ABSTRACT

The plants that utilized for manufacture of Traditional systems of medicine all over the world are termed as “Medicinal plants”. Among all the health centers in the world that use medicinal plants as sources of their medicines, India is one of them. Since ancient times, India has been a land of high depository of medicinal plants and the traditional knowledge of their benefits. Several local communities have formulated their lifestyle with hundreds of traditional therapies and medicinal plant remedies. The Traditional system of medicine has been broadened with the view of their applications based on region and community specific medicinal plants. Some of the specialized fields of health care viz., childcare, traditional birth attendants, antidotes against bites of poisonous organisms, bone setting and mother and postnatal care. Three MPCAs (North Rajabhatkhawa MPCA, Sursuti MPCA and North Sevoke MPCA) of North Bengal (terai and duars) have recorded the occurrence of a rich spermatophytic flora. The undulating *Terai* and *Duars* landforms and temporary or permanent virgin elaborate land systems are forming a mosaic of tall grasslands, savannas, evergreen and deciduous forests. The gentle slope of the Terai and duars is located at 25º 57' to 26° 36' N latitude and 89° 54' to 88° 47' E longitude (Terai) & 26°.16' to 27°.0' N latitude and 88°.4' to 89°.53' E longitude (Duars) with altitudinal range varying from 80 to 100 m above mean sea level. The taxonomic distribution of medicinal plants in these regions is also quite wide. Medicinal Plants Conservation Areas (MPCAs) areas are the virgin broad leaf forest with diverse vegetation. There were representation of primitive taxa like Cyatheaceae, Marattiaceae, Aristolochiaceae, Piperaceae, Lauraceae, Trochodendraceae, Annonaceae, Chloranthaceae, Magnoliaceae etc. in one hand and on other hand progressed taxa like Apiaceae, Araliaceae, Campanulaceae, Asteraceae. Many RET and endemic elements are also living in these MPCAs. The three MPCAs are also the store house for a large number of NTFP resources many of which are of high market potential and also of medicinal importance. Over 35 percent of the resources of Himalayan hotspot are threatened due to various anthropogenic activities. Despite being the store house of medicinal and aromatic plants and the related traditional knowledge, their documentations especially of Terai and Duars region is still lacking. Hence, present work was initiated as the first attempt for the documentation of medicinally important plant and their uses in the traditional system of medicine. Present study shows that the angiosperms are represented by 626 species under 397 genera belonging to 102 families which include Pteridophyte and Angiosperms (monocot and dicot flora). The most

dominating family of three MCPAs are Fabaceae represented by 47 species and 26 genera, followed by Asteraceae 31 species with 27 genera, Rubiaceae 25 species with 19 genera and then Lamiaceae, Lauraceae, Acanthaceae, Malvaceae, Scrophulariaceae, Papaveraceae, Ranunculaceae, Rosaceae, Brassicaceae, Boraginaceae, Primulaceae etc. Around 38 (34 %) of endemic species of monocot and dicot species are acknowledged to be exclusively endemic to the Darjeeling foothills and adjoining area of Terai and Duars region of West Bengal. like *Globba racemosa,* and other endemic elements such as *Carex filicina, C. decora, Amorphophallus napalensis, A. paeoniifolius, Calamus latifolius, C. erectus, C mahanandensis, C pseudoerectus, C. leptospadix, Phoenix rupicola, Tupistra nutans,Carex vesiculosa, Dioscorea prazeri, Eriocaulon edwardii, Molineria crassifolia, Zingiber rubens, Hedychium densiflorum, H. coccineum, Curcuma aromatica* and *Bulbophyllum spathulatum* etc are observed from the three MPCAs of North Bengal.

