THE USE OF THE CADASTRAL INFORMATION SYSTEM (CIS) FOR MANAGE AND CADASTRAL DATABASE QUERY

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Abstract

The MapSIC software is a Cadastral Information System (CIS) which allows, by its interactive features, to manage and query the CIS Database and Digital Field Model, represented by level curves in 2D form or by color, depending by relief height, in 3D form. Through its multiple facilities meet the technical requirements of the imposed cadastral works, both in inside and outside of the city.

Its main functions of import, export, digitizing/vectorization, as well as compatibility with software for processing field's raw data (TopoSys) and with GIS (Geographic Information Systems) complex software systems, ranks the MapSIC software in the segment of applications that are producing directly geo-informational data, bringing remarkable benefits of these data users. It suffices to think of the possibility of real-time updating of information related to graphic and alphanumeric objects.

To achieve the CIS Data Bank was chosen as the study area, the former vineyard unit SAE Copou Iasi with a total area of 111 hectares, located, until 2007, in the outside of Iasi City.

The initial cadastral data, from surveying done in 2004, have been updated based on the land register documentation approved by the Cadastre and Land Registration Office Iasi (OCPI Iasi) and on the reception of General technical cadastre made for the north-west of the City of Iasi.

Updating cadastral data was necessary due to changes caused by the recognition of the right of ownership to former owners, according to the Law No. 18/1991, the Land Fund law, and due to the existing documentations of dismantling of land parcels, because of the inclusion of study area in the extended inside of the City of Iasi since 2007.

The MapSIC software was conceived from the desire of capitalization of the obtained data, by choosing and adopting the best solutions in terms of socio-economic view.

Key words: agricultural cadastre, topographic-cadastral digital plan, Cadastral Information System

By automating the work of surveying, the agencies of management, planning and forecasting from all sectors of national economy, are advantaged in taking decisions, when the volume of data and information provided by land register is very high, in the real estate concern.

Also, the efficiency of the automation of cadastral work increases when processing and analyzing data and information is quick and convenient, because they reflect, at any time, the reality on the ground.

The importance of updating these data and information, in terms of the shape, area, category of use, the owner and others, is due to traffic dynamics of real property in a society with a changing economy.

Rapid consultation, by policy makers, of the land registry documents, data and information which have been updated regularly, is possible only if these documents are computerized.

MATERIAL AND METHOD

In order to obtain a cadastral database and a digital cadastral plan for the former vineyard unit SAE Copou Iasi, which later, in 2004, became Vinifruct Copou, was made the lifting in plan of the points of detail, using the electronic measuring equipment (Huţanu, Cr., 2010).

The need for topographic measurements reflected the cadastral changes that occurred in time over the land parcels. If, initially, in 1965, in the area under study was designed and established, according to the conditions of relief, a vineyard unit, after 1990 the parcels situation (Huţanu, Cr., 2011), speaking in cadastral terms, gradually began to change due to:

- implementation of Law no. 18/1991, for restoring property rights of former owners;
- the Cadastre and Land Registration Office Iasi endorsement of the dismantling documentations of land parcels;
- inclusion in the constructed area of the City of Iasi, from 2007;
- conditions imposed by Law no. 50/1991, authorizing the construction works and some measures for housing.

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RESULTS AND DISCUSSIONS

For example, Vinifruct project database (*fig. 1*) was formed by storing records of each object attached to layers resulted from **General Technical Cadastre**.

Defining a new layer, for attaching the database in Microsoft Excel, is performed by accessing the function *New Layer* from the *File* menu.

In the window *New Layer* will be written in the field *Layer Name* the name of the new layer, without spaces and diacritics (PLOT_SUMMARY) and from the field *Layer Type* will be selected the option *Table.* So that this sheet of plots to be compatible with the AutoCAD's file, after the activation of the layer, will be accessed the function *View All* from the menu *Database,* for viewing the window that will contain, under the form of a table, the Microsoft Excel data file.

The main work functions from the data entry window are:

