Petroleum embargo-1973 pounded its iron on the world's economy disrupting the most sheets and the budgets of both the leading and the trailing countries. This provided the opportunity to look at the serious crisis relating the crisis of energy sources that have been overexploited by mankind during the post-world war-II era. The whole of the world is consternated of the fear of the day on which Earth is likely to go dry of oil. Even the liberal estimates do not grant this possibility beyond next four to five decades. The root of the problem is that we are not yet facing the situation or to counter it with suitable handy alternative source/s of energy. True, we have an alternative in the atomic energy or hydrogen fusion. But, are we really equipped with the handy technology to yoke these power-packed sources? Are they coupled with environmental hazards turning...
The Solar energy is enormous, but how far can it replace the fossil hydrocarbons? Energy flow perpetually and this is possible only if it comes in currency. This can be possible if it can be converted in the required form and dispensed as and when required. Hence, for the use of its boundless energy, we can hardly use it at our will. Therefore, we really look at the green cover for its service in binding the solar energy in the form of organic compounds. But, we are poised to the problem of poor green cover on the earth.

To meet our energy requirements, keeping the environment healthy, the earth must put on apparel on at least 33% of its surface. The reality is that the vast land comes with scrubby vegetation, polar ice-caps, deserts and naked mountains. India, in particular, has been facing the incessantly declining forest cover which is less than even half the required.

Looking into the demand of time, the world has penitently realized the need for more land under forest cover. During two decades in many countries, laboratories are instituted to take care of this urgent task. At home, different programmes such as social-forestry, agro-forestry, energy-forestry and like programs launched by different government machinery and many people are keenly keeping their eyes on this aspect. As a result, along with the conservation of forests and afforestation programmes, social-forestry, agro-forestry, energy-forestry and like programmes have been launched during the last one and a half decades. Energy-forestry is a new land-utilization world-wide. It has to be utilized upon as intermediate between the forest and agriculture (Gustafsson 1987). It is one of the powerful alternative sources of energy.
Many people have voiced their concern to (Siren 1982; Sennerby-Forsse 1983). Though social forests or energy-forests are being set up in many parts of the country, they lack proper planning. Pattern of their biological/environmental impacts, rate and turn of growth and development, value as art crops – including fuel and fibre – seem grossly neglected. Most of them are fast growing, poor fuel-yielding plant species. Not that, by and large each of such social forests is an assemblage of one or only a few species. This amounts to be almost a situation of monoculture which is injurious to ecological balance.

It is, therefore, required to organize the social forests which would:

- c. Have long life;
- d. Produce wood to meet the energy requirements of countless hamlets which still depend on firewood;
- e. Provide minor plant products along with fodder.

This is by no means an easy job. It is necessary to put on high investments of gray matter before brown skull and will at the heart. The problem needs to be looked upon from various angles by experts drawn from different fields, and should be pursued coherently in close co-ordination.

During last one and a half decades, a group of botanists under the leadership of J.T. Bhat has been striving hard on a concerted programme investigating various aspects of the biological biomass - the wood. The Sapwood and Reaction formation (Bhat 1981); reaction wood (I}

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Flouration in wood (Revathi 1987) are some of the major aspects of their investigation. These are worked out for their genesis, chemistry, aging etc, using the physico-morphogenic techniques, light microscopy, histochemistry and biochemical analysis. Hence, I preferred to join this group, work up the present problem to work out the energy content of some dicot trees, which is one of the major aspects related to the social forestry.

Various plant species are evaluated for energy potential on the basis of various parameters like their oil, polyphenol, carbon and protein contents (Carr 1985); content and structural make-up of the wood (Tan 1978; Cull 1983). The biochemical reactions have their cumulative effect on the energy content of wood. Hence, the present work components of the common tree species of the social forests in Gujarat State, and to work out the correlations, if any, between the energy potential of the species.

As the metabolites are stored in the tissues of the trunk in variable quantity, it was also thought worth finding out the relationships between the structure and content, if any, in various species.

The earlier work in this laboratory clearly demonstrated that the metabolites are stored in quantity and kind in various parts of the same tree within the same stem axis, i.e. the sapwood and the inner heartwood; the trunk axis and the inclined branch axis, the upper and the lower half of the inclined axis etc. Not only that, each of the topographic distributions of metabolites...
prompted me to look at the problem in
of seasonal variations and the topographic
fications within the stem axis. Therefore,
resent investigation aimed at:
using the structural complexion of wood;
using the distribution of various principal
secondary metabolites in woody tissues, with
elp of histochemical techniques;
lation and fractionation of metabolites from
topographic regions of stem axis during
rent seasons;
lng out the energy potential of distillation
ions and their contribution to the total
content of wood of investigated species.
ification of moisture, ash, metallic
ts and parenchyma tissue of wood;
lishing the correlations among the
ities of different metabolities, ash,
ure, histological pattern, seasonal
ation, position of wood in stem axis and

**HARDWOOD STUDIES**

**g. providing a guideline for screening the**
pecies for their inclusion in the in-
meaningful energy forests.

The present work was carried out as
following lines:

**A. STRUCTURAL ASPECTS**

a. Sapwood and heartwood of the vertical t
b. Sapwood of the upper half and the lower
the branch axis (upper tiltwood -
lower tiltwood - LTW, respectively).
c. Histochemical distribution of starch, pro-
teins and extractives in various tis

**B. BIOCHEMICAL ANALYSIS OF METABOLITES**

a. Extraction and quantification of
carbohydrates, proteins, polyphenols
Identification of nitrogen and ash.

Total analysis of ash using EDAX technique.

Y VALUE (EV)

Whole wood.

Oil and polyphenols.