Design and Development of Software for Insect Pest Management of Vegetable Crops using Web Technology

Simarjeet Kaur, B K Sawhney, Sandeep Kaur

Abstract— The accurate and timely advice for the effective insect pest management is an important component in controlling the pest on vegetables crops. This web based insect pest management system aims to transfer the pest management practices in different vegetable crops recommended by Punjab Agricultural University to the farmers for their guidance to take quick and timely actions for pest management in their fields. This system has been developed using PHP, HTML, CSS, JavaScript and Ajax and database has been designed using MySQL. The proposed system is advantageous as it is easy to use, effective and efficient in controlling the insect pests by providing accurate and timely information at affordable cost.

Index Terms— HTML, JavaScript, MySQL, PHP, Web based Insect Pest Management System.

I. INTRODUCTION

Vegetable, being a rich source of vitamins, proteins, minerals, carbohydrates and fibers, are also called protective foods, form an integral part of human diet. As far as production is concerned, India ranks at number two in the world after China. But, as a matter of fact, in terms of productivity and per capita availability, India is still lagging behind many countries of the world. Per capita availability of vegetables in our country is 210-gm/ person/ day against 300-gm/person/day as recommended by Indian Council of Medical Research [1].There is urgent need to increase the productivity of vegetables in our country to feed the increasing population. One of the major constraints in increasing vegetable production is loss caused by insect pests.

The solution to this problem is the development of software for guiding the farmers regarding insect pest management program for the vegetable crops. The developed software will provide the information about the identification of insect pests of these vegetables and its management using web technology to the farmers. The software will also provide the information about major insect pests of these vegetables, different stages of pests, damaged symptoms of the crops and their management. So it will help the farmers to identify the pest problem and in deciding the pesticide, its dose and time of application because careful selection of products and application techniques is important to minimize impact on beneficial organisms, humans and the environment.

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The pest management techniques depend on accurate and timely information, which helps in diagnosis of the pest and suggest control methods. The reasons frequently stated by the farmers for non adoption of improved or advanced farm practices are non- availability of technical guidance at the right time and affordable cost.

In few years time, Internet and especially World Wide Web (or simply Web), evolved rapidly from a media of information sharing to a ubiquitous platform of several applications [2]. Internet is the modern tool by which quick time response can be generated. The advanced computer technologies like expert system, World Wide Web provide scientists a vehicle to develop variety of applications which will not only help the farmers but also the students, researchers and extension workers to better manage the operations through timely decision making. These systems help in the diagnosis of insect pest and suggest the control measures to the farmers at remote places as a substitute of expert. This software can be made available at Krishi Vigyan Kendras (KVKs).

II. PROBLEM STATEMENT

Farmers reside at remote places far away from the experts. They cannot take timely remedial measures. In such conditions, the farmers are often tempted to resort to indiscriminate use of pesticides which leads to disturbances in the ecosystem, resulting in resurgence of pest, secondary pest outbreaks and development of resistance among pests to pesticides. Thus there is strong need to develop web based system to transfer the pest management practices in different vegetable crops recommended by Punjab Agricultural University to the farmers for their guidance to take quick and timely actions for pest management in their fields.

III. SOLUTION METHODOLOGY

The proposed system is a web based system. It is developed using the Punjab Agricultural University recommended technologies w.r.t. Insect Pest Management in Vegetable Crops in both open fields and net/poly house structures. Colored images of insect pest and damaged vegetables are shown. It will enable farmers, extension workers and researchers to identify the insect pest and help to follow the management practices recommended by Punjab Agricultural University.

The major operations performed by the proposed system are

- Insect Pest Management system has two modules: user module and admin module.
- User has to fill a simple registration form to access all the services provided by the system.
- Password is stored in encrypted form.

- Any user can check the insect pest profiles either by its name or image or by vegetable name and come to know about the identification, damage, life history and control recommended by Punjab Agricultural University.
- User can check the activity period and peak activity period of various insect pests and can also search for various insect pests which are active in any particular month.
- User can search any vegetable or insect pest which is available in the database.
- Admin has the authorization to add, update and delete any vegetable/insect pest in open fields or in protected structures like net/poly house.
- Registered users of the system can submit the feedback on insect pest topic by voting system.
- Admin can check the number of votes submitted on any insect pest article and came to know about the usefulness of the information.
- Registered user of the system can post a query regarding any insect pest problem which is answered by the admin.

IV. MATERIAL AND METHODS

A brief introduction to the technologies used to develop the proposed web based system is given here:

PHP (recursive acronym for PHP: Hypertext Preprocessor) is an open-source server-side scripting language (Freely downloadable from php.net) for creating dynamic WebPages and other Web applications [3]. PHP was originally created by Rasmus Lerdorf in 1995. Open source means that anyone can access the source code and can use, alter and redistribute it without any cost. Server side scripting means that all of the code is executed on the server before the data is passed to the user's browser. In the case of PHP this means that no PHP code ever reaches the user, it is instead executed and only the information it outputs is sent to the web browser. The PHP code is enclosed in special start and end processing instructions <?php and ?> that allows to jump into and out of "PHP mode". The current major version of PHP is 5. In this proposed system PHP code has embedded into the HTML source document and interpreted by a xampp web server with a PHP processor modules, which generates the web page document.

HTML (Hypertext Markup Language) HTML is not a programming language; it is a markup language. HTML stands for Hyper Text Markup Language. The Web browser contains an interpreter for this language and a viewer for the resulting formatted text [4]. Developed by scientist Tim Berners-Lee in 1990, HTML is the set of markup symbols or codes inserted in a file intended for display on a World Wide Web browser page. By convention all HTML tags begin with an open angle bracket (<) and end with a close angle bracket (>). HTML tags normally come in pairs like and . The first tag in a pair is the start tag and second tag is the end tag. The end tag is written like the start tag, with a forward slash before the tag name. Start and end tags are also called opening tags and closing tags. All the input forms and majority of PHP files in web based insect pest management system developed herein are designed with html.

