CHAPTER VI

SUMMARY AND CONCLUSION.
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The present study is based on 85 species belonging to 39 genera representing two families viz, 15 genera and 35 species from Verbenaceae and 24 genera and 50 species from Lamiaceae.

Verbenaceae is a large tropical and subtropical family comprising about 98 genera and 2614 species. Whereas in Lamiaceae 200 genera and 3200 species represented cosmopolitan distribution (Lawrence 1951). In India the family Verbenaceae and Lamiaceae are represented by 23 and 55 genera respectively (Hooker 1885).

These two families are not only important from the point of view of wild taxa which show great variation in morphological characters but also due to interesting medicinal, timber and ornamental plants.

Recently trichomes and their morphological
variation have been found to be an important tool in dealing with taxonomic problems and interrelationships of taxa. The families included in the present studies are known to be having great variety of trichomes. However work reported so far on the trichomes of these families is quite scanty.

Hence the present studies on structure, Organographic distribution of vegetative as well as floral trichomes were taken in hand and the extent to which the result can be used in solving taxonomic problems within these families has been assessed.

A total number of 42 type of trichomes are recorded. All of these form of hairs have been grouped into two main categories i.e., Non glandular (38 types) and Glandular (4 types). The Non glandular trichomes are divided into Unicellular (11 types), Bicellular (9 types) and Multicellular (depending upon the number of cells forming the body of trichome). The last category of hairs (Multicellular) further distinguished into Uniseriate (13 types), Stellate (3 types), Peltate and Dendroid types.
The Glandular trichomes are classified into Unicellular glandular capitate, Bicellular glandular capitate, Uniseriate glandular capitate and Dendroid glandular capitate.

An occurrence of total trichome types in these families is given below:

<table>
<thead>
<tr>
<th>Trichome category</th>
<th>Verbenaceae</th>
<th>Lamiaceae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non glandular trichomes</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Glandular trichomes</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

The above trichome analysis clearly reveals that Non glandular hairs are more common in occurrence than the Glandular ones. Further, the considered two families are much similar in their trichome Complexes.

The following conclusions based on the results of present study reveals taxonomic significance of trichomes in Verbenaceae and Lamiaceae.

1. Among Non glandular category an observation of Bicellular form in Verbenaceae and Unicellular form
in Lamiaceae are most important because they were not reported by Metcalfe and Chalk (1950). Further 7 - forms in Unicellular types i.e. A2, A3, A4, A6, A7, A8, & A9; 5 - forms in Uniseriate types i.e. E, G, K, L, N; in the Verbenaceae and 5 - forms in Bicellular types i.e. B4, B5, B6, B7, B9; 3 - forms in Uniseriate types i.e. D, F, K in the family Lamiaceae are newly recorded.

2. In Glandular category, Dendroid glandular capitate type is the new record in the Verbenaceae and it is observed on the leaf upper surface of Callicarpa lanata and on the leaf lower surface & corolla of Tectona grandis.

3. Both Verbenaceae and Lamiaceae exhibit similarity in most of the trichome types (a) presence of 9 - Unicellular forms i.e. A1, A2, A3, A4, A5, A6, A7, A8, A9; (b) presence of 7 - Bicellular i.e. B1, B2, B4, B5, B6, B7, B9; (c) presence of 14 - Multicellular i.e. C, D, E, F, G, H, I, J, K, L, M, P, Q2, R and (d) presence of 3 - Glandular types i.e. S, T, U.
4. The considered families show heterogeneity in some trichomous form i.e. the family Verbenaceae lacking Unicellular arrect, Bicellular septate flagellate, Bicellular acuminate & Stellate biradiate and in Lamiaceae absence of Unicellular dolebrate, Uniseriate torulose, Uniseriate falcate, Stellate multiradiate and Dendroid glandular capitulate types.

5. In the non-glandular category Unicellular hairs are most common and are observed on all the parts of the studied taxa except stamen & gynoecium where they are restricted in occurrence. Viz., only A1, A2 & A5 types on stamens and A2 type on gynoecium are observed in Verbenaceae. Similarly A1 & A2 types on stamens and A1, A2 & A5 on gynoecium are recorded in the Lamiaceae. Among Unicellular category Papillose type is represented by maximum number of taxa of Verbenaceae and Lamiaceae (17 & 28 species respectively). Some of the Unicellular forms are rather restricted in distribution and each observed in one species only. Such as Unicellular dolebrate in Lippia nodiflora of Verbenaceae whereas Unicellular acerate in Leucas urticaefolia, Unicellular acuminate in Leucas biflora and Unicellular curved in
Micromeria biflora of Lamiaceae.

