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MPDB 1.0: a medicinal plant database of Bangladesh

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Abstract:
The term of medicinal plants include a various types of plants used in herbalism with medicinal activities. These plants are considered as rich resources of ingredients which can be used as complementary and alternative medicines and, also in drug developments and synthesis. In addition, some plants regarded as valuable origin of nutrition. Thus, all these plants are recommended as therapeutic agents. Information related to medicinal plants and herbal drugs accumulated over the ages are scattered and unstructured which make it prudent to develop a curated database for medicinal plants. MPDB 1.0 database is dedicated to provide the first window to find the plants around Bangladesh claimed to have medicinal and/or nutritive values by accumulating data from the published literatures. This database contains 406 medicinal plants with their corresponding scientific, family and local names as well as utilized parts for treatment from different districts of Bangladesh. Information regarding ailments is available for 353 plants. In addition, we have found active compounds for 78 plants with their corresponding PubMed ID.

Availability: www.medicinalplantbd.net

Key words: Medicinal plants, Database, MPDB 1.0, Active agents.

Background:
Nature has provided innumerable number of culturally important medicinal plants that have been indispensable for the treatment of various diseases and maintaining health. Plants produce a wide variety and high diversity of secondary metabolites, which are not required for the immediate survival of the plant but which are synthesized in response to stress as a means to protect themselves from organisms, diseases or the environment **[1].** Medicinal uses of plants have been documented in approximately 10,000 to 15,000 of world's plants and roughly 150-200 have been incorporated in western medicine **[2].** And, it is currently estimated that approximately 420,000 plant species exist in nature **[3].** A good number of secondary metabolites from plants possess interesting biological activities with various applications, such as pharmaceutical ingredients, insecticides, dyes, flavors, and fragrances **[4, 5].** Despite decades of research, active compounds of plant remain poorly characterized **[6].**

Usage of natural substances as therapeutic agents in modern medicine has sharply declined from the predominant position held in the early decades of last century, but search for bioactive molecules from plants continues to play an important role in fashioning new medicinal agents. With the advent of modern techniques, instrumentation and automation in isolation and structural characterization, we have on hand an

enormous repository of natural compounds. In parallel to this, biology has also made tremendous progress in expanding its frontiers of knowledge. The interplay of these two disciplines constitutes the modern thrust in research in the realm of compounds elaborated by nature **[7].**

MPDB 1.0 database is dedicated to provide the first window to find the plants around Bangladesh claimed to have medicinal and/or nutritive values with their scientific names, family names, local names, and utilizing parts, sources, ailments, available extraction procedure and active compounds. The user or researcher may search any plant from this repository according to any key words. Thus, MPDB 1.0 will be a useful platform which would act as an efficient search engine for the researchers and clinicians who are interested to work with reported Bangladeshi plants having medicinal and/or nutritive values for the production or synthesis of more effective drugs.

