

# Improvement of Ethnobotanical Information System Using SQL Server

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**Abstract**— The paper deals with the relationship between ethnobotanical documentation tables and database management system for ethnobotany. Ethnobotany is a scientific investigation of the connection among plants and individuals. The need of right approaching this province of knowledge likewise installing authentic information has been as often as possible recognized. The main aim of the investigation is to survey the variety of methodologies in putting away ethnobotanical data in databases and to give some insignificant measures to these databases. In this article has been analyzed for gathering ethnobotanical data when using information system and defined storage management system for ethnobotanical information system for preparing ethnobotanical documentation tables to building up database management system for ethnobotany. The information in this type can be seen and altered effectively utilizing spreadsheet programs which are recognizable to the working explorative ethnobotanists. The use of tables for the institutionalized access to information in either possess or openly accessible databanks and the standardization of activity techniques is introduced.

**Keywords**— ethnobotany, ethnobotanical data standards, Traditional Knowledge Databases, Database Management Systems for ethnobotany, SQL server, ethnobotanical documentation

## I. INTRODUCTION

All through mankind's history, individuals used different materials from nature to fix their sicknesses and enhanced their well-being. Substances were generated from vegetation, fauna and mineral sources situated in individuals' prompt environment yet in addition in remote zones [1]. Nature has been the wellspring of therapeutic operators for a large number of years, and a great number of current medications have been confined from regular sources, many dependent on their utilization in the customary drug. These plants based conventional restorative frameworks keep on assuming a basic job in human concerns, with about 80% of the world's occupants depending for the most part on customary medications for their essential social insurance however, therapeutic plants shape the guideline segment of the conventional drug [2]. Therapeutic legends throughout the years have ended up being a significant guide in the present day screening of medications. Lately, has been pointed out the absence of data on the general significance of therapeutic plant (or other valuable plants) inside a culture and the requirement for looking at the using of plants between socially. Such examinations have imperative ramifications

for research in the field of characteristic items since these ethnobotanical ponders indicate out the species which most critically ought to be contemplated phytochemically and which are thought about them to be the in all probability ones to contain bioactive mixes. Indigenous individuals make use of an extensive variety of plants restoratively to keep up their wellbeing. There is an incredible guarantee for new medication disclosure dependent on customary plant employment. Likewise, plants might be used as sustenance, and it is hard to draw a line between these two gatherings, nourishment might be medication and the other way around [3]. The loss of dialect and customary learning because of cultural assimilation and plant environment annihilation is a noteworthy concern, especially among littler and more helpless clans and indigenous gatherings. Genuine risks exist for the survival of such individuals and their societies and the environments which support them and furnish western and customary prescription with novel plant items for human prosperity all over the place. As indigenous societies turn out to be progressively divided and undermined by present-day improvement weights in creating nations, people learning might be lost until the end of the time.

The term ethnobotany firstly was presented by American botanist John Harshberger in 1896 as "the investigation of plant use by people". Ethnobotany considers the connection among people and plants in the entirety of its multifaceted nature and is commonly founded on an itemized perception and investigation of the utilization a general public makes of plants, including every one of the convictions and social practices related with this usage [4]. Medical plants have dependably been the fundamental research interests of ethnobotany and the investigation of these assets has likewise made noteworthy commitments to the hypothetical improvement of the field [4].

The improvement and make use of databases incorporated with conventional learning is extending. While there's an expected 40 years history of using databases in ethnoscientific subfields (e.g. ethnobotany, ethnobotanics, ethnozoology, ethnopharmacology and so on.) are not knew nearly nothing of their potential hugeness to indigenous people group. People need to keep up control of a database will probably require self-ruling advancement or community accomplices focused on strategies that stick to social conventions and the insurance of customary learning. While thinking about the significance and potential advancement of a database it is basic to survey its incentive as a computerized innovation. Ethnobotany is recently improved field of the request which is getting more consideration from

the academic network in Azerbaijan as of late. There are some distributed works in this field.

The mission of this article is to clarify for gathering ethnobotanical data when using information system and for preparing ethnobotanical documentation tables to define storage management system for ethnobotanical information system for building up database management system for ethnobotany.

## II. USING INFORMATION SYSTEM FOR GATHERING ETHNOBOTANICAL DATA

From straightforward indexing of generally used medical plants, ethnobotany has developed to address complex human-plant relations. Ethnobotanical information is essential for an assortment of logical investigations, for example, pharmacology, veterinary science, nature, and customary learning preservation. The obstructions to getting to ethnobotanical data limit the capacity of scientists to address issues in the territories of examination, protection, practical using.

