



Integrative Database System of Agroecology in the Black Soil of China

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❁ **The organization of the paper:**

❁ **1. The introduction:**



❁ **2.Data structure:**



Variable types

Data types

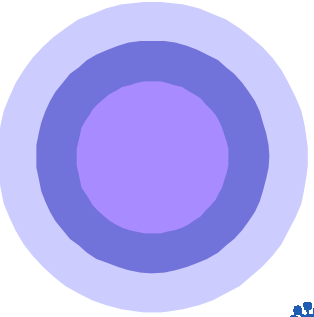
Data organization



❁ **3.System functions:**



It mainly talk about some menus designed in the database,such as Agro-expert system,spatial dataset and so on.



4. Metadata



Metadata concept
Metadata management



5. Data sharing

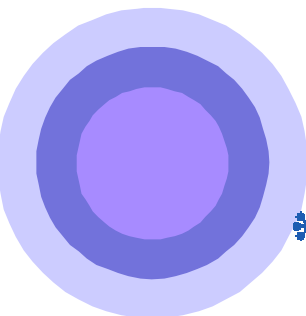
6. Conclusion





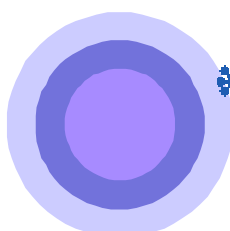


1. Introduction


The black soil in Northeast China is one of only three areas which can be found in the world. It is world-famous for its fertility and high-yield grain production and an important base for commodity grain production in China. Nowadays black soil is endangered by severe erosion. Therefore, it is urgent to establish a comprehensive agricultural database of black land to record factors affecting sustainability.



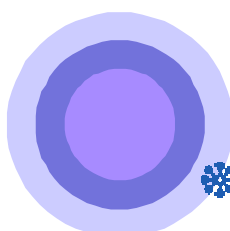
* Database is a very important tool to assist scientific researches. In this paper, the CSDB_BL database is described.





* CSDB_BL is a sub database of China sciences database. The purpose of setting up this database is to store and manage a large amount of data which has accumulated in long-term researches, observations and statistics in black land, Northeast China, and also can use those




data doing analysis for strategic and tactical researches in agriculture and provide stronger data support and expert suggestion to researchers, officers, and farmers.



* Powerbuilder 8.0 and Oracle are as the main the programming languages of CSDB_BL ; VC and VB language are being used for expert system development ; Java and FrontPage 2000 and ASP language are being used for Web database development.



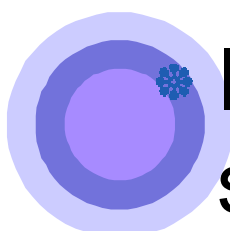


* The aims of setting up the database are to a). classify systematically the data on agro-ecological research on black soil; b). manage and make use of the data under standardization; c). integrate with GIS and imitate the model of expert system; d). share data on the Internet. Also, the database can provide a scientific basis and counter measures to ensure agricultural sustainability in Northeast China.

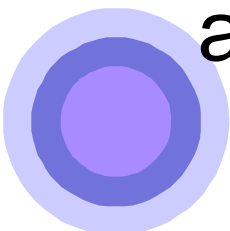

It can also be expected that the database



will play an important role in regional grain safety, economic security and environmental conservation.



In this paper, the scientific concept and software development of the database, and the database connected with expert system modeling and GIS are described. Metadata and data sharing on the Web are also discussed.



