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IAD: The first online initiative to the documentation of Aphyllophorales Fungi from India

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ABSTRACT

This is the first on-line database i.e. IAD- Indian Aphyllo-Fungal Database has been launched on the website www.fungifromindia.com. In all there are 1646 records of Indian Aphyllophorales has been put from 52 families, 190 genera and 1217 species of a much neglected group of Basidiomycetes fungi. Every species has been given a unique identity number that can be cited in the publication where the nomenclatural novelty is introduced. Every record of this database has been linked with the world reputed myco-database (www.mycobank.org). This Indian Aphyllofungal database contributes to the first initiative for the international biodiversity documentation from India, where they will further be linked to other databases from world.

Key words: Aphyllophorales, IAD, Myco-Bank, mycology, online database.

INTRODUCTION

Fungi are among the most diverse and important organisms. If the estimate is correct, then sites share enough species to make broad-scale inventory work possible yet harbors sufficient number of unique species to make valuable contributions to our understanding of fungi biodiversity and the ecological, evolutionary and genetic processes of these fungi and their associated organisms (Mueller Bills and Foster, 2004).

Aphyllophorales:
Aphyllophorales order was proposed by Rea, after Patouillard, for Basidiomycetes having macroscopic basidiocarps in which the hymenophore is flattened (Thelephoraceae), club-like (Clavariaceae), tooth-like (Hydnaceae) or has the hymenium lining tubes (Polyporaceae) or sometimes on lamellae, the poroid or lamellate hymenophores being tough and not fleshy as in the Agaricales. Traditionally the order has had a core of four families based on hymenophore shape, as described above, but recent detailed microscopic studies of basidiocarp structure has shown these groupings to be unnatural and the taxonomy of the order is at present in a state of flux. Donk (1964), who recognized 22 families are now followed, (Hawksworth *et al.*1991). Keys to 550 spp. in culture are recognized by Stalper (1978).

The ultimate aim of the present study was to compare occurrence and distribution of wood rotting Aphyllophorales from the Pune district and to give easy access to researchers and the students for the Indian Aphyllophorales Fungal information. It has tremendous mycological significance and we are sure that it will update the knowledge of wood rotting Aphyllophorales of Pune and India. This is the first Indian database on a much neglected group of Basidiomycetes. The database will inspire the students as well as researchers to study the Aphyllophorales from India. Such type of database gives the information in very short period which will help researchers to save their energy and time for further research.

MATERIALS AND METHODS

Digitization work- Database preparation (Indian Aphyllo-fungal Database i.e. IAD)

Card Preparation:
More than 1700 reference cards of size 17.5 x 12.5 cms were prepared from extensively surveyed Indian literature including reference books, research papers, explainatory notes etc. The latest nomenclatural change has been added on the card by different coloured ink. The basic reference is quoted at the right hand corner of the ruled card. The important references of the same species are added on the back side of the reference card. The information on the card is kept in similar format for all the cards as follows.

Digitization:
Now a days digitization is a need in every field of information generation, processing, preservation and access. Many institutions and agencies run the activities at National and international level. In India the digization programmes are on the first step and becoming more focused activities now a days. The technologies are a complex process of experimentation with gains and losses, triumphs and failures (Dasgupta, 2005; Nagarkar 2000)

Because of digital technology expectations of people's hopes are increased for facing the challenges bridging the gap between information rich and poor countries and also upgrading the level of development in all its different facets. Now after all this, the responsibilities rests on may persons like decision makers, technological experts etc. and also the local institutions for roles in bringing digital information to the diverse mob of the country

For getting multi-lingual and multi-sectoral information more sophisticated technology is needed based on available technical infrastructure. As the rate of development is seen after few years every corner of India will be having digital technology. Many Indian decision makers have now realized the value of information is power and Government of India with other agencies are also taking necessary efforts to enrich IT based Information for substantial improvement in the quality of life of every Indian personnel. (Dasgupta, 2005).

Card:

Short form of the reference at right hand side top corner
Recent name of the species
Old name of the species
Family
Host
Locality
Distribution
Reference sited

Data Feeding in Excel:

The data on the above said cards is feed in different columns sequence wise as that of the card information so that the uniform system is developed in the database. MS Office 2007 has been used for creating the MS Excel sheets. The advantage of the excel sheet data was that we could import the same data in any usable format, which was not possible in other forms so easily. More than 1700 entries of the records have been done from all over India very keenly.

Database Building:

In this database the software's which are used as follows:

DBMS	:**MySQL Server 5.0**
Serverside script	: **PHP 5.2.9**
Server	: **Apache 2.2**
Javascript library	: **Scriptaculosus**

Being reference data it is not complex in terms of relationships between the files. But the complexity is present in terms of repeating phrases/words and different words with same/similar meaning. The primary key for the record table is defined by the collection of three columns viz. genus, species and original reference. The original reference field had to be added in the primary key since there can be repeating genus-species combination obtained from different sources of data. Uid is the unique identification number for each record. The columns in the database are as follows:

Software:

Between the physical database itself (i.e. the data as actually stored) and the users of the system is a layer of software, usually called the database management system or DBMS. DBMS provides a view of the databases that is elevated somewhat above the hardware level and supports user operations that are expressed in terms of that higher level view.

Description of All Pages of Database:

The website contains the pages as follows Home page, General search (Simple search), Advanced Search, Output of the search, Browse, Card viewer, Card, References page, Contact page, Site Map, Help Page, Publications and Data entry page.

Figures 1: Database Home page

Home page:
It contains introductory information and links to other pages. Data statistics given on the front page will change automatically as per the updates in the data records. **(Figure No. 1).**

General search (Simple Search) Page:(Figure No. 2)
It contains a text input field where user can type keywords to be searched. There is also a dropdown box for selecting the operate (AND/OR). A button is added to the page which is used to initiate the querying process. When this search button is pressed on 'onclick' event is fired and subroutine is called. This subroutine (written in java script) takes key words and operator from corresponding fields of the pages and sends it to the serverside script that accesses the database (here it is simple search.php). This script works in backend to search for the data.

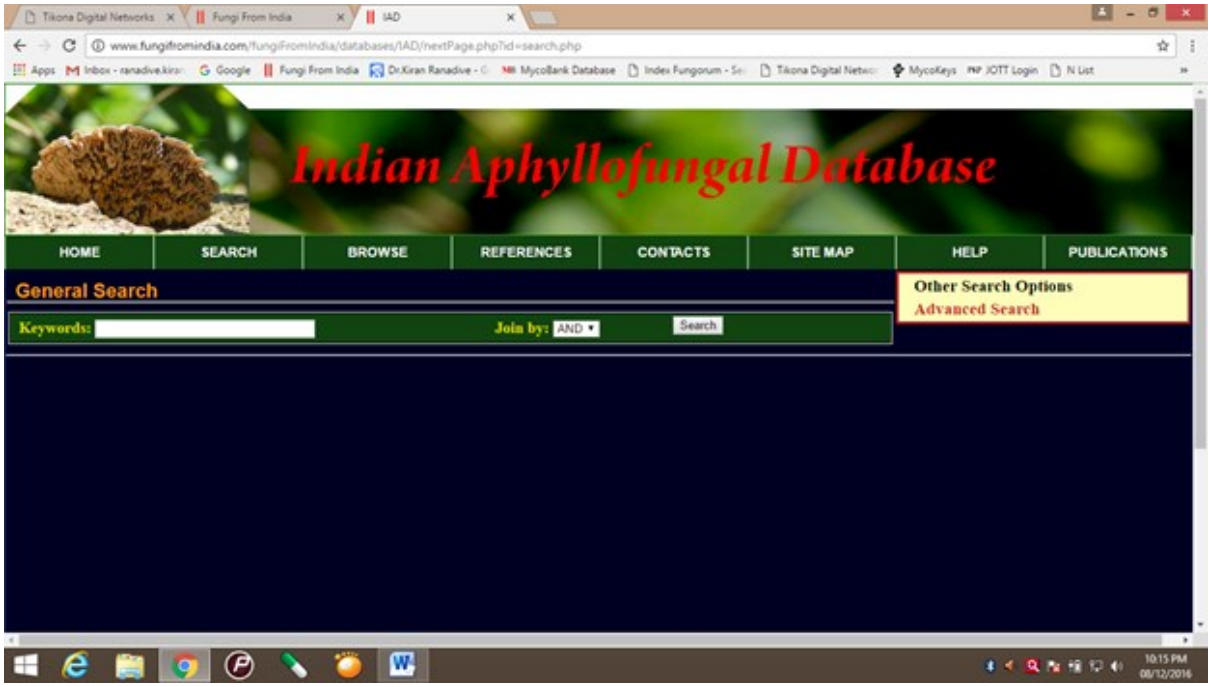

Figure 2 : Database Simple Search and Advanced Search page:

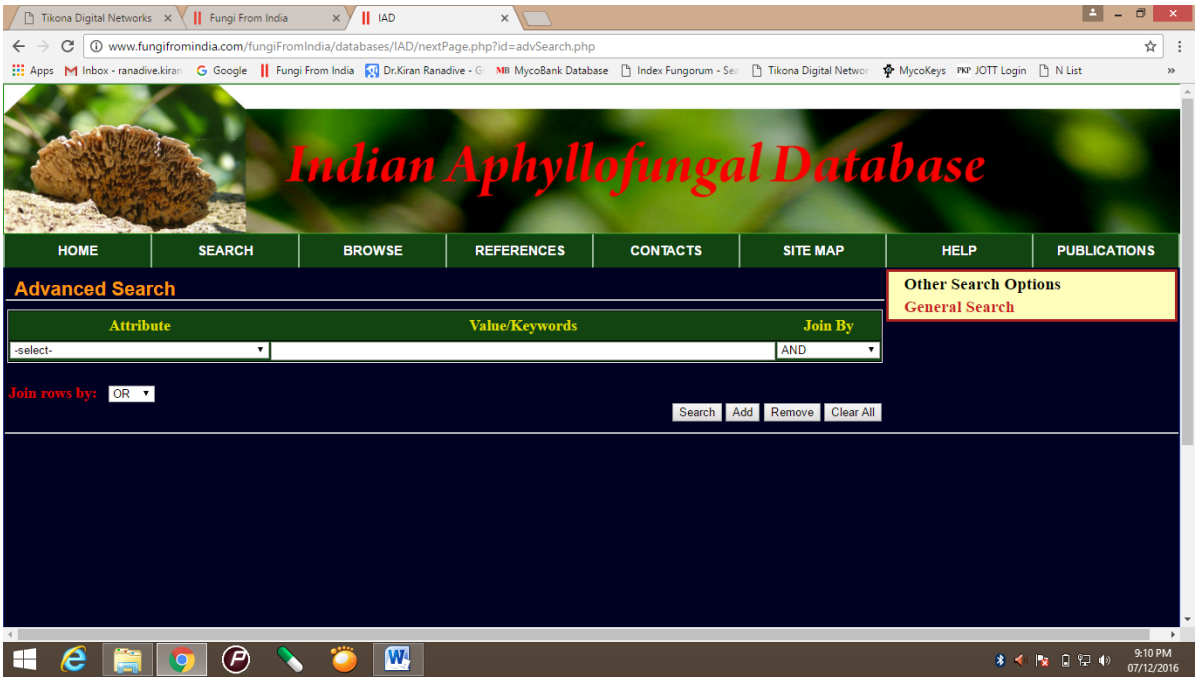

Figure 3 : Database Advanced Search page:

If the data matching to the query is found, the script generates a tabular output in html format and returns it to the client. Being in the "html format", the data can then be viewed in browser as the html page that contains the search results.

Advanced Search Page: (Figure No. 3)
This page contains three input fields as follows
a. Dropdown box- For selecting database field to be searched.

b. Text input field - For Keywords, dropdown box for logical Operate.

c. Row join operator-For joining multiple searches.
The set of these 3 basic input fields mentioned above form a single search. More than one searches can be performed in one go by adding such sets of three field s and joining them by 'row join operator'. For this add and remove buttons are given.

