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MULTILINGUAL MULTIMEDIA BASED CROP DISEASE ASSISTANT

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Abstract

India's agriculture is composed of many crops, with the major yield of staples foods like rice and wheat. Indian farmers also grow pulses, potatoes, sugarcane, oilseeds, and such non-food items as cotton, tea, coffee, rubber, and many more to earn their livelihood.

Despite the overwhelming size of the agricultural sector, however, yields per hectare of crops in India are generally low compared to international standards. In this paper the model of multimedia based Plant Disease Identification for Wheat crop is discussed. The research aims to use modern information technology to facilitate communication between researchers and farmers to transfer information in more cost effective way. The developed model helps the endusers;farmers and students who study plant pathology to use mobile phone in easy and convenient way to access crop disease information.

Keywords:

Plant Disease, Disease Management, Agriculture, Mobile Technology, Crop Productivity, Multilingual.

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The aim of research is to identify plant disease and provides multimedia based information like scientific name, Diagnostic Symptoms, Disease Cycle, and Disease Management, in multiple languages.

1. INTRODUCTION

Agriculture, with its allied sectors, is unquestionably the largest livelihood provider in India, more so in the vast rural areas. It also contributes a significant figure to the Gross Domestic Product (GDP).[18].

Sustainable agriculture, in terms of food security, rural employment, and environmentally sustainable technologies such as soil conservation, sustainable natural resource management and biodiversity protection, are essential for holistic rural development. Indian agriculture and allied activities have witnessed a green revolution, a white revolution, a yellow revolution and a blue revolution.[18]

Telecommunication, especially mobile phones have the potential to provide solution to the existing information asymmetry in various lagging sectors like agriculture. India's agricultural sector suffers from low growth rates and low productivity.[19]

Many factors may contribute to differences in national agricultural productivity levels, including small farm size, lack of access to credit to invest in more productive technologies, lack of insurance to manage weather risk, and lack of information on increasing crop productivity. An alternative to traditional agricultural extension services is to deliver agricultural information to farmers via low-cost information and communications technologies. Mobile phones are being used to deliver not only information but also a range of financial services such as payments, credits, insurance, and savings.[20]

2. THE STUDY

Mobile technology helps farmers to improve the agriculture production through significant disease management measurements available easily in convenient way. The essential part of this research is the need to develop a system which transfers the knowledge of experts to the farmers through effective means of communication.

The following fig 1 shows the average yield of major crops in India in Ka per Hector.

Crops	1970-71	1980-81	1990-91	2000-01	2010-11	2015-16	2016-17*
Rice	1123	1336	1740	1901	2239	2400	2543
Wheat	1307	1630	2281	2708	2989	3034	3172
Pulses	524	473	578	544	691	656	765
Oilseeds	579	532	771	810	1193	968	1229
Sugarcane (tonnes/ha)	48	58	65	69	70	71	68
Cotton	106	152	225	190	499	415	513

Source: **Directorate of Economics & Statistics, Department of Agriculture, Cooperation and Farmers Welfare**
Note: ***Third Advance Estimates.**

fig 1 : Average yield of Major crops in India (Kg/ha). (Source [16])

To increase the yield of any crop proper disease management should be done.Generalized symptoms may be classified as local or systemic, primary or secondary, and microscopic or macroscopic. Local symptoms are physiological or structural changes within a limited area of host tissue, such as leaf spots, galls, and cankers.[15] ,[14]

Systemic symptoms are those involving the reaction of a greater part or all of the plant, such as wilting, yellowing, and dwarfing.[15] ,[14]

Primary symptoms are the direct result of pathogen activity on invaded tissues (*e.g.,* swollen "clubs" in clubroot of cabbage and "galls" formed by feeding of the root-knot nematode). Secondary symptoms result from the physiological effects of disease on distant tissues and uninvaded organs (*e.g.,* wilting and drooping of cabbage leaves in hot weather resulting from clubroot or root knot). Microscopic disease symptoms are expressions of disease in cell structure or cell arrangement seen under a microscope. [15]

Macroscopic symptoms are expressions of disease that can be seen with the unaided eye. Specific macroscopic symptoms are classified under one of four major categories: prenecrotic,

necrotic, hypoplastic, and hyperplastic or hypertrophic. These categories reflect abnormal effects on host cells, tissues, and organs that can be seen without a hand lens or microscope.[15]

The study shows that there is a need of having a model which can identify the disease of a crop and disseminate disease management information to the farmer.

