Protecting Traditional Knowledge Digitally:
A Case Study of TKDL

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Abstract: *Traditional knowledge on biodiversity from India has been particularly vulnerable to patent claims and the Indian government and NGOs have made several biopiracy claims in recent years. India has taken various initiatives regarding the protection of traditional knowledge under intellectual property rights, including the Traditional Knowledge Digital Library (TKDL), which is a major step to curb biopiracy. The paper discusses various aspects of TKDL including its role in the preservation, protection and dissemination of traditional knowledge, searching facilities, benefits, and current status. The paper also tries to explore the Traditional Knowledge Resources Classification.*

1. INTRODUCTION

Traditional knowledge (traditional knowledge), indigenous knowledge (IK), and local knowledge generally refer to the matured long-standing traditions and practices of certain regional, indigenous or local communities. Traditional knowledge also encompasses the wisdom, knowledge and teaching of these communities. In many cases, traditional knowledge has been orally passed from person to person for generations. Some traditional knowledge is expressed through stories, legends, folklores, rituals, songs and even laws. Other forms of traditional knowledge are often expressed through different means.

Recently, international attention has turned to the use of intellectual property laws to preserve, protect and promote traditional knowledge. Three broad approaches have been developed. The first emphasizes protecting traditional knowledge as a form of cultural heritage. The second looks at the protection of traditional knowledge as a collective human right. The third, taken by the World Trade Organization (WTO) and the World Intellectual Property Organization (WIPO) investigates the use of existing or novel measures to protect traditional knowledge.

2. OBJECTIVES

The present study was carried out to study an unique digital initiative taken by India to protect the traditional knowledge i.e. creation of Traditional Knowledge Digital Library. The study was carried out with following objectives

- To take a brief review of existing documentation on traditional knowledge
- To study the biopiracy instances and protection measures of TK in India.
- To study the role of TKDL in protecting traditional knowledge
- To study Traditional Knowledge Resource Classification (TKRC) system

- To analyse the contents of Representative database of TKDL

3. SCOPE AND LIMITATIONS

The present study will be restricted to analysis of representative database of TKDL which is readily accessible from the official website of TKDL. The scope includes 1200 formulations selected from various classical texts of Ayurveda, Unani and Siddha systems of medicine viz 500 formulations from Ayurveda, 500 formulations from Unani and 200 Siddha formulations.

4. METHODOLOGY

The study focuses on current status of TKDL. The paper is largely based on review of the literature. An analytical study has been carried out in which the contents of the representative database of TKDL was studied in detail.

5. REVIEW OF LITERATURE

5.1 India and Traditional Knowledge

India is a country, which has been nurturing a tradition of civilization over a period of about 5,000 years. India's ancient scriptures consist of the four Veda, 108 Upanishads, 2 epics, Bhagavad-Gita, Brahma sutras, eighteen *Puranas, Manusmriti, Kautilya Shastra* and *smritis.* Biologically speaking, India is one of the 12 most biodiverse countries of the world. With only 2.4 percent of the world's land area, India accounts for 7 to 8 percent of the recorded species of the world. India's diversified agro-climatic nature is a blessing. The whole world has 26 agro-climatic zones and India alone has 16 agro-climatic zones. India's diversified agro-climatic zones start from the Trans-Himalayan region to the coastal areas of Kerala, Andaman and Nicobar, which are home to a varied range of medicinal plants like herbs, shrubs, tubers, mangroves and rhizomes. The Botanical Survey of India and the Zoological Survey of India have recorded over 47,000 species of plants and 81,000 species of animals. (Simeone)

This multitude of natural wealth has created a renewed interest in the traditional medicinal system, which includes the Unani, Yoga, Ayurveda, Homeopathy and Siddha systems. The Ayurveda is the oldest and most effective of these alternative systems of medicine. The ancient scriptures of the Ayurveda are full of instances where herbs with medicinal properties were used not only for curative purposes but also for increasing physical and mental efficiency.

Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry. Many widely used products, such as plant-based medicines and cosmetics, are derived from traditional knowledge. Other valuable products based on traditional knowledge include agricultural and non-wood forest products as well as handicrafts.

