GENERAL CONCLUSION
Eucalyptus sp. is increasingly becoming a major component of forest vegetations all over India. This species is extensively cultivated under different agro-climatic conditions for soil reclaimations, fuel, paper pulp, essential oil etc. The lignin content of Eucalyptus largely determines its timber and paper pulp quality. The enzyme peroxidase has been reported to be involved in the last step of lignin biosynthesis.

The variations in peroxidase activity in leaves of Eucalyptus trees were studied as influenced by location, season and spatial positioning on the plant. The positive correlation between peroxidase and lignin was utilized to identify trees with the potential for producing high biomass (in terms of lignin).

To understand the nature of the peroxidase, the enzyme was purified (to homogeneity) and its temperature and pH stability, substrate specificity, isozyme pattern, molecular weight, glycosylation pattern and isoelectric point were studied. Spectrophotometric and spectrofluorometric studies were also carried out.

Eucalyptus was propagated from the screened mother plants, using tissue culture techniques, with a view to raising cloned plants with desired biochemical characteristics within the shortest possible time.

An antibody against purified Eucalyptus peroxidase was developed, which could be used as a versatile tool for the quick screening of potential high lignin producers (in seedling populations), detection of elicitor induced peroxidase changes (e.g. during systemic acquired resistance) and as a means for rapid purification of peroxidase from heterogeneous protein mixes (using immobilized antibody columns).
The results showed significant variation in peroxidase activity with regard to spatial
distribution and seasonal changes. From February onwards peroxidase activity gradually
increased till October and then declined steadily in December. The activity of peroxidase was
found to be higher in basal leaves as compared to the apical leaves irrespective of seasonal
and locational changes.

Eucalyptus peroxidase was found as one major isozyme in the leaf (as well as bark). A 187-
fold purification of the leaf peroxidase was obtained. The enzyme utilized the substrates
NADH, coniferylalcohol and syringaldazine (in addition to o-dianisidine) at very different
rates. Contrary to expectations reactivity was very low with syringaldazine and relatively low
with NADH. The enzyme showed a temperature optimum of 50 °C and pH optima at 5.5.
SDS- PAGE of the purified enzyme fraction yielded a single protein band. The subunit
molecular weight for peroxidase was found to be 58kDa. Spectrofluorometric and
spectrophotometric scanning of purified peroxidase revealed that purified enzyme contained
very low amounts of tyrosine. The purified peroxidase also showed mannosyl moieties and
was bound to a Con A- Sepharose column.

Clonally propagated Eucalyptus plantlets developed from identified mother plant with desired
biochemical characteristics. Nodal explants with single dormant bud of identified Eucalyptus
plant were cultured on MS medium supplemented with various concentrations and
combinations of BAP, IBA and NAA. Clonally propagated plants were successfully
transferred to the field and showed similar trends vis a vis the peroxidase activity levels of the
mother plants.
Polyclonal antibodies against purified Eucalyptus peroxidase was utilized to develop a quick scan method for detecting Eucalyptus peroxidase at the field level. This method could be utilized to identify plants especially at the seedling stage with potentially low or high lignin content without invasive and complicated analytical procedures.

The anti-Eucalyptus peroxidase antibody was cross reactive with jute leaf peroxidase and was utilized to identify jute cultivars with low and high peroxidase activity. These results were further correlated to low and high lignin content in these cultivars.

Eucalyptus leaves were found to respond to the elicitor BABA with high increase of peroxidase activity. This is the first report of BABA being used as an elicitor for a forest tree (Eucalyptus) and has enormous application for disease management in planned forestry.