The different idea of accessible ethnobotanical information has presented difficulties for information access, the board and incorporation. At present, the first step is to use informatics devices to digitize both unpublished and distributed ethnobotanical information held in various forms for straightforward entry. A second step is to encourage increased and consistent coordination of information from various spaces, for example, scientific classification, phytochemistry, pharmacology and microbiology. Such a coordinated data framework can possibly connect ethnobotanical information with datasets from different controls, in this manner encouraging better comprehension for taking accurate choices.

In the ongoing past, there has been an expansion in the accessibility of ethnobotanical information over the web. In spite of an expansion in the number of activities giving information in computerized type, for example, social databases and HTML website pages, the aggregate information accessible online are divided. Also, these endeavors don't similar to the measure of ethnobotanical information gathered throughout the hundreds of years and the rate at which it is produced in electronic arrangements. Further, because of the absence of informatics framework encouraging simple access and restrictions in information the board programming, gigantic measures of information can't be coordinated, prompting excess and ineffectual use.

### 2.1 Ethnobotanical Data Standards

The heterogeneous idea of conventional ethnobotanical plant information and its related information, held in a scope of advanced and noncomputerized designs over the globe, has made its use difficult. Far-reaching information measures are required to beat these hindrances and to disentangle obtaining, the executives and sharing. To date, there have been a couple of endeavors toward this path. An early endeavor prompted the Economic Botany Data Collections Standard (EBDCS), which did not adequately address ethnobotanical and conventional information issues, and this thusly prompted the present Databases and

Registries of TK and Biological/Genetic Resources Standard.

➤ **Economic Botany Data Collections Standard** - In the range of 1989 and 1992, the Taxonomic Database Working Group (TDWG) built up the Economic Botany Data Collections Standard (EBDCS). TDWG, which is presently known as Biodiversity Information Standards, is a global logical body engaged with the improvement of information gauges for the trading of biodiversity and related information. EBDCS was produced to institutionalize descriptors and terms depicting the financial, social, and social estimations of plant species. Despite the fact that EBDCS covers a few parts of ethnobotany, this standard has not been generally acknowledged because of issues in its usage in a social database structure, it is being nonnatural for beginners and it's being inaccessible in promptly useable electronic configuration. Another downside of this standard is its restricted degree, which does not cover parts of plant use, for example, social hugeness, proprietorship and drug planning strategies. In 2006, TDWG embraced another procedure for information measures advancement, and every more established standard are being reexamined. Accordingly, the biodiversity informatics specialist and client network perceives the need to return to and reconsider EBDCS to make it more extensive and easy to use.

➤ **Databases and Registries of Traditional Knowledge and Biological/ Genetic Resources Standard** -To secure against misappropriation of customary information as licenses on nonunique advancements, the Traditional Knowledge Digital Library (TKDL) was started in India in 2001. For creating TK databases, for example, TKDL and libraries, a worldwide information standard tending to destinations, for example, positive and cautious information assurance, finish partner inclusion, decentralized working regional and national databases, protection and conservation is fundamental. In 2003, the Intergovernmental Committee of the World Intellectual Property Organization embraced DRTKBGRS as a specialized standard for the documentation of conventional learning and its related biological assets. The standard completely covers different parts of TK documentation, for example, information coordination, support for numerous dialects, socially reasonable documentation, issues identified with vocabularies. Also, the Traditional Knowledge Resource Classification System was produced dependent on the structure of International Patent Classification for Indian frameworks of prescription, for example, Ayurveda, Unani, Yoga and Siddha. At present, the European Patent Office gets to TKDL for assessing patent applications [5].

### 2.2 Traditional Knowledge Databases

Customary medical information comes by means of contemporary documentation or noteworthy ethnographic content. When coordinated, the content is viewed as arranged [6]. Databases that incorporate types of customary information have been used since 1970. Government offices, nations, associations, and universities have all built up these databases for various reasons. Databases, explicitly ethnobotanical and ethnobiological one, are incorporated pretty much with customary ethnobotanical learning and

information identified with the scientific classifications and understandings about the earth and its life forms. Databases can likewise be hybridized, which means they are incorporated with both conventional learning and Western logical information [7]. There are various difficulties in building up a therapeutic plant database, these incorporate the accompanying example of issues and potential issues: information coordination, absence of a model, different scientific categorizations, area, licensed innovation rights, information precision, information support, "information heterogeneity", databases measure, number of clients, and cost [8]. Classification components of a database include logical name, family, topography, basic names, and specialist names [9]. Databases can likewise incorporate principles created by the Biodiversity Information Standards and additionally the Economic Botany Data Collection Standard. The reception of semantic web ontology is probably going to drive database improvement [10].

