VI. SUMMARY

Invasion of exotic species is considered as one of the greatest threats to native biodiversity. In Indian context, there are several weeds that are known for invading different habitats and among them *Chromolaena odorata* (L.) R.M.King & H.Rob. (=*Eupatorium odoratum* L.), *Lantana camara* L. and *Parthenium hysterophorus* L. occupy top slots as the worst invaders. In the present study, an attempt has been made to understand the ecology of these three invasive species with regard to the areas of their invasion, parameters that distinguish infested sites from non-infested sites, impact of invasion on native biodiversity, build models based on these parameters to predict invasion in future and validate these models on ground.

The methodology involve intensive field work throughout the study area (Goa, Maharashtra and Karnataka tri-junction in Western Ghat) for identifying the invaded localities and collecting co-ordinates using GPS, laying quadrats for quantitative vegetation studies, collection and analysis of soil samples for pH, Electrical conductivity (EC), Organic Carbon (OC), Nitrogen (N), Phosphorous (P) and Potassium (K), study of plant biodiversity in relation to canopy gap, invasion and soil parameters, use of MAXENT modeller using WorldClim data and validation in the field.

Results have shown that:

a) *Chromolaena odorata* is mostly invading the area at lower altitudes (<200 m alt.) of Western Ghat on western slopes and higher altitudes (> 600 m alt.). High rainfall in Western slopes is considered as the main reason; absence of it in mid altitudes (200 – 600 m alt.) is due to the least disturbance of the area as it falls under series of Wildlife Sanctuaries. Parameters including that of soil are
not significantly different from infested and adjacent non-infested sites though there is positive correlation between pH and Weed patch size and negative correlation between pH and canopy gap, and weed area and canopy gap thus forming a complex set of characters. Species are slightly less in infested sites and some species have shown higher occupancy in infested sites proving that the weed alters the biodiversity of invaded areas. MAXENT modeller improved the prediction with additional data with validation in the field. Precipitation in January, July and May along with BIO4 [Temperature Seasonality (standard deviation *100)] are the major deciders of its invasion. The prediction of species shows only within study area shows that the species has adopted very well for varying environmental conditions.

b) *Lantana camara* invasion is seen only at higher altitudes above 500 m altitude with slight overlap with *C. odorata*. These are outside Goa and rainfall is slightly lesser than Goa. Soil parameters are not significantly different between infested and non-infested sites. There is a positive correlation between weed area on one side and pH, slope and altitude on the other. However, canopy gap and weed area show slight negative correlation indicating to complex interactions happening under the canopy gap. Certain species are found to show increased occupancy in infested sites as compared to non-infested sites. Similarly there species that are exclusive to infested or non-infested sites. Further studies are required to understand their role. MAXENT modeller predicted its distribution only at higher altitude and for local areas. Inability to predict outside the study area is linked to weeds adaptability to varying ecological conditions outside the study area.
c) *Parthenium hysterophorus* is found to be occupying drier areas in the study area which are to the east of Western Ghats. Infested sites are basically grasslands or open areas and fallow fields. Overlap of *P. hysterophorus* with *C. odorata* is nil and with *L. camara* is slight. There is a slight difference in soil parameters between infested and non-infested sites especially in pH. Species richness is more in infested sites as compared to non-infested sites. Some common species either increased or decreased their occupancy in infested sites indicating to the influence of weed on biodiversity. As the sites are very close to each other due to limited dry area in study area MAXENT could predict only to the local level. Additional sites far away from the study area improved the prediction of probable area, again indicating as in earlier cases enormous adaptability of the weeds.

Series of local specific studies are recommended to understand the adaptability of weeds to varying ecological conditions.