

MAGICdb – Mango Genetic stocks Identification and Characterisation database

Dineshwaran Asaithambi¹, Senthil Natesan^{1*}, Vinothkumar Venkatesan¹, Raveendran Muthuraja¹, Kumar Muthusamy², Ponnuswami Vinayagam²

¹Department of Plant Molecular Biology & Bioinformatics, TamilNadu Agricultural University, Coimbatore, Tamil Nadu – 641003;

²Horticulture college and research institute, Periyakulam, Tamil Nadu – 625604; Senthil Natesan – Email: senthil_natesan@tnau.ac.in; Phone: 91 - 422 - 6611353; +91 98422 32057; FAX: +91 - 422 - 2431672; *Corresponding author

Received August 29, 2013; Accepted August 31, 2013; Published September 23, 2013

Abstract:

MAGICdb is a unique database that integrates the morphological, fruit quality and the marker data of most popular and widely cultivated commercially important mango cultivars. The main objective of MAGICdb is to provide the end users with an integrated dataset of each mango variety cultivated widely in Tamil Nadu. MAGICdb structure is categorized in to three domains namely Morphological Data Search, Fruit Quality Search and Marker Search which in further contains details on Tree Character, Bearing Habit, Season of fruiting, Number of inflorescence/Sq.m, Percentage of hermaphrodite flower(%), Fruit set percentage(%), Number of fruits/ tree, Fruit weight (g) and, Yield (Kg/ tree). This database is equipped with a user friendly interface enabling the users to retrieve the information with ease. Database is available at <http://www.tnau-genomics.com/mango/index.php>

Background:

Mango, *Mangifera indica* belongs to the family Anacardiaceae occupies a pre-eminent place among the various fruit crops grown in India. It is native to the Indian subcontinent from where it spread all over the world. Mango, popularly known as “king of Fruits” is celebrated as National fruit in India and also in Philippines and Pakistan [1]. In Tamil Nadu, mango cultivation occupies nearly 1, 48000.0 ha and its production reaches 82, 3000 metric tons per annum with its productivity measuring 5.60 tonnes per hectare (Indian Horticulture Database, 2010-11). Ever growing market potential for Mango and its processed products in the market has created a great demand for its improved and increased cultivation. Several studies by research institutes have developed a wide information resource on morphological, geographical and molecular attributes of mango. Combining such information, knowledge pool about above mentioned traits of ten popular, commercially important mango cultivars in Tamil Nadu was created and entitled as **MAGICdb (Mango Genetic stocks Identification and Characterisation database)** by a team of researchers at TamilNadu Agricultural University. MAGICdb is the only currently available database that provides a

meaningful integrated data set about mango varieties. In addition to farmers and breeders, this database can also serve as a promising reference material for mango processing industries.

Methodology:

Database outline, content and source

Data about ten major commercial mango cultivars namely Alphonso, Bangalora, Kalepad, Himayuddin, Sendura, Mulgoa, Neelum, Rumani, Banganapalli and, Swarnarekha were collected from State Horticulture Farm, Kanyakumari (Longitude 77°32'E and Latitude 8°04'N) and Tenkasi Farmers holdings in Tirunelveli District (Longitude 77°30'E and Latitude 8°97'N). Incorporated into the database are three categories of information source namely i) Morphological characters, ii) Fruit Quality Parameters, and iii) Marker data. Search of the Database is categorized as Morphological Search, Fruit Quality Search and Marker Data Search. The morphological data and the fruit quality data are stored in the MYSQL database and are connected to the web server. Morphological data table contains sub divisions such as Tree Character, Bearing Habit, Season of fruiting, Number of inflorescence/Sq.m, Percentage of hermaphrodite flower(%), Fruit set percentage(%), Number of

fruits/ tree, Fruit weight (g) and, Yield (Kg/ tree). The fruit quality data table includes particulars about TSS (°Brix), Reducing Sugar (%), Non-Reducing Sugar (%), Total Sugar (%) and, Carotenoidsh (mg/100g) content of the give mango varieties.