- *New Field* - the name of a column in the table, but no longer than eight characters;
- *Use column for external link* - the connection of a column from the table with the server;
- *Find / Replace*- search and replace data in the table shown;
- *Check Valid Images* - check the accuracy of the connection of the data from the table with the associated graphic elements.
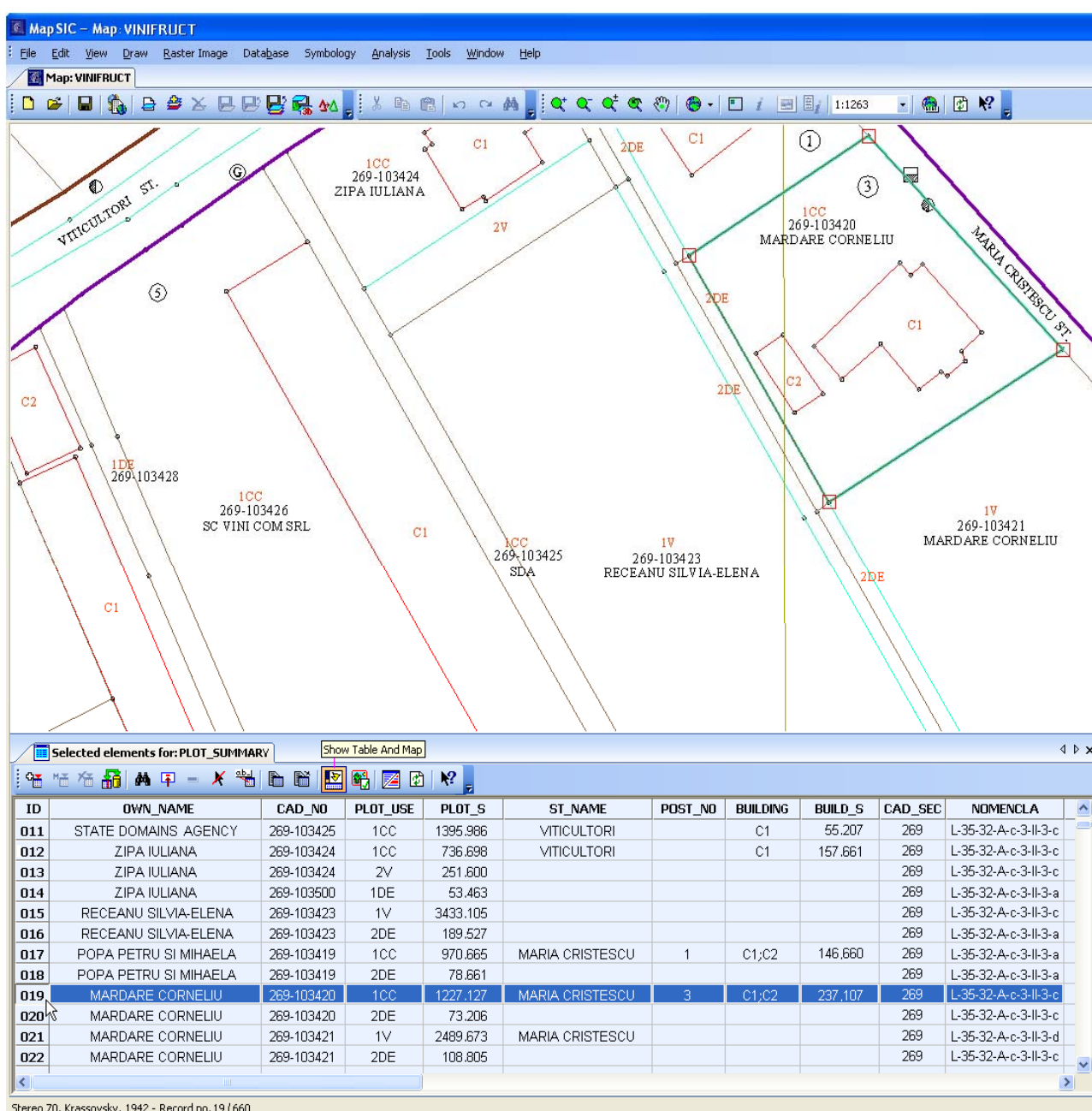

Figure 1 **Simultaneous view of the sheet of plots and digital plan**

The import of the data file from Microsoft Excel will be possible to be done if by the function *New Field* will be created, in the sheet of plots of the program, an identical table header.

While the Microsoft Excel file is opened will be selected only the rows and columns that we want to import in the draft program, so it could to be saved, for example, under the name *VINIFRUCT* in the field *Name Box*. Then, by clicking the function *Import from Excel* from the menu *Database* of the draft program, will be opened the window *Import Excel Structure,* which allows us to import the table structure from Microsoft Excel.

Because all the conditions of compatibility are met it will be pressed the key *Load Excel fields* to create association links between the layer PLOT_SUMMARY from the Program MapSIC and table structure saved under the name VINIFRUCT in the field *Excel Source table*, respectively with the file saved under the name Vinifruct.xls in the field *Input Excel file*.

By pressing the key *Next,* opens the window *Import Excel Records*, which allows the transfer and data recording in the sheet of plots.

Transferring data displayed in table VINIFRUCT - Excel in the table PLOT_SUMMARY of the MapSIC program is done with *Import data* key.

