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A Software for Diagnosis and Management of Diseases and Pests in White button Mushrooms

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Abstract:- The cultivation of White Button Mushrooms are growing in Punjab and adjoining areas are carried out by seasonal growers with no almost environmental controls. In the country of India majority of the mushroom holdings are lacking adequate pasteurization compost preparation and proper environmental control facilities, which give rises to the development of various diseases and pests sufficiently to a level to cause considerable yield loss. So this crop is always under threat of attack by diseases and pests. Diagnosing these diseases and pests is difficult and subjected to expert opinion. This proposed system is developed to automate the inspection of White Button Mushrooms and helps to identify diseases and pests. There are also a number of diseases which have similar symptoms making it difficult for non-experts to distinguish them correctly. The proposed system will use colored images of defected mushrooms to detect and diagnose the particular disease and pest. This will assist the farmers to identify any pest, any disease and make right action. This system is developed using ASP.Net and database using SQL Server 2008.

Keywords: Diagnosing, Agaricus bisporus, ASP.Net, HTML, SQL Server.

I. INTRODUCTION

Button Mushroom (Agaricus bisporus.) is the most popular mushroom variety grown and consumed all over the world. In previous times, its production was limited to the winter season in India but with technology development it can be produced throughout the year in farms by adopting different levels of technology. The white button mushrooms (Agaricus bisporus) are belonging to class basidiomycetes and to family agaricaceae. The white button mushrooms are produced all over the world and accounted for 35-45 % of the total mushroom production. The large units with production capacities between 2000 – 3000 tonnes\annum have been set up mostly as export oriented units in different regions of India. The small units exist throughout India and function during the autumn and winter months only. The mushrooms are affected adversely by a large number of biotic and a biotic agents/ factors. Many of these biotic agents act as competitor moulds thereby adversely affecting spawn run whereas others attack the fruit bodies at various stages of crop growth producing distinct disease symptoms.

Detection of diseases and pests can be effectively done by software using image processing. As software is set of computer programs which are capable of offering solutions or advices that are related to specific problems in a given domain and at a level comparable to that of human experts in a field. One of the advantages is that the software is able to reduce information that human users need to process, reduce personnel costs and to increase output of business. There are some diagnosing systems which depend on the ability of an end user to understand abnormal symptoms of plant and convey these symptoms through a textual output. If, however, the end user interprets the abnormal observations in a wrong way and chooses a wrong textual answers to a presented questions then this expert system will reach to a wrong conclusion.

The proposed software is developed to help researchers and farmers for identification and management of these diseases. This proposed system uses the textual descriptions and photographs. This system consists of database containing information about different diseases of white button mushrooms and different colored images of these diseases. The textual inputs and images are used to detect and diagnose the diseases. The users can easily identify any disease, pest and become able to make the right decision and choose the right treatment for management of diseases and pests. This software is regularly updated by administrator. It will also be helpful in reducing cost by timely detecting the disease accurately.

II. SYSTEMS IN AGRICULTURE

The systems are developed to diagnose the diseases and pests of various crops. Farmers face several problems like soil erosion, weather damage recovery, mixing and application, yield loses, increasing cost of chemical pesticides, the need to spray and pest resistance. But researchers in the field of agriculture are working on new management strategies to promote success of farm. Farming has become technologically advanced and expert systems are widely used in the field of agriculture in many countries today. By this farmers can get expert opinion on their specific problems like selection of most suitable diagnosis or identification of livestock disorder, crop variety, suggestion tactical decisions throughout production cycle etc. from the expert system. There is always a need to develop a new system for different regions. Using expert system technology in agriculture is not new thing. (POMI) (Gerevini et al, 1992), an expert system for integrated pest management of apple orchards has been developed in Italy. CUPTEX (Rafea et al, 1995) is an expert system for handling management of cucumber disorders. The NEPER

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wheat expert system (Kamel et al, 1995) is used for handling the production management aspects of wheat crops. Yialouris and Sideridis (1996) developed an expert system for tomato. It handles the tomato disease identification problem. The United State Department of Agriculture has developed an expert system for cotton crop management to provide appropriate management recommendations to cotton growers [4]. Center for Informatics Research and Advancement Kerala has prepared an Expert System called AGREX. It helps the Agricultural field personnel give timely and correct advice to the farmers [4]. An expert system for integrated production of muskmelon can be found in Ref. [8]. TOMATEX is an expert system for tomatoes [9].