5.2 Biopiracy

Traditional knowledge has always been an easily accessible treasure and thus has been susceptible to misappropriation. The traditional knowledge, particularly, related to the treatment of various diseases has provided leads for development of biologically active molecules by the technology rich countries. In other

words, traditional knowledge is being exploited for bio prospecting. Also Traditional knowledge is often misappropriated, because it is conveniently assumed that since it is in public domain, communities have given up all claims over it.

Biopiracy can be defined as the stealing of biomedical knowledge from traditional and indigenous communities or individuals. The term can also be used to suggest a breach of a contractual agreement on the access and use of traditional knowledge to the detriment of the provider, and also applies to bioprospecting without the consent of the local communities. (Gupta 2005)

5.3 Biopiracy: the Indian Experience

In 2000, CSIR found that almost 80 per cent of the 4,896 references to individual plant based medicinal patents in the United States Patents Office that year related to just seven medicinal plants of Indian origin. Three years later, there were almost 15,000 patents on such medicines spread over the United States, UK, and other registers of patent offices. In 2005 this number had grown to 35,000, which clearly demonstrates the interest of developed world in the knowledge of the developing countries. Conveniently, none of the patent examiners are from developing countries, allowing a virtual free pass to stealing indigenous knowledge from the Old World. (Martin)

4. Cases of Biopiracy in India

- ***Turmeric:*** The rhizomes of turmeric are used as a spice for flavouring Indian cooking. It also has properties that make it an effective ingredient in medicines, cosmetics and dyes. As a medicine, it has been traditionally used for centuries to heal wounds and rashes. In 1995, two expatriate Indians at the University of Mississippi Medical Centre (Suman K. Das and Hari Har P. Cohly) were granted a US patent (no.5, 401,504) on use of turmeric in wound healing. The Council of Scientific & Industrial Research (CSIR), India, New Delhi filed a re-examination case with the US PTO challenging the patent on the grounds of existing of prior art. CSIR argued that turmeric has been used for thousands of years for healing wounds and rashes and therefore its medicinal use was not a novel invention. Their claim was supported by documentary evidence of traditional knowledge, including ancient Sanskrit text and a paper published in 1953 in the Journal of the Indian Medical Association. The US Patent Office revoked this patent in 1997, after ascertaining that there was no novelty; the findings by innovators having been known in India for centuries.(Menon)

- ***Neem:*** Neem extracts can be used against hundreds of pests and fungal diseases that attack food crops; the oil extracted from its seeds can be used to cure cold and flu; and mixed in soap, it provides relief from malaria, skin diseases and even meningitis. In 1994, European Patent Office (EPO) granted a patent (EPO patent No.436257) to the US Corporation W.R. Grace Company and US Department of Agriculture for a method for controlling fungi on plants by the aid of hydrophobic extracted Neem oil. In 1995, a group of international NGOs and representatives of Indian farmers filed legal opposition against the patent. They submitted evidence that the fungicidal effect of extracts of Neem seeds had been known and used for centuries in Indian agriculture to protect crops, and therefore, were unpatentable. In 1999, the EPO determined that according to the evidence all features of the present claim were disclosed to the public prior to the patent application and the patent was not considered to involve an inventive step. The patent granted on was Neem was revoked by the EPO in May 2000. (Menon)

- ***Basmati Rice:*** Rice Tec. Inc. had applied for registration of a mark “Texmati” before the UK Trade Mark Registry. Agricultural and Processed Food Exports Development Authority (APEDA) successfully opposed it. One of the documents relied upon by Rice Tec as evidence in support of the registration of the said mark was the US Patent 5,663,484 granted by US Patent Office to Rice Tec on September 2,

1997. This US utility patent was unique in a way to claim a rice plant having characteristics similar to the traditional Indian Basmati Rice. It was challenged and later revoked by USPTO. (Subbiah)

5.5 Documentation of Traditional Knowledge

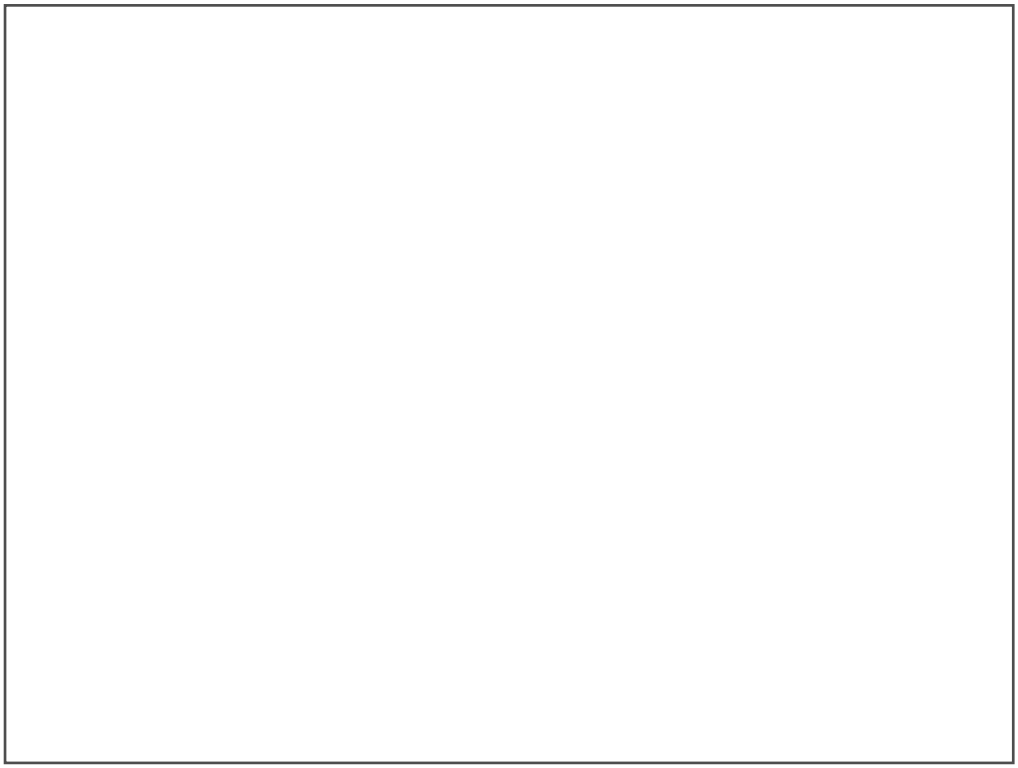
India has woken up to the task of protecting her traditional knowledge from patent bio-piracy. Protection and preservation of traditional knowledge have been a matter of concern to the developing countries in general and India in particular. As a result of this, in 1999, the Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy-(AYUSH), erstwhile Department of Indian System of Medicine and Homoeopathy (ISM&H) constituted an inter-disciplinary Task Force, for creating an approach paper on establishing a Traditional Knowledge Digital Library (TKDL).The project TKDL was initiated in the year 2001.

6. Traditional Knowledge Digital Library (TKDL) http://www.tkdl.res.in/

TKDL is a collaborative project between Council of Scientific and Industrial Research (CSIR), Ministry of Science and Technology and Department of AYUSH, Ministry of Health and Family Welfare, and is being implemented at CSIR. An inter-disciplinary team of Traditional Medicine (Ayurveda, Unani, Siddha and Yoga) experts, patent examiners, IT experts, scientists and technical officers are involved in creation of TKDL for Indian Systems of Medicine.

The project TKDL involves documentation of the traditional knowledge available in public domain in the form of existing literature related to Ayurveda, Unani, Siddha and Yoga, in digitized format in five international languages, which are English, German, French, Japanese and Spanish.

Figure No. 1: Home page of TKDL



7. Traditional Knowledge Resource Classification (TKRC)

Traditional Knowledge Resource Classification (TKRC), an innovative structured classification system for the purpose of systematic arrangement, dissemination and retrieval has been evolved for about 25,000 subgroups against few subgroups that was available in earlier version of the International Patent Classification (IPC), related to medicinal plants, minerals, animal resources, effects and diseases, methods of preparations, mode of administration, etc.