As display options, data lines of the 660 plots can be ordered alphabetically from A to Z, if the top of the triangle from the key OWN_NAME

is pointing down or from Z to A if it is pointing up. Regardless of the option chosen, the data will be copied by the MapSIC program in the order in which were saved in Microsoft Excel.

Data imported from Excel in the layer *PLOT_SUMMARY* will be saved with the extension .dbf.

Once the conditions of compatibility are met and connection links made between the lines of table from the sheet of plots and polygons parcels of the active layer, can be accessed various features of the program to query the data from the sheet of plots of the project.

Simultaneous viewing of the graphic elements and of the matching database records is due to the function *Show Table And Map* from the sheet of plots toolbar. When activating this function the application window is split in the up area, in which graphic elements of the digital plan are displayed, and the below area, in which will be displayed the records attached to a parcel polygon from the layer PROPERTY_BODY_L. (fig. 1).

By the activation of the function *Find / Replace* from the sheet of plots toolbar (fig. 1) opens the window through which you can search or replace some data in the table.

By using *Find All* option, after selecting the column and writing the search element (fig. 2), because you can not view all table lines, under the sheet of plots will be shown the number of lines selected from the total lines of the table (fig. 1).
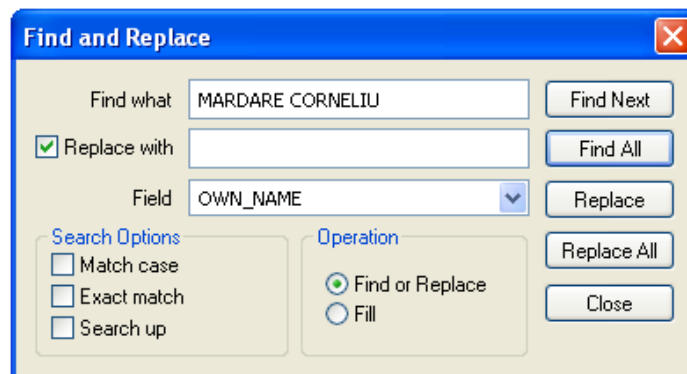

Figure 2 **Search in the attached table**

Ability to view only selected lines (for example: of the data of the 4 recorded lines, which contain the search element, from the total of 660 lines of the table) will be done by accessing the menu function *View Selected* from the menu *Database*.

If you click on a line identification number will automatically select both the line from table and the polygon, which corresponds to the data, being displayed in the foreground, in the digital

plan window, with bold and a specific symbol on the fraction points from the contour (fig. 1).

By activating the option *Replace All*, after also writing of the replacement element in the field *Replace with* (fig. 2), under the sheet of parcels will be shown the number of replacements made in the table (fig. 1).

Selection of plots by the size of the area is made through the function *Simple Query* (fig. 3), from the menu *Analysis* on the toolbar of the program.
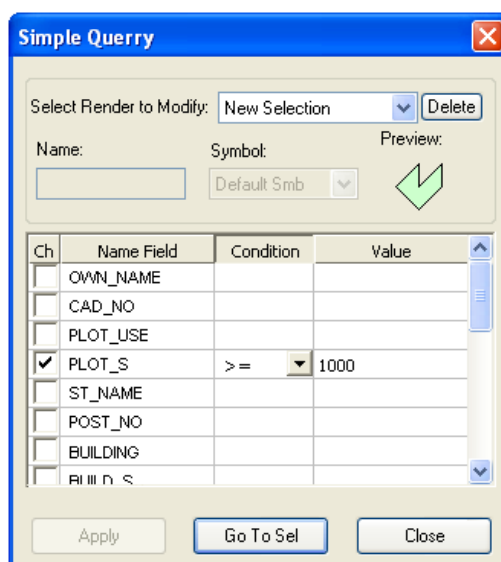
Figure 3 **The query data** f**unction from the attached table**

After setting the search parameters from the columns *Condition* and *Value* (for example: ≥ 1000 m^2), is pressed the key *Go To Sel* (fig. 3) and in the sheet of plots table will only be shown the data lines for plots which have the area that meets the search conditions (fig.4).

Figure 4 **The result of the search and the selection of the data lines table**

The display of the selected lines is made in the order they were recorded in the table, keeping the identification number of the line, to retain the link created with the graphic elements of the digital plan. However, under the sheet of plots will be shown the number of registered lines (206), which meet the condition set, from a total of 660 lines of the table. When the polygon contour of a parcel changes, the perimeter and area of the plot will be updated through *Polygon tools* function from *Draw* menu.