2.Data structure

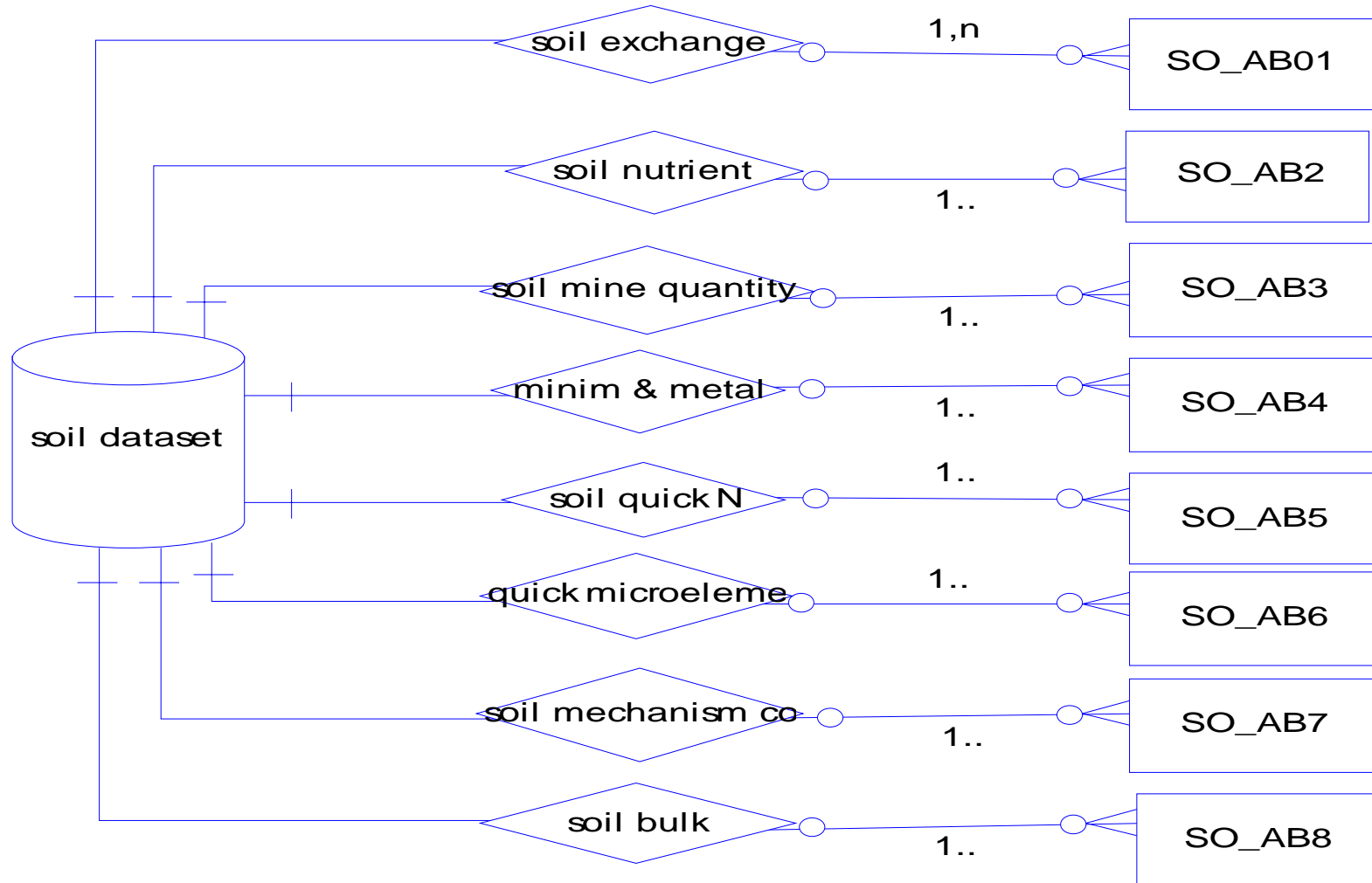


fig1.conceptual data model of soil dataset



* Data organization are as follows:

* Data tables derived from water observation and experiments were encode as Wo, in the same way, soil as So, biology as Bo, statistics as Tj, special projects as Pro, vector image as Vec and the code of driving valuables as Dri. This defined function made data query easy. Meanwhile, the metadata are corresponding with the data entity one by one, no confusion.