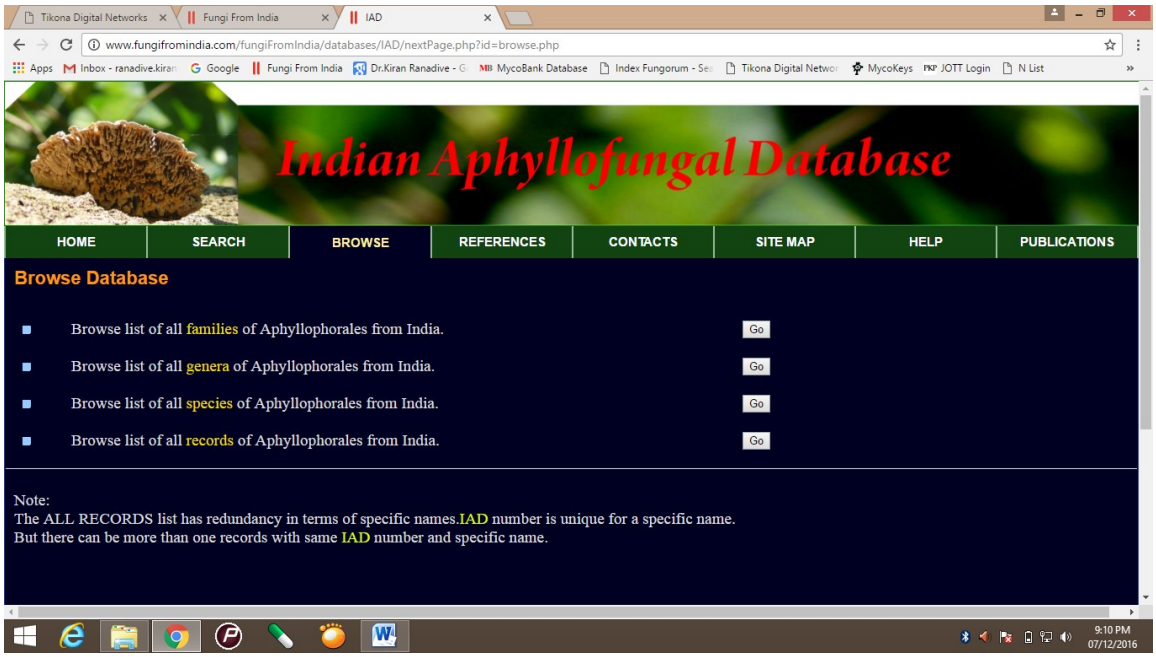

Figure 4-a: Database Browse page

Figure 4-b : Database Search page result:

Output of the Search:
Both simpleSearch.php and advSearch.php generate output in same format. The searched records are presented in a tabular format with serial number, IAD-ID number genus name, species name and family name as the columns. The output generated by this script is in a card format and is not presented to the user as different page but is dynamically embedded in the existing search results page. This achieves the purpose of both user-friendliness and the minimum amount of data transfer. The embedded page is formatted in such a way that the user feels as if looking the hardcopy of the card. The card can be closed using the provided 'close' button and other cards can be reviewed in the same page without querying the database again and again.

Browse page:(Figure No. 4a and 4b)
Browse: Family
Browse: species specific query
Output of browse queries is same as that for search queries.

Card Viewer:(Figure No. 5)
This page will display the card as well as the background showing glimpses of the result of the query put by the user/visitor. This function will help the user/visitor to get back to the species in which lies client's second interest. Every record is connected with the world reputed Mycobank website (http://www.mycobank.org/mycotaxo.aspx)[8]

Figure 5 : Database Card viewer:

Card:(Figure No. 6) The card is the source of all basic information like

IAD Number (The Unique Indian Aphyllofungal Database Number**)**
Name of the species
UID (Unique ID number given to every Record from The Database)
Family Name
Rot Type Recorded
Host
Locality
Geographical Distribution
Original Reference (From where the data of the is taken)
Research Work Reference (Any other research reference to be added)

Card:

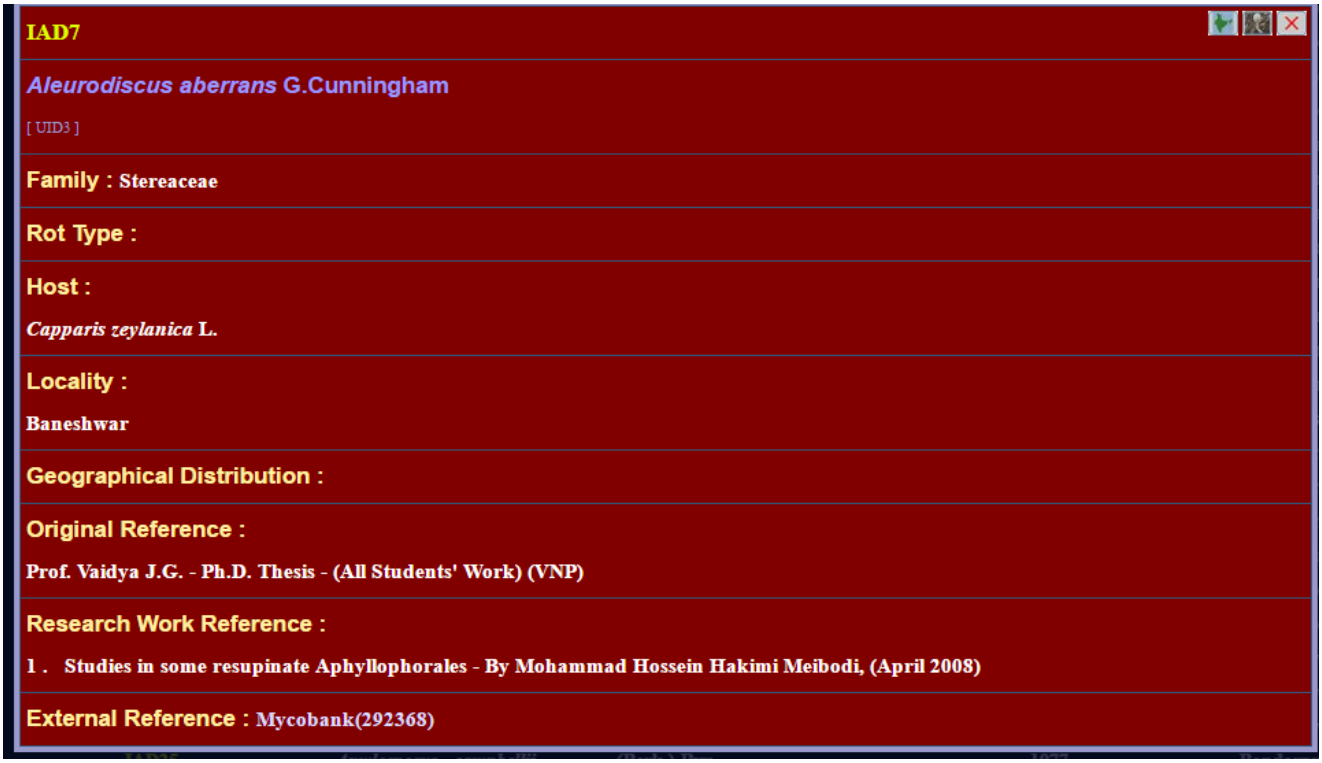

Figure 6 : Database Card :

References Page:(Figure No. 7)

This page includes more than 19 major references used for this Database. Reference books, Ph.D. Thesis of the related subjects are given sequentially.

Figure 7 : Database Reference page:

Contacts Page:(Figure No. 8)

This page shows the photographs and biodatas of the authors Database for any further queries about the Database.

Figure 8: Database contact details page:

Site Map:(Figure No. 9)

In this page the short cut links are given for every major part of topics of the Database which occurs on the task bar of the Database. It is very much easier for every visitor of this Database.

