CONCLUSION

From the present study following inferences can be drawn:

- Sequential extraction of chir pine needles yielded more amount of extractives in hot water followed by methanol, acetone and petroleum ether.
- Qualitative analysis revealed presence of significant amounts of phenol, terpenoid, flavonoid, alkaloid and tannin in methanolic extracts of chir pine needles as compared to other solvents (hot water, acetone and petroleum ether). Slight amount of carbohydrate was detected in hot water extract.
- Methanolic extract was further evaluated for antifungal and anti-borer activities as it contain more functional groups responsible for the activity.
- Preliminary screening of methanolic extracts of chir pine needles by Poisoned Food Technique revealed the strong growth inhibition activity against wood decaying fungi i.e. *Trametes versicolor* and *Oligoporus placentus* and bamboo decaying fungi i.e. *Xylaria acuminata, Hypoxylon rubiginosum* and *Hypochnicium punctulatum*.
- Methanolic extract of chir pine needles, at its inhibiting concentrations, were found to be fungitoxic for the test fungi i.e. *Trametes versicolor, Oligoporus placentus, Xylaria acuminata* and *Hypoxylon rubiginosum*. Whereas, for *Hypochnicium punctulatum* it was found to be fungi static.
- Bamboo blocks (soil block bioassay) treated with methanolic extracts of chir pine needles exhibited best treatment at higher concentration (7%) against bamboo decaying fungi i.e. *Xylaria acuminata, Hypoxylon rubiginosum* and *Hypochnicium punctulatum*.
- Treatment of bamboo product (pen stand) with higher concentration (7%) of methanolic extracts of chir pine needles exhibited the best in inhibiting the infection of bamboo decaying fungi i.e. *Xylaria acuminata, Hypoxylon rubiginosum* and *Hypochnicium punctulatum*.
- High concentration (7%) of methanolic extract of chir pine needles exhibited high mean mortality of bamboo ghoon larvae

No significant difference was observed in mean weight loss (%) of bamboo blocks in soil block bioassay due to different bamboo decaying fungi, thus it signifies that all the test bamboo decaying fungi are degrading the bamboo blocks in a similar degree.
Whereas, significant difference was observed in per cent infection index on bamboo products between *Hypochnicum punctulatum* and other two test fungi (*Xylaria acuminata* and *Hypoxylon rubiginosum*). Here, the per cent infection index was found to be more on the bamboo products infested by the bamboo decaying fungi (*Xylaria acuminata* and *Hypoxylon rubiginosum*).

The mean mortality (%) of bamboo ghoon borer was found to be 91.66% in bamboo splits treated with 7% concentration of methanolic extract of chir pine needles. From this study it can be concluded that the methanolic extract of chir pine needle is very effective in inhibiting the infestation of bamboo ghoon borer. The present study shows potential antifungal and anti-borer activities of methanolic extract of chir pine needles against the test bamboo decaying fungi and bamboo ghoon borer.