3. System functions

In this part, it mainly talk about some menus,look at fig.2

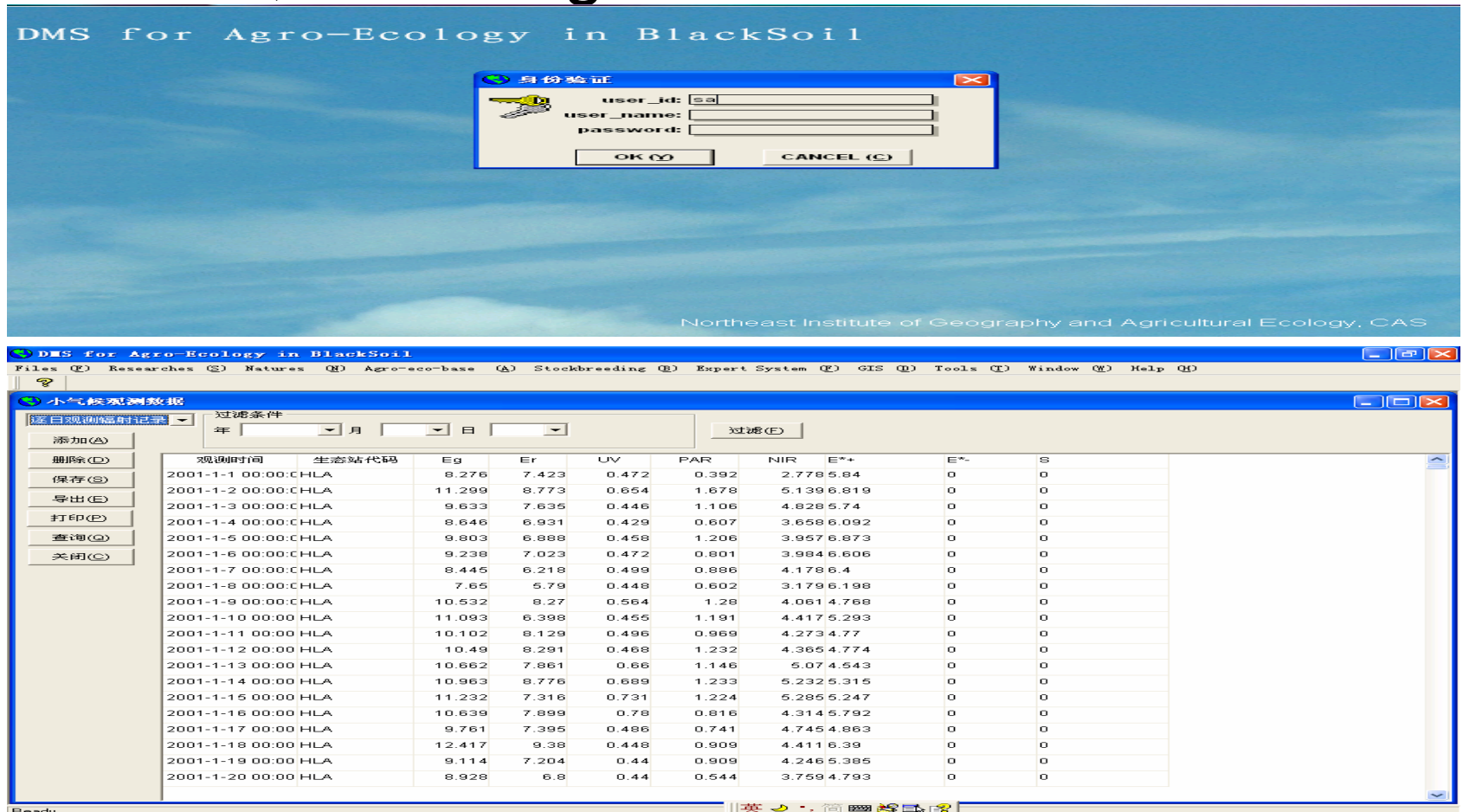
