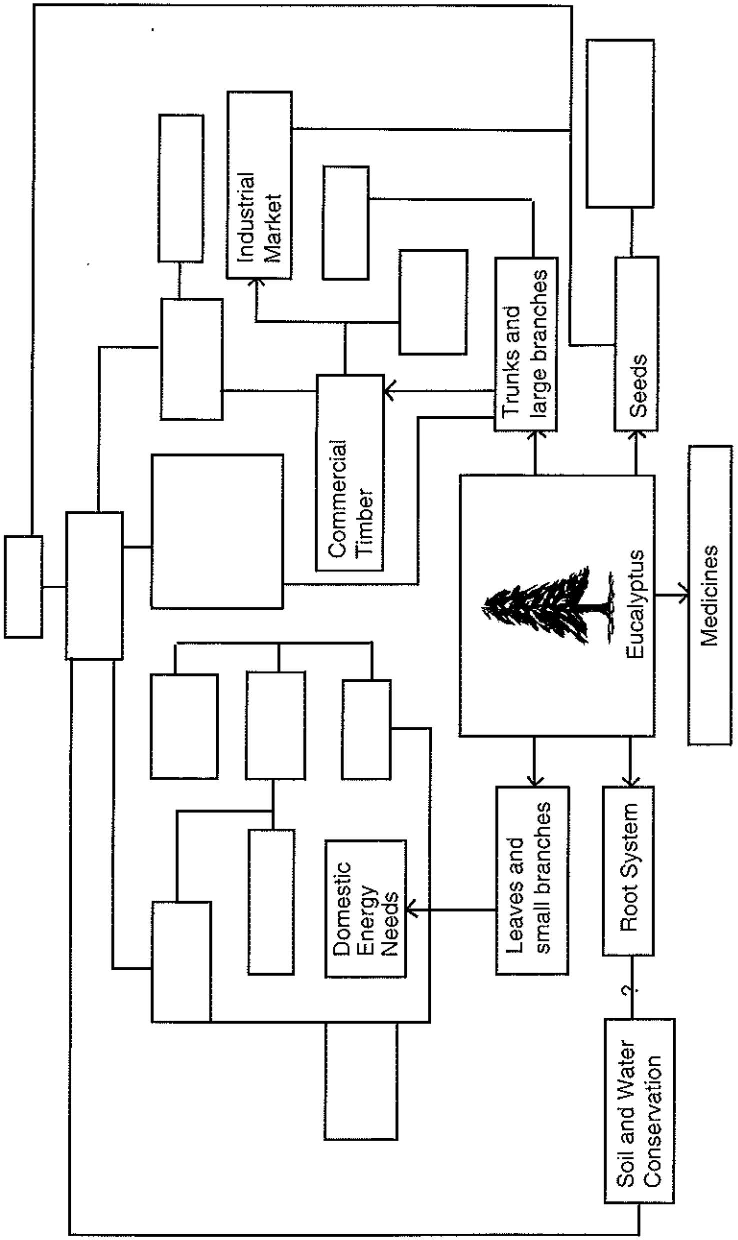
Figures 2 and 3 describe the comparative biomass contribution of indigenous trees and Eucalyptus. Afforestation strategies based dominantly on Eucalyptus are not therefore, the most effective mechanism for tiding over the serious biomass crisis facing the country. The benefits of Eucalyptus have often been unduly exaggerated through the myth of its fast growth and high yields. The myth has become pervasive because of the unscientific and

Figure 2: The Contribution of Traditional Tree Species to the Rural Life-support Systems.



Source: *Shiva et al (1981)*

Figure 3: The Comparative Contribution of Eucalyptus to the Rural Life-support Systems



Source: *Shiva et al (1981)*

unjustified advertisement of the species. It has also been aided by the linear growth of Eucalyptus in one dimension while most indigenous trees have broad crowns that grow in three dimensions.