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Interactive Database: An Effective Tool for Biodiversity Conservation and Sustainable Utilisation: A Case Study of Arunachal Pradesh

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Abstract: ***All the North Eastern States are known to possess rich biodiversity, unparalleled folk Knowledge and multiple natural resources. Arunachal Pradesh is one such state inhabited by a large number of tribal communities, who because of physiographical isolation and remoteness have evolved local practices to support their livelihood, sustenance and health. The divergent altitudes and physiography has resulted in a variety of vegetation types typically harboring unique plant species assemblage. Most importantly the recognition of unique medicinal plants from the state is a matter of great concern. Based on the available resources, an Inventory of Medicinal and Aromatic Plants of Arunachal Pradesh is attempted and a database has been developed comprising of 1654 species against the earlier known 500 medicinal plants. The present database has high potential, as a decision making tool for conservation of Medicinal Plants. In order to identify medicinal plants traded in huge quantities, a comprehensive review of each medicinal plant species of the state viz-a-viz the checklist of 178 medicinal plant species recorded in high volume trade (≥100 Metric Tonnes/Year) in India was undertaken [25]. The database developed is first of its kind and will help different stake holders especially the people who are working in the field of ethno botany, which in turn is linked with modern pharmacology data. Propagation information has been linked to facilitate the cultivation aspect of the species in the state. The database has several Photographs which will serve as a useful tool for easy identification. It also provides information on Conservation of species based on the Conservation Assessment and Management Prioritization (CAMP) assessment of North East species [24]. A similar attempt can be made for all other North East states for conservation of medicinal plants and other bio resources like bamboos, canes, orchids etc.***

Keywords: Medicinal Plants, Conservation, Database

1. Introduction

Arunachal Pradesh is one of the "Biodiversity Hotspot" areas in the world [17]. The state is blessed with rich and fascinating vegetation and holds a large number of curious, botanically interesting, exquisite, economically important, rare, threatened, endangered and endemic plants. It is one of the mega hot spot areas, bestowed with one of the largest forest cover in the country and is a store house of several aromatic and medicinal plants. It is home to several high altitude species which are not found in abundance elsewhere in the country [18].

The state of Arunachal Pradesh located in the eastern Himalayas is known for the rich medicinal plant diversity and resources. Although there are a few published literature which emphasizes on the ethno medicinal values and plant species used by tribal people in various systems of medicine in Arunachal Pradesh, their documentation in the form of a database is first of its kind and it will definitely help different stake holders especially the people who are working in the field of ethno botany. To serve the needs of a range of stake holders, including students and researchers of the Indian Systems of medicine as well as the policy makers, foresters, farmers and the herbal industries, an authentic information system has been envisaged.

The present database is multifaceted, user-friendly, has high potential as a decision making tool for conservation of Medicinal Plants and to undertake future research activities related to medicinal plants.

2. Material and Methods

Arunachal Pradesh is one of the three states where MoEF GOI along with UNDP-GEF (United Nations Development Program – Global Environmental Facility) have implemented and supported project "Mainstreaming Conservation and Sustainable Use of Medicinal Plant Diversity in three Indian states." The task of preparing the database was entrusted to FRLHT, as it is pioneer in medicinal plant conservation and holds the largest database on plants used in Indian System of Medicine.

Development of the database required rigorous desk research and field surveys along with stake holder consultation. As such number of publications were screened, this included floras, monographs, research papers, field manuals etc. A check list of over 1800 species reported from the state was prepared. This list was further scrutinized with the help of experts with special focus on Arunachal Pradesh flora. Several synonyms were excluded and the list was finally trimmed to 1654.

The species in this list was provided with information on nomenclature, vernacular name, botanical description, distribution, correlation to Sanskrit names, pharmacology, propagation, cultivation, conservation, trade, etc. Each entry was also provided with a field photograph as far as possible, largely taken during field surveys.

The inputs received during interactive session with various stake holders were incorporated and a near final version prepared was circulated to the funding agency for peer review. A final version was thus prepared taking into account all the comments and suggestions.