The TKRC is mainly divided into the following sections:

A – Ayurveda

B – Unani

C – Siddha

Y – Yoga

Section A ie Ayurveda is divided into the following classes:

01 – Pharmaceutical preparations (Kalpana)

02 – Personal Hygiene Preparations

03 – Dietary (Food / Food stuff or Beverages)

04 – Biocides, Fumigatives (Dhupana, Krimighna)

The Pharmaceutical preparations are divided into following sub-classes based on the material used.

01A – Based on Plants (Audbhida)

01B – Based on Animals (Jangama)

01C – Based on Minerals (Parthiva)

01D – Characterised by Diseases (Roga)

01E – Characterised by Actions (Karma)

01F – Mode of Administration

01G – Miscellaneous

8. National Knowledge Commission and TKDL

The National Knowledge Commission, Government of India, in December 2007, recommended that the work on TKDL should be diversified and expanded. Further, the Commission suggested that steps should be taken for the use and incorporation of TKDL, with all pertinent sources of information, into the minimum search documentation lists of International Search Authorities and other offices while processing patent

applications. (National Knowledge Commission 2005)

9. TKDL Database: Current Status

It is a database with a tool to understand the codified knowledge existing for the Indian Systems of Medicine including Ayurveda, Siddha, Unani and Yoga as prior art. It is not a diagnostic or usage database. TKDL is also not the prior art in itself; the Books on Indian Systems of Medicine are the prior art, which act as the source of information for TKDL.

However, TKDL contains the scanned images of medicinal formulations from the original books. TKDL covers over two lakh formulations, which have been taken from Ayurveda, Unani, Siddha and Yoga texts. It is pertinent to note that TKDL does not contain the entire information existing in the Indian Systems of Medicine. Rather than comprehensive, TKDL is a dynamic database, where formulations will be continuously added and continuously updated according to the inputs from the users of the database. The full database has been made available to all the IPR offices worldwide to facilitate Prior Art search and prevent biopiracy.

A representative database containing 1200 formulations selected from various classical texts of Ayurveda, Unani and Siddha systems of medicine can be accessed from the offcial website of TKDL. It includes 500 formulations from Ayurveda, 500 formulations from Unani and 200 Siddha formulations, which are readily available.

10. Yoga and Traditional Knowledge

Copyrights over yoga postures and trademark on yoga tools have becoming rampant in the West. Till now, 130 yoga-related patents granted in the USA are traced.

Scientists are presently scanning through 35 ancient Sanskrit texts, including the Mahabharata, Bhagawad Gita and the Yoga Sutras of Patanjali to identify and document all known yoga concepts, postures and terminology. Till now, 600 ‘asanas’ (physical postures) have already been documented. The team plans to put on record at least 1,500 such yoga postures by the end of 2009. Besides photos and explanation of the postures, video clips of an expert performing them will be put inside the TKDL. A voice-over will also point out which text mentions the posture. The information will be available in five international languages. (Yoga Piracy)

6. OBSERVATIONS

6.1 Milestones in TKDL Project

The activities of creation of TKDL began in 1999. The project TKDL was initiated in the year 2001. The database is growing day by day and it is well appreciated by developing as well as the developed countries. The major milestones in this project are described briefly in Table No. 1.

Table No. 1: Milestones in TKDL Project

Sr. No	Activity	Period	Responsibility
1.	Recognition of need of creation of	June, 1999	Third Plenary Session of

