

Herbal Gardens of India: A Promising Online Database

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Abstract—Everywhere we walk in nature, we are surrounded by medicinal plants growing uncared. Some plants among them are edible, supply nutrients as well as strengthen our various VITAL systems to protect from innumerable diseases. In India, a number of herbal gardens have been established by various funding agencies where a large number of medicinal plant species are maintained. But there is no system available for sharing the information for effective utilization of these public and private funded gardens spread nationwide. Therefore, an idea of creating a web based networking of herbal gardens was conceived and created with generous funding from National Medicinal Plant Board (NMPB), New Delhi using technical expertise from Directorate of Medicinal and Aromatic Plants Research (DMAPR), Anand, Gujarat.

The DMAPR (www.dmapr.org.in) has developed a web based networking platform of herbal gardens in India to collect and disseminate information on availability of planting material from various gardens to facilitate exchange of planting material among the member herbal gardens as well as others who desire to have these. The network also provides access to information to common people about herbal gardens of India. The site is available at www.herbalgardenindia.org. At present a total of 119 herbal gardens across the country registered as members.

The database contains information on species viz., species name, common name, number of plants available in each species, planting material availability etc., maintained in the respective herbal gardens. In the database, species were classified based on the plant habit, viz., tree, shrub, herb and climber. This database also provides various search options such as 'Species wise', 'Scientific name wise', 'Common name wise', 'Local name wise', 'Family wise', 'City wise', 'State wise', and also has provision of 'Advance search'.

The networking of herbal gardens has a number of advantages such as one can access information on availability of species, planting material etc., at various herbal gardens. This would also facilitate the collectors to approach nearby garden for the material. Members of this herbal garden network have the access to the website for updating their data from time to time.

Keywords: Herbal gardens, Medicinal plants, planting material, online database, herbal gardens network

1. INTRODUCTION

India is blessed with two mega centers of biodiversity (The Hindustan Center of Origin and The Central Asia Centre of

Origin). About 43000 plant species are said to exist in India of which 7500 plant species are referred in Indian folklore. About 1700 plant species are mentioned in the documented form of old literature (Ramakrishnappa, 2002). The recent era has witnessed revitalization in traditional health care system and more people started depending upon traditional herbal health care systems for various ailments. Majority of these medicinal plants are collected from the wild for its consumption which are made available at number of herbal gardens established by various agencies (Srinivasa Rao N at al. 2007). However, there is no system available for sharing the information for effective utilization of these public and private funded gardens spread nationwide. Considering these lacunae in the present system, an online database system was developed for storing/updating/accessing/identifying and disseminating information on availability of planting material from various gardens to facilitate exchange of planting material among the member herbal gardens as well as others who desire to have these. An attempt was made to create a user friendly web based information system on herbal gardens in India was conceived for online accessing.

The networking of herbal garden consists of centralized information on all the available herbal gardens in India. The database maintains species information based on plant habits viz., herb, shrub, tree as well as climber available in herbal gardens. It also provides number of plants maintained in each species with quality parameters identified, availability of planting material, etc., based on information given by the participating member herbal gardens. Members of this herbal garden network have the access to the website for updating their data from time to time. The common people can interact with the user friendly website to access information on number of species maintained, availability of planting material of Medicinal Plants, etc., at various herbal gardens. This system facilitate the collectors to approach nearby garden for the material.

2. MATERIALS AND METHODS

2.1 Database development

Data on herbal gardens were collected from individual herbal gardens maintained by various governments and non-government organizations of India through the help of National Medicinal Plant Board (NMPB) and different state forest departments. Interested herbal gardens were asked to send the information about the species viz., species name, common name, number of plants available in each species, planting material availability, etc maintained in the respective herbal gardens and also the name of funding agency that supports the herbal garden maintenance. The information thus collected was utilized for the data base development. In the database, species were classified based on the plant habit, viz., tree, shrub, herb or climber, etc.

2.2 Software development methodology

2.2.1 Software requirements:

The database retrieval is mainly based on queries, which allow users to look up specific information from the huge data stored in the database. A user searches the required data by any criteria (for example by species, name of herbal garden, state, city, etc). Therefore, development of database using a MySQL is highly suitable because of its speed, reliability and flexibility. Moreover, MySQL is an open source database management system, which is commonly used with the web pages and runs on both Linux and Windows servers.

Apache Tomcat 6.0 and Struts' 2.0 were chosen as the application server and framework respectively for building web based application. Java Script was chosen as the front-end as it is most commonly used as a client side scripting language and more flexible with Tomcat application server.

2.2.2 Design & implementation:

The website was developed using Tomcat6 (Moodie and Mittal, 2007) as application server, Struts' 2.0 (Donald Brown *et al.* 2008, Srikanth and Nithin, 2005) as application framework, Java Script (Flanagan, 2006) as front-end and MySQL 6.0 (DuBois, 2007; Dyer, 2008) as back-end.

3. RESULTS & DISCUSSION

The web site was hosted at <http://www.herbalgardenindia.org>. A total of 119 herbal gardens across the country were registered under the present herbal garden network (Table 1). The database consisted of various fields namely Name of the garden, Location of the garden, Curator details, Species details, Number of plants available in each species in each garden, Quality parameters identified, Quantity of planting material available etc.. The species were classified based on the plant habit, viz., tree, shrub, herb or climber. The technical information of the species included the associated taxonomic data such as Species name, Botanical Name, Common name,

Synonyms, Family name, Local names in different Indian languages such as Gujarati, Bengali, Hindi, Kannada, Malayalam, Marathi, Oriya, Punjabi, Sanskrit, Tamil, and Telugu etc. High resolution photographs of plant species were collected and integrated with technical information of respective species. A total of 340 records of tree species, 267 species of shrub species, 725 records of herb species and 108 species of climber species are recorded in the database.

Table 1: List of registered herbal gardens

- [1] Adarsh Herbal Garden, Sundarde
- [2] Agasthiar Herbal Garden, Melur
- [3] S.J. Herbal Garden, Vijayawada
- [4] Ambejalgaon Herbal Garden, Kargat
- [5] Anand Herbal Garden, Morshi
- [6] AUS UPVAN, Ranchi
- [7] Ausadhiya Poudh Vatica, Pantnagar
- [8] Ausdhiya Vatika, Hisar
- [9] Aushadhiya Udyan, Jabalpur
- [10] Azad Hitech Herbal Garden, Kanpur
- [11] Botanical Garden, Chandigarh
- [12] Botanical Garden, Nauni-Solan
- [13] Botanical Garden, Sarangpur
- [14] Botanical Garden, Waghai
- [15] CHF Herbal Garden, Pasighat
- [16] Coastal Ecosystem Herbal Garden
- [17] D.C.Narke Vidyniketan, Kuditree
- [18] Department of Agronomy, Lothian
- [19] Dhanvantari and Sanjivani Herbal Garden, Junagadh
- [20] Dhanvantary Udyan, Rahuri
- [21] Dhanvantri CCMB Herbal Garden, Hyderabad
- [22] Dr. Baliram hire Adivasi Vidyalaya, Dari Herbal, Dari
- [23] Gangangiri Maharaj Herbal Garden, Sangamner
- [24] Gopabandhu Ayurveda Mahavidyalaya, Her. Garden, Puri
- [25] Govt. Med. Bot. Garden, Antarsuba
- [26] Govt. Med. Bot. Garden, Bhuj
- [27] Govt. Med. Bot. Garden, Danta
- [28] Govt. Med. Bot. Garden, Jeetnagar
- [29] Govt. Med. Bot. Garden, Rajpipla
- [30] Govt. Med. Bot. Garden, Saputara
- [31] Govt. Med. Bot. Garden, Sasangir
- [32] Govt. Med. Bot. Garden, Vansada
- [33] Harishankar Herbal Garden, Nandupala
- [34] Herbal Garden, Sadayampatti
- [35] Herbal Garden, Dharwad
- [36] Herbal Garden, Jabalpur
- [37] Herbal Garden, Asamannoor
- [38] Herbal Garden, Nagpur, Nagpur
- [39] Herbal Garden, Deogaon

