

GMOTIS : Genetically Modified Organisms Tracking Information System

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Why GMOTIS ?

In numerous countries, laboratories that carry out experiments involving GMOs require authorization from government bodies. Accurate information concerning each GMO must be summarised in a document for submission to a genetic engineering commission. Gathering such information is often a tedious and long task. Many paper forms have to be manually filled in ; this generally leads to a loss of information.

GMOTIS is a generic tool (PHP4) associated to a database (Oracle) that allows researchers to store GMO information (GMO, prokaryotic organisms, eukaryotic organisms, expression vectors, researchers, suppliers, DNA elements, groups of elements and expression cassettes).

Originally developed to facilitate GMO data storage for government declaration, it enables automatic printing of declaration forms. GMOTIS is now also aim at management of GMO data, thus becoming a more comprehensive daily research tool.

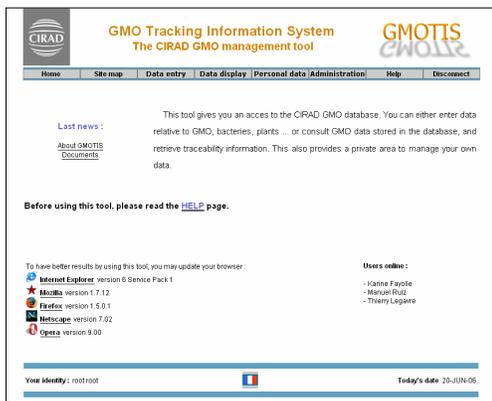


Fig 1 : GMOTIS home page. Once the user identified, he can choose either viewing the information stored in the database, or entering new data. He can also modify, validate or delete some data that have not been validated yet.

GMOTIS usage

GMOTIS menu includes three main modes (fig 1) : "Data entry" (fig 2), "Validation" with possibilities for modifying or deleting data before validation (fig 3), and "Data display" (fig 4).

Data entry

The "Data entry" mode is a set of successive forms. Scroll lists contain existing data (already stored in the database), or lead to a new form. The example given relies on the entry of a vegetal GMO followed by the entry of a new plant. The entered information is stored in a session file until the data entry is not finished; this makes easier the navigation between different forms.

A configurable help system appears in each form of the data entry mode. It gives examples and explanations about form contents.

Validation

The "Validation" mode relies on the fact that each user may have a status of : user, responsible, superuser or root.

Thus, "users" can only enter data, consult the information stored in the database, and modify or delete their own data that have not been validated yet.

Users with the "responsible" status can, in addition, validate data that has been entered by users working on the same project.

The "superuser" is the person who writes the document which is submitted to the government. He can validate the information entered by all other users, and manages users' accounts through the administration mode.

The "root" can perform all above mentioned actions, and has an access to the configuration mode of the tool.

Data display

In the "Data display" mode, data are shown in arrays ; some links appear so as to display more detailed information in a new window.

Moreover, each user of GMOTIS can access to a private area to store available data and to retrieve rapidly each time they use the tool.

This tool provides a system for project managing ; this leads to a compartmentalization according to different researcher teams.

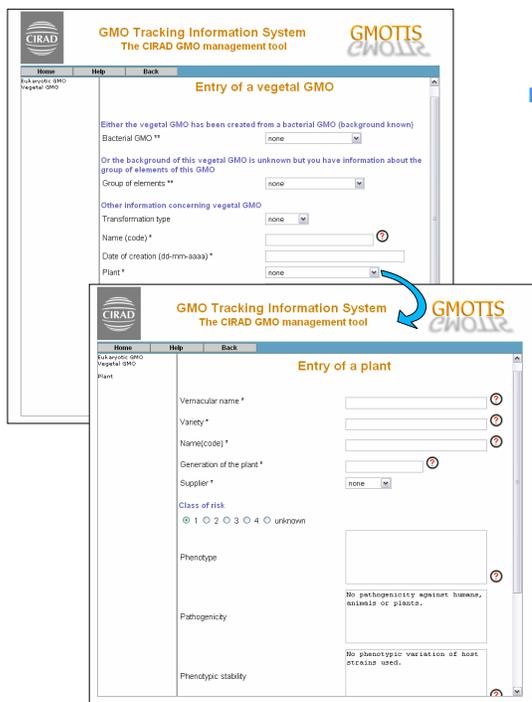


Fig 2 : Entry of vegetal GMO form, linked with the entry of plant form. These forms contain all the information required for the government declaration.

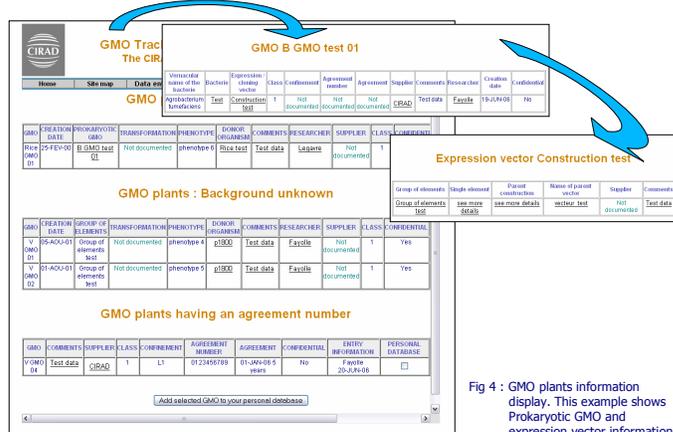


Fig 4 : GMO plants information display. This example shows Prokaryotic GMO and expression vector information.

Traceability

Traceability is ensured by the fact that the origin and the background of each DNA element (promoter, gene, terminator, etc.), contained in an expression vector or an expression cassette, are registered into the database.

For example, if users request a prokaryotic GMO, they will be able to retrieve the origin of each expression vector's fragment (from an organism) and possibly its background (from another expression vector).

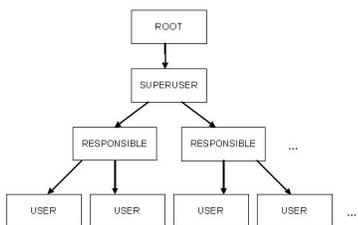


Fig 3 : Layout of GMOTIS users.

Security

GMOTIS relies on a secured system :

- Each user has to identify himself each time he uses the tool with a login, which is stored in a PHP session file, and a password, which is stored in the database
- Data can be stored as confidential, so that only specified users can consult them
- There are distinct validation levels for GMO information entered into the database : each piece of data must be confirmed at least one time before being consultable
- The session expires after one hour of inactivity

In conclusion, this system has been designed in order to save time, avoid loss of information, and facilitate GMO declarations. It is a generic tool, providing for the needs of all research units working with GMOs, considering each type of GMO, and adaptable for future needs. This tool was initially created for use within CIRAD, and subsequently for all interested laboratories.