3. RESEARCH METHOD : The Model Developed

The model developed as part of research is a Multilingual Multimedia Based Crop Disease Management System using Mobile Technology, will assist framers, non-experts and students of plant pathology to identify plant diseases, based on the selection of pictures representing the symptoms on a specific sample of plants. The model can be used remotely through smart phone or tablet.

The user interface is simple based on a selection of crop by the user through visual identification of the crop image and small text description of crop name.

The system provides list of images of popular plant diseases with text description and audio support.

The user can compare the actual crop image with the suggested image of crop diseases available in the system and ease the process of manual recognition of plant disease. Once manual recognition is done, user can access the detail information of plant disease like scientific name of the disease, Diagnostic Symptoms, Disease Cycle and Disease Management.

The model is developed, considering wheat crop as a sample and provides information related to symptoms of wheat diseases and provide information related to its diseases.

Fig 2 : Language Selection

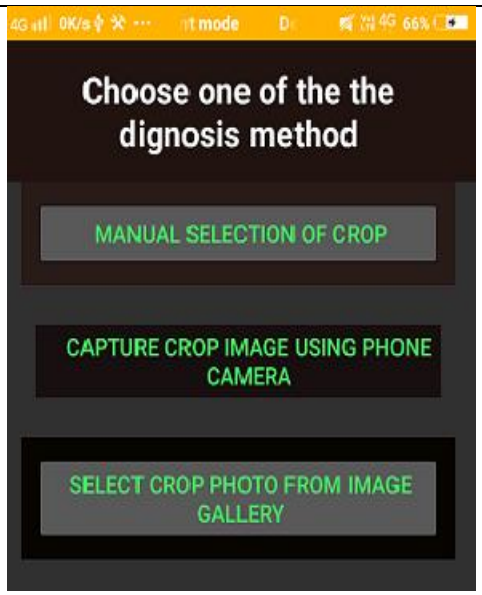

Fig 3 : Selection of Disease Diagnosis Method

- To start with the application and access the disease related information the end user needs to select the choice of interface language, as shown in above Fig 2.
- Once the end user selects the language, the next step is selection of diagnosis method as shown in above Fig 3.
- There are three options available, and the user needs to opt for the first method i.e. MANUAL SELECTION OF CROP as shown in above Fig 3.
- When MANUAL SELECTION OF CROP option is selected the next step is selection of the crop as shown in Fig 4. When user selects the crop the crop name appears as shown in Fig 5.

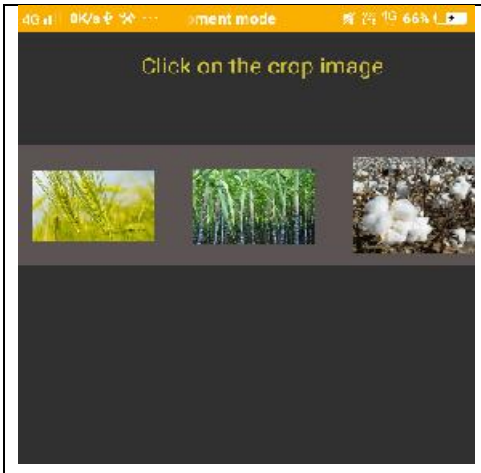

Fig 4 : Select Crop

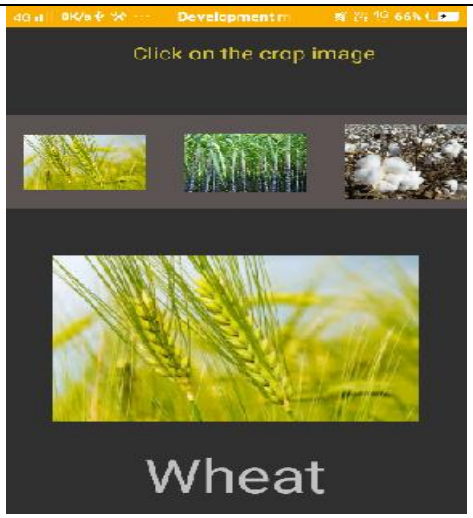

Fig 5 : Displays user selected crop

- The following Fig 6 shows images of various wheat diseases. When the end user clicks on the one of diseased image it displays the Disease name (with Audio support).