- [40] Herbal Garden, Solan
 [41] Herbal garden,, Bolangir
 [42] Herbal Garden, Lonje
 [43] Herbal Garden, Lohoner
 [44] Herbal Garden, Degloor
 [45] Herbal Garden, Junagadh
 [46] Herbal Garden, Kottigepalya
 [47] Herbal Garden, Jobner
 [48] Herbal Garden, Shindad
 [49] Herbal Garden, Malegaon
 [50] Herbal Garden, Telkoi
 [51] Herbal Garden, Karimancode
 [52] Herbal Garden, Katra
 [53] Herbal garden, Mandvi
 [54] Herbal Garden, Joginder Nagar
 [55] Herbal Garden, Bhubaneswar,
 [56] Herbal Garden, Bolangir
 [57] Herbal Garden, Dumreda
 [58] Herbal Garden, Faizabad
 [59] Herbal garden, Vellayani
 [60] Herbal Garden, Khandagiri
 [61] Herbal Garden, Namakkal
 [62] Herbal Garden, Neri
 [63] Herbal Garden, Nrusinghnath
 [64] Homoeopathic Medicinal Plants Research Garden,
 Kundah
 [65] ICAR-DMAPR, Anand
 [66] CSIR, Palampur
 [67] Jawahar Navodaya, Wardha
 [68] Jawahar Navodaya, Khairi
 [69] Jawahar Navodaya, Nagbhid
 [70] Botanical Garden, Gandhinagar
 [71] Jijamata Madhyamik, Erondol
 [72] Kamalapur, Diggahandi
 [73] Kasturba Sewa Samiti Nursery, Deothi, Solan
 [74] KFRI Garden, Peechi
 [75] Koinpur Ex-Situ Conservation/ Live Herbarium,
 Paralakhemundi
 [76] Late Tatyasaheb Ringangaokar Udyan, Nagpur
 [77] M.A.K.Govt.H.S.School Herbal Garden, Karaiyur
 [78] Mahatma Gandhi Madhyamik Vidyalaya, Manjrod
 [79] Mahesh Munot Vidyalaya, Rahuri
 [80] Mathama Gandhi Bunidhi Vidhyalaya, Akkalkuwa
 [81] RPRC, Bhubaneswar
 [82] R.R.I. (Ayurveda), Guwahati
 [83] Med. Plant Garden, East Khasi Hills
 [84] Med. Plant Garden, Rongrenggiri
 [85] Med. Plant Garden, Sangmeim
 [86] Med. Plant Garden, Umkhuti
 [87] Med. Plant Garden, Umsaw Nongladew
 [88] Med. Plant Garden, Vadodara
 [89] Med. Plant Garden, Itanagar
 [90] Med. Plant Garden Jabalpur
 [91] Med. Plant Garden, Akola
 [92] National Her. Garden, Ambala
 [93] Med. Plant Farm, Denkanikota
 [94] Nehru Vidyamandir, Kotoli
 [95] North-East Eco. Park, Jorhat
 [96] Pana Nuagam, Khallikote
 [97] Parshuram Naik Vidyalaya Campus, Borgaon Manju
 [98] Plant Biodiversity Park cum Genomic Valley, Dapoli
 [99] Regional Research Institute of Ayurveda, Jhansi
 [100] Renuka Mata Herbal Garden, Sinnar
 [101] RRI (Ay.), Kothrud
 [102] S.M.P. Garden, Terikhet
 [103] Sanjivani Kutira, Bhanjanagar
 [104] Sant Dnyanehwar Mdhyamik Vidyalaya,, Balde
 [105] Sant Teresa Herbal Garden, Shrirampur
 [106] Sant Tukaram Maharaj Herbal Garden, Tornala
 [107] Sartuli, Kallikote
 [108] Sasan Ambagam, Hinjilikatu
 [109] Herbal Garden, Rajkot
 [110] Shivaraj Vidyalay, Kagal
 [111] Shri Devi Shantadurga Highschool, Malvan
 [112] Siddha Medicinal Plants Garden, Mettur
 [113] Sita Ashok Herbal Garden, Pune
 [114] Smt. Laximibai gangane Vidyalaya, Wadali Deshmukh
 [115] St.Claret's Herbal Garden, Karumathur
 [116] Venknath Herbal Garden Loni, Shrigonda
 [117] Viswanathan Memorial Herbal Park, Vellanikkara
 [118] Vivekanand Sec. Vidyalaya, Mangali (Rvt.), Mangali
 [119] Yashwant Herbal Garden, Kasola

3.1 System Interface

The software package designing was divided into three main modules such as 'User', 'Member' and 'Administrator'. The 'User' of this herbal garden network has the access of centralized information on all the available herbal gardens in India. The 'Member' of this herbal gardens network has the access to the website for updating their data from time to time. The 'Administrator' of this herbal garden has the control to create a new member herbal garden in the network, manage the database based on the information given by the participating member herbal gardens, delete unwanted information and modify the existing database, etc.

