



The design and implementation of an integrated optimal fertilization decision support system

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ABSTRACT

This paper designs fertilization decision support algorithms from the perspective of decision support system with the model of agricultural fertilization principles. These integrated and optimal algorithms can provide accurate scheme of fertilization for users. The fertilization decision support system was designed and implemented in accordance with the B/S structure by using ASP.NET platform and SQL2000 database, which has wide applicability, flexibility and high accuracy. It is practical and interactive to meet the needs of most of the users.

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1. Introduction

Decision support system (DSS) [1] is a computer-based and human–computer interactive system, which adopts the theory of decision making. And it is mostly used to solve the problems of segmental structured and non-structured decision in organizational management, and not only provides users flexibility to access data and to construct models, but also supports users to make right decisions. Generally speaking, DSS consists of data subsystem, model subsystem, dialogue subsystems and other components. Traditional decision support systems came to a conclusion by means of the data models and the conventional numerical calculations in the decision-making process. A great deal of knowledge and knowledge reasoning which is difficult to express by mathematical models and calculation methods exist in the traditional decision support system. Therefore, it is hard to simulate the conditions of the real world with traditional DSS. The best way to build a real-time or online intelligent decision support system (IDSS) of such a complicated fertilization decision-making process is combining multi-expert knowledge and the data from scenes. Combined with mathematical and knowledge models, decision support systems have the capability of numerical calculation and knowledge processing [2].

In recent years, computer technology and geographic information systems technology have been widely used in fertilization research, and a lot of fertilization decision support systems have been developed. The decision support system is based on agriculture models which are tested by a large number of fertilization experiments, and the modes of fertilization mainly include effect function method, nutrient balance method, and fertility combined method. By means of the “3414” experiment and discussion, soil fertilizer effect function method can be widely applied, soil nutrient balance method is one which includes the calculation of biomass crops, and dissimilar subtraction method of soil fertility computes optimal fertilization by using the soil value test. The algorithms of the existing fertilization decision support systems are generally based on those models. For example, some fertilization expert systems, which are using a single principle of the model according to the local agricultural test data have some decision support capabilities. But data processing is not accurate because of the defect of the model. Lacking of the design of the users real-time communication platform, incompletely accessing to the conditions such as real-time weather and soil data, the decision support data of which is not comprehensive [3–7].

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