- To fetch information related to Scientific name of Disease, Diagnostic symptoms, Disease Cycle and Disease management the user needs to select CLICK FOR DISEASE INFORMATION AND MANAGEMENT DETAILS (as shown in Fig 6), which displays the result as shown in Fig 7. The user needs to scroll down for full details. When end user clicks on the play audio button, it reads outs the full text that appears in Fig 7.

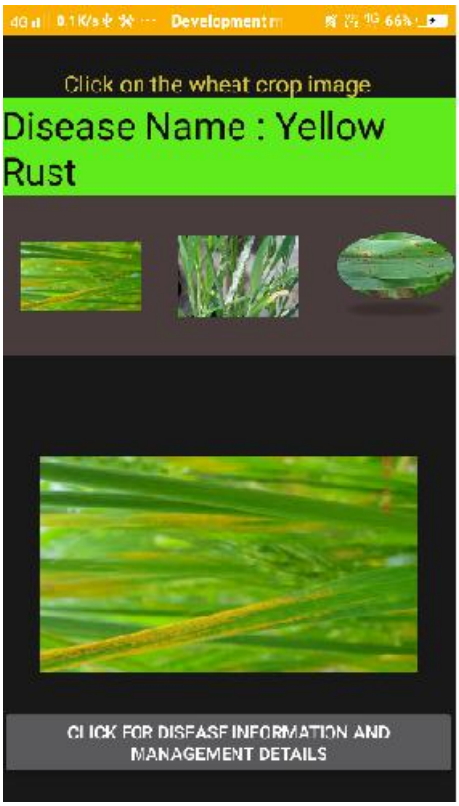

Fig 6 : Disease selection

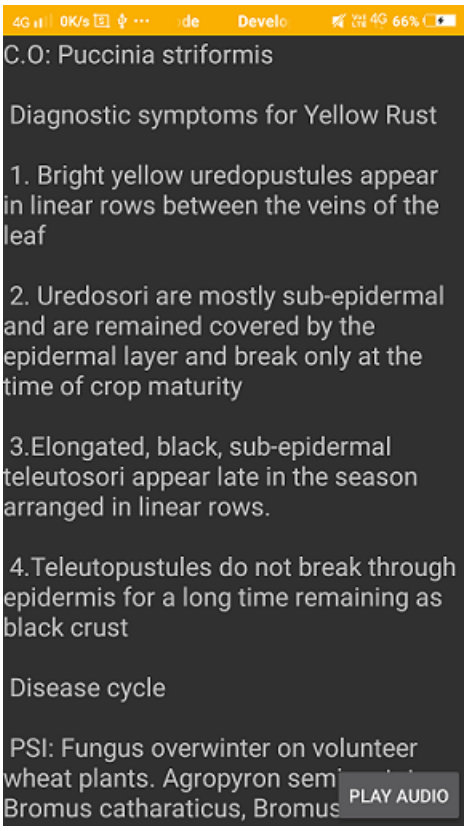

Fig 7: Disease Diagnostic symptoms and Disease Management. (Source [17])

4. RESULTS ANDCONCLUSION

The proposed model is implemented as Mobile app named MAgriculture using Android Studio 2.1.3. The app will aid the farmers for identification of crop disease in less time and considering the disease management remedies to increase the crop yield. The model supports multilingual facility also. Multimedia support adds support to persons who have some vision disability can use audio file and person with hearing disability can read the textual information. As Agriculture is a proved backbone for the Indian economy this model will prove to be beneficiary application to this sector.

The proposed model will prove as an aid with ease to the farmers for identification of crop disease in less time with the suggested remedies to decrease yield loss, which directly affects the economy of the country.

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