3. Result and Discussion

The database is broadly divided into an operating manual section and a technical section. An analysis of the medicinal flora is given in the text with all possible analytical methods based on part used, family of plants, habit of plants, medical systems, etc.

3.1 Data Analysis

Status wise analysis

The checklist of medicinal plants of Arunachal Pradesh consists of **2175** botanical names represented by1654 taxa, classified as shown in Figure1. The habit wise and life form analysis of the data is given in Figure 2 and 3.

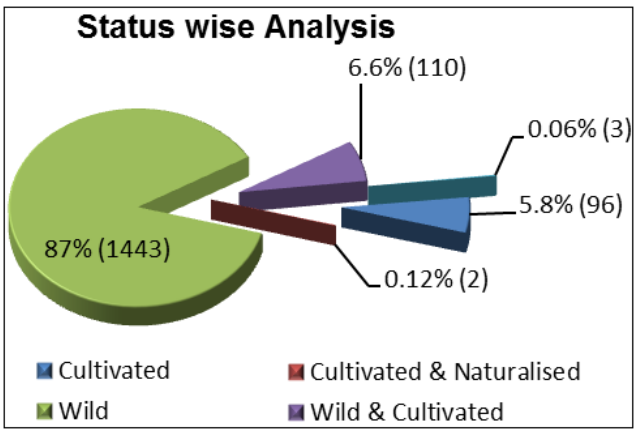

Figure 1: Status Wise Analysis of 1654 medicinal plants*

*Values in paranthesis indicate numbers

Details on life forms enumerate is given in Figure 2

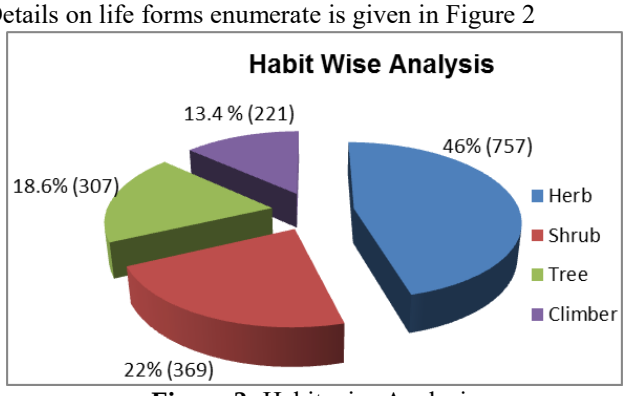

Figure 2: Habit wise Analysis

4.2 Red Listed Species

The Red Listed status given is on the basis of Conservation Assessment and Management Prioritization (CAMP) assessment report of North East held at Guwahati during 2003. Since 1995, FRLHT has been coordinating the rapid assessment of "threat status" of medicinal plants across 17 states and overall 335 species were assessed and assigned Red List status ranging from Near Threat (NT) to Critically Endangered (CR) based on IUCN Red list criteria and categories. Out of the 335 red listed medicinal plants, 44 have been recorded in the current study area of Arunachal Pradesh. Obviously there is a need to undertake assessment in respect of several other medicinal species of conservation concern.

Medicinal Use:

Ethno-medicinal uses for species from the published literature pertaining to Arunachal Pradesh were compiled and included into the database.

