CONCLUSIONS

The conclusions drawn on the basis of the results of the present investigation on *Eucalyptus*, are highlighted below.

1. Flouristic composition including density, biomass and plant diversity under *E. tereticornis* monoculture plantation is poor compared to indigenous trees. The gradient in these parameters with respect to mixed culture plantation is still more. For a better phyto diversity and vegetational richness, mixed culture plantation of the local tree species rather than the fast growing eucalypts should, therefore, be preferred.

2. Poor performance, in terms of germination, plant height, relative growth rate with respect to length or biomass of different crops grown under *Eucalyptus* is noticed. This tree therefore, is not better suited for agro-forestry plantations.

3. The plantation of *Eucalyptus* even as field bund or shelterbelts around the cropped area adversely effects even the south facing crops not only in terms of its growth and existance but also the economic yield. These adverse effects, however, decrease with increase in distance upto 11 ± 1 from the tree line. The effect, as expected, is more pronounced on north facing crops because of the additional effects of the shade. The area sheltered by mango trees, in contrast, though also affects to some extent, the quantum of the effect compared to that of *Eucalyptus* is minimal. It is, therefore, suggested that *Eucalyptus* should not be planted even as a shelterbelt plantation. Shelterbelt plantation - a concept proposed and propagated for the temperate area being copied even for the tropical or subtropical region is evidenced to be an unhealthy proposal especially in context to *Eucalyptus* under Indian conditions.

4. *E. tereticornis* plantation improves the richness of the inorganic element of the soil apart from lowering the pH and increasing the conductivity of the medium. The amount of C, N, P and ions of K, Ca, Mg under monoculture plantation is more compared to open area and maximum at 1 m distance from the tree.

5. The poor performance of crops or understorey vegetation is not due to the lack of minerals, but due to the allelopathic property of the tree.

6. *E. tereticornis, E. globulus* and *E. citriodora* are strong allelopathic tree.

7. Its allelopathic property is attributed to the phenolic acids and volatile terpenes, apart from the other organic molecules in their glycosidic (leachable) and/or aglyconic forms.
8. Different parts of the tree contribute towards allelopathic property of it to a varying degree. Maximum quantum, in this regard, is made by leaves followed by bark and the least by the stem from intact or fallen leaves or decomposition of the fallen leaves.

9. Leachation in water, volatilization or decomposition of the fallen leaves or bark are among the processes that lead to the release of the allelochemics in the environment. The released chemics add to the soil and affect the germination of seeds, growth and establishment of seedlings. It all results in the poor performance of the vegetation of the area.

Since volatile terpenes have partial vapour pressure more than the composite gases of the air, these travel down toward the earth and get adsorbed on the surface of the soil particles.

10. In all, 13 terpene viz α-pinene, β-pinene, limonene, cineole, p-cymene, linalool, citronellal, terpinen-4-ol, α-terpineol, citral, geraniol, geranyl acetate, are identified from these Eucalyptus species.

11. Among the volatile components, cineole is predominant in E. tereticornis and E. globulus and citronellal in E. citriodora. Apart from these, other identified components also contribute to the allelopathic property of the tree.

12. The amount of volatile essential oil varies from species to species (being maximum in E. citriodora) and in different seasons.

13. In a year, the effect of different phenolic acids that are released from the plant and qualified to be allelochemics, are seen to be maximum in autumn followed by in pre-monsoon and least in post-monsoon. Their content in any of the seasons is more on the surface of the soil compared to other depths. Their concentrations decreases with depth of the soil. At any depth, it is significantly more at 1 m distance from the tree and decreases with increase in distance from the tree.

14. The phenolic acids in Eucalyptus leaves or the soil bearing the tree exist in three forms, leachable (water-soluble), non-leachable (methanol-soluble) or insoluble-bound form. These are present even at the depth of three feet.

15. Eight phenolic acids occur in E. tereticornis leaves. In addition to these eight, 3 more namely, syringic acid, 'unidentified II and III' occur in the soil inhabiting the tree.

16. Eucalyptus allelochemics (soil chemics or volatile components) inhibit respiratory electron transport chain of germinating seeds. This effect is not only dependent on concentration but also on the product of concentration...
and time of treatment. At relatively low concentration or at initial stage of treatment, the system respond by enhancing the respiratory event.

17. Different crops behave differently in response to allelochemics. In general, forage crops are comparatively resistant and oil yielding seed crops are susceptible.

18. The ratio of seed coat thickness and seed volume (SCT/SVol) plays a role in susceptibility/resistance of the crop. A mathematical model is formulated to predict the response of different crops to the different chemics without subjecting to germination trial.

19. Allelochemics, irrespective of the nature, affect by impairing the general mechanism of the target plant involving drift in content of macromolecules and activity of enzymatic system.

20. Eucalypt allelochemics act by affecting the general metabolism of the target plant. Such effects may be the cause or consequence of the effects on the respiratory electron transport and arresting the photosynthetic events through lowering the contents of the pigments involved.

21. From the socio-acceptability point of view, over 90% of the Indian planters feel illusioned not only with the performance of the monoculture *Eucalyptus* plantation but also from the associated environment linked problem.