List of Figures and Tables

Figures

Fig 1.1 *Andrographis paniculata* Nees

Fig 1.2 Schematic representation of reported species of *Andrographis* Wall and their distribution.

Fig 3.1 Schematic representation of extraction and estimation of andrographolide

Fig 3.2 Schematic representation of DNA extraction protocol of *A. paniculata*

Fig 4.1 Germplasm collection of *A. paniculata* organised at TBGRI during 1998-'99

Fig 4.2 Meiotic chromosomes of *A. paniculata* (n=25) collected from Aakkulam (Kerala)

Fig 4.3 Effect of seed moisture content on germination of seeds of varying ages in *A. paniculata*

Fig 4.4 The effect of various treatments on inducing germination in freshly collected seeds of *A. paniculata*

Fig 4.5a Polygraphic representation of selected quantitative morphological characters of *A. paniculata*

Fig 4.5b Polygraphs showing diversity in morphological characters among 15 populations of *A. paniculata.*

Fig 4.6 Variation in plant habit of *A. paniculata.*

Fig 4.7 Variation in leaf colour in *A. paniculata*

Fig 4.8 Variation in flower pigmentation in *A. paniculata*

Fig 4.9 Chemical structure of andrographolide (C20H30O5; MW 350.44)

Fig 4.10 The mean andrographolide content of three successive generations in different populations of *A. paniculata.*

Fig 4.11 Absorption spectrum of authentic andrographolide. Data from Shimadzu HPLC analysis.

Fig 4.12 Absorption spectrum of andrographolide extracted from AP36. Data from Shimadzu HPLC analysis.

Fig 4.13 Isozyme profiles of 15 populations of *A. paniculata*

Fig 4.14 Dendrogram based on UPGMA clustering of 15 populations of *A. paniculata* using the genetic distances of Nei (1972) derived from isozyme data

Fig 4.15 Isozyme profiles of 11 local populations of the two metapopulations of *A. paniculata* from Sirumalai and Nallamalai region having a total of 36 subpopulations.

Fig 4.16 A dendrogram based on UPGMA clustering of 11 local populations of the two metapopulations of *A. paniculata* from Sirumalai and Nallamalai region using the genetic distances of Nei (1972) based on isozyme data

Fig 4.17 RAPD profile of *A. paniculata* amplified by OPZ-19 and OPAW-11.
Fig 4.18 Dendrogram based on UPGMA clustering of 15 populations of *A. paniculata* using the genetic distance of Nei (1972) derived from RAPD data.

Fig 4.19 RAPD profiles of 36 subpopulations of the 2 metapopulations of *A. paniculata* using various random primers.

Fig 4.20 Dendrogram based on UPGMA clustering of the 11 local populations of the 2 metapopulations (AP54 and AP56) of *A. paniculata* using the genetic distance of Nei (1972) derived from RAPD data.

Fig 4.22 Biomass and andrographolide content of chemical mutants of *A. paniculata* (AP36) averaged from 2 successive generations (2nd & 3rd).

Fig 4.23 Esterase profile of 13 mutant lines of *A. paniculata* (AP36)

Fig 5.1 Distribution map of *A. paniculata*.

Fig 5.2 Possible genotype effects on seed germination in *A. paniculata*.

Fig 5.3 Chlorophyll, carotenoid and anthocyanin content of young and mature leaves of *A. paniculata*.

Fig 5.4 Variation in genetic variability measures of 15 populations of *A. paniculata*.

Fig 5.5 Two types of leaf and fruit morphology in *A. paniculata*. (a) fruits and leaves collected from AP18, (b) fruits and leaves from AP06.

**Tables**

| Table 1.1 | List of vernacular names of *A. paniculata* Nees |
| Table 1.2 | List of biological activities of *A. paniculata* Nees |
| Table 1.3 | List of ethnomedical activities of *A. paniculata* Nees |
| Table 1.4 | Selective list of web sites dealing with *A. paniculata* |
| Table 3.1 | List of *A. paniculata* populations studied for intraspecific variations. Appropriate IDs were given for each population with a prefix of AP derived from the botanic name, *Andrographis paniculata* |
| Table 3.2 | List of attributes used for studying morphological variation in *A. paniculata* |
| Table 3.3 | Details of enzymes used for isozyme analysis |
| Table 3.4 | Details of gel and electrode buffer composition (modification of Anonymous, 1997) used for native PAGE of isozymes |
| Table 3.5 | Composition of reagents used for activity staining of isozymes |
| Table 3.6 | Stock solutions and reagents used for DNA extraction and estimation from fresh leaves of *A. paniculata* |
| Table 4.1 | Summary of the results of pollination experiments in *A. paniculata* |
| Table 4.2 | The andrographolide yield in 15 populations of *A. paniculata* for the three successive generations |
| Table 4.3 | Concentration of chlorophylls, carotenoids and anthocyanins obtained from different populations of *A. paniculata*. The value of each population... |
Table 4.4 Concentration of chlorophylls, carotenoids and anthocyanins obtained from different populations of *A. paniculata*. The value of each population represents average of 4-8 mature plants.

Table 4.5 Overall allele frequencies at 15 loci in 8 different enzyme systems (EST, GOT, ADH, SDH, MDH, GDH, PER, SOD) in 15 populations of *A. paniculata*.

Table 4.6 Descriptive statistics (over all loci) of 15 populations of *A. paniculata*.

Table 4.7 Genetic relationship among 15 populations of *A. paniculata* from different localities.

Table 4.8 Overall allele frequencies at 6 loci in the 11 local populations of the two metapopulations of *A. paniculata* from Sirumalai and Nallamalai region.

Table 4.9 Descriptive statistics (over all loci) based on isozyme analysis within and between 11 local populations of the two metapopulations of *A. paniculata* from Sirumalai and Nallamalai region.

Table 4.10 Genetic relationship among 11 local populations of the two metapopulations of *A. paniculata* from Sirumalai and Nallamalai region.

Table 4.11 F-statistics of local populations of the two metapopulations of *A. paniculata* from Sirumalai and Nallamalai region.

Table 4.12 List of primers and their base sequence employed in PCR for detection of RAPD variation in 15 populations of *A. paniculata*.

Table 4.13 Summary of genetic variation statistics of 15 populations of *A. paniculata* for all loci obtained through RAPD assays.

Table 4.14 Genetic identity values from RAPD data obtained in 15 populations of *A. paniculata*.

Table 4.15 List of primers and their base sequence employed in PCR for detection of RAPD variation within 2 metapopulations (AP54 and AP56) of *A. paniculata*.

Table 4.16 Summary of genetic variation statistics for all loci from the 11 subpopulations of the 2 metapopulations of *A. paniculata*.

Table 4.17 Genetic identity values from RAPD data obtained with 11 local populations of the 2 metapopulations of *A. paniculata*.

Table 4.18 Mutagenesis of *A. paniculata* (AP36) seeds: details of duration of treatment vs. percentage of EMS (v/v), germination percentage of treated seeds and corresponding ids.