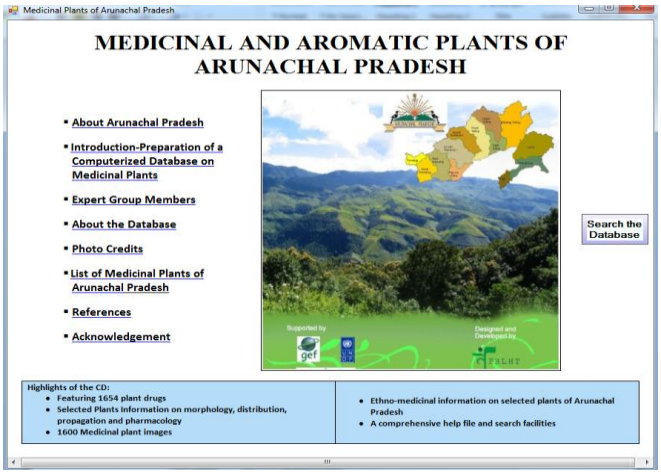

Figure 3: Screen shot of Database

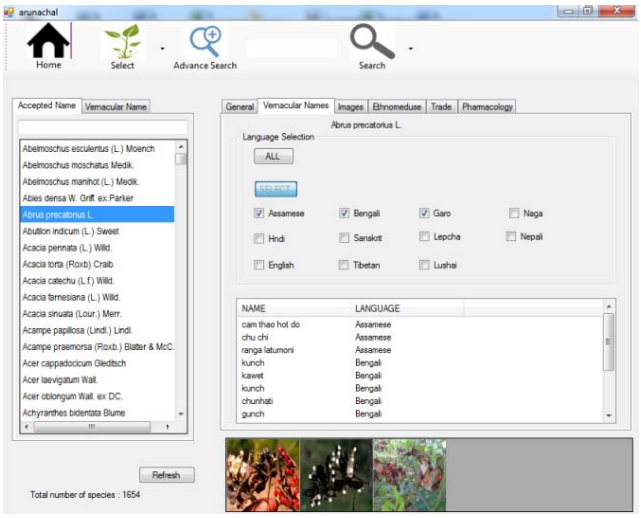

Figure 4: Database with Screen shot of vernacular names

The database section was separately provided with details as mentioned above which is hosted on a window based platform and is queriable. The database has an abbreviation section which relates to the acronyms and abbreviations used in the work. As part of the database maps and tables are included in introductory part. A section on conservation of concerned species is appended to facilitate developing plan

for conservation action. Database contains a total of 1654 species belonging to 217 families and has around 30,000 vernacular names. As many as 1604 photographs are used in the database for easy reference and field identification.

Search Database Menu: In the main Menu application contains Home, Search Option and Advanced Search option. In the Submenu search is either by Accepted name or by Vernacular name. When clicked on the accepted name the details pertaining to botanical information along with synonyms, distribution data, botanical reference, habit of the species, cultivated and red listed status on selection get displayed. The item "systems of medicine" denotes medical system in which the species is being used.

Vernacular Names: Vernacular names are listed based on the option on selection of a botanical name. One can selectively look for a particular language as required. Searching botanical name is made easy by adding vernacular names and vice versa.

Images: "Image tab" displays selected species images by clicking the forward and backward arrow button. Thumb nail images are always visible to increase user friendliness while browsing various tabs and menus.

The selection of species based on the filtering options given in the select menu, enables users to look for appropriate group of medicinal plant species like plants used in different system of medicine, Images, Propagation, Ethno medicinal, Pharmacology, plant based on habit (tree, herb, shrub & climber), plants with cultivation status, Aromatic plants and Red listed Medicinal plants.