	Traditional Knowledge (TK) databases and need of support to developing countries by Standing Committee on Information Technology (SCIT) of World Intellectual Property Organization (WIPO).		SCIT, WIPO under the Chairmanship of Dr. R. A. Mashelkar, the then Director General of CSIR, India
2.	Direction to Department of Indian Systems of Medicine & Homoeopathy (ISM&H) for initiating measures to protect Indian Traditional Knowledge, in particular, Ayurveda	-	Planning Commission constitutes Task Force under the Chairmanship of Prof. D.N.Tiwari,the then Member Planning Commission on S&T.
3.	Approach paper on setting up of TKDL.	October, 1999	Paper prepared by Mr. V. K. Gupta, the then Senior Technical Director, National Informatics Centre at the direction of the then Secretary, Department of ISM&H
4.	Submission of approach paper to SCIT, WIPO	December, 1999	Dr. R. A. Mashelkar, the then Director General of CSIR, India
5.	Setting up of the interdisciplinary (inter-ministerial Task Force on TKDL, consisting of experts from Department Of ISM&H, Central Council of Research in Ayurveda & Siddha (CCRAS), Banaras Hindu University (BHU), National Informatics Centre (NIC), Controller General of Patents Designs & Trade Marks (CGPDTM), etc. under the Chairmanship of the then Senior Technical Director in NIC, Mr. V. K. Gupta	January, 2000	Department of ISM&H
6.	Submission of TKDL Task Force Report to Department of ISM&H*	May, 2000	TKDL Task Force
7.	Presenting TKDL Concept & Vision at International forum	May, 2000	Dr.R.A.Mashelkar, the then Director General of CSIR, India
8.	Cabinet Committee of Economic Affair’s (CCEA’s) approval on TKDL Project	January, 2001	Department of ISM&H
9.	Memorandum of Understanding (MoU) between Department of ISM&H and National Institute of Science Communication (NISCOM)**	June, 2001	Department of ISM&H and NISCOM
10.	TKDL software, specifications and design	July, 2001	Mr. V. K. Gupta, the then Director, NISCOM
11.	Establishing TKDL team of Project Assistants (IT), Ayurveda, Patent Examiners, etc.	October, 2001 to March, 2002	NISCOM, CCRAS, Department of ISM&H and CGPDTM.
12.	Presentation on Traditional Knowledge Resource Classification (TKRC) at International Patent Classification (IPC) Union for getting established WIPO-TK Task Force consisting of USPTO, EPO, JPO, China and India	February, 2001	Mr. V. K. Gupta, the then Director, NISCOM
13.	WIPO-TK Task Force recommended for adding a subclass under A 61	February, 2002	Meeting on behalf of India was attended by Mr. V. K. Gupta, the then Director, NISCOM as the member of International Task Force and the presentation was made on the issue of linkage between TKRC and IPC
14.	Committee of Experts recommended:(i) inclusion of approx. 200 subgroups on TK against earlier few sub-groups on medicinal plants, (ii) linking of TKRC to IPC and (iii) continuation of work on biodiversity, TK and TCE	February, 2003	-------do-------

15.	Internationally recognized specifications and standards for setting up of TK data bases and registries based on TKDL specifications (a) Drafting of specifications at WIPO Regional Symposium at Kochi, based on TKDL	November, 2002	Regional TK experts from China, Philippines, India (Prof. Anil Gupta, Prof. Madhav Gadgil, Dr. Darshan Shankar, Mr. V. K. Gupta, etc.)
	(b) Presentation of WIPO document No. WIPO/GRTKF/IC/4/14 at the 4th Session of Intergovernmental Committee (IGC) of WIPO on Intellectual Property and Genetic Resources, Traditional Knowledge and Expression of Folklore	December, 2002 July, 2003	Mr. V. K. Gupta, the then Director, National Institute of Science Communication And Information Resources (NISCAIR)
	(c) Adoption of recommendations contained in document No. WIPO/ GRTKF/IC/4/14 by International IP community at the 5th Session of IGC		Intergovernmental Committee (IGC) of WIPO
16.	Constitution of Access Policy Issue Committee (APIC)	August, 2002	(i) Frame policies on accessing TKDL database (ii) Decide on matters relating to dissemination of TKDL (iii) Meet defensive and positive objectives of TKDL
17.	Completing data abstraction work on 36,000 Ayurveda formulations for creating TKDL in five languages, i.e. English, German, Spanish, French and Japanese	March, 2003	TKDL team of Project Assistants (IT), Ayurveda, Patent Examiners and Scientists functioning since October 2001 at NISCAIR (erstwhile National Institute of Science Communication, NISCOM).
18.	Release of demo CD containing a sample of 500 formulations	October, 2003	Released by the then Hon’ble Union Minister of Human Resource Development, Science & Technology, and Ocean Development and presided by the then Hon’ble Union Minster of Health & Family Welfare and Parliamentary Affairs.
19.	Initiation of the TKDL Unani project	June 2004	Department of AYUSH and NISCAIR
20.	Initiation of TKDL Ayurveda Phase II	August 2004	Department of AYUSH and NISCAIR
21.	Meeting with Hon’ble Minister of Health and Family Welfare on providing access to TKDL database to European Patent Office (EPO)	August 2004	Department of AYUSH and NISCAIR
22.	Concordance between IPC and TKRC and approval on linking of TKRC with IPC	October, 2004	35th IPC Union Meeting Describe Concepts presented by Mr. V.K. Gupta, Director NISCAIR
23.	Workshop on Creation of TKDL for SAARC Countries	December, 2004	SAARC Documentation Centre, NISCAIR and Ministry of Human Resource Development
24.	Request for access to TKDL by EPO	July 2005	CSIR
25.	Initiation of project on TKDL Siddha	August, 2005	Department of AYUSH and NISCAIR
26.	Creating of TKRC containing approx. 25,000 subgroups	December, 2005	NISCAIR

