

Analysing Awareness of Farmers in Kolhapur Region about Expert System Implementation for Irrigation of Sugarcane

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Abstract— An expert system is very applicable to agriculture which is considered as vast and large field with uncertainty. Most of the expert systems has implemented in agriculture to solve various problems. The paper talks about various agricultural applications of expert system and puts findings of research carried out to study farmer awareness about implementation of expert system for irrigation of sugarcane in Kolhapur region. The main objective of this paper is to draw conclusion and provide significant suggestions in this regard.

Keywords—expert system, sugarcane, irrigation, Kolhapur, farmer awareness.

I. INTRODUCTION

Indian economy is an agro based economy. More than 70% population based on agricultural for its subsistence. In India agriculture is regarded as gamble with monsoon.

Kolhapur region, in general is known as the prosperous area with availability of water, soil quality etc. Though this is feature of region considering the possible threats of environment irregular monsoon and deteriorating soil quality, it is important to use the applications driven by technology. The use of advanced systems such as expert system, the deterioration of soil and problems of scarce water can be solved.

An expert system is a computer-based program that uses knowledge, facts and different reasoning techniques to solve problems that normally require the abilities of human experts. [1]. Agricultural production has evolved into a complex business which requires the accumulation and integration of knowledge and information from many diverse sources.

II. APPLICATIONS OF EXPERT SYSTEM IN AGRICULTURE

Knowledge system technology has been applied to a variety of agricultural problems since the early 1980s. In agriculture, expert systems combines the expertise of agriculture related disciplines, with a framework that best addresses the specific, on-site needs of farmers and thereby solve many problems. Unfortunately, agricultural specialist assistance is not always

available when the farmer needs it. In order to alleviate this problem, expert systems were identified as a powerful tool with extensive potential in agriculture.

Agricultural expert system can be classified according to domain specific task that this system performs such as: irrigation, fertilization, pest management, diagnosis of plant diseases, and others.

TABLE I
SOME AGRICULTURAL EXPERT SYSTEMS

| S No. | Developer | Expert System |
|-------|--|---|
| 1 | Michalski et al., 1983 | diagnosis of Soybean diseases |
| 2 | Roach et al,1985 and Gerevini et al., 1992 | apple orchid management (POMME) |
| 3 | Lemon, 1986 | crop management for cotton (COMAX) |
| 4 | Plant, 1989 | agriculture management for all crops (CALEX) |
| 5 | Warkentin et al. 1990 | agroforestry expert system (UNU-AES) |
| 6 | Rafea et al., 1991 | crop management expert systems for different crops |
| 7 | Rafea et al., 1994 | cucumber and citrus management |
| 8 | Gerevini et al., 1992, Italy | integrated pest management (POMI) |
| 9 | Kamel et al., 1994 | integration of numerical simulation models into the crop management expert system |
| 10 | Loh et al., 1994 | integrating GIS and expert systems |
| 11 | Schroeder et al., 1994 | expert system for wheat management |
| 12 | Rafea et al., 1995 | Integrating multimedia with expert systems |

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|----|---------------------------------|---|
| 13 | Mohan and Arumugam, 1995, India | intelligent front-end for selecting evapotranspiration estimation methods |
| 14 | Rafea et al., 1995 | cucumber production management |
| 15 | Schulthess et.al., 1996 | picture-based expert system for weed identification |

III. NEED OF EXPERT SYSTEM FOR IRRIGATION OF SUGARCANE

In Maharashtra, sugarcane cultivation, which is on less than 4 percent of the total cropped area of the state, takes away almost 70 percent of irrigation water in the state. This leads to massive inequity in the use of water within the state. Future growth of cane in Maharashtra is likely to be severely hampered by scarce water supplies. Also Maharashtra has witnessed drought in the last two years. Kolhapur region is not drought prone but due to less rainfall suffering from scarcity of water.

In Kolhapur region most of the farmers use traditional irrigation methods. A good part of the applied water is lost in conveyance, application, runoff and evaporation and hence the efficiency of these irrigation methods is low. Excess of water also causes deterioration of soil in this region.

Plant water requirement is depend on various parameters such as soil characteristics, humidity and temperature which often change. Farmers manually deal with these parameters which will require some kind of expertise to analyze exact water requirement. This problem can be perfectly rectified with Recent developments in information technology, specifically the new capabilities of software development efforts known as Expert system for irrigation analysis and thereby manage irrigation practices for sugarcane.

IV. RESEARCH DESIGN

A. Objectives

- To study various agricultural applications of expert system.
- To analyse farmers awareness and willingness of expert system implementation.
- To draw conclusion and to provide meaningful suggestions in this regard.