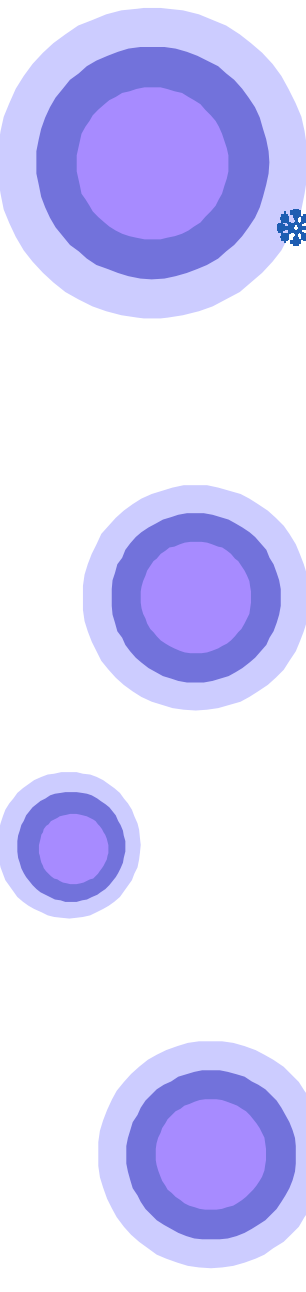
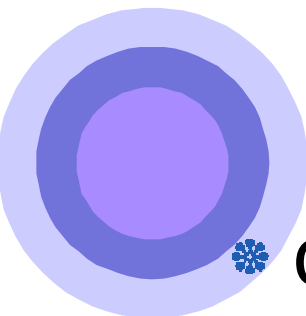


