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THE DEVELOPMENT OF A DIAGNOSTIC EXPERT SYSTEM ON PESTS AND DISEASES OF BLACK PEPPER IN SARAWAK

Fatimah Othman, Lily Eng, Asmah Salowi and Wong Ting Hung

ABSTRACT

This article describes an information Technology (IT) project undertaken by the Agricultural Research Division of the Department of Agriculture, Sarawak. The main activities in the development of an expert system for diagnosing pest and disease problems of black pepper are explained. These activities included the knowledge acquisition process, the development of diagnostic procedures for the expert system, the conceptual user interface, and end users' evaluation of the system. The completed system, XCROP, is captured on CD-ROM for ease of distribution to end users.

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INTRODUCTION

The Agricultural Research Division of the Department of Agriculture, Sarawak is generating research data which can be transformed into technologies that are capable of increasing productivity and efficiency towards commercialised agriculture for income maximisation. Since its inception in 1955, the Research Division has produced research results and gained expertise in numerous fields of study related to crop production. One field of study is on pests and diseases of major crops commonly grown in Sarawak. The Research Division has identified these pests and diseases, and established the methods of preventing and controlling them. The effective dissemination of these research outputs and knowledge to extension workers

and agriculture producers in the State is essential in addressing problems on crop pests and diseases. To meet this challenge, information technology (IT) advances in software engineering, multi-media and electronic communication can be exploited.

This paper describes the main activities in the development of an IT tool for disseminating research findings and knowledge to potential end users in Sarawak.

LITERATURE REVIEW

Fatimah *et al.* (1997) reported that in Sarawak, problems on pest and disease incidences are regularly referred to Agricultural Research Centre Semongok. Some of these referral cases are simple and could immediately be solved by the extension workers and agriculture producers, provided they have the right knowledge. Others, however are more difficult to diagnose and solve on-site and therefore need the attention of specialists. Disease and pest problems are often ill-structured and solutions do not adhere to any exact analytical means. The diagnosis technique is sometimes based on experience, research findings and occasionally by trial and error approach. This type of approach is therefore heuristic in nature. Heuristics are "rules of thumbs" learned through experience, which are difficult to computerise using conventional programming. They are best approached through an expert system solution (Giarratano & Riley, 1989).

An expert system makes extensive use of specialised knowledge to solve problems at the level of a human expert. It is a component of artificial intelligence (AI), which specialises in programming intelligence. A pioneer in expert system research, Professor Edward Feigenbaum of Stanford University, defined an expert system as ".... an intelligent computer program that uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for their solution."