Scientific Name	Family Name	Local Name	Utilized Part	Location	Ailment	Active Compunds	Pubmed ID
Alternanthera sessilis (L.) DC.	Amaranthaceae	Sanchi shak, Shanti shak	Leaf, stem	Dhaka	Leucorrhea. Leaves and stems are cooked and eaten.		
Amaranthus spinosus L.	Amaranthaceae	Kanta khudri shak	Leaf, top portion of stem, root	Dhaka	To keep body healthy, pain, whitish discharge in urine of males or females.		
Amaranthus tricolor L.	Amaranthaceae	Laal shak	Leaf, top portion of stem	Dhaka	To increase blood, blood purifier.	betanidin 5-O-glucosyltransferase	23987812
Coriandrum sativum L.	Apiaceae	Dhonia pata	Leaf, stem	Dhaka	To increase appetite, gastrointestinal disorders, to add flavor to dishes.	3,4,5-trimethoxybenzyl alcohol, methyl syringate, 3,4-dimethoxybenzyl alcohol, derivatives of linalool	23939803
Colocasia esculenta (L.) Schott	Araceae	Kochu shak	Leaf, stem	Dhaka	Blood purifier.	asialofetuin	24006804
Typhonium giganteum Engl.	Araceae	Shada narkel kochu, Dudh kochu	Tuber	Dhaka	Blood purifier, nutritive.	termitomycesphins A and B	21190430
Eclipta alba (L.) Hassk.	Asteraceae	Kala koita	Leaf	Dhaka	Headache, to blacken hair, to delay graying of hair.	eclalbasaponin VI	22978212
Enydra fluctuans Lour.	Asteraceae	Helencha shak	Leaf, stem	Dhaka	Leucorrhea.		
Xanthium indicum J. Koenig ex Roxb.	Asteraceae	Ghagra shak	Top porion of stem	Dhaka	Any type of pain (like rheumatic pain, pain resulting from injuries).		
Basella rubra L.	Basellaceae	Puin shak	Leaf, stem, seed	Dhaka	To keep healthy, physical weakness.	lutein, beta-carotene, violaxanthin, neoxanthin, and zeaxanthin	15826027
Chenopodium album L.	Chenopodiaceae	Baitar shak	Leaf, stem	Dhaka	Gastrointestinal disorders (constipation, bloating).		

Figure 1: Screenshot from the web interface of medicinal plant database, MPDB 1.0.

Methodology:

Literature mining

To retrieve data, over 100 of literatures (published in international and local journals till 2013) were collected claiming information regarding any medicinal or nutritive values of Bangladeshi plants around the country. Search items include their scientific names, family names, local names, utilizing parts, sources, ailments, available extraction procedure and active compounds.

Database preparation:

MySQL 5.0 (http://www.mysql.com/), an object-relational database management system was used (RDBMS) at the backend which stores information as tables and performs SQL (Structured Query Language) queries that provides speed and flexibility in data retrieval. Hypertext Preprocessor (PHP) programming language along with HTML was used as the front end in order to provide dynamism to the Web interface. MPDB 1.0 was deployed on Apache HTTP server and runs on a server managed by the Windows operating system.

Database access:

The lists of medicinal plants from Bangladesh with Scientific name, Family name, Local name, Utilized part, Source of plant, Ailment, Active compounds and PubMed ID have been organized here. The user can type any key word i.e. Scientific name, Family name, Local name, Utilized part, Source of plant, Ailment, Active compounds to find the corresponding information available in the database **(Figure 1).**

Conclusion:

MPDB 1.0 is a specialized, first of its kind value-added database that will enable effortless pursuit of relevant knowledge on medicinal plants and active compounds. MPDB 1.0 will help in the process of drug discovery by acting as a promising search engine for *in silico* screening of phytochemicals in future. Though a web site named medicinal plants in Bangladesh (www.mpbd.info) is providing information about beneficial effects of Bangladeshi plants, but this site is not bonafide for the researchers for citation and also less user friendly considering the fact that it is difficult to retrieve complete information. Our database is completely customized based on search engine where by putting any keyword users can find all the related information. To develop the database, some of the data were collected from the research articles published in nationally reputed journals which are yet to be indexed in PubMed and this is why some of the spaces under PubMed ID are blank. Moreover, in the interface of the search result within MPDB 1.0 database **(Figure 1),** some of the spaces in the context of active ingredients will be found blank, though those plants have beneficial role in many ailments. When we searched for the active compounds/agents of these plants in the PubMed, no reports were found. This, we believe, will easily open a door for the researchers who are interested to work with the active ingredients of the medicinal plants in future. Further work is required to elaborate the database by incorporating data on disease targets of active compounds of these medicinal plants. Additional search and retrieval features will also be added to enhance the usability of the web interface in future.

Future development:

We are working to elaborate the database by incorporating data on disease targets of active compounds of these medicinal plants. Additional search and retrieval features will also be added to enhance the usability of the web interface in future.

Conflict of interest:

Authors declared that there is no conflict of interests.

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