The display in the table, by the MapSIC program, of the areas recalculated for parcels is in square meters and the perimeter of polygons in meters. Under the sheet of plots will be shown the number of changes occurred in the total of rows in the table.

At the end of the project will appear a window where files are checked with the extension .shp, in which were made changes. Confirmation of changes is done by pressing the key *Yes*.

For 3D visualization of the digital plan, from the access window of the MapSIC program, will be pressed the key *3D Preview* to activate interactive functions for representing digital model of the study area terrain by shading or coloring depending on the height of the relief.

It is possible to view 3D digital plans if checking one point from the layer DETAIL_POINT it will appear joined in a rectangular box, next to the plane absolute coordinates, also its altitude (for example: x= 634886.58 y= 692738.45 z= 124.77). Then, to get a prospective image of the study area, in the layer PROPERTY_BODY are saved plots polygons obtained by the union of quoted points.

Land relief rendering elements, saved in the layer LEVEL_CURVES, will have the same properties with parcel polygons, if they have been obtained using the program Surface Mapping System.

Enabling only these three layers, by turning them in different angles, we will be able to view the perspective image of the digital plan.

In figure 5 is presented the perspective image of the digital plan in the south-west of study area.
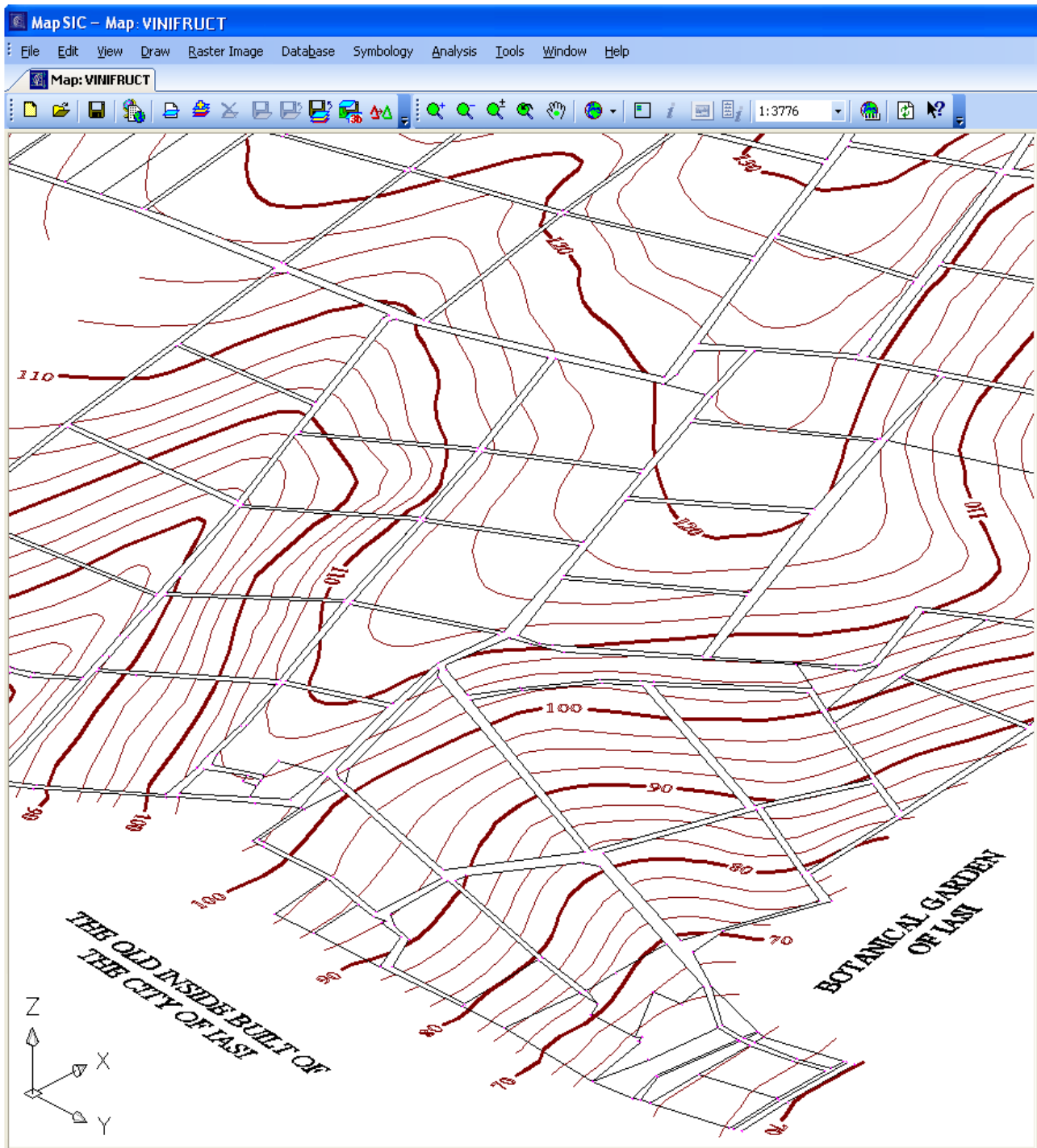

Figure 5 **The viewing of the perspective image of the digital plan**

The viewing of the digital plan under different angles will be made based on the left-right rotation options from the toolbar of the menu *Draw* and on the mouse scroll wheel to rotate up and down.