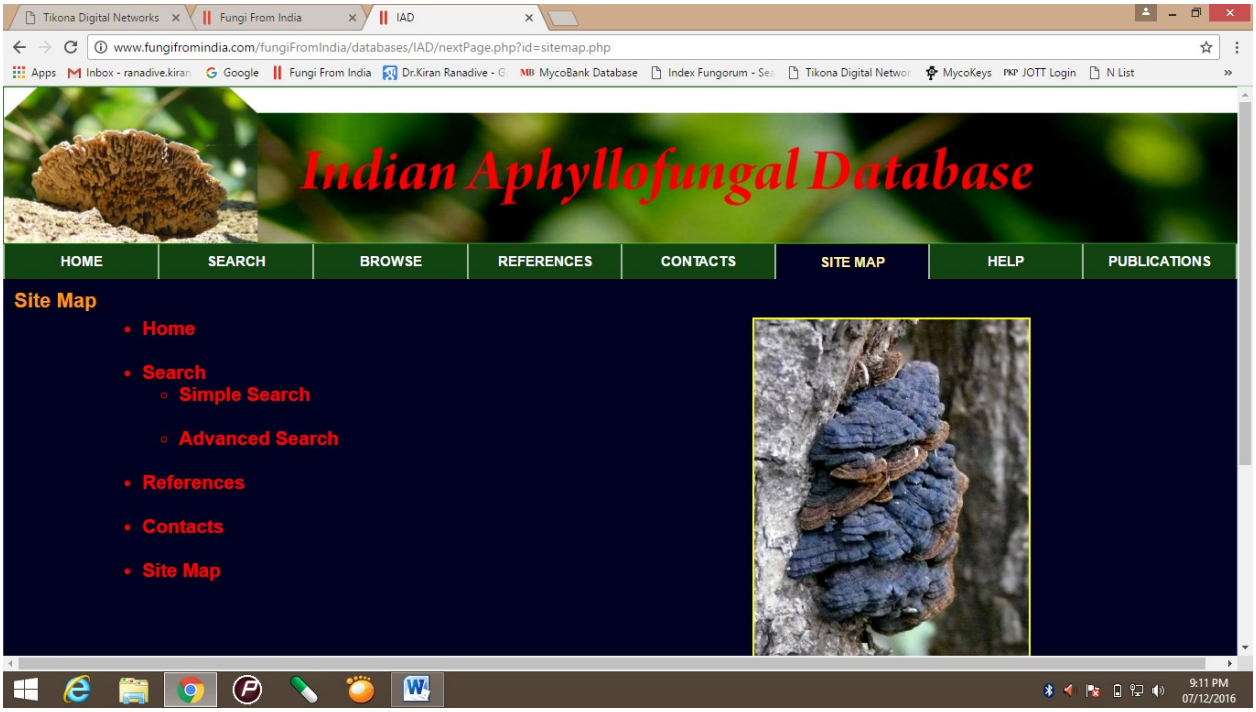

Figure 9: Database Site map page:

Help Page:(Figure No. 10)

This page is really the encouraging page for every visitor of the Database because it gives every help regarding (How to use the database?) its use. The page is having the screen shots of all the pages which will help the student as well as researchers to solve their difficulties regarding the use of the Database.

Figure 10: Database Help page:

Publications:

This is the section containing the publications done by author of this database. **(Figure No. 10)**

Figure 10 : Database Publication page:

RESULT

The present work has contributed for the first time in India about the Aphyllophorales Reference database. The in this study more than 1700 reference cards were prepared in a standard way. The database shows total 1646 records in which total 1217 species were recorded from 52 families and 190 genera of Aphyllophorales from all over India. This IAD Database has been launched online on www.fungifromindia.com. Every species of this database has been linked to the www.mycobank.org.

DISCUSSION

The literature on fungi is scattered in journals, not easily accessible to the Indian students. The unavailability of the related literature may develop the disliking of the subject, so in such case our IAD-Reference Database (The database giving all Aphyllophorales references from India on a single click, i.e. on IAD- Indian Aphyllofungal Database) will minimize the efforts and time for the survey of literature. This is the first Indian effort to do such contribution in the history of Indian Mycology and just made available free of cost for all researchers from world. This database will help to the new comers in the field and it is available free of cost online. This database work has been completely funded by the author himself only. This is expected to serve as an initial step towards better understanding of the Aphyllophorales from any locality of India.

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Conflicts of interest: The authors stated that no conflicts of interest.

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