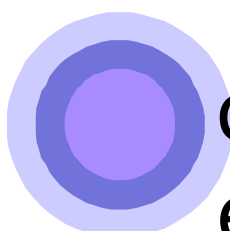
Fig.2 The main menu of the database





• Upon entering the database, a start-up window with a main menu appears at the top of the screen with the following main options: file, research data; nature resources, agricultural ecology, animal husbandry, expert system, GIS analysis , tools, windows, help and so on. Among them the most important part is Agro-expert system. This part plays a very important role in the database. The data



can be variedly selected from the database and shared for expert system.



There are two main sub-expert systems, one is macroscopical strategic part for evaluating changes of agricultural resources and environment. (Liu et al., 2002), (Fig. 3)



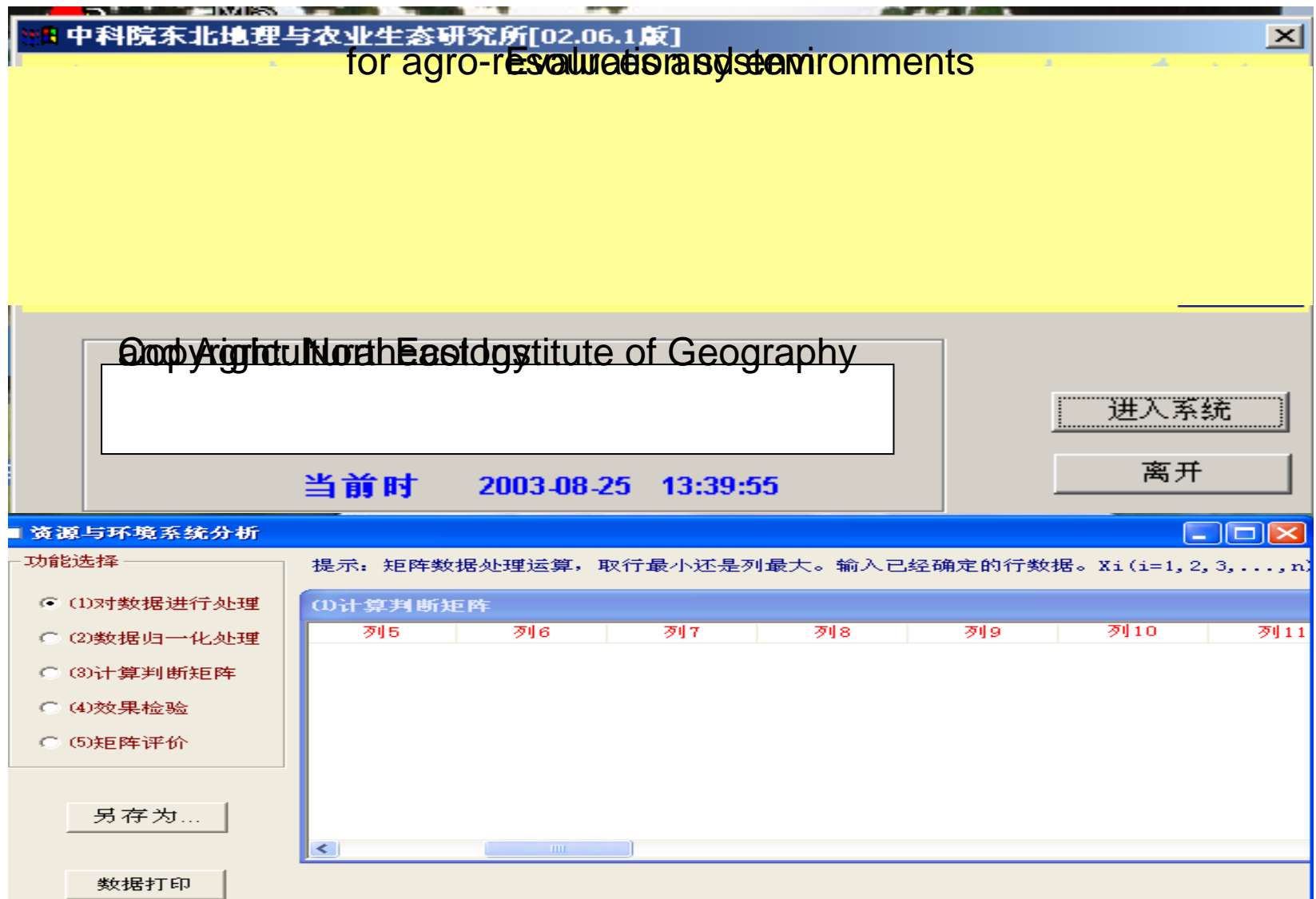


Fig. 3 Data input window of evaluation expert system for agro-resources and environments



The purpose is to evaluate and analyze large scale environmental changes, the study of the overall aspects and workings of local and national agricultural economic and ecological developments. And it therefore provides the data and analysis necessary for the government; the government can make an optimum developing plan for the regional or national agriculture. Another is tactical part, which deals with some problems that could occur



Fig.4 Soybean growth simulation expert system



4. Metadata

The criterion of metadata version 1.0* for Chinese Ecological Research was used in this database. The main content of it includes 8 sections: dataset information; research project information; method information; dataset structure; dataset statement and Web information; scale information; cited information and personal information. Conceptual model of soil NPK treatment and yield measurements at Hailun station was taken as a sample to describe a design of metadata. (Fig.5)

Conceptual Data Model
Model: soil nutrient and water obs
Package:
Diagram: Diagram_1
Author: Zhaojun Date: 2003-5-3
Version:

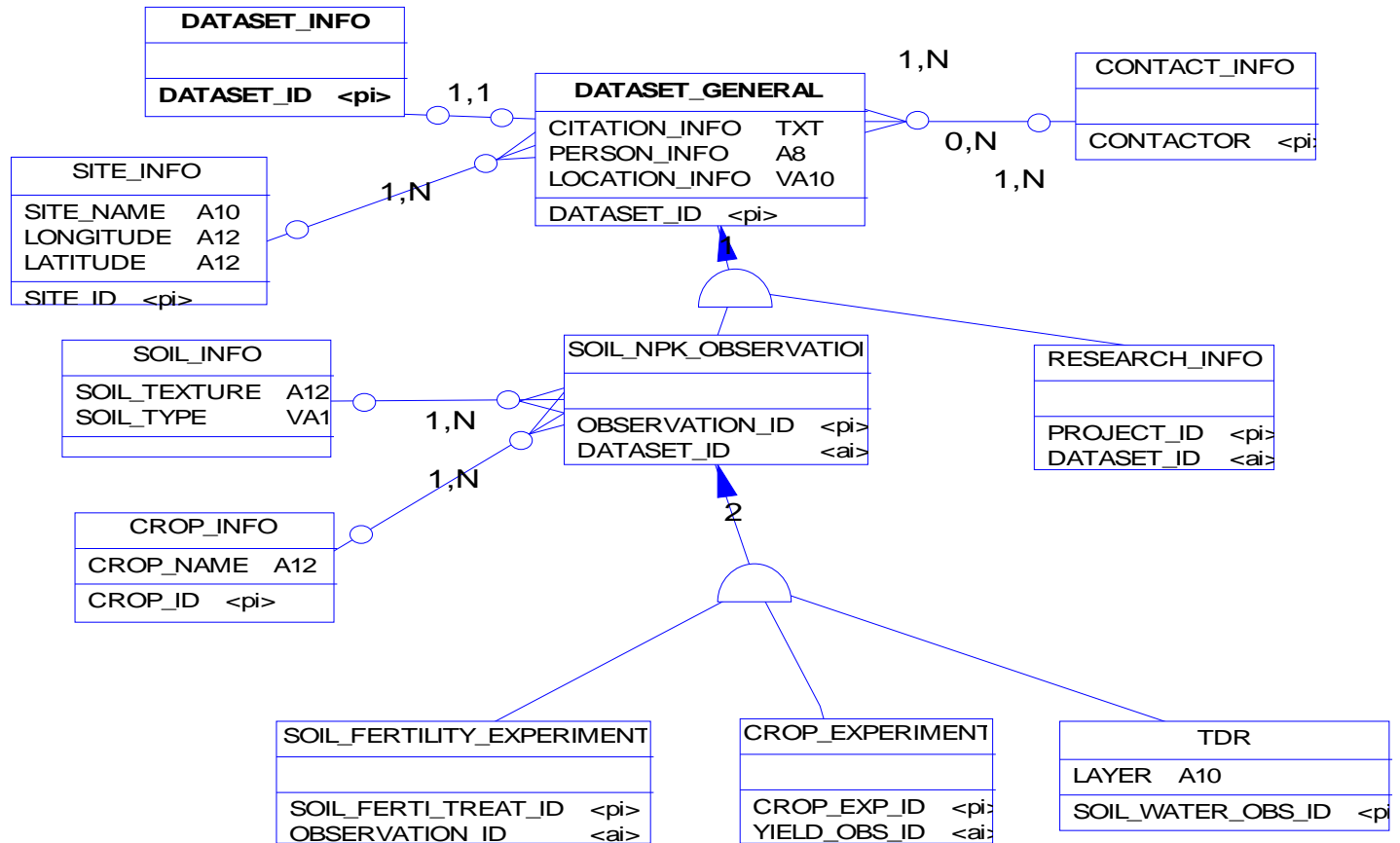


Fig.5 Conceptual model of soil NPK treatment and yield measurements at Hailun station



❁ Metadata management:

The management of metadata is controlled by the metadata server.



It includes data lists, catalog establishment and updates. It was developed by XML language.





5 Data sharing

* Data sharing on WEB is very important. Therefore WEB database is constructing now. The test Website is

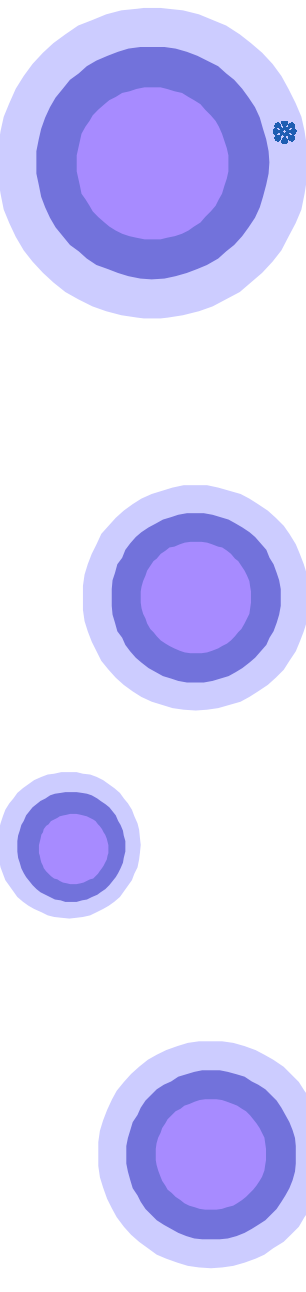
<http://www.neigae.ac.cn/031/index.htm>

In the near future, users from anywhere will be able to browse freely and query any of Metadata of CSDB_BL on the Website and they can also download the data entity by different priority when they pitch on the metadata.



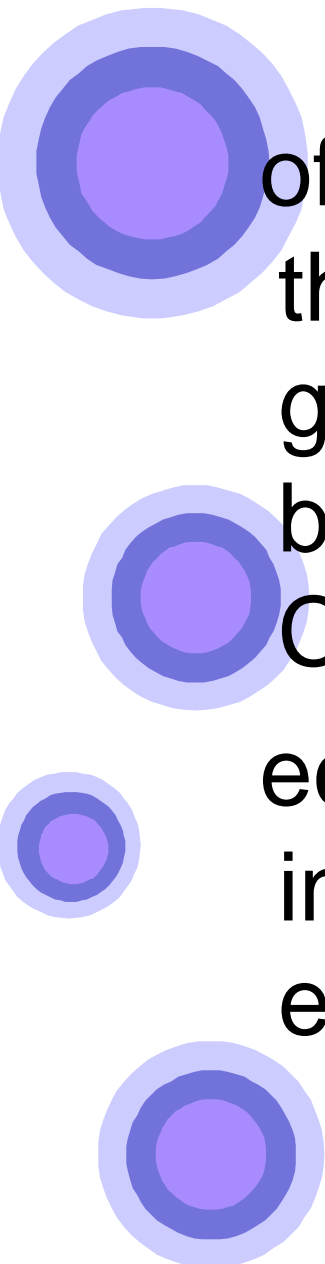
6. Conclusion

- * The CSDB_BL database management system for windows described above represents a useful tool for the development of agricultural ecology. The software has been developed to enable the CSDB_BL to connect with GIS and several models. It also provides the design and implementation of environmental decision-making support systems.



CSDB_BL remains open for future development and improvement, including interfaces with innovative new programmers and connections with GIS and other expert systems. It will improve the data auto-transfer from dataset to the models and develop on – line Internet versions.

The application of CSDB_BL will help us to formulate new theories and monitor regular changes by analyzing huge amount



of data currently being collected. In the meantime it will assist the government in developing a plan based scientific data to improve China's agro-ecological and agro-economic position in the world which in turn will hopefully lead to social economic advances for China.

Four decorative purple circles of varying sizes are arranged vertically on the left side of the slide. The top circle is the largest and contains a small blue snowflake icon. The other three circles are smaller and do not contain any icons.

Acknowledgements:

At last, I will represent my teacher and all members to express our acknowledgements to Chinese Scientific database system and thank Prof. Ben Price who is working in Northeast Forestry University, for his checking and amending the mistakes in grammar.