The home page of this website (Fig. 1) consists of introduction, list of herbal gardens, tree species, shrub species, herb species and also climber species. The home page

interface consists of 4 main modules viz., 'Gardens', 'Species', 'Search' and 'Login'.



Fig. 1: Homepage

The 'Gardens' module gives the list of all registered member herbal gardens and the number of species available at the respective garden within the parenthesis. Each herbal garden gives details such as the name, address, location and details of the contact person of the herbal garden, with in this main menu, there are four sub-menu viz., 'Tree species', 'Shrub species', 'Herb species' and 'Climber species', wherein one can search the availability of medicinal species based on species habit. For example, the 'Tree species' option gives the list of tree species available, number of plants maintained, quality parameters identified, and quantity of planting material / seed production in the respective garden. Likewise the 'shrub species', 'herb species' and 'climber species' options also gave the similar details of the respective species available in the respective garden.

One can also search the availability of a desired medicinal species in different member herbal gardens through the main menu 'Species'. The 'Species' module gives the sub menu consists of 4 options viz., 'Tree species', 'Shrub species', 'Herb species' and 'Climber species'. By default the menu displays the list of tree species and the parenthesis shows the number of herbal gardens having the respective species. Each species gives the details such as type of species, botanical name, common name, synonyms, family name, local names and the table having the details such as name of the herbal garden, number of plants maintained, quality parameters identified, and quantity of planting material / seed production at various herbal gardens (Fig. 2).

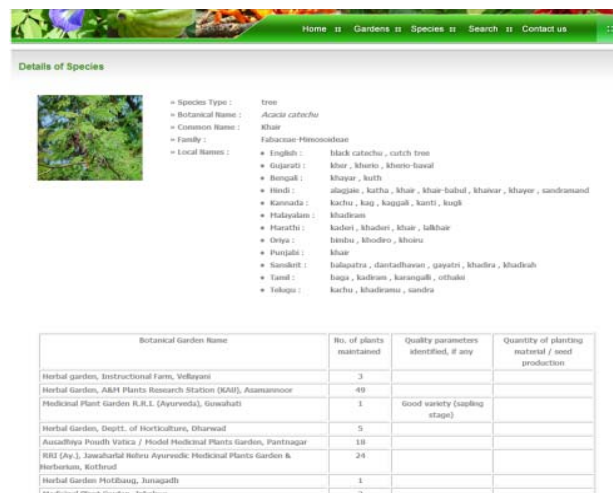


Fig. 2: Details of species

Also, the 'Search' module consists of various search options such as 'City wise', 'State wise', 'Species wise', 'Scientific name wise', 'Common name wise', 'Local name wise', 'Family wise' and 'Advance search'. For example the 'City wise' search displays a text box where one can enter a required city field with minimum 3 characters, which searches the entire database and gives the matching records in the next window. From this list, user can select a required record and access the information. Similarly in the 'Advance search', it displays a text box where one can enter any required name with minimum 3 characters, which searches the fields such as scientific name, common name, local name and family name and gives the matching records of the appropriate fields in the next window. From this list, user can select a required record and access the information.

The 'Login' module allows to enter the registered user into their herbal garden master data. This also allows to insert availability of species information, to modify existing details of herbal garden details and species availability information, and to change the existing password. The login details were created and provided to all the registered members in this network to update information regularly on the herbal garden / medicinal garden maintained in their organization.

4. CONCLUSIONS

The online database thus created gives centralized information on all the available herbal gardens in India through web based networking. The database maintains species information based on plant habits viz., herb, shrub, tree as well as climber available in herbal gardens. It also provides number of plants maintained in each species with quality parameters identified, availability of planting material, etc., based on information given by the participating member herbal gardens. The use of high resolution photographs of species was a determining factor to help in the identification/recognition process. The common people can interact with the user friendly website to

access information on number of species maintained, availability of planting material of Medicinal Plants, etc., at various herbal gardens.

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