

## Information Technology in Agriculture

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**Abstract**— Information Technology can improve the technologies used in farming and is very useful in farm management, crop data management. There is much contribution from Information Technology in agricultural productivity. Various technologies or Computer-aided devices are used in the agriculture sector that leads to growth and overall performance in any field such as horticulture, forestry, etc. Information Technology is not only useful at the farmer level but also it supports the research related to this field and business that is running in the agriculture field like information to the Management level. This article covers the Information technology-based systems that are useful for the farmer community, mobile-based solutions, and Web-based services, automated systems, Agriculture database that may be useful for Scientific Research, Management Information System in Agriculture in India. In addition to it, Expert Systems, robots developed and designed especially for the agriculture sector, DSS (Decision Support System) in agriculture and its importance for Management level.

**Keywords**— ICT, Web, Database, Experts System , Agribot

### I. INTRODUCTION

Information and communication technologies in every field play a very important role. The agriculture sector also getting more productivity and accuracy with the emerging technologies of ICT (Information and communication technologies). Whether it is about Management Information System at a higher level or farmers at the field level, Information Technologies is helping a lot in this sector. Many agricultural development projects are using ICT for monitoring various schemes and make it easy for the farmers or beneficiaries to get the most out of these projects through Web-based access or other scientific programs implementation with the help of information technologies. This is time-saving and fewer chances of human error. Web-based technologies proved to be the most effective ways, especially in rural, or remote areas where all the information and guidance can easily be provided through internet contents to a large group and any changes/updating are also easy. Now if we talk about higher levels like an Agricultural think tank, Research stations, Krishi Vigyan Kendras, Agricultural Universities, Research Farms, here also Information systems stores, represents, and analyses data in a very efficient way that is further used for various studies and research programs. Robotics in the field of agriculture is also getting major improvements. Many types of researches are going on for this area at the University level or at research stations established for agriculture growth by the Government [1, 2].

### II. RELATED WORK

Surabhi Singh, Santosh Ahlawat and Sarita Sanwal have explained about the major ICT initiatives launched for farmers in India[1].

K. Subhadra discussed about IoT (Internet of Things), Big Data, AI (Artificial Intelligence) and their application in agriculture[2].

### III. SOFTWARE PRORAMS AND DEVICES DESIGNED FOR AGRICULTURE

#### 1. Automated systems

Automated systems without human labour works very efficiently and saves the time. Also there is no need of supervisory control. For example, automated crop cutting machines that do not require human labour and accomplish the job in a very less time.

#### 2. Agricultural mobile Apps in smartphones

The various smartphone mobile apps have been developed for helping out farmers in agriculture, horticulture, forestry, animal husbandry etc.

#### 3. RFID (Radio-frequency identification)

RFID provides the data like name of breeder, bearer's location, origin of livestock and dates of movement of livestock. This technology also provides great advantage in controlling the disease outbreaks in livestock.

#### 4. Web based services

Now a day's internet use is increasing rapidly. So many services are offered by the Web based technologies in the field of agriculture or horticulture etc. Whether it is about E-Learning or E-Commerce, farmers are getting most out of it. The portals designed for Agriculture by the Government mostly, provided all the information to the stakeholders such as any agricultural Scheme related information, Experts talks or chats related to agriculture, Subsidy forms online filling, eligibility check, Farm operations, crops related information.

## 5. Information Technology based Manufacturing

Information Technology assists farmers in farm operations, including planning and management of fields.

## 6. Seed-counting machines

For the farmers who deal with Seed manufacturing, its distribution and management, it is difficult to count the seeds for various packing requirements. The seed counting machine has a inbuilt software programme which automatically does the job of counting according to the parameters set the user in a time efficient manner.

## 7. Computer aided Microscope system

The Laptop or Personal Computer attached to the Microscope records all the data for further analytical process thus helping the Researcher and Agricultural Scientist for their experiments.

## 8. RaitaSnehi

This Agribot developed at St Thomas College of Engineering and Technology, APJ Abdul Kalam Technological University, Kerala, India can perform basic elementary functions of agriculture like spraying the pesticides in the farms. The use of robotics applications in agricultural machinery design and task executions has increased the agriculture production [3].

## IV. MANAGEMENT INFORMATION SYSTEM IN AGRICULTURE

MIS is very important in every field so in Agriculture. It provides the data and information to the management to make important decisions based on the inputs and thus productivity is directly affected by these decisions. Some information systems in this field are mentioned below:

### 1. AgRIS

The Agricultural Resources Information System (AgRIS) is an e-governance programme of the Government of India for agricultural by the Department of Agriculture and Cooperation. It provides the information about the National Spatial Data Infrastructure on agriculture.

### 2. AgROVOC

AgROVOC is a multilingual agricultural thesaurus available in 23 languages developed by Food and Agriculture Organisation (FAO). It covers terminology of all subject fields in agriculture, horticulture, forestry, environment, food etc [4].

## V. EXPERT SYSTEMS

Expert systems are computer software programs developed to simulate the problem solving behaviour of an expert. It is capable of solving very complicated problems that requires extensive human expertise. It is known as Knowledge Based System. The human knowledge and date stored in the computer are used by the Experts System when needed to solve problems.

## VI. DECESION SUPPORT SYSTEM

DSS are computer based Systems that uses human Knowledge and data stored in the database for supporting the decision making process. The DSS technology uses a Database, a Model and a user interface. Results are processed and produced according to user criteria, Inputs and *User knowledge and Expertise*.

## VII. DATABASE MANAGEMENT SYSTEM: AGRICULTURE DATABASE

Agriculture Scientific Research requires information resources and agricultural database can be very beneficial for this. Agriculture database can store very large sized files and it is an integrated system that can be easily updated.

### Various Agriculture Databases (In India) are :

- AGRICOLA
- AQUASTAT
- Environments (MANAGE) Database
- PAN Pesticide Database
- Pesticide Properties Database
- Plant Science
- Safe Drinking Water Information System
- Aginfonet aglibrary

## VIII. CONCLUSIONS

There are many positive impacts of Information Technology in the agriculture sector which contribute to increased yields, and crop production, easy adaptation to climate change. The government of India in collaboration with the IT sector is taking various initiatives to bring IT-based services to farmers at their doorsteps for their convenience. This paper suggests a thought of contributing some major innovations/ICT based programs in the field of agriculture. The significance of various technologies has been highlighted considering all the aspects. The paper concludes that for more development and growth in the agriculture sector, Information Technology plays an important role and farmers must take the advantage of IT based techniques. For achieving this objective they should be aware of all the projects, and schemes which are meant for the up-gradation of agriculture technologies aided by IT, for more productivity. For modern agriculture, IT would play a very crucial role in revolutionizing agriculture through many programs and research works for this area.

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