III.BRIEF DESCRIPTION OF AILMENTS OF WHITE BUTTON MUSHROOMS

General distribution of various competitor moulds and pathogenic fungi is as follows:

I. Those occurring mainly in compost include: Olive green mould (Chaetomium, olivaceum and other spp.), Ink caps (Coprinus spp.) Green moulds (Aspergillus spp. and Penicillium spp.), Black moulds (Mucor spp., Rhizopus spp.) and other (Myriococcum praecox, Sporotrichum sp., Sepedonium sp., Fusarium spp., Cephalosporium spp., Gliocaldium spp., and Papulospora spp.).

II. Fungi occurring in compost and in casing soil: White plaster mould (Scopulariopsis fimicola): Brown plaster mould (Papulospora byssina), Lipstick mould (Sporendonema purpurescens), False truffle (Diehliomyces microsporus) and green moulds.

III. Fungi occurring on and in casing soil and/or on the growing mushrooms: Cinnamon mould (Peziza ostracoderma), wet bubble (Mycogone perniciosa), Dry bubble (Verticillium fungicola), Cobweb (Cladobotryum dendroides), Pink mould (Trichothecium roseum) and green moulds.

IV. Fungi attacking the fruit bodies only: Fusarial rot (Fusarium spp.). At any phase an undesirable growth or development of certain moulds can happen and can adversely affect the final mushroom yield.

IV. MATERIALS AND METHODOLOGY:

From a user's viewpoint, the system operates like a sophisticated e-mail system within a centralized database to save and capture data for future retrieval and processing. First, a user observes a pest or disease or symptom and captures an image through a camera. After capturing the "digital samples", the user then signs on to this website to submit these with the pertinent field data to a database. After the user submits a sample to the server of website, its sampled image is matching with the stored images in the database automatically. If this image is matched with any image of the database up to required percentage then the corresponding management techniques are displayed. If image is not matched with the required percentage then prescriptions will sent later by an administrator through an email. The unmatched image is discussed with the experts and find out the required solution.

In this image comparison is done with the help of pixels. The user has to enter an image with required size. Then this size is converted into pixels. After this matching ratio is calculated by using formulae:

Variable= ((Matched pixels)/Total size in pixels)*100.

The given Data Flow Diagrams(DFDs) explain how data flows in this proposed system.

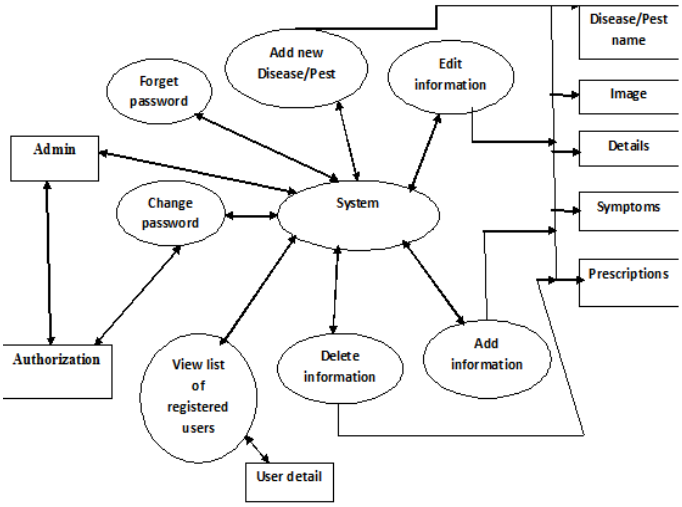

Fig.1: DFD of Administrator.