### 2.3 Data Integration Strategies

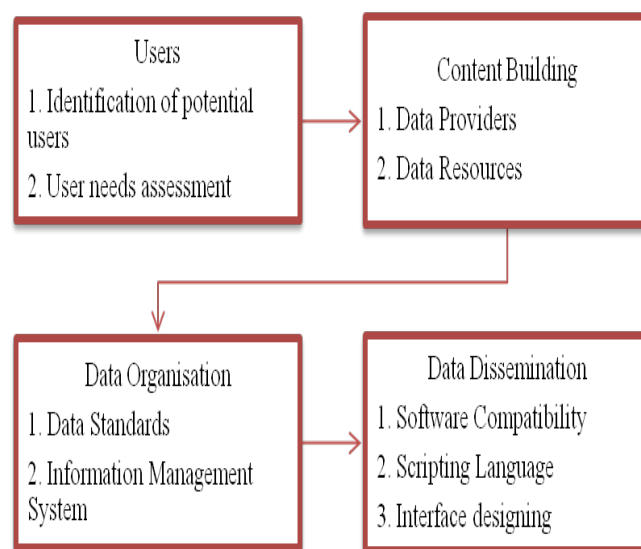
The key segments for coordinating information, while securing information are content building, learning association, and information dispersal, every one of which requires a contribution from indigenous societies and additionally analysts and researchers. These parts should be between connected to encourage proficient trade between ethnobotanical information generators, administrator, and clients. Amid the execution of the information joining procedures, to ensure protected innovation rights, it is indispensable that indigenous societies decide the idea of information accumulation, the board, and introduction.

➤ **Content building** - Ethnobotanical data exist in both advanced and noncomputerized designs spread over an assortment of organizations and indigenous societies all around. With due acknowledgment and regard, indigenous societies also, partners must be urged to take an interest in all parts of the content building, as the structure will be used in settling on educated choices, for example, for land and asset the board and also for research and preservation exercises. As the learning base develops, data deficits can be recognized, with the goal that explicit arrangements can be investigated.

➤ **Knowledge Organization**- Productive usage of the learning created and its improvement is troublesome without the legitimate association of the data. To encourage disclosure and recovery of pertinent data, information measures, metadata stores, ontology, and controlled vocabularies should be created. It is important to have straightforward, multilingual and easy to evaluate information for usage by specialists with various expertise levels and phonetic foundation. Extensive suites of ethnobotanical information principles and patterns would encourage interoperability and mix of ethnobotanical databases and entrances with nonethnobotanical information gateways. So also, make use of models and combination devices will likewise empower ethnobotanical datasets to be connected and their information made accessible in a unified shape through a solitary united entrance for simple access by all clients. It will be illogical and would not function and also set up an online interface for simple client get to that

joins numerous databases around the globe. This methodology guarantees that each dataset is kept by its beginning gathering of caretakers, therefore encouraging upkeep and refreshing of the records by these learned overseers as required after some time. The improvement of such norms and diagram and in addition a bound together entryway is along these lines a matter of need.

➤ **Knowledge Dissemination** - It is vital to give data to a wide gathering of people in the dialect that they comprehend, for directing exploration, strategy making and protection. Amusingly, a great part of the accessible ethnobotanical data is just in English, along these lines confining its ease of use and prompting substance and learning isolate. The local dialect of numerous nations wealthy in biodiversity and conventional learning isn't English. For the sustenance and protection of this learning, it is urgent to digitize and disperse data in the particular local dialects also. Then again, the auxiliary information ordered from open space assets, for example, reports, distributions, and proposals can be made freely accessible.