27.	Inclusion of 207 subgroups,related to algae,fungi,lichens or plants or derivatives thereof used in Traditional Herbal Medicines in International Patent Classification, 8th Edition	January, 2006	IPC union,WIPO
28.	Approval on Access to TKDL database to International Patent Offices(IPOs) by Cabinet Committee on Economic Affairs	June 2006	-
29.	Vetting of Access Agreement	August,2005; March,2008; June,2005; December,2005; February,2008; January, 2006	(i) Legal and Treaties Division, Ministry of External Affairs (ii) Department of Legal Affairs, Ministry of Law and Justice (iii) Shri Praveen Anand, Leading Patent Attorney (iv) Shri Soli J. Sorabjee, Former Attorney General
30.	Access Agreement sent to EPO	July, 2006; December, 2006	CSIR
31.	Request by United States Patent and Trademark Office(USPTO) for access to TKDL database and sending of Access Agreement	December, 2006	CSIR
32.	APIC meeting to discuss the responses given by EPO and USPTO	June, 2007	APIC
33.	Initiation of activities on creation of TKDL Yoga	January 2008	CSIR, Department of AYUSH and Morarji Desai national Institute of Yoga (MDNIY)
34.	APIC meeting to discuss the clarifications sought by EPO, gives clearance for signing of Access Agreement	July, 2008	APIC
35.	TKDL database containing over 2 lakh formulations on Ayurveda, Unani and Siddha comprising 30 million A4 sized pages	July 2008	CSIR
36.	Access to TKDL database given to European Patent office under Access Agreement	February, 2009	CSIR
37.	Request for access to TKDL by German Patent and Trademark Office (DPMA)	March 2009	CSIR
38.	Request from Malaysia for having a joint workshop on experience sharing in the area of traditional medical knowledge	March, 2009	CSIR
39.	Request from Thailand for having a joint workshop on experience sharing in the area of traditional medical knowledge	April, 2009	CSIR
40.	Transcription of 2.05 lakh formulations	August, 2009	CSIR
41.	USPTO in principle agreement to TKDL Access Agreement conveyed to Indian Mission in US	May 2009	Acting Director USPTO
42.	Formal agreement to TKDL Access Agreement by USPTO	July 2009	USPTO
43.	Prior art evidence based on TKDL citations under Third Party observations against 35 Pipe line patent applications at EPO	June-July 2009	V.K.Gupta, Senior Advisor and Director, TKDL
44.	Based on third party observation filed,EPO asked applicant to take position on TKDL cited references for a patent relating to cancer treatment using Pistacia species	July 2009	EPO
45.	EPO set aside intention to grant patent on antivitilgo cream to Perdix Euro group SL Spain based on	July 2009	EPO

	TKDL Cited references and re-opened the case for substantive examination.			
46.	Access to TKDL database granted to CGPDTM (Indian Patent Office) under Access Agreement	July, 2009	CSIR	
47.	Access to TKDL database given to German Patent and Trademark Office (DPMA) Under Access Agreement	October, 2009	CSIR	
48.	Withdrawl of four patent applications at EPO based on TKDL database	August-November 2009	EPO	
49.	Access to TKDL database given to USPTO under Access Agreement	November, 2009	CSIR	