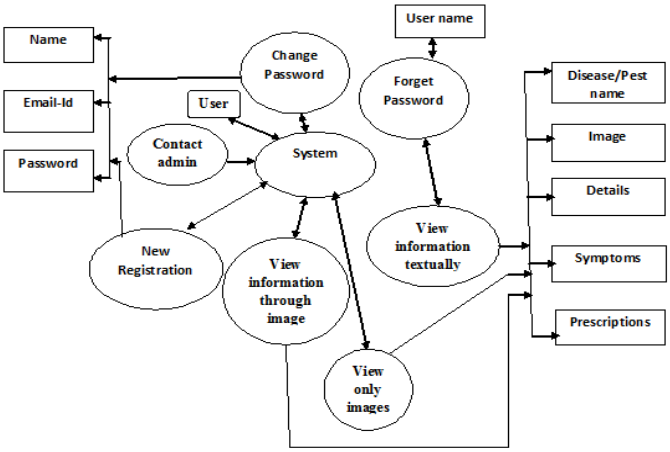

Fig.2: DFD of User.

In Fig.1. Administrator plays different roles like he/she can add, update and delete information which is related to diseases/pests. Administrator also can assign permissions to different images to be displayed which are loaded by users on website. But in Fig.2. Users can get information textually, through images and can view only images of different diseases/pests.

V.RESULTS AND DISCUSSION

This is an intelligent computer program that uses knowledge and inference procedure to solve problems that are otherwise difficult enough and require human expertise for their solution. At first level the system allow user has to decide whether he/she wants to know management techniques either

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through textually or through image user make selection simply clicking on the particular link. At this stage user has also choice of view all images of related diseases or pests at different levels. At second level if user selects textually description option or view through image option then system identified the disease, the software provides exhaustive information about the disease such as its causal organism, favourable weather conditions, survival of the pathogen, loss causing potential of the disease etc. and if user selects the view only image option then system returns all the stored images of that particular disease and pest. At the third level finally system intends to link the identification system to the disease control module so that the information on identified disease for recommendations control can be generate.

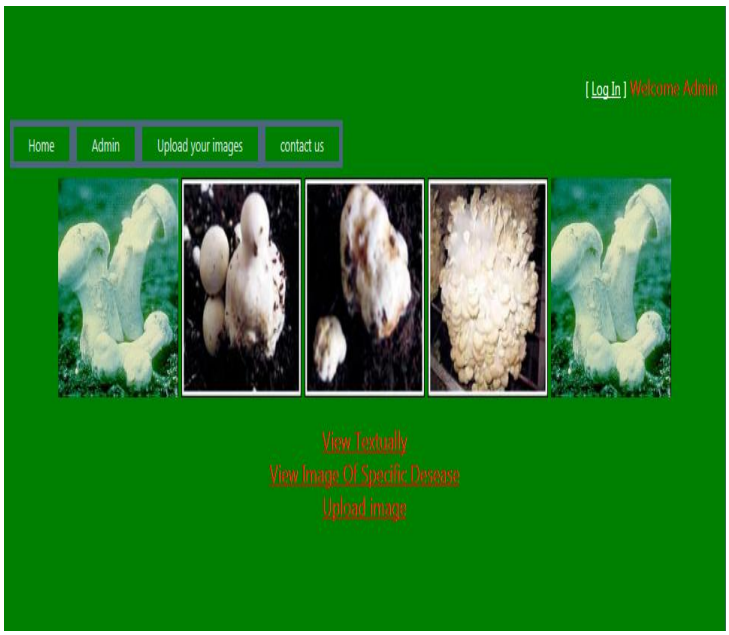

Fig.3: Screen for User Options.

Fig.4: Screen having textual information.

Fig.5: Screen having only images of related disease/pest.

Fi.6: Screen having information through an uploaded image.

VI.CONCLUSION

The "A Web-based Software for Diagnosis of Diseases and Pests in White button Mushrooms" developed is an integration of image and textual data. The system can be used by extension personnel, researchers and farmers to identify white button mushrooms diseases and enable their management. User can easily identify the disease on the basis of photos of symptoms and text description of disease. The user friendly software developed using windowing environment, thus provides enough facilities to identify the disease and to suggest the remedy conveniently. The rapid development of internet technology has changed the way of expert system development. It is easy to access the system via the internet. The experience and lessons learned from the development of expert system suggest that the system is still useless for many farmers in its present form. Many farmers in the country are illiterate and knowledge of computers in rural areas is still a problem. In summary, general objective of an expert system is to provide expert knowledge to non experts. The use of internet technology has greatly enhanced the benefits of such systems. However the development of web-based expert systems poses new challenges and emphasis on more research to be carried out.

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Biography

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