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A software system for tobacco germplasm data

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Abstract

Tobacco germplasm are of different 'types', with large numbers of accessions in each type. In order to effectively manage this tobacco germplasm information, a user-friendly menu-driven software has been developed based on Visual C++ and MS-Access. The system allows the user to store, modify and update germplasm information as and when required, and represents a decision-making tool.

Keywords: database; germplasm management; germplasm resources

Introduction

Accessing the large amounts of plant genetic resource data requires the development of germplasm databases to store and retrieve the information (Fox *et al.*, 1996; Fox and Skovmand, 1996; Bruskiewich *et al.*, 2003; Christopher *et al.*, 2005; Chen and Huang, 2007; Agrawal *et al.*, 2007; Mundankar and Karibasappa, 2008). Some of the current databases are international based, while others are either national or crop based (www.globalplanofaction.org). Some examples are the AVRDC Vegetable Genetic Resources Information System (AVGRIS; http://203.64.245.173/avgris/), the Biodiversity Directory of Germplasm Collections database (http://www.bioversityinternational.org/index.php?id = 168) and the System-Wide Information Network for Plant Genetic Resources (SINGER; http://singer.grinfo.net/). These database systems provide online access to the germplasm data.

Tobacco is grown as a commercial crop in many different countries, and each of these maintains its own germplasm collections. Most of these countries are managing these collections without computer databases. Although a single database in Chinese language is available (Zhang *et al.*, 1990), its global accessibility is restricted in view of its language.

In India, the Central Tobacco Research Institute takes the responsibility to collect, maintain, evaluate and document tobacco germplasm, to facilitate their improvement for domestic and export purposes (Rao *et al.*, 2005). The collection consists currently of approximately 2400 accessions, including 57 wild *Nicotiana* species, but at the moment lacks a database system. Here, we describe a software system for tobacco germplasm, which has been designed to store, update and access the germplasm data.

Software system for tobacco germplasm

A datasheet with 100 fields has been prepared based on various parameters related to tobacco germplasm (Fig. 1). Based on this datasheet, a software system for tobacco germplasm data (SSTG) has been developed in English language using Visual C++ (Bennett, 1997; Harvey and Paul, 2000, 2004) as a front-end application and MS-Access (Microsoft corporation, 1994) as a back-end application. A personal computer system with a minimum of 64 MB RAM, preloaded with Visual C++ and MS-Access, a CD-ROM drive for loading the software

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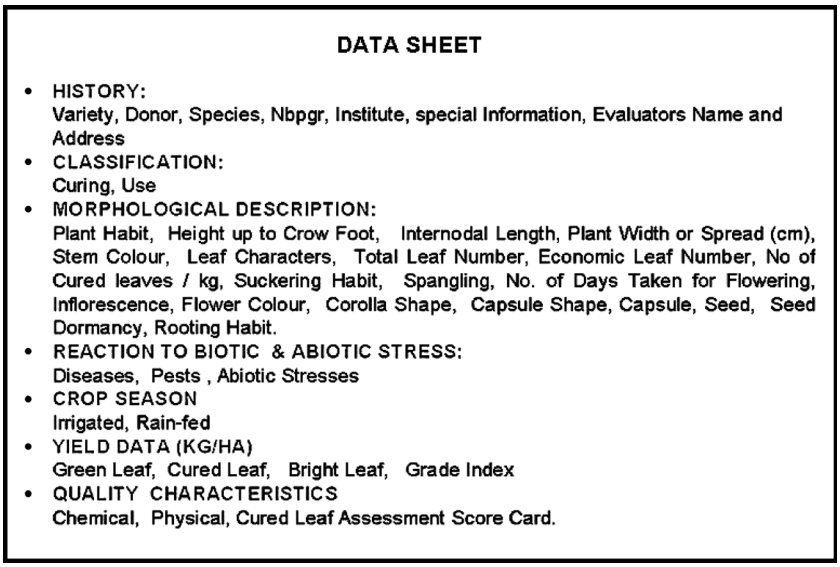

Fig. 1. Datasheet consisting of various fields in the database.

and a Super Video Graphics Adaptor monitor is required for the execution of this software.

SSTG helps to store, update and access the tobacco germplasm data for the optimum management of germplasm resources. The main menu (Fig. 2) of this system consists of five modules. The 'INSERT' module allows the user to enter the entire record of a germplasm accession including history (variety, type, donor, specifies, etc.), classification (curing and purpose), morphological classification (plant habit, height, internodal length, stem width, stem colour, etc.), leaf characters (colour, stalk, shape, base, midrib, surface, maturity, size and leaf thickness), reaction to biotic and abiotic stresses (diseases, pests and abiotic stress), crop season (crop condition, green leaf, cured leaf, bright leaf and grade index) and quality characteristics (chemical, physical, cured leaf, etc.) into the database. The 'DELETE' module helps to delete the entire information of a particular accession. The 'UPDATE' module allows changing the values of a record in the stored database. The 'RECORD REPORTS' module permits the display of the entire information by selecting an accession name. The 'QUERY' module (Fig. 3) provides an option of selecting the germplasm lines having combinations of various parameters. Multiple queries can be made

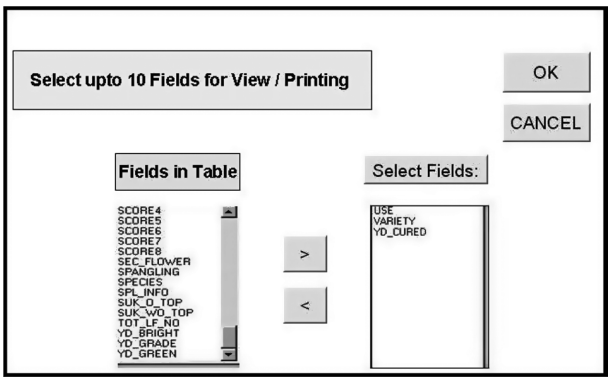

Fig. 3. Query menu 1 helps the user to select various parameters for accessing the required information from the database.