Among the 77 threatened species, 45 are under Least Concern (LC) like *Cryptocarya amygdalina, Litsea laeta, Machilus duthiei, Knema erratica, Acorus calamus, Calamus tenuis, Smilax ovalifolia, Murdania japonica, Curculigo capitulatae, Gloriosa superba, Asparagus racemosus, Codariocalyx motorius, Rauvolfia serpentina, Mucuna pruriens* etc. whereas, 12 species are under Near Threatened (NT) like *Actinodaphne sikkimensis, Cinnamomum impressinervium, Areca triandra, Daemonorops jenkinsiana, Monochoria hastate, Bambusa balcooa, Phrynium pubinerve, Alpinia calcarata* etc. 10 Vulnerable (VU) species like *Microsorum punctatum, Fimbristylis aestivalis, Schoenoplectiella juccoides, Sccharum arundinaceum, Saccharum spontaneum, Sporobolus diander, Cissus repens, Duchesnea indica Hoya parasitica* etc. are growing within thr territory of the three MPCAs of North Bengal plains. *Beilschmiedia assamica, Leucaena leucocephala, Morus indica, Drymaria cordata, Polycarpon prostratum, Justicia diffusa* and *Centella asiatica* are enlisted as Endangered Species (EN). *Piper peepuloides, Staria palmifolia* and *Curcuma caesia* are recorded as Critically Endangered species (CR) found in the three MPCAs of North Bengal. Out of the 626 species of recorded flora, 89 species has been enlisted as exotics species mainly found in marginal and road side area of the three MPCAs of North Bengal. Some very common exotic species are *Ageratum conyzoides, Ageratum houstonianum, Bidens pilosa, Digitaria ciliaris, Evolvulus nummularius, Hyptis suaveolens, Mikania micrantha, Mimosa pudica, Pupalia lappacea, Solanum sisymbriifolium, Tridax procumbens* etc. are quite common in different forest marginal and forested paths.

The entire area of three MPCAs was surveyed during the years 2017-2021 with the assistance of Wildlife, Silviculture Wing of Forest Department, Govt. of West Bengal. The phytosociological study of the different forested MPCAs, nested quadrates were plotted and minimum of 0.03% areas were covered under quadrate sampling for the better assessment of Biodiversity. For tree layer 10 × 10 m, shrubs and climbers 5 × 5m and herbs 1 × 1 m quadrates were plotted in random methods during three different seasons, namely designated as pre-monsoon [March – April], monsoon [May – July] and post-monsoon [September – November]. The quadrate data are gathered and analyzed through computing for percentage of Frequency, Abundance, Density, Relative Frequency, Relative Density, Relative Abundance and Important Value Index for all the recorded plant species. Using these data, concentration of species (Simpsons Index 1949), Species Richness (Margalef Index 1958 and Menhinick Index 1964), and Species Diversity (Shannon-Weiner Index 1963) etc. has been determined. Frequency (F), Density (D), Abundance (A), Relative Frequency (RF), Relative Density (RD), Relative Abundance (RA) or Relative Dominance (RDm) [for tree layer only] and Importance Value Index (IVI) were analyzed to understand the importance of diverse species in forest community. The present study shows that the evaluating species diversity and species richness and comparisons of species similarity between different vegetation types, their taxonomic distribution of medicinal plants and endemic, exotic and threatened status of the three MPCAs. The concentration of dominance expresses if there is dominance of one or a few species in the sampled area. Concentration of dominance for tree strata was calculated using Simpson index and the result (ranging from 0.95 – 0.99) showing significant values for all the three MPCAs. Species richness for same vegetation were measured using Menhinick and Margalef Index and calculated values were appeared to be very high for all the studied MCPAs i.e., ranging from 3.27 to 3.76 and 1.49 – 1.63 respectively denoting the high arboreal spermatophytic diversity. The diversity of the plants community of different MCPAs was reflected by Shannon-Weiner index. Its values were found to be high for two MPCAs i.e., North Sevoke and Sursuti whereas it showed extremely low value for NRVK. The present data is indicating a heterogeneous assemblage of herbs, shrubs, climbers and trees in a diverse and stable habitat for North Sevoke, Rajavatkhawa and Sursuti MPCAs.

Extensive surveys were conducted during 2017-2021 over the three MPCAs and recorded 626 species of vascular plants and most of the species were traditionally used to cure various ailments the local ethnic communities like *Rajbonshi, Rabha, Mech,*

Oraon and *Munda* etc. An attempt has been made to record MPCA wise list of indigenous medicinal plants and their ethno-botanical uses of herbal medicines. Total of 364 species of useful medicinal values with NTFPs have been recorded that includes parts of medicinal plants, fruits and tender shoot as edible, religious value, ornamental, fodder, fuel etc.

It is now clear that the medicinal plant diversity is significant, and the ecosystem of West Bengal is somewhat dependent on the wide range of several families. Along with other floristic elements, the medicinal plants of the region at present are under some mild threat of losing their habitat mostly due to anthropogenic reasons like habitat fragmentation, unscientific plant parts extraction and natural causes.

Developmental works, Unscientific collections from wild, Predominance of grey market in the medicinal plant trade, Exploitation of Forest fringe dwellers and forest villagers, Absence of a true data base on our medicinal plant resources etc. and natural threats like Climate change, earthquake, fire etc. Establishment of more such small pieces of dense forested patches need to be declared as MPCAs because these areas provide double layer of protection from various anthropogenic pressure as those areas not even allowed ecotourism.