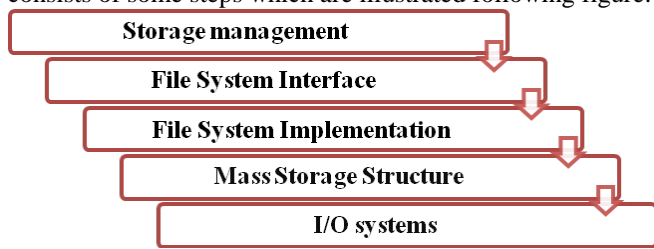


**Fig. 1.** Steps involved during the implementation of the Ethnobotanical Database

### III. STORAGE MANAGEMENT OF ETHNOBOTANICAL INFORMATION SYSTEM

Ethnobotanical information documentation and data ought to be seen as an asset for supporting the data and basic needs of every one of those engaged with the plant. In the event that this is to be the situation, the data must be overseen over the entire lifetime of a plant - from plan through to activity, with the plant data and documentation organized with the prerequisites of explicit operational staff and assignments as the main priority. It ought to likewise be of adequate quality to move certainty and guarantee that it is used. Tragically documentation created within plan exercises isn't constantly composed to address the explicit needs of operational staff, and it tends not to be organized or exhibited in a frame appropriate for prepared operational access. For customary paper-based documentation, characteristic access and ordering restrictions imply that

relating a huge documentation set to an explicit plant circumstance may not be simple. Storage management consists of some steps which are illustrated following figure.



**Fig. 2.** Storage Management of ethnobotanical information system

- Hierarchical databases
- Network databases
- Relational databases
- Object-oriented databases
- Graph databases
- ER model databases
- Document databases

Ethnobotanical information is significant data it can't be distributed or utilized in the conventional type of scientific articles. Another sort of computer based logical writing is rising in which information are dispersed in electronic databases.

Relational database ideas of software engineering and Data recovery ideas of computerized libraries are significant for comprehension ethnobotanical databases. These are regularly portrayed as semi-organized information, and can be shown to as tables, key delimited records, and XML structures. Cross-references among databases are normal, utilizing database promotion numbers. Ethnobotanical database is a gathering of information that is sorted out with the goal that its substance can without much of a stretch be accessed, controlled, and refreshed.

**3.1 Database Management Systems for Ethnobotany**

Ethnobotanical database is an ethnobotanical gathering of information or records. Database management systems are intended to work with information. A database management system (DBMS) is a product framework that uses a standard technique to store and sort out information. The information can be included, refreshed, erased, or navigated utilizing different standard calculations and questions.

There are a few sorts of database the management systems. Here is a rundown of seven basic database management systems:

**Table 1.** The advantages and disadvantages between relational DB and nonrelational DB

<b>Relational Databases (SQL DB)</b>	
<b>Pros</b>	<b>Cons</b>
<ul style="list-style-type: none"> <li>▪ Relational databases work with structured data.</li> <li>▪ They support ACID transactional consistency and support "joins."</li> <li>▪ They come with built-in data integrity and a large eco-system.</li> <li>▪ Relationships in this system have constraints.</li> <li>▪ There is limitless indexing. Strong SQL.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Relational Databases don't scale out on a level plane great (simultaneousness and information size).</li> <li>▪ Information is standardized, which means bunches of joins, which influences speed.</li> <li>▪ They have issues working with semi-organized information.</li> </ul>
<b>Nonrelational / NoSQL</b>	
<b>Pros</b>	<b>Cons</b>
<ul style="list-style-type: none"> <li>▪ They scale out on a level plane and work with unstructured and semi-organized information. Some help ACID value-based consistency.</li> <li>▪ Pattern free or Schema-on-read alternatives.</li> <li>▪ High accessibility.</li> <li>▪ While numerous NoSQL databases are open source thus "free", there are regularly impressive preparing, arrangement, and improvements costs. There are presently additionally various business items accessible.</li> </ul>	<ul style="list-style-type: none"> <li>▪ More fragile or possible consistency rather than ACID.</li> <li>▪ Constrained help for joins.</li> <li>▪ Information is denormalized, requiring mass updates.</li> <li>▪ Doesn't have worked in information honesty.</li> <li>▪ Constrained ordering.</li> </ul>

**IV. TABLES NEEDED FOR ETHNOBOTANICAL DOCUMENTATION**

After making of ethnobotanical documentation, a few tables are expected to store information and to fill in as query tables. A query table is a table that contains a rundown

of qualities that can be utilized by different tables. For instance, in each plant record, there is a need to put the area from where the example was gathered. The numerous examples were gathered in a similar database, the name of the database must be composed each time you enter information of the example collected from that database. It is compulsory to make query tables for area, plant type, natural surroundings, and plant accessibility, also need to make

separate tables to store information of plants and other ethnobotanical features.