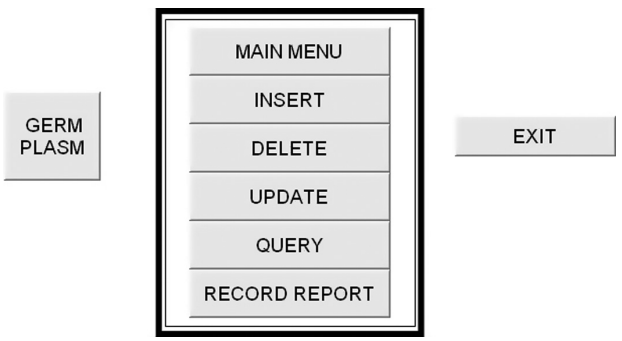

Fig. 2. Main menu allows the user to add, delete, update and retrieve the data from the database.

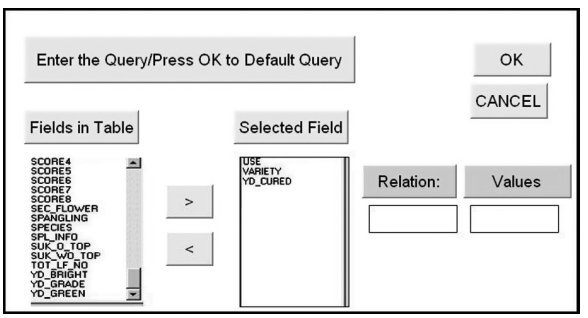

Fig. 4. Query menu 2 helps the user to access the database with multiple queries using relational operators.

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using relational operators (Fig. 4) to obtain the required report. A hard copy of the selected report can be obtained using the 'PRINT' option.

Conclusion

SSTG with user-friendly menus for storing and retrieval of tobacco germplasm data will be of use for tobacco researchers. This software enables the scientists to add new data, delete unwanted data, update existing data and retrieve data on the selected parameters with conditional queries on germplasm accessions. This database can be kept in the web server for online access by the scientists engaged in tobacco research, throughout the world. SSTG can be obtained by contacting hravisankar@india.com.

References

Agrawal RC, Drona B and Saxena S (2007) Genebank information management system (GBIMS). *Computers and Electronics in Agriculture* 59(1–2): 90–96.

Bennett D (1997) Visual C++ – Developers Guide. USA: Techmedia-Macmillan Computer Publishing.

Bruskiewich R, Cosico A, Eusebio W, Portugal A, Ramos LR, Reyes T, Sallan MAB, Ulat VJM, Wang X, McNally KL, *et al*., (2003) Linking genotype to phenotype: the international rice information system (IRIS). *Bioinformatics (Supplement)* 19: i63–i65.

Chen S and Huang SC (2007) The information system of genetic resources of horticultural plants in Taiwan. *Acta Horticulturae (ISHS)* 760: 603–608.

Christopher GM, Bruskiewich RM, Portugal AM and Cosico AB (2005) The international rice information system. A platform for meta-analysis of rice crop data. *Plant Physiology* 139(2): 637–642.

Fox PN and Skovmand B (1996) The international crop information system (ICIS) connects Genebank to breeder to farmer's field. In: Cooper M and Hammer GL (eds) *Plant Adaptation and Crop Improvement*. Wallingford, UK: CAB International, pp. 317–326.

Fox PN, Lopez C, Skovmand B, Sanchez H, Herrera R, White JW, Duveiller E and Van GM (1996) *International Wheat Information System (IWIS)*. Version 1 (CD-ROM). El Batan, Mexico: CIMMYT.

Harvey MD and Paul JD (2000) *Getting Started with Microsoft Visual C++6 with an Introduction to MFC 2/E*. Englewood Cliffs, NJ: Prentice Hall.

Harvey MD and Paul JD (2004) *Visual C++.NET: How to Program*. Englewood Cliffs, NJ: Prentice Hall.

Microsoft corporation , (1994) *MS-Access Building Applications*. Redmond, WA: Microsoft corporation.

Mundankar KY and Karibasappa GS (2008) Information system for grape germplasm in India. *Acta Horticulturae (ISHS)* 785: 159–162.

Rao RVS, Murthy TGK and Sarala K (2005) Germplasm resources and their utilization in improvement of Indian tobacco. *Tobacco Research* 31: 19–34.

Zhang XZ, Kong FS and YANG MK (1990) A design scheme for a database system of crop germplasm resources. *Scientia Agricultural Sinica* 23: 79–87.

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