6.2 Present Status of TKDL

Present status of transcription of the traditional medicine formulation in the Traditional knowledge Digital Library is given in the following table

Table No. 2: Present Status of TKDL (as on November 2009)

Sr. No.	Discipline	No. of texts (including volumes) used for transcription	Transcribed
1	Ayurveda	75 books	82,665
2	Unani	10 books	1,13,800
3	Siddha	50 books	12,778
4	Yoga	13 books	974
	Total	148 books	2,10,217

6.3 Content Analysis of Representative Database of TKDL

A detailed content analysis of Representative database of TKDL reveals following findings

Table No. 1: Contents of Representative TKDL database

Sr. No.	Subject	No. of Formulations	%
1	Ayurveda	500	41.67
2	Unani	500	41.67
3	Siddha	200	16.66
	Total	1200	100

The selected 1200 formulations make use of about 308 plants as ingredients besides ingredients of animal or mineral origin. These formulations are in turn used to treat 214 diseases.

4. Search Types and Search Options

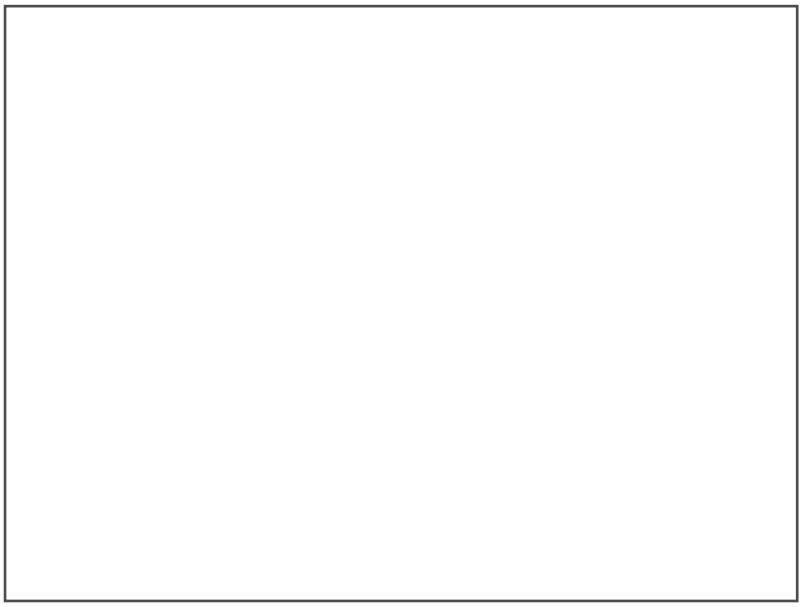
The database can be searched in two ways viz

- ***Simple Search:*** Different search terms including Keywords, Diseases and IPC Codes can be used with the operator 'OR' (the use of operator 'AND' is not supported). The corresponding menu lists all the search terms available in this database and can be used to select the appropriate search term.

- ***Advanced Search:*** This option allows search using several search terms such as Keywords, Disease, IPC Code, Bibliography and Title, each individually specified. All these terms can be

selected from appropriate help menus. Figure No. shows the screen of Advanced search