**Table 2.** Table of the botanical description of plants

Column Name	Data type and size	Description
Plant ID	Int	Enter plant ID number
The Name of Plant in Azerbaijani	nvarchar(100)	Enter Azerbaijani name of plants
Scientific Names of plants	nvarchar(100)	Enter Latin name of plants
The Name of Plant in English	nvarchar(100)	Enter English name of plants
The Name of Plant In Russian	nvarchar(100)	Enter Russian name of plants
Plant life-forms	nvarchar(100)	trees, shrubs, herbs, annuals, biennials, perennials
The structure of fruit	nvarchar(1000)	Enter fruit details
The form of flowers	nvarchar(1000)	Enter flowering details
Flowering Months	nvarchar(30)	Enter flowering months
Fruiting Months	nvarchar(30)	Enter fruiting months
The height of plants	nvarchar(30)	Enter height of plants
Poisonousness	nvarchar(150)	Enter poisonousness rate
Resources (informants)	nvarchar(200)	Enter first name, last name, social position of informants

**Table 3.** Table of family name of plants

Column Name	Data type and size	Description
Family ID	Int	Enter family ID number
Family name in Azerbaijani	nvarchar(100)	Enter Azerbaijani family name of plant
Family name in Latin	nvarchar(100)	Enter Latin family name of plant
Plant Family ID (f.k)	Int	Enter Plant Family ID number

**Table 4.** Table of the growing location of plants

Column Name	Data type and size	Description
Location ID	Int	Enter location ID number
Province	nvarchar (50)	Enter name of province
Economic regions	nvarchar (50)	Enter name of economic regions
Administrative divisions	nvarchar (50)	Enter name of administrative divisions

**Table 5.** Table of the diseases name which ethnobotanical plants using of treating process

Column Name	Data type and size	Description
Diseases ID	Int	Enter diseases ID number
PN ID	int	Enter name of plants ID
Diseases	nvarchar(100)	Enter name of diseases

**Table 6.** Table of the name parts of plants which have important role in life of people

Column Name	Data type and size	Description
UPP ID	Int	Enter using parts of plants ID number
PN ID	Int	Enter name of plants ID
Using parts of plants	nvarchar (50)	Enter name of the part of plants

**Table 7.** Table of the name of the chemical substances which existing in the medical plants

Column Name	Data type and size	Description
PCN ID	Int	Enter name of plants ID
Chemical composition ID	Int	Enter chemical composition ID
Chemical substances	nvarchar (100)	Enter name of chemical substances

**Table 8.** Table of the local name of plants

Column Name	Data type and size	Description
PN ID	Int	Enter number of plants ID
Plant name ID	Int	Enter name of plants ID
Location name ID	Int	Enter name of growing location of plants
Local name of plants	nvarchar (100)	Enter local name of plants

**Table 9.** Table of the name of the using forms of plants

Column Name	Data type and size	Description
PUF ID	Int	Enter plants' using forms ID
PN ID	Int	Enter name of plants ID
Plants' using forms	nvarchar (100)	Enter name of using forms of plants

**Table 10.** Table of the negative effects of plants

Column Name	Data type and size	Description
PNE ID	Int	Enter negative effects ID of plants
PN ID	Int	Enter name of plants ID
Negative effects of plants	nvarchar (100)	Enter name of negative effects of plants

## V. CONCLUSION

Regardless of varieties in methodologies, presence of many covering highlights illustrated excess of assets and endeavors. As the improvement of worldwide information in a solitary database may not be conceivable in perspective on the way of life explicit contrasts, endeavors can be given to explicit territories. Existing situation calls for methodology for characterizing a typical standard in ethnobotanical database for information and scientific progression. It is clearly shown that the most suitable way for gathering ethnobotanical information in a database is to use SQL Server. Databases focus on areas which plants are grown, medication system of society, territorial perspective, malady and phytochemical data are investigated. Issues related to data standards, and lack of information connecting among various ethnobotanical information systems and other issues like absence of update and manageability. In this article has been illustrated some steps of storage management for ethnobotanical system and compared relational database (SQL Server) and nonrelational database (noSQL). It was shown separate tables to store information of plants and other ethnobotanical features for creating ethnobotanical database. At the result, it is possible to create database in MS SQL Server with using these tables.

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