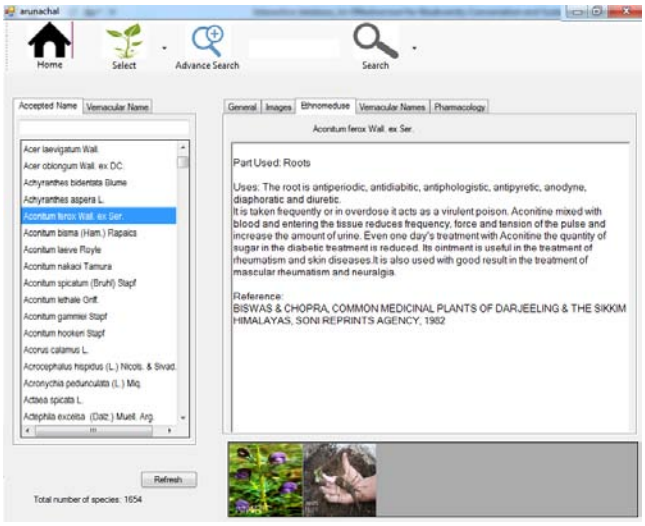

Figure 5: Database with Screen shot of Ethno-medicinal uses

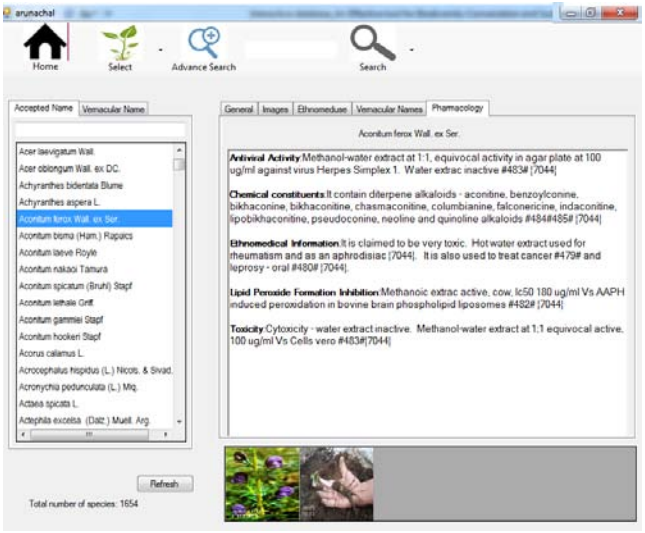

Figure 6: Database Screen shot showing Pharmacology data

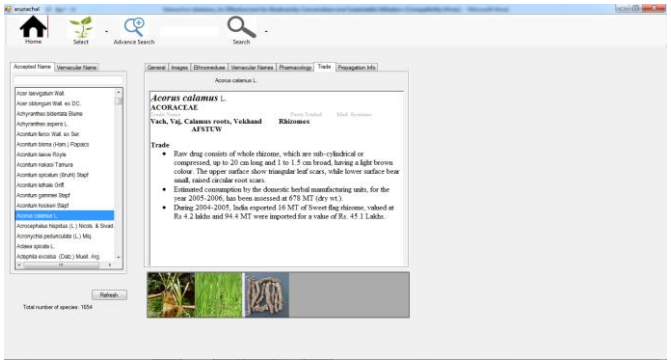

Figure7: Screen shot of database showing Trade Information

A comprehensive help file and search facility has been provided in the application.

4. Conclusion

This database can be used to serve the needs of a range of stake holders, including students and researchers of the Indian Systems of Medicine as well as the policy makers, foresters, farmers and the herbal industries, an authentic information system for promoting conservation of natural ecosystem. This is relevant, as the database provides information on botany, distribution, market demand and the threat status.