The information available in MAGICdb database are easily accessible and user friendly to retrieve the data.

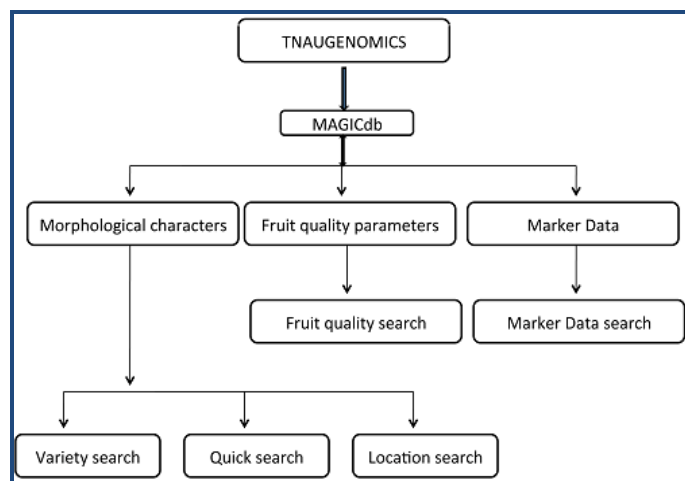


Figure 1: Flowchart representing schema of MAGICdb)

Languages and Software's Used

The Server side scripting language used was PHP 5.3.1. (**Hypertext Pre Processor** [4]) and the Data is stored and retrieved from the database using the MySQL 5.0.8. The user interface is designed using HTML 5.0 (**Hyper Text Markup Language**), JDK 1.5 (**Java Development Kit**) and CSS 3.0 (**Cascading Style Sheet**). **WAMP Server 2.2** is a Windows web development environment. It allows us to create web applications with Apache2, PHP and a MySQL database. Alongside, PhpMyAdmin allows us to manage easily our databases.

Database Architecture

The MAGICdb Architecture is done with three layers. The Topmost layer is the User interface layer or the Presentation Layer (Web Page) which is done by using **HTML** and **CSS** codings. **HTML** is a platform independent language that can be

used on any platforms like Windows, Linux and others. Mid Layer is the Application layer in which PHP Language is framed as a platform for intermediating between the Web Browser and MySQL Database. A 'precise query' is formulated in such a way that it returns what the user wants without superfluous results. To enable precision in a query, an appropriate set of relational operators, as well as direct access to the underlying data, must be provided [2, 3]. MySQL is a data storage area in which small sections called TABLES. Very similar to a HTML tables, the MySQL tables consist of rows, columns and cells. MySQL runs as a server providing multi-user access to a number of databases. The data sources such as the morphological characters, fruit quality traits and marker data are integrated into the database and are arranged ontologically. These three sub schemas are provided with further search by means of dropdown menus. The procedure is simple and is understandable.

Database Schema

The Database schema is as shown in the **Figure 1**

Utility:

MAGICdb has been designed in a view to help the breeder and industrial community for easy access to information on marker and morphological details of each mango variety. On the other hand it provides researchers, students and people of all community with a complete set of data to know about the major cultivated commercial ten mango cultivars. In addition, a data on varieties of mango grown all over the world is given in HTML format. The Google earth plug-in has also been integrated to provide the users much graphical interface for gaining information.

The information about the other varieties will also be added in the days to come.

Reference:

- [1] <http://www.mangifera.org/index.php>
- [2] Jayakodi M *et al.* *Bioinformation* 2011 **6**: 391 [PMID: 21904428]
- [3] Jayakodi M *et al.* *International Journal of Computer application* 2011 **2**: 56
- [4] <http://www.php.net>

Edited by P Kanguane

Citation: Asaithambi *et al.* *Bioinformation* 9(16): 838-839 (2013)

License statement: This is an open-access article, which permits unrestricted use, distribution, and reproduction in any medium, for non-commercial purposes, provided the original author and source are credited