SUMMARY

In many developing countries there has been an increase in international trade in herbal medicine due to its fewer side effects. Although the plant *Walsura trifoliata* is used ethnobotanically no evidence has been found for its antioxidant and antimicrobial activity. In the present study, anatomy, histochemistry, barcoding, genetic diversity, bioactivities and compound isolation was done for the plant *Walsura trifoliata*. The leaves were characterized with the presence of thick cuticle and the presence of stomata on the abaxial side. Tannin was found in petiole and petiolule. Wood is characterized with the presence of crystals as found in the members of Meliaceae. Localization of lipid in ground tissues, proteins in parenchyma cells, tannin is parenchyma cells and ground tissues were found in the leaves of *Walsura trifoliata*. Molecular characterization of the plant was analysed using DNA barcoding where *rbcL* and *matK* were sequenced for this plant for the first time. The *rbcL* and *matK* sequences were compared with the available *rbcL* and *matK* sequences of Meliaceae. The *rbcL* sequence of *Walsura trifoliata* and *Walsura tubulata* showed similar sequence. In *matK* sequence the bp of *Walsura tubulata* is less than the sequence obtained from *Walsura trifoliata* and it is similar for the available sequence. It shows that the *Walsura trifoliata* is closely related to *Walsura tubulata*. The genetic diversity of *Walsura trifoliata* was studied by collecting *Walsura trifoliata* from three different localities, one from the Coastal forest (Puthupet, Tamil Nadu) and two from the Eastern Ghats (Kambakkam and Nagallapuram, Andhra Pradesh). From each locality three samples were collected from three accessions. A total of nine accessions were amplified using random primers. Of the 30 RAPD primers used 24 primers were not amplified and six primers were amplified showing polymorphic bands. PCR analysis of nine accessions of *Walsura trifoliata* with six polymorphic random markers generated a total of 470 scorable bands. The maximum numbers of bands were obtained with
primer OPA-04 (104) and the minimum with OPA-07 (58). The polymorphic information content (PIC) ranged from 0.33 to 0.12 with average of 0.20. The dendrogram obtained using RAPD cluster analysis showed the divergence within the accession.

The antimicrobial activity of *Walsura trifoliata* was studied using young leaves, mature leaves, bark and root in hexane, ethyl acetate and methanol extracts against ten bacteria and six fungi. Significant activity was observed in the root of *Walsura trifoliata*. Further the root extract was used for the analysis of antioxidant activity. Antioxidant activity was tested using the *Walsura trifoliata* root in hexane, ethyl acetate and methanol at different concentration (200-1000 µg/ml). Of the three different solvents used, the antioxidant activity was found to be more effective in the methanol extract. The compounds were present in methanol root extract was responsible for the significant activities. So the crude methanol extract of *Walsura trifoliata* root was used for the isolation of active compounds. A total of 79 fractions were obtained using column chromatography and based on TLC similar fractions were pulled together and 8 major fractions were obtained. These 8 major fractions were tested for antioxidant activity to find the active fractions. Fraction 4 and fraction 8 showed significant antioxidant activity. Hence fraction 4 and 7 were analysed using IR, GC-MS and NMR spectroscopy and found that fraction 4 was 3,4,5 trihydroxybenzoic acid and fraction 7 as β-sitosterol. These compounds were tested for its cytotoxicity using HepG2 cell lines. The cytotoxic effect shows that as the concentration increased activity also increased. When the compounds were compared to the drug Cyclophosphamide, the drug affected the normal cells than the effect of the compounds on the normal cells. From this study, the effect of antimicrobial, antioxidant and anticancer activity of the plant *Walsura trifoliata* was detected.