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References

[1] L.R. Bhuyan,"Some plants used as medicine by Nishi tribe of Arunachal Pradesh: A Preliminary Study," Journal of Economic and Taxonomic Botany, 27(2), pp. 447-450, 2003.
[2] A.S. Chauhan, K.P. Singh, D.K. Singh, "A Contribution to the Flora of Namdapha Arunachal Pradesh," Hajra, P.K. (Ed)., (Botanical Survey of India, Calcutta, pp. 422, 1996.
[3] J.A.Chauhan, K. Haridasan, "Biodiversity vis-à-vis forestry in Arunachal Pradesh," Arunachal forest News 11 (2), pp. 32-38, 1993.
[4] H.J. Chowdhery, "Arunachal Pradesh, Its people ethnobotanical diversity and conservation," [In: Ethnobiology in Human Welfare. S.K. Jain. (Ed.)], Deep Publication, New Delhi, pp. 323-328, 1996.
[5] R.K. Choudhary, "A Preliminary Report on Floristic Diversity of Dihang Dibang Biosphere Reserve of Arunachal Pradesh," Bulletin of Arunachal Forest Research, 24 (1 & 2), pp. 29-34, 2008.
[6] H.J.Chowdhery, G.S. Giri, G.D. Pal, A.Pramanik and S.K. Das, "Material for the Flora of Arunachal Pradesh," Vol I, Hajra P.K., Verma D.M. and Giri G.S. (Ed)., Botanical Survey of India, Calcutta, pp. 693, 1996.
[7] H.J. Chowdhery, G.S. Giri, G.D. Pal, A. Pramanik and S.K. Das, "Materials for the flora of Arunachal Pradesh," Vol II, Giri G.S., Pramanik A and Chowdhery H.J. (Ed)., Botanical Survey of India, Calcutta, pp. 350, 2009.
[8] H.J. Chowdhery, G.S. Giri, G.D. Pal, A. Pramanik and S.K. Das, "Materials for the Flora of Arunachal Pradesh," Vol III, Chowdhery H.J., Giri G.S. and Pramanik A. (Ed)., Botanical Survey of India, Calcutta, pp. 350, 2009.
[9] A.S. Chauhan, "A Contribution to the Flora of Namdapha," Arunachal Pradesh, Botanical Survey of India, Calcutta, 1996.
[10] A.K. Das, "Less- Known Uses of Plants among the Adis of Arunachal Pradesh," Ethnobotany, Deep Publication, New Delhi, Vol-9, pp. 90-93, 1997.
[11] R.D. Gaur, "Flora of District Garhwal North West Himalaya (with Ethnobotanical notes)," Transmedia, UP, Sri Nagar (Garhwal), 1999.
[12] S.S. Dash, Native species of Begonia L. (Begoniaceae) in Arunachal Pradesh – Diversity and Distribution, Bulletin of Arunachal Forest Research 26 (1 & 2), pp. 29-43, 2010.
[13] K. Haridasan, L.R. Bhuyan and M.L. Deori, "Wild edible plants of Arunachal Pradesh," Arunachal Forest News, 8 (1&2): pp.1-8. 1990.
[14] K.Haridasan, G.P. Shukla and B.S. Benewal, "Medicinal Plants of Arunachal Pradesh," S.F.R.I. Information Bulletin No. 5. State Forest Research Institute, Itanagar, 1995.
[15] P.K. Hajra, D.M. Verma, and G.S. Giri, Materials for the Flora of Arunachal Pradesh, Botanical Survey of India, Culcutt, 1:320, 1996.
[16] K. Haridasan, Anupam Sarmah, L.R. Bhuyan, S.N. Hegde and S.P. Ahlawat, SFRI Information Bulletin No.16 – "Field Manual for Propagation and Plantation of Medicinal Plants," State Forest Research Institute, Itanagar, 2003.
[17] S.Hussain and D.K. Hore, "Collection and Conservation of Major Medicinal Plants of Arunachal Pradesh," The Indian Forester, Vol 138, Issue 12, December, 2008. ISSN No. 0019-4816http://www.indianforester.co.in/index.php/indianforester/article/view/877
[18] R.N. Kaul and K. Haridasan, "Forest types of Arunachal Pradesh – Preliminary study," Journal of Economic and Taxonomic Botany, **9**(2), pp. 378-389, 1987.
[19] Miket, Shilpa Soni and S.P. Shukla, "Study on Algal Flora of Algae – Moss Association on Barks of some selected tree species at Rono – hills of Papum pare district in Arunachal Pradesh," India Bulletin of Arunachal Forest Research, 22(1 & 2), pp. 1-8. 2006.
[20] A. Nageshwara Rao and K. Chowlu, "Contributions to the orchid flora of Kamlang Wildlife Sanctuary in Lohit district of Arunachal Pradesh," Bulletin of Arunachal Forest Research, 22(1 & 2), pp. 22-26, 2006.
[21] A. Nageshwara Rao, 2006. "Alpine Orchids of Arunachal Pradesh," Bulletin of Arunachal Forest Research 22(1 & 2) pp. 27-32, 2006.
[22] Rao R.R., Tariq Husain, Bhaskar Dutt and Arti Garg. 1998. "Revision of the Family Berberidaceae of India – Rheedea," 8, pp.1 – 66, Lucknow
[23] R.C. Srivastava and R.K. Choudhary, "Floristic Scenario of Itanagar Wildlife sanctuary – A case study," Bulletin of Arunachal Forest Research, 22 (1 & 2), pp. 17 – 21, 2006.
[24] D.K. Ved, G.A. Kinhal, K. Haridasan, K. Ravikumar, Vijay Shankar and J.Indresha, "Report of CAMP Workshop,"(Arunachal Pradesh, Assam, Meghalaya and Sikkim), FRLHT, Bangalore, 2003.
[25] D.K.Ved and G.S. Goraya, "Demand and Supply of Medicinal Plants in India," FRLHT, Bishen Singh Mahendra Pal Singh, Dehradun, 2008.

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