VI SUMMARY

Finger millet (*Eleusine coracana* Gaertn) is the third most important millet crop after sorghum and pearl millet in India. The crop is grown in diverse ecologies in different parts of the Country. Finger millet improvement through breeding research is in progress in different states and the breeders are constantly looking for new and diverse germ plasm for deployment in crop improvement research. The native home of finger millet is presumed to be high lands of East Africa, especially Ethiopia (Hilu and de Wet, 1976). It reached India at least 3000 years ago (Vishnu Mittre, 1968). Finger millet germplasm is highly variable both in India and Africa. Long history of cultivation in India accompanied with human selection has resulted in the generation of extensive variability giving India a status of secondary centre of diversity (Naik et al. 1993).

Over years efforts have gone on in the country to assemble finger millet germplasm from its primary centre in Africa and secondary centre of diversity India. The importance of using African germ plasm in crop improvement and the benefits accruing there on has been duly recognized. This in turn has prompted germplasm curators and breeders to look more closely the germplasm collections for indepth assessment of variability harbouring in African collections in comparison with Indian collections.

Keeping the above in view, the present study was envisaged where a cross section of African and Indian collections were considered for comparison of
diversity. The experimental material consisted of a total of 289 accessions (140 African and 149 Indian) representing the cross of section of diversity assembled from different parts of India and Africa. They were grown in 17 x 17 Simple Lattice Design with 2 replications. Data were collected on 12 qualitative and 13 quantitative characters besides screening for blast disease. Various statistical tools were employed for assessing the magnitude of variability present in Indian and African germ plasm. The salient findings are summarized here.

1. Assessment of diversity in germplasm and its quantification is essential as it forms the basis for its effective utilization. In this process, qualitative characters are useful in precise characterization of germplasm. The study of 12 qualitative characters revealed that the African accessions were more variable than Indian accessions especially for characters such as ear shape, ear size, finger branching, grain covering by glume, grain colour and shape. The frequency of white seed colour types were more in African accessions.

2. Variability available for quantitative characters will decide the utility of germplasm. The analysis of variance demonstrated highly significant differences among the accessions of both Africa and India for all the 13 characters studied; suggesting the presence of large variability. The range value which is an indicator of spread of character was larger for many traits especially in African accessions except for productive tillers, finger number, days to 50% flowering and yield per plant. The mean values for many characters were higher in African germ plasm compared to Indian accessions.
3. The phenotypic and genotypic co-efficients of variations were relatively higher in African accessions for 1000 grain weight, leaf number, flag leaf length and width, and yield per plant. On the other hand, Indian accessions showed high co-efficients of variability for finger number and finger width. For other attributes there was little difference between the two sets.

4. The heritability estimates were high for days to 50% flowering, plant height, finger number, finger width, 1000 grain weight and flag leaf length in both African and Indian accessions. However, the productive tillers and finger number were moderate for heritability estimates.

5. As far as genetic advance estimates are concerned it was moderate for grain yield in both groups and low for culm diameter, tiller number, flag leaf width, finger number and width and 1000 grain weight in both the groups.

6. From the study of frequency distribution of classes for various characters, it appeared that the African accessions were more evenly distributed and better represented in all classes compared to Indian germplasm. The Indian germplasm inspite of showing narrow range recorded higher mean values because of larger concentration of accessions around mean or positive side of mean.

7. The Indian germplasm were by and large characterized by earliness, narrow and small leaves, medium long broad fingers, medium plant height, thin stems and moderate to high tillering. On the other hand, African germplasm were
characterized by late flowering, tall, stout in stature, long broad flag leaves and moderate to low tillering.

8. The African germplasm exhibited high level of resistance especially for finger blast suggesting greater utility of African accessions in resistance breeding programmes.

9. As regard character associations, 9 out of 13 characters considered showed highly significant positive co-relation with yield in both African and Indian germ plasm. The important characters were days to 50 per cent flowering, finger length and width, plant height and number of leaves. Contrary to expectation, productive tillers which showed strong positive association with yield in African germplasm did not show any association in Indian accessions. However, finger width in Indian germ plasm significantly influenced yield suggesting its role in improving yield.

10. The positive association of yield with days to 50 per cent flowering implied a limitation of combining yield and early maturity. But, productive tiller number, plant height, flag leaf length and width and finger length can be used as selection criteria as these characters are positively associated with yield.

11. There were differences in the way the characters directly contributed to yield in African and Indian accessions. In Indian subset two characters such as days to 50% flowering and 1000 seed weight showed high positive direct effect; while in African accessions culm diameter and productive tillers in addition to 1000
seed weight and days to 50% flowering directly contributed to yield. Such differences in the two different sets of germplasm is obvious as the nature and direction of selection have been different.

12. The range of $D^2$ values indicated the presence of greater diversity in African accessions than Indian accessions. However, the number of clusters formed were 13, 15 and 16 respectively in African, Indian and combined set. The clustering pattern in the combined set showed the joint presence of both African and Indian accessions in 10 out of 16 clusters formed. Similar overlapping of accessions from different countries or states was seen within African and Indian subsets also. Such inclusions of accessions from different regions in one and the same cluster indicated the absence of discernable relationship between genetic and geographical diversity.

13. A few accessions in the present study formed solitary clusters. Three each of such clusters were seen in African and Indian subset. The reason for formation of such solitary clusters could be total isolation preventing the gene flow and intensive natural / human selection for diverse adoptive gene complexes.

14. The careful scrutiny of data base of the material under study and also from field observations a couple of accessions showing distinct superiority for yield and yield attributes have been identified for possible use in ongoing crop improvement activities.
15. It is summed up that large genetic diversity exists in both groups of African and Indian germ plasm for all important characters, suggesting that germ plasm of both regions are required in crop improvement. The two groups have characters mostly overlapping but distinct and differing for some attributes of breeding value. The involvement of African germ plasm in Indian programmes and vice versa will be rewarding.