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Conservation of certain indigenous medicinal plant of upper Brahmaputra valley of Assam: Computational Biology approach

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Abstract

The unique genetic resources of nature are under danger of extinction due to changes in farming methods and other human factors. Few systematic efforts have been made to investigate and protect the therapeutic and nutritional potential of these rare genetic resources. However, there are a number of plant-based pharmaceuticals already on the market, and there has been a growing interest in herbal therapy both at home and abroad. Therefore, a streamlined data gathering method that offers in-depth scientific knowledge of the plants is urgently required. In light of these considerations, we have developed a web-enabled medicinal plant database system in the Upper Brahmaputra valley of Assam using computational biology methods, so that scientists, researchers, and anyone else interested in medicinal plants can quickly and easily access taxonomic data, images, and details about the plants' medicinal properties and bioactive compounds.

Key-Words: Computational Biology, Database, Medicinal Plants

INTRODUCTION:

Plants have been employed as a source of medicine in every civilization throughout history. Traditional rural and tribal communities in India have long recognized the social, cultural, spiritual, and therapeutic value of medicinal plants. There has been a rise in demand for medicinal plants in both emerging and developed nations as people become more aware of the benefits of using natural goods as a viable alternative to pharmaceuticals. The interconnected nature of conservation and development issues calls for a coordinated approach to solving both. Therefore, modern conservation strategies like the Convention on

Biological Diversity (CBD) and the Global Strategy for Plant Conservation (GSPC) make it clear that conservation must include human needs². The widespread uptick in interest in herbalism has been predicated on the expectation that medicinal plants would remain accessible indefinitely. However, there has been no coordinated attempt to guarantee this, despite the challenges presented by rising demand, a rapidly expanding human population, and the widespread degradation of plant-rich environments. Detailed knowledge is limited since many therapeutic plants are threatened with extinction or severe genetic loss in the present day.

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No measures have been done to preserve the majority of the world's threatened plant species used in medicine. There is not even a comprehensive list of medicinal plants for most nations. The traditional societies that are now in danger of disappearing are the keepers of much of the information on how to utilize them, but very little of this knowledge has been documented systematically.

Because Assam is one of the biodiversity rich regions and the second largest state of Northeast India, covering an area of 78,438 sq km, of which 23,688 sq km area is covered by forest, our current study aims to digitalize the compiled information on traditionally used potential medicinal flora of upper Assam, along with their geographic and temporal distributions. A subset of the population relies only on herbal treatments made from locally accessible plants since the area is both genetically and technologically diverse. Natural genetic diversity is on the brink of extinction due to human activities such as shifting farming techniques. Furthermore, there has not been nearly enough systematic research done to discover and protect this natural biological legacy of humanity's for its therapeutic and nutritional potentials. Despite having some of the world's greatest indigenous knowledge systems for biodiversity and herbal medicine, the area ranks dead last in intellectual property rights (IPR) ownership.

Methodology

The information on ethno-medicinal plant and their uses were collected through a massive exploration drive and purely freelance manner from five districts, namely Tinsukia, Dibrugarh, Sivasagar, Jorhat, Golaghat of upper Brahmaputra valley, Assam. The plants were identified according to Flora of Assam³ and other standard. Based upon this information, designed a web enabled information system relying on object-oriented database⁴ technology. The access to this database is free of charge and available to scientific users, researchers and home users who interested in medical plants.

Results and Discussion

In order to create a user-friendly and efficient information system, the Database on ethno medicinal

plant makes use of a mix of server-side and client-side software technologies to maintain and communicate plant information systematically. Microsoft Access, a forms-based software tool, and SQL Server were first used to host a local database on university PCs in the Department of Life Sciences in Dibrugarh. Subsequently, an advanced web-enabled information system was developed using WampServer5 (Version 2.0), a mix of the Apache web server, the PHP6 (Hypertext Pre-processor) server-side language, and the MySQL database. Both the scientific name and the popular name (Assamese name), together with their synonyms, are searchable for medicinal plant species native to the five districts of the upper Brahmaputra valley in Assam. In addition to distribution maps, traditional medicinal applications, bioactive compounds, plant photographs, and a brief description of the geography, climate, population, vegetation, and various communities of the five districts of the upper Brahmaputra valley in Assam, our database also includes information at the genus and species taxonomic classification levels. Links from our database to relevant external resources like the Convention on Biological Diversity (CBD), Species 2000, the International Plant Names Index (IPNI), The Nature Conservancy, etc. are presently being implemented. A feedback form was developed and implemented so that people from all around the world may communicate and share their insights. Users in administrative roles often use a secure web-based administration page to make changes and maintain data.

Biological data, including taxonomy, habitat, distribution, photographs, population trends, specimens, uses, and conservation status⁷, are all part of biodiversity informatics, which is the study of information systems that can combine geographical, climatological, and environmental data with biological data. The sustainable use of medicinal plants for healthcare is only one area where this kind of information system may significantly improve human well-being. We anticipate that the scientific community will find the information system useful for conducting a rapid review of plants used to treat a variety of diseases; it also offers tremendous potential for the creation of novel drugs derived from plants, and it may prove useful in screening the most urgently needed species for effective conservation measures and long-term sustainable use.

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