WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

USAGE OF IOT AMONG FARMERS IN MONITORING CROP HEALTH, WEALTH AND SOIL CONDITION

***Dr. N.GIRI* [*], *B. PAVITHRA* [**]**

[*]Assistant Professor, Department of Commerce, Nallamuthu Gounder Mahalingam College, Pollachi,Tamilnadu,India
[**]Ph.D Research Scholar, PG and Research Department of Commerce, Nallamuthu Gounder Mahalingam College, Pollachi,Tamilnadu,India

A B S T R A C T :

The use of Internet of Things (IoT) technologies in agriculture has transformed how farmers manage soil conditions, keep an eye on crop health, and allocate resources optimally, all of which have improved agricultural sustainability and productