SUMMARY AND CONCLUSION

The present study dealt with forty-five medicinal plants belonging to thirty-two angiospermic families for their antimicrobial potentials, antioxidant activity and phytochemical constituents. Forty-five medicinal plants were screened for antimicrobial activities against twenty selected clinical and phytopathogens. Well diffusion method was carried out using organic solvents (Hexane, chloroform and Methanol) of bark, leaves, flowers, and fruits of all the plants against seven clinical and thirteen phytopathogens. Different concentrations ranging from 100 mg/ml to 500 mg/ml were assayed against the pathogens. The results were obtained in dose-dependent manner. All the plants used in this study exhibited some degree of antibacterial as well as antifungal activity against clinical and phytopathogens.

The methanolic extract showed better inhibitory action than the hexane and chloroform extracts. So we selected methanol for further studies. Among the forty-five selected plants (methanolic extracts) screened, thirty plant extracts showed moderate to best antibacterial and antifungal activity on both clinical and phytopathogens. The plant species viz., Hildegardia populifolia, Phyllanthus amarus, Siegesbeckia orientalis, Adhathoda vasica, Azadirachta indica, Emblica officinalis, Trianthema portulacastrum, Morus alba, Piper longum, Sida acuta, Terminalia arjuna, Tamirindus indicus, Boerhavia diffusa, Ocimum sanctum, Clitoria ternatea, Hyptis saveoules, Cassia occidentalis, Catharanthes roseus, Elephantopus scaber, Bombax ceiba, Butea monosperma and Piper betle, showed significant activity against clinical and phytopathogens viz., Pseudomonas syringae, Erwinia caratovora, Bipolaris bicolor, Rhizoctonia solani, Alternaria alternata, Aspergillus niger, Pencillium expansum and...
Fusarium oxysporum (phytopathogens) and Escherichia coli, Staphalococcus aureus, Micrococcus sp (clinical pathogens). *H. populifolia* and *T. chebula* showed significant inhibitory activity on all the pathogens tested in this study. Of all these selected medicinal plants *Hildegardia populifolia* exhibited good degree of antimicrobial activity. The reports of this plant against selected pathogens were reported for the first time. These plants could serve as useful sources for new antimicrobial agents.

Minimum inhibitory concentration (MIC) was performed on forty five medicinal plant extracts against 20 pathogens. These results showed that DMSO was the best extractant. It is also low in toxicity to the test organisms and further studies will be carried out using DMSO as an extracting solvent. In this assay forty five plants species showed antibacterial and antifungal activities even at minute quantity (2mg/ml to 25mg/ml concentration). Fifteen species showed very low inhibitory effect in one or other bacterial and fungal species of both clinical and phytopathogens. *H. populifolia* showed fairly good inhibition in almost all the bacterial and fungal pathogen of selected pathogens.

Results revealed that many plant extracts possess biological activity against various phytopathogenic species. The observed reduction in the phytopathogenic organisms, suggests these extracts may have an important role in alternative control methods against plant pathogens.

As the Methanolic extracts of *H. populifolia* and *T. chebula* exhibited a wide range of inhibition zones on all the tested pathogens, an attempt was made to isolate the biologically active compounds. A preliminary phytochemical analysis revealed the
presence of Alkaloids, Tannins, Saponins, Terpenoids, Flavonoids and Phenolics. In *H. populifolia* four compounds viz., Hp\(^1\), Hp\(^2\), Hp\(^3\) and Hp\(^4\) were isolated. All these four compounds are alkaloids. These compounds were identified as Hp\(^1\) as β-sitosterol, Hp\(^2\) as Stigmasterol, Hp\(^3\) as 4-Allyl-furo (2, 3-b) quinoline-3-carboxylic acid methyl ester and Hp\(^4\) as Betulinic acid. The Hp3 compound is a new compound and reported for the first time. These compounds showed antimicrobial activity against selected pathogens. The antimicrobial activity of *H. populifolia* methanolic extracts are largely due to the presence of alkaloids, triterpenoids, sterols, tannins etc. and their synergistic effect of aerial parts.

The fractions obtained from *T. chebula*, TC\(^1\), TC\(^2\) and TC\(^3\) were assayed for antimicrobial studies. TC\(^1\) and TC\(^3\), showed a very good inhibitory activity on both bacterial and fungal pathogens tested.

The antioxidant capacities and total phenolic contents of 45 selected medicinal plants associated with the antimicrobial activity were evaluated using the FRAP and DPPH assays as well as the Folin-Ciocalteu method, respectively. Result of a particular antioxidant assay depends on the chemistry of the assay and the nature and combination of bioactive principles in the material under investigation. Overall, these medicinal plants had relatively high antioxidant capacities and total phenolic contents. A significant correlation between the FRAP values and DPPH values suggested that antioxidants in these plants were capable of reducing oxidants and scavenging free radicals. Several plants (*H. populifolia*, *T. chebula*, *C. aisatica*, *T. catapa*, *C. roseus* and *B. monosperma*) showed the highest antioxidant capacities and total phenolic contents among all the tested species. Because of their strong antioxidant capacities, these plants are also potential in controlling diseases. In the future, the specific compounds with high antioxidant capacities should be isolated, purified and identified from these plants to further develop...
natural antioxidants.

As expected, the polar methanol extracts showed good antioxidant activity of *H. populifolia* and *T. chebula*. As far as we know, this is the first report to describe an antioxidant effect of *H. populifolia* towards total antioxidant activity and total phenolic contents. Therefore, as it is stated above *H. populifolia* showed high antioxidant capacity mainly due to its phenolic compounds.

It appears that all the forty five plant extracts with antimicrobial activity have antioxidant activity with some altered results. For further investigation, it therefore appears to be best to focus on the crude extract without preliminary serial extraction. For quality control purposes it is important to know the identity of the active compounds even if they have much lower activity than the crude extract.

The result of these studies may be helpful in developing the plant based natural antibiotics, fungicides and insecticides for preventing and curing the common diseases of humans and commercial crops and to reduce the pathogen population. This will also offer a great help in facing the emergence spread of antimicrobial resistance.