6. Bicellular conical and bicellular hooked appeared comparatively common, being present on 36 & 34 taxa of Lamiaceae and 12 & 16 taxa of Verbenaceae.

7. Out of 18 - Multicellular trichome types, 14 - types are recorded in Verbenaceae, in which Peltate type is recorded in maximum number (19 species) followed by Uniseriate hooked (16 species). In Lamiaceae 15 types of Multicellular trichomes are recorded. Among these Uniseriate hooked is observed in 34 species, followed by Uniseriate filiform & Uniseriate conical types each in 25 species. Some of the Multicellular forms are restricted in distribution and each observed in one species only. i.e., Uniseriate acastrate in Holmskioldia sanguinea, Uniseriate acuminate in Premna wightiana, Uniseriate falcate in Durenta plumeiri and Stellate triradiate in Callicarpa lanata of Verbenaceae. In Lamiaceae, Dendroid types in Meriandra bengalensis and Stellate biradiate & triradiate types in Colebrookia oppositifolia are restricted in occurrence.
8. Total four types of Glandular hairs have been observed in present investigation and all the types are recorded in family Verbenaceae. While, in Lamiaceae, Dendroid glandular capitate type is not observed.

9. Among Glandular category, Unicellular glandular capitate is one of the most common type, occurring frequently on the various parts of 47 taxa of Lamiaceae and 26 taxa of Verbenaceae. Metcalfe & Chalk (1950) have also observed it in Lamiaceae as a characteristic type of the whole family.

10. Range of number of trichome types observed in Lamiaceae is as follow: Pogostemon electranthoides - 16 types; Colebrookia oppositifolia - 15 types; Leucas nepetaefolia and Leonotis nepetaefolia - 14 types in each. Similarly in Premna latifolia & Holmskioldia sanguinea - 14 types in each; Vitex negundo and Clerodendron phlomoides - 13 types in each; Verbena bipinnatifida and Vitex siamica - 12 types in each are observed in family Verbenaceae.
11. Trichome complements studies at family level reveals that most of the trichomes are recorded on both vegetative and floral parts. Some types are restricted either to vegetative or to floral parts. Such as in Verbenaceae Uniseriate cylindrical and Uniseriate acerate types are observed on vegetative parts only and Unicellular torrulose on floral parts only. In Lamiaceae Stellate triradiate are recorded on vegetative and Unicellular acuminate & Unicellular torrulose on floral parts only.

12. In Verbenaceae A1, A2, A5, B1, B4, B5, B9, E, G, R, S, T, & U types of trichomes on stamen of 12 taxa and P, Q2, R, T & U types on the gynoecium of 7 taxa are recorded; whereas in Lamiaceae A1, A2, B1, B5, B7, C, R, S & U on the stamen of 14 taxa and A1, A2, A5, B7, C & S on gynoecium of 3 taxa are recorded. The aforesaid types being present in various reticulate combinations in different taxa attested the systematic importance of themselves in present investigation.

13. Lippia nodiflora, Durenta plumieri, premna wichitiana, Holmskiöldia sanguinea, Callicarpa lanata
are quite distinct in possessing specific form of trichomes in each e.g. Unicellular dolebrate, Uniseriate falcate, Uniseriate acuminate Uniseriate acerate and Stellate triradiate respectively. Similarly Colebrookia oppositifolia, Micromeria biflora, Leucas urticaefolia, L. biflora and Meriandra bengalensis in Lamiaceae are distinct from the considered taxa in possessing Stellate bi and tri radiate, Unicellular curved, Unicellular acerate Unicellular acuminate and Dendroid forms respectively.

14. In family Verbenaceae - Lantana camara, L. indica, Lippia seminata, L. nodiflora, Verbena bonariensis are the species which lack Bicellular and Multicellular type of trichomes. Presence of only Peltate and Unicellular type of trichomes on all the parts of Verbena officinalis prove taxonomic value of trichomes. Another interesting observations occurred in Nyctanthes arbortristis where no Glandular forms are observed. Similarly Clerodendron indicum being absolutely glabrous, could also be identified on occurrence of only Peltate and Unicellular glandular capitate types.
15. Trichomic key devised to identify the taxa of Verbenaceae and Lamiaceae successfully support the view of earlier workers regarding taxonomic importance of plant hairs.

16. Trichomic similarity at trichomic% level reveals that the family Verbenaceae and Lamiaceae are stand together at 62% similarity in Unicellular forms, 78% both in Bicellular and Multicellular forms and 75% in Glandular forms. At Overall trichome level these families exhibit 79% similarity.