CONCLUSION

The present systematic studies on 'the Endemic Species of the Family Acanthaceae from the Northern and Central Western Ghats' resulted in identifying 46 specific and infraspecific endemic taxa spread over 13 genera from the study area as against 67 taxa spread over 27 genera listed in literature. Genus *Strobilanthes* Blume has maximum number (22 taxa) of endemic species in the study area. Phytogeographical distribution of the endemic Acanthaceae in the study area reveals that 28 taxa are strictly endemic to Northern and Central Western Ghats; the Central Western Ghats are richer in the number of endemic taxa (37) as compared to the Northern Western Ghats with 26 endemic taxa. Uttara Kannada in Central Western Ghats has the highest number of endemic taxa (23), followed by Pune in Northern Western Ghats which has 14 endemic taxa. The threat status worked out for the endemic species revealed that seven taxa are CR, ten taxa each are EN and VU, 16 taxa NT and three are assigned LC. The taxonomical evaluation resulted in recognizing two new varieties, merger of two species and one species being reinstated. One taxon was shown to have extended distribution; *lectotypes* and *neotype* were selected for some taxa. Anatomical differences observed among the spilt genera were not significant to keep them as separate entities. Hence were considered as congeneric and treated under *Strobilanthes* Blume. The pollen morphology was conserved across the sub-tribes: Ruelliinae; Andrograpgideae; Justiciinaee and Barleriinae and was in agreement with the classification of earlier workers such as Scotland and Vollesen (2000). Acanthaceae is shown as a monophyletic group by other authors. In the present study, *Thunbergia* is the out group of the retinaculate sub family Acanthoideae. The phylogengy results are in accordance with Scotland and Vollesen (2000), except for *Barleria* which forms a clade with *Strobilanthes*.

Similarly, all the clades of genera with bi-lipped corolla, ascending-cochlear aestivation, superimposed anthers, spurred anthers and elastically separating capsules have grouped together. *Neuracanthus trinervius* remains unresolved although it comes close to the group with ascending-cochlear aestivation. Thus the present work contributed immensely in understanding the taxonomy, phytogeography and threat status of endemic plants of Acanthaceae which will be useful in conservation.

SUMMARY

Acanthaceae is one of the leading family with high number of endemic genera and species in the Western Ghats and is third among the six families having high degree of endemism in Peninsular India. Though there have been general studies carried out on Acanthaceae, no specific works have yet been done. Critical studies including re-evaluation of taxonomic circumscription of endemic species have not been carried out. Publications of new species over the last few years, shows the existence of gaps. The threat status, phytogeography and phylogeny of the endemic genera of Acanthaceae were not worked out. Hence the present study has been undertaken, with the objective to critically study and evaluate the taxonomic circumscription of endemic species of Acanthaceae from the Northern and parts of Central Western Ghats and to interpret their phytogeography and phylogeny.

Field trips were carried out to the different parts of the Western Ghats in the states of Maharashtra, Goa and Karnataka to collect and study the endemic species of Acanthaceae. The collected specimens were critically studied under stereo microscope and identified using various floras. Their identity was confirmed by comparing them with authentic collections/type specimens from various herbaria. Standard revisionary methods were used for evaluating the taxa and names were applied using type method. Nomenclature has been updated in accordance with the ICBN and other publications on Acanthaceae. Herbaria were prepared using standard herbarium techniques and were deposited at the Goa University Herbarium.

The present study resulted in identifying 46 taxa spread over 13 genera to be endemic to the study area. Two species, viz. *Strobilanthes ciliatus* and *S. warreensis* were merged and considered as *S. ciliatus*. *Dicliptera ghatica* was collected after a gap of 50 years. *Dicliptera foetida* var. *ghatica* has been reinstated back to species

rank as *Dicliptera ghatica*. Two new varieties were erected, *Rungia linifolia* var. *saldanhae* and *Strobilanthes reticulatus* var. *1.* **var. nov**. *Strobilanthes gamblei* was accepted as a distinct species. *Gymnostachyum latifolium* var. *decurrens* was found to show extended distribution from the Southern Western Ghats into Central Western Ghats.

Pollen study has been carried out and the results show that the pollen morphology was conserved across the sub-tribes: Ruelliinae; Andrograpgideae; Justiciinaee and Barleriinae. The different pollen types observed were spheroidal, prolate to sub-prolate, prolate to sub-oblate, prolate spheroidal. SEM analysis of seeds helped in determining the taxonomic status and circumscription of some of the endemic taxa.

Anatomical studies of the stem sections of split genera of some of the *Strobilanthes* show that the differences observed among the spilt genera were not significant to keep them as separate entities. Hence are considered congeneric and treated under *Strobilanthes* Blume.

Phylogenetic analysis based on 24 morphological characters of 56 taxa of Acanthaceae including several wides with *Thunbergia* as the out group show well resolved monophyletic retinaculate sub-family Acanthoideae. However the genus *Neuracanthus* is not very well resolved, although it comes close to the sub-tribes Andrographinae and Justiciinae with which it shares ascending-cochlear aestivation. With the exception of *Barleria* which is nested within the clade of *Strobilanthes*, the phylogeny of the endemic taxa from the study area is in agreement with the results of earlier recent studies.

Study of phytogeographical distribution revealed that the Northern and Central Western Ghats is very rich in endemic plants of Acanthaceae. The Central Western

Ghats has more endemice taxa (37 taxa) as compared to the Northern Western Ghats with 26 endemic taxa. Similarly Uttara Kannada has the highest number of endemics (23 taxa) and Pune comes next with 14 endemic taxa of Acanthaceae in the study area.

The threat status for the endemic species was worked out according to IUCN 2001 Categories & Criteria (Version 3.1), which resulted in assigning seven taxa the status of CR, 10 taxa each are EN and VU respectively, 16 taxa NT and three taxa LC. For 31 of the 46 endemic taxa, the threat status was assigned for the first time during the present study, there was a change in the status for 13 taxa, while two taxa showed no change in status.

The present study thus provides information on endemic plants of Acanthaceae in the study area, their phytogeographical distribution and threat status. The pollen morphology for many of the taxa is made available through the present work. Their nomenclature is updated and illustrations are provided. With the help of SEM of seeds and morphological data, some new taxa were erected. Thus, the present work contributed immensely in understanding the taxonomy, phytogeography and threat status of endemic plants of Acanthaceae which will be useful in conservation.