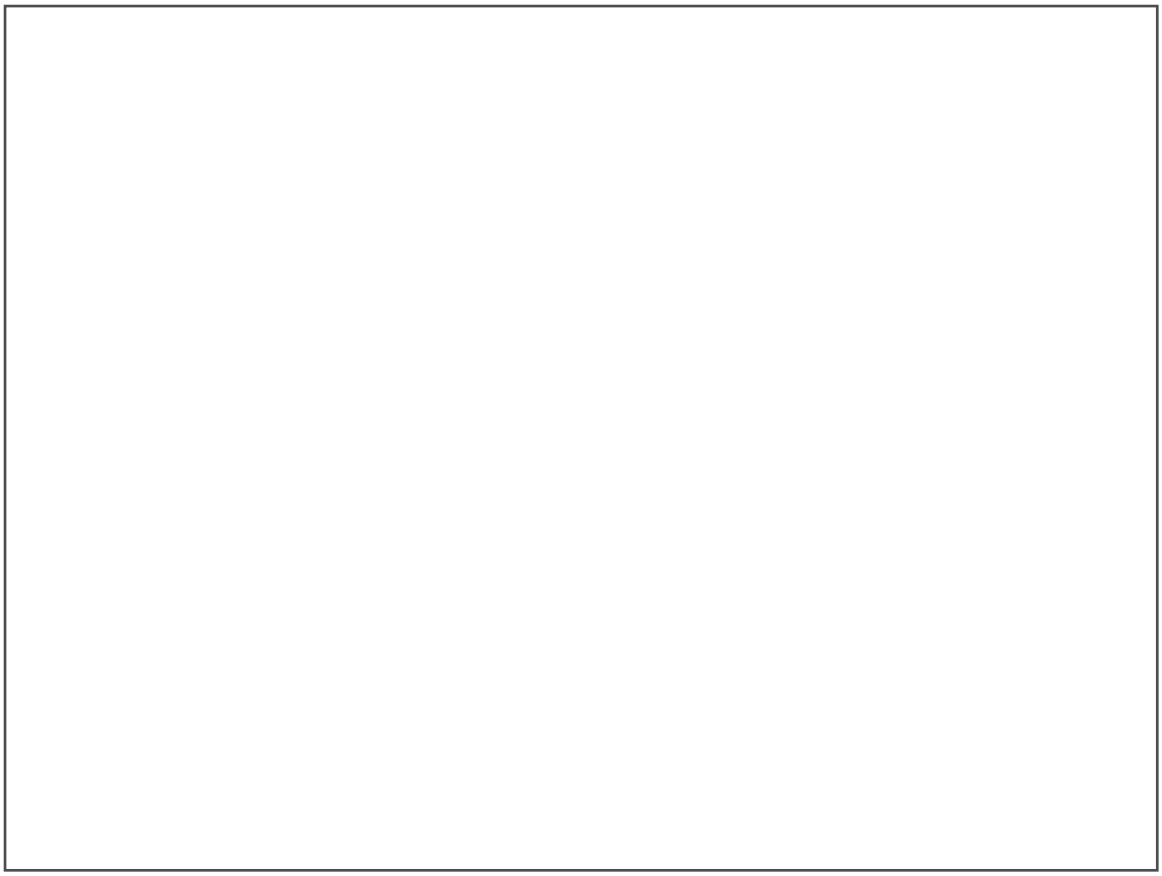
Figure No. 2: Advanced Search Window



5. Help Menu

TKDL database offers a strong backbone of Help Menu in the form of Keyword Help, IPC Help, Title Help, Biblio Help and Disease Help, which facilitates effective searches. Figure No. 3 shows the search results by giving the Keyword ‘bamboo’. Total 8 formulations are found.

Figure No. 3: Search results for ‘Bamboo’ Keyword



7. CONCLUSION

Once the traditional knowledge is recorded in TKDL, legally, it becomes public domain knowledge. Under the patent law, this means that it is considered to be prior art and hence is not patentable. Such a written record, in a form easily accessible to patent offices around the world, would provide all such offices with a record of India's prior art. Patent examiners could easily check this database and reject any patent application that might be a mere copy of traditional knowledge. Thus it helps in preventing cases of bio-piracy.

TKDL has a rich database of information and proved to be extremely useful to research and industry, both in India and abroad, providing an impetus to invention, and the development of products such as medicines, which would be of immense value to all of mankind.

TKDL serves the purpose of integrating the various documents related to traditional knowledge in a common language and in an easy retrieval form. It is of enormous benefit in developing the traditional knowledge further.

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She has 18 years professional experience. Presently working as Sr. Lecturer at Department of Library and Information Science, RTM Nagpur University, Nagpur. She has worked at Patent Information System, Nagpur for 11 years and as a Librarian at Shivaji Science College, Nagpur for 6 years. She has published 4 books, 5 papers in International journals and 14 papers in National journals. She has 4 papers published in International conference proceedings and 20 papers in National conference proceedings. Recently she has presented a paper at International Conference on E-governance at Boston, USA. She is recipient of P.V. Verghese Award for Best Paper published in ILA Bulletin in 2002.

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