Summary and Conclusions

SUMMARY AND CONCLUSIONS

Polymorphic complex *C. ternatea* L., collected from diverse geographical area of India have been subjected to morphological, cytological, electrophoretical, DNA content and hybridization analysis.

1. Twenty-five populations were collected from different parts of India and have been analysed morphologically. Comparative study of quantitative characters reveals that basic phenotypic characters are similar.
2. Subtle differences are noticeable with respect to leaf form and size, calyx, bracteoles, flower nature, colour, arrangement of stamen pod size, number of seeds per pod, seed coat colour ecological preferences and rhizobium requirement.
3. On the basis of subtle differences, 25 collections of *C ternatea* fall in to 5 categories ie., *C. ternatea Var. ternatea f. ternatea,* Fantz, *C. ternatea Var. ternatea f. fasciculata* Fantz, *C. ternatea Var. ternatea f. albiflora* (Voight) Fantz, *C. ternatea Var. Var. pleniflora f. pleniflora* Fantz and *C.ternatea Var. pleniflora f.leucopetala Fantz.* Such

intraspecific morphovarients are considered to be incipient species and it is essential and important step in evolution.

4. Cytological studies reveal that all the studied taxa are diploids with 2n=16. and n=8 chromosomes.

5. Karyotypic analysis shows that the chromosomes can be distinctly differentiated in to long, medium and short chromosomes. Existence of intraspecific karyotypic variations is noticed.

6. Karyotype of studied taxa is similar in having a pair of medium chromosome with interstitial satellites, which occupies fifth position in ideogram.

7. Karyotypes of the studied taxa are asymmetrical.

8. Change in F%, TF% and coefficient variation percentage indicate role of diversification due to structural alterations.

9. Meiosis in all taxa is normal with 8_{II} at metaphase-I. All the taxa show-1-2 quadrivalents-indicating role of translocation in species divergence. Occurrence of bridge in certain taxa suggests that evolutionary divergence is also because of paracentric inversions.

10. Pollen fertility is high in forms of Var. Ternatea, where as it is low in forms of Var. Pleniflora. Low pollen fertility in the members of Var. pleniflora is attributed to cryptic structural changes.
11. It is opined that chromosomal repatterning and point mutations are playing important role in the diversification of *C. ternatea.*
12. SDS-PAGE studies reveals that each taxa can be identified on the basis of banding pattern and similarity in origin some bands suggest correlation between taxa.
13. Maximum polymorphism of polypeptides is met in the region of lower molecular weight markers.
14. On the basis of banding pattern similarity closer relationship between *C. ternatea Var. ternatea f. ternatea, C. ternatea Var. ternatea f. fasciculata* and *C. ternatea Var. pleniflora f. pleniflora* has been suggested and in case of *C. ternatea Var. pleniflora f. pleniflora* and *C. ternatea Var. pleniflora f. leucopetala* still closer relationship is noticed.

15. Similarity percentage of protein fractions reveals that *C. ternatea Var. ternatea f. ternatea* and *C. ternatea Var. ternatea f. fasciculata* show high degree of electrophoretic homology. *C. ternatea Var. ternatea f. fasciculata,* and *C. ternatea Var. pleniflora f.pleniflora* have very high degree of homology.

16. On the basis of electrophoretical study it is suggested that, genetic homology exists in following order in Var. Ternatea *C. ternatea Var. ternatea f. ternatea, C. ternatea Var. ternatea f. fasciculata* and *C. ternatea Var. ternatea f. albiflora* and in Var. Pleniflora *C. ternatea Var. pleniflora f. pleniflora* and *C. ternatea Var. pleniflora f. leucopetala.* Genetic similarity between said varieties is also noticed in the forms *C. ternatea Var. ternatea f. fasciculata* and *C. ternatea Var. pleniflora f. pleniflora.*

17. Observations on electrophoretic banding in hybrids demonstrated that, number bands did not exceed parental bands.

18. Majority of the hybrids showed more similarity, towards maternal parent with respect to banding pattern than the paternal parent.
19. Few hybrids showed some bands, which were characteristic to the paternal parent. This is an interesting feature. On the basis of this character hybrids can be distinguished from respective maternal parent. This aspect has practical importance since hybrid seeds can be distinguished from selfed seeds of maternal parent.
20. The 2C DNA value in twentyfive population exhibits range of variations. 2C DNA content variation has selection/adaptive value.
21. The intraspecific variations in DNA amount in *C. ternatea* reveal heterogeneity in different taxa and is playing significant role in genome divergence and evolution. Lower DNA values with evolutionary advancement and ecological adaptation have been noticed in members of Var. Pleniflora.
22. Observation on correlation between nucleotypic parameters and DNA content show positive as well as negative correlations.

23. DNA content study indicates that amplification or loss of DNA has a significant role in microevolution of genomes.
24. Breeding observations in *C. ternatea* indicates flower is highly specialized for self-pollination, however due to mutation in members of Var. Pleniflora floral architecture has been altered hence, sexual reproduction has suffered.
25. Intraspecific crosses attempted in the various combinations to asses the genetic relation among different taxa of *C. ternatea.*
26. Crossability data and chromosome pairing during meiosis of F_1 hybrid show that, close gene homology exists between members of Var. Ternatea and so also in the forms of Var. Pleniflora.
27. Reproductive isolating mechanisms are not well developed but reproductive isolating mechanisms like ecological and mechanical mechanisms are working.
28. Finer details of chromosome pairing and crossability data indicate that genome homology between different taxa exists in following order *C. ternatea Var. ternatea f. ternatea* - *C. ternatea Var.ternatea f. fasciculata* - *C. ternatea Var. ternatea f. albiflora* on one side and on other side *C. ternatea*

Var. ternatea f. fasciculata C. ternatea Var. pleniflora f. pleniflora - C. ternatea Var. pleniflora f. leucopetala.

29. Meiosis in F_1 hybrids is almost normal except for univalents, multivalents chromosomal bridges and laggards in few cells. Occurrence of quadrivalents in all diploid hybrids and low pollen fertility in case of few F_1 hybrids which entails that, these taxa are differentiated by reciprocal translocations and cryptic structural hybridity. Bridges indicate that divergence occurred because of paracentric inversions.

30. Occurrence of different flower colour and flower shape is due to gene mutations. Inheritance of flower colour is due to complementary interaction of genes. Where as flower shape is due to dominant gene mutation.