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ONLINE REPORTS OF LONGTERM EXPERIMENTS FOR PROPER APPLICATION OF FERTILIZERS TO THE CROPS

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ABSTRACT

World population is expected to surpass the 9 billion mark by 2050, and agriculture has to increase the production of nutritious food to meet the growing demand and ensure food security for all. It has to generate jobs, improve incomes and contribute to poverty eradication and rural economic growth. And it has a major role to play in the sustainable management of natural resources. The long-term fertilizer experiments at fixed sites in different agro-ecological zones (AEZ) in India covering important soil types and predominant cropping systems were initiated during early 1970s to monitor the changes in soil quality/health, crop productivity and sustainability under continuous application of plant nutrient inputs through fertilizers and organic sources. A large number of Long-Term Fertilizer Experiments (LTFE) on various Food, Horticulture and Commercial Crops are being conducted at various Indian Council of Agricultural Research (ICAR) Institutes and State Agricultural Universities (SAU). Usually the information generated from these experiments is not available in compatible form at one place to the scientific community working in National Agricultural Research System (NARS). Also planners/ research workers may be interested in this information as this will help them in planning/conducting the future long term experiments. This system provides reports for centre information, experiment information, bifurcated experiment information, weather parameters, crop information, fertilizer dose, experimental data and experimental data with bifurcated treatments. It is useful for planning, designing and statistical analysis of data relating to experiments conducted under the AICRP on LTFE in perspective of soil fertility and crop productivity.

Key words : *Long term fertilizer experiments, soil fertility, reports, web-based, JSP.*

World population is expected to surpass the 9 billion mark by 2050, and agriculture has to increase the production of nutritious food to meet the growing demand and ensure food security for all. It has to generate jobs, improve incomes and contribute to poverty eradication and rural economic growth. And it has a major role to play in the sustainable management of natural resources. The information needs of farmers in both developing and developed countries will only increase as they have to make more and more complex decisions on how to use their land, what crops to produce and how, in which markets to buy inputs and sell their products. Their decisions, which also include choices on how to finance their business and reduce the risk they face, impact the livelihoods of their families and society.

Soil is one of the most important natural resources meeting three basic human needs of food, fiber and shelter. In addition, it i) acts as universal filter for purification of water, ii) stores water and nutrients for plants, iii) acts as a habitat for number of beneficial soil organisms, iv) provides physical support to plant, v) purifies air by absorbing harmful gases, vi) moderates the climate, and vii) helps in sustaining ecological balances by maintaining equilibrium of gases in atmosphere. The purpose of conducting long-term fertilizer experiments at fixed sites in different agro ecological zones (AEZ) with important cropping system of that zone was not only to monitor the changes in soil quality and yield responses under continuous supply of plant nutrient inputs through fertilizers and organic sources, but also help in developing strategies and policies for rational use and management of fertilizers to improve soil quality with minimum environmental degradation.

Kumar P., 1991 developed an information system on agronomic practices of major crops. The different information needs considered were soil & climatic information, field preparation and sowing information, fertilizers and irrigation information, plant protection information, harvesting and storage information. (Patil, A.N., 2002) proposed thatWorkers tried to expertise in decision making. He developed a Decision Support System for Nutrient Management in Wheat, Mustard and Bajra by this provides intellectual support to farmers and extension workers for applying the adequate fertilizer doses on the basis of soil test value

or the type of soils in different regions. (Vats *et al*., 2006) carried out by a review of the databases developed for long term fertilizer experiments in India revealed that institutions conducting long term fertilizer experiments are maintaining the information on these experiments at institute level only and as such no national database is available in India. (Sanjeev K. *et al*., 2006) described that the present era has seen an exponential growth and diversification in all forms of on-line data management system, which is sometimes called as information explosion. It has become possible due to the impact of computer technology on the modern society. Computerized data management systems have influenced nearly all types of organizations, whether small or large, public or private, national or multinational. Online data management systems exist for almost all the fields may be farm management, Industry management or Satellite management etc. Online Data Management System for Long Term Fertilizers Experiments (ODMSLTFE) is an attempt to develop such a web-based user- friendly, integrated solution for the data management activities of AICRP on long term fertilizer experiments. (Dahiya S. *et al*., 2008) explained that a Web based information system entitled "National Information System on Long Term Fertilizer Experiments (NISLTFE)" has been designed, developed and uploaded at Indian Agricultural Statistics Research Institute (IASRI) domain http://www.iasri.res.in:8081/nisltfe/. NISLTFE would generate information for various policy decisions in the context of achieving higher productivity and maintaining sustainability under modern intensive cropping system based on high external inputs of fertilizers, agro-chemicals and high yielding cultivars under irrigated/ rain fed conditions etc.

MATERIALS AND METHODS

Data Storage of LTFE in Electronic Form **:** The data of the following characters for each crop under the cropping system are being received from all the cooperating centers every year.

(i) Yield : Grain and Straw

(ii) Plant nutrient uptake separately for grain and straw in respect of :

Primary nutrients – N, P and K

Secondary nutrients – Ca, Mg and Sulphur

Micronutrients – Zn, Fe, Mn and Cu

(iii) Available soil nutrients either after the harvest of each crop or completion of each crop cycle at the depth of 0-15 cm in respect of the following characters:

E.C., pH, O.C. and Bulk Density.

Available N, P, K, Ca, Mg, S, Zn, Fe, Mn and Cu

(iv) Weekly Weather Data: total rainfall, number of rainy days, maximum and minimum temperature, humidity and wind velocity etc.

System Architecture and Requirements : This search system has been designed with a layered structure wherein each layer corresponds to a particular functionality. The design of information search (Figure-1) is made up of three layers viz. User Interface layer (UIL), Application layer (APL) and Database layer (DBL).