CSS stands for Cascading Style Sheets. Style Sheets are powerful mechanism for adding styles (e.g. fonts, colors, spacing) to web documents. They enforce standards and uniformity throughout a website and provide numerous attributes to create dynamic effects. With style sheets, text and image formatting properties can be predefined in a single file. HTML elements on a web page can then be bound to the style sheet.

JavaScript is a client side scripting language. JavaScript developed by Netscape in 1995 as a method for validating forms and providing interactive content to web site. JavaScript is embedded between the <script>…..</script> HTML tags. These tags are embedded within the <head>…. </head> tags of the HTML program. Only a browser that is JavaScript enabled will be able to interpret JavaScript code. In the current system, JavaScript code is embedded in the HTML, to be interpreted and run by the JavaScript enabled client's browser. It is used to validate and process user inputs which are entered by the html forms.

MySQL is a powerful and an open source Relational Database Management System (RDBMS) developed, distributed, and supported by Oracle Corporation. It is based on Structured Query Language (SQL) which is used to retrieve, insert, delete and update stored data. The data in MySQL is stored in database objects called tables. A table is a collection of related data entries and it consists of columns and rows. It is very fast, reliable, and easy to use. MySQL has been used to develop database for web based insect pest management system and MySQL commands are embedded into PHP files.

AJAX stands for Asynchronous JavaScript and XML. AJAX is a new technique for creating better, faster, and more interactive web applications with the help of XML, HTML, CSS and Java Script. XML may be used to receive the data returned from the web server. Ajax allows content on web pages to update immediately when a user performs an action, unlike an HTTP request, during which users must wait for a whole new page to load.

Hardware Requirements:

- Pentium 4 or ADM or Celeron Processor
- Ram 512MB or above
- 2 GB Hard Disk
- CD-ROM or DVD-ROM Drive

Software requirements:

- Windows 2008, Windows XP, Windows Vista or Windows 7.
- XAMPP-WIN32-1.7.3 open source installer package for window includes:

✓ Apache Web Server Version 2.2.14
✓ PHP Script Language Version 5.3.1
✓ MySQL Server Version 5.1.41
✓ phpMyAdmin Database Manager Version 3.2.4

V. CONCLUSION

Web based systems have become increasingly important due to the fact that the Internet and the World Wide Web have become ubiquitous, surpassing all other technological developments in our history [5]. The proposed web based system is multiuser system. It is compatible with all the modern operating system and provides information to the user about major insect pests of vegetables. The system provides accurate information which helps in diagnosis of the pest and suggests control methods. This system not only helps farmers but also the students, researchers and extension workers to better manage their work through timely decision making.

VI. SCREENSHOTS

Fig.1 Homepage

Fig.2 List of Insect Pests

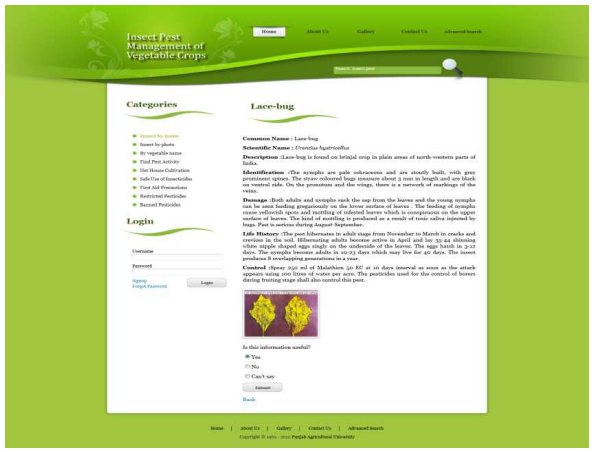

Fig.3 Insect Pest Detailed Information and Voting Screen

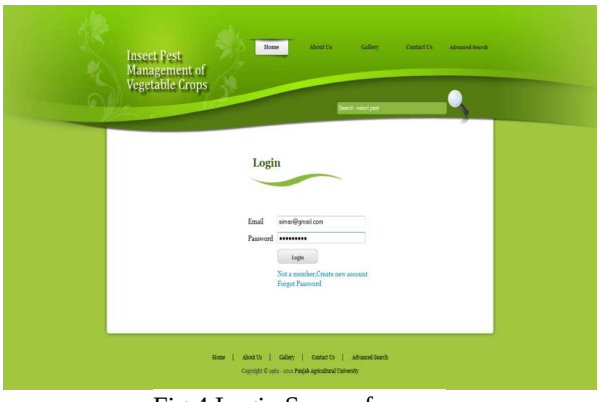

Fig.4 Login Screen for user

Fig.5 Get information about Insect Pest by its image

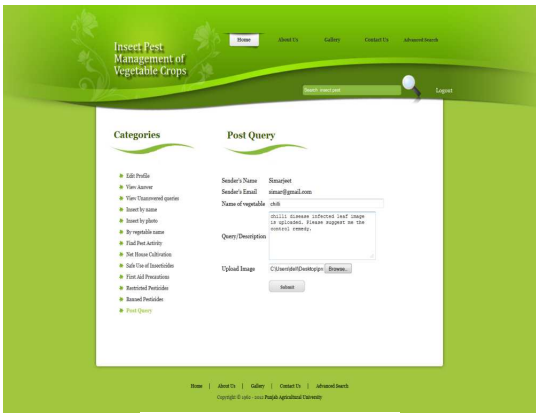

Fig.6 Post Query Screen

Fig.7 User can view the answers of the queries posted by him/her

Fig.8 Search Screen

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