B. Scope of the Study

The study was limited to accessing the sugarcane producers' awareness and willingness about implementation of Expert system for irrigation of sugarcane. The geographic scope of the study was limited to Kolhapur region which consist Kolhapur, Sangali districts.

C. Significance of the Study

In the developing countries like India, agriculture is the occupation of major portion of population. The western and southern part of Maharashtra is known for prosperity of water and at the same time it is also known as sugar belt for number of sugar factories and huge number of sugarcane growers. But the sugarcane cultivation consumes huge quantity of water which is a natural source and recently, due to the uncertain rain, it is important to productively and efficiently use these resources. This is the major concern in the study areas and the same can be replicated in other parts of the country. Therefore, it is important to explore the possibility of use of expert system for sugarcane cultivation.

D. Data Collection

The present study requires first hand information i.e. Primary data which is collected from sugarcane growers from Kolhapur division through Questionnaire. 40 farmers were selected from these two districts. The data collected for the present study especially the primary data was analysed by using the advanced techniques like MS Excel.

V. FINDINGS

In a survey conducted for the research 23 farmers are from Kolhapur district and 17 are from Sangali District.

- Out of the total sample farmers 40% are graduates which means that majority (60%) of the farmers are educated till SSC, HSC and none of the farmers have post graduate degree. Lack of education is the main reason for lower awareness about use of technology in farming.
- Most of the farmers are from the age group of 41-50 years (42.5 %). Only 12.5 % of the farmers are below the age of 40%. It means that relatively younger population is away from agricultural activities.
- 67.5% of the farmers have a cultivation land of 1-5 acres. Because of low land holding it is not affordable for the farmers to go for expert system.
- Majority of the farmers (70%) are of the opinion that because of common scheme, it is not possible for individual farmers to take the decisions about implementation of expert system.
- 87.5% of the farmers are using traditional irrigation method which cannot be automated.
- 47.50 % of the farmers strongly agree that there are number of advantages of drip irrigation and around 45 % of the farmers agree about the same fact. It means that more than 90 % of farmers are aware of advantages of new irrigation methods.
- Majority (62.5 %) of the farmers are using mobile phone and only 15 % farmers are using smart phones. Therefore it is difficult to implement automation through mobile apps.

- Almost all (97.5 %) of the farmers are not implementing any irrigation automation tool.
- 52.5 % of the farmers are willing to implement expert system for sugarcane irrigation in their farms. 37.5 % of the farmers are not willing to implement expert system for sugarcane.
- Those farmers who are willing to implement expert system as well as those farmers are reluctant to implement expert system have stated that there are few problems in implementing expert system like irregular electricity supply, huge cost, question of economical, technical and operational feasibility, lack of awareness and information etc.

VI. PROBLEMS OF IMPLEMENTING EXPERT SYSTEM

Following are some of the problems to implement expert system for sugarcane irrigation.

- Most of the farmers using traditional irrigation methods which are difficult to automate.
- Some of the farmers intend to implement expert system but as there is common irrigation schemes individual farmer may not be position to take the decision.
- Expert system development, implementation and maintenance are very often an expensive process which requires time and effort.
- These are designed to assist and not necessarily to substitute the experts
- Most of such systems are technical and not user friendly which make farmers difficult to understand
- Lack of technical support necessary to implement and maintain expert system
- The system only works in controlled conditions. Therefore it cannot be totally replaced with human efforts
- Most of the farmers are not willing to change to new techniques. Resistance to change the traditional system is the common problem observed.
- Considering the cost and technology the expert system is not feasible for small farmers.

VII. CONCLUSION

For the purpose of detail analysis, certain statistical tools were used and wherever required, the software was also used to analyse the data and get the results. Following are the results,

- Most of the Farmers use traditional irrigation methods such as furrow irrigation which causes many problems in Kolhapur region.

- Most of the farmers are unaware about expert system and its agricultural applications.

Thus it can be concluded that, Even though the expert system can be used to solve irrigation problems of sugarcane, farmers have lots of misunderstanding about its effectiveness and feasibility. This unawareness causes unwillingness to implement expert system in their forms.

VIII. SUGGESTIONS

Following are some suggestions given to increase the awareness about expert system and its applications among farmers

- Expert systems should be in mother tongue of farmers and user friendly.
- Expert systems technical, operational and more important economical feasibility needs to be checked before implementation.
- Promote farmers to use expert systems in their farm
- Arrange awareness camps for farmers
- Governments should Provide subsidy to farmers for implantation of expert system
- Make technical support easily available to farmers to assist implementation and maintenance of expert system

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