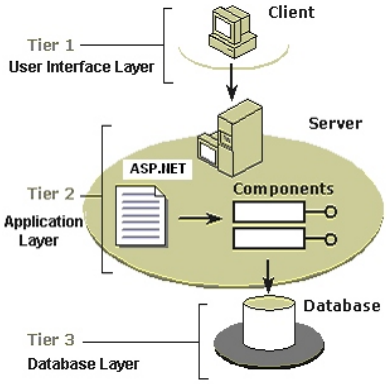

Fig.-1 : Three Tier Architecture of Search System.

User Interface layer (UIL) : The User Interface Layer of the system is implemented using HTML (Hyper Text Markup Language) and JavaScript. The UIL consists of forms for accepting information from the user and validating those forms using Java Script.

Application Layer (APL) : Server Side Application Layer is implemented using Java Server Pages™(JSP). This technology generates HTML pages according to the user's action and request. Figure 2 shows one of the most common ways of using JSP.

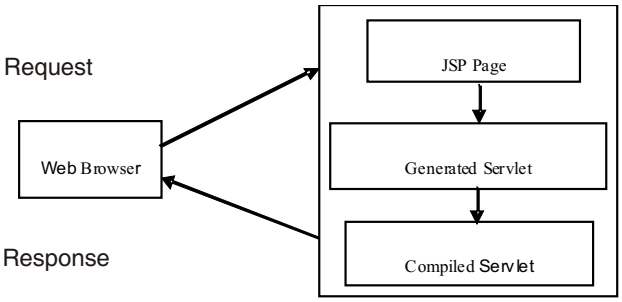

Fig.-2 : Building Web Pages with Java Server Pages.

Database Layer (DBL) : Database Layer of the system is implemented using Microsoft Access 2000. It is used for designing the Tables, Relationships, Referential Integrity Rules and Queries. The relational approach has been used to design the database. The fundamentals of Normalization theory have been used to normalize the different tables of the database [Loney (2004)]. All tables have proper interaction among themselves via primary key - foreign key relationship. Report system on LTFE is developed as a web-based application. Only requirement at the client side is web browser in order to access the application.

RESULTS AND DISCUSSION

Functionalities of Report System : Report System is web-based, user-friendly and integrated system. Figure-3 shows the home page of the system.

Fig.-3 : Home Page of Software.

Report Management : User can retrieve information from this system through searching. Users can select any topic according to their needs. The report page is shown in figure-4. They can get report of Centre Information, Experiment Information, Bifurcate Information, Weather Parameters, Crop Information, Fertilizer Dose, Experimental Data, Experimental Data With Bifurcated Treatments.

Fig.-4 : Report Management.

Data Report Information : The end products of any system are its outputs. System analysis and design concentrates primarily on the outputs of a system. The most important things are its data. The user can get data reports as shown in figure-5, 6, 7.

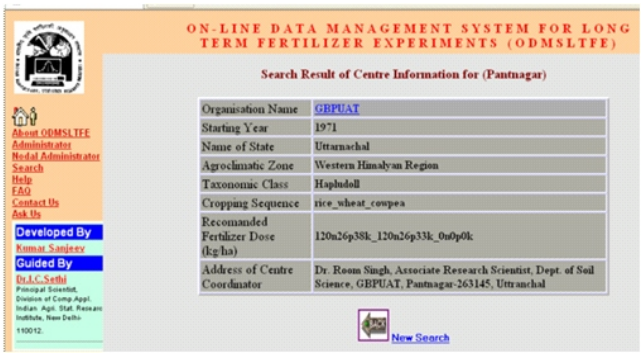

Fig.-5 : Centre Information.

The report results will be got through a table. It includes various fields of information. This report page is shown in screen shot of software.

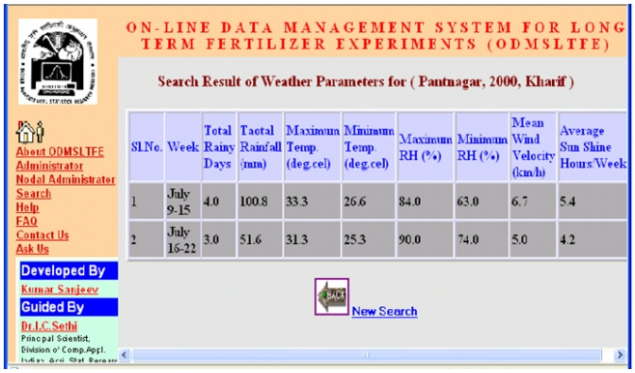

Fig.-6 : Weather Parameters Report.

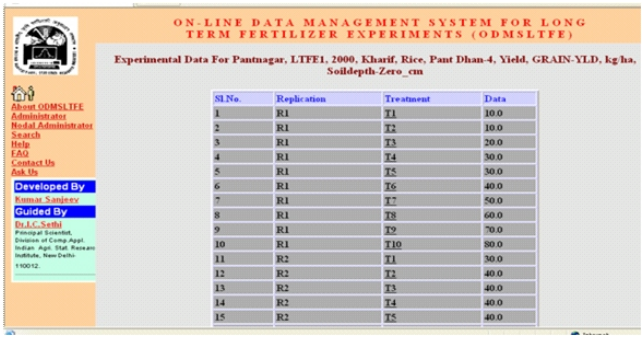

Fig.-7 : Experimental Data Report.

CONCLUSIONS

This system provides reports for centre information, experiment information, bifurcate information, weather parameters, crop information, fertilizer dose, experimental data, and experimental data with bifurcated treatments. It is useful for planning, designing and statistical analysis of data relating to

experiments conducted under the AICRP on LTFE in perspective of soil fertility and crop productivity.

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