SUMMARY
Coastal sand dunes are of great ecological significance. Dune vegetation stabilizes existing sand surfaces and speeds further accretion by reducing wind speed over the surface of sand. In the sand dunes, sand movement, scarcity of nutrients and organic matter, low water retention, high evaporation rates and other factors contribute to make the dunes a harsh and unfavorable medium for plant growth.

Arbuscular mycorrhizae improves nutrient uptake by plants, helps to stabilize the sandy substratum by binding sand grains into wind resistant aggregates and are thus important for the survival of plants and in sustaining their growth in the physiologically demanding dune environment.

The coast of Goa which extends approximately 120 Km in length has beautiful stretches of sandy shores and beaches. The dimension of hotel industries and tourism development on the beaches is surely affecting the dune system. Any perturbation to an existing ecosystem that includes physical removal of plants and changes in soils physical and chemical characteristics has a major impact on symbiotic association.

An understanding of mycorrhizal associations in sand dunes and their distribution in soil is essential in any attempt to use them in environmental conservation. The work carried out from the present investigation can be highlighted as follows:
1. In the present study, the status of arbuscular mycorrhizal fungi in Coastal sand dune vegetation of Goa is reported for the first time.

2. Depending upon the magnitude of disturbance, the various sites surveyed under the present study are classified into three categories viz., Least disturbed, moderately disturbed and Severely disturbed.

3. The least disturbed sites include sand dunes from Varca and Mobor; The moderately disturbed sites include sand dunes from Colva, Benaulim, Majorda and Junes (Mandrem), while the severely disturbed sites include sand dunes from Miramar and Bambolim.

4. The survey of the Coastal sand dune vegetation revealed presence of 55 plant species belonging to 33 families.

5. A total of five plants species viz., Ipomoea pes-caprae, Spinifex littoreus, Vitex trifolia, Cocos nucifera and Casuarina equisetifolia were the most dominant and common at all the eight study sites.

6. A survey of extent of root colonization and AM fungal spore density in the Coastal sand dune vegetation of Goa carried out from the three sites viz., Mobor, Colva and Majorda indicated that all the plants selected for the study
were mycorrhizal. However, the extent of colonization in these plant species varied. Arbuscular mycorrhizal colonization in plants ranged from 52-100%. Arbuscular mycorrhizal spore number in rhizosphere soil exhibited great variation. It ranged from 12 spores + 2 sporocarps/100g soil to 984 spores + 20 sporocarps/100g soil.

7. Study on the occurrence and distribution of AM fungi in less disturbed (Varca) and severely disturbed (Miramar) sand dune ecosystem indicated that the average spore density was higher in less disturbed dunes (1040.5 spores + 10 sporocarps/100g soil) than severely disturbed dunes (424.4 spores + 5.6 sporocarps/100g soil). The AM fungal species richness was higher in Varca (21 sp.) than Miramar (14 sp.). The dominance of AM fungal species varied at both the sites.

8. The qualitative and quantitative studies of AM fungal spores in the sand dune vegetation of Goa carried out from six sites viz., Mobor, Benaulim, Colva, Majorda, Bambolim and Junes (Mandrem) confirms the universal occurrence of AM fungal spores. Average spore density varied from a minimum of 233 spores + 18 sporocarps/100g soil per site to a maximum of 725 spores + 15 sporocarps/100g per site. In all, 50 AM fungal species belonging to five genera viz., *Acaulospora*, *Gigaspora*, *Glomus*, *Sclerocystis* and *Scutellospora* were identified. The species richness varied from a minimum of 8 AM fungal species per site to a maximum of 31 AM fungal species per site. *Acaulospora*
spinosa, Glomus macrocarpum, Acaulospora scrobiculata, Gigaspora margarita and Scutellospora weresubiae were dominating species in terms of frequency of occurrence as well as abundance in coastal sand dune vegetation of Goa.

9. The studies on seasonal variation of AM fungi with respect to root colonization, Total spore density and Species diversity taken up at two sites viz. Colva and Majorda revealed that the seasonal variations have a remarkable influence on the occurrence of spores. Average spore density recorded was maximum in early monsoon (July) followed by early summer (March) and minimum in post monsoon (November). Average percentage root colonization was maximum in November followed by July and minimum in March. At both the sites, Scutellospora coralloidea was the most frequently recovered fungus in all the seasons. The frequency of occurrence and relative abundance of AM fungal species varied with the seasons.

10. The various types of studies on AM fungi in coastal dune vegetation of Goa revealed a rich diversity of AM fungal species. A total of 51 AM fungal species were recorded from the dunes. The most frequently occurring AM fungi from the less disturbed to moderately disturbed dunes include Acaulospora spinosa, A. scrobiculata, A. elegans, Gigaspora margarita, Glomus macrocarpum, G. heterosporum, Sclerocystis sinuosa, S. clavispora, Scutellospora coralloidea, S. calospora, S. gregaria and S. weresubiae; while
the most abundant AM fungi include *Acaulospora spinosa*, *A. scrobiculata*, *A. elegans*, *Gigaspora margarita*, *Glomus macrocarpum*, *G. fasciculatum*, *G. heterosporum*, *G. maculosum* and *Scutellospora calospora*.

11. Six of the dominating species of AM fungi on Coastal sand dunes of Goa were multiplied on the roots of *Eleusine coracana* (L.) Gaertn. Three of the AM fungal species could be successfully multiplied.

12. Study of growth responses of *Anacardium occidentale* L., a dominating plant species in back shores of Goa coast, to inoculation with *Glomus macrocarpum*, a local isolate and *Glomus intraradices*, an introduced species tolerant to high temperature and salinity revealed that the plant showed better growth response with the local isolate (MIE=70.59%) as compared to introduced species (MIE=70.59%).

13. Transplantation of AM inoculated nursery seedlings may prove advantageous on reclamation sites, as limited nutrients in the soils would be more efficiently extracted. It is essential to isolate local AM fungi and include them during screening for efficiency, in order to select an efficient strain of AM fungi best suited for a particular host plant.