For the representation of the terrain digital model by color, depending on the height of relief,

is activated the option *Shape Fade* of the function *Statistics*, from the menu *Analysis* of the MapSIC program.

In the open window it is chosen the layer LEVEL_CURVES to determine color ranges towards linear elements (*fig.6*), which will become a base for the representation of the relief by color.
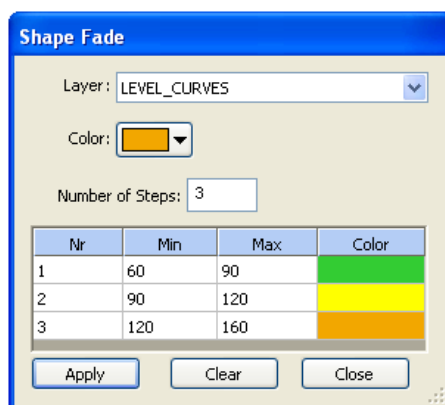
Figure 6 **The choice of colors depending on the height of the relief**

Exclusion or adding rows to the table, to decrease or increase the number of color ranges, is made by modifying existing digit in the field *Number of Steps*. The option name itself suggests to us that the transition from one color to another is done gradually.

Finally, pressing the key *Apply*, depending on the selected colors for each rates range, the program displays, in the application window, the digital model of relief by color (fig. 7).
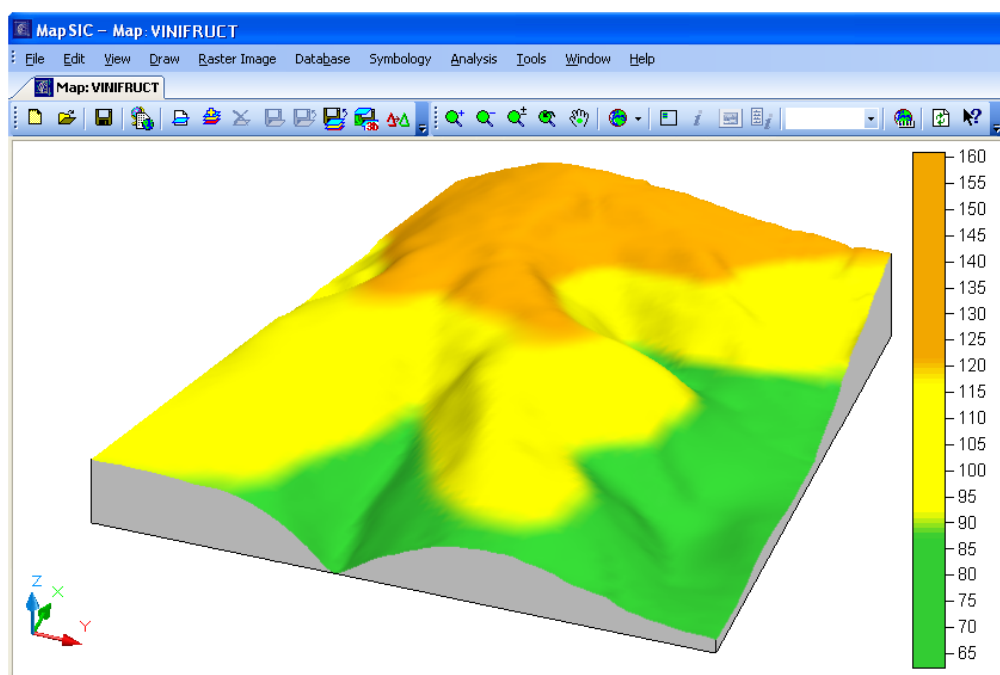

Figure 7 **The 3D colored model depending on the height of the relief**

These interactive features are designed to provide choice and decision making, using elements from the database or graphical information.

CONCLUSIONS

The benefits of digital topographic and cadastral plans are that database updating is done in a short time and at low cost.

Cadastral Information Systems are designed from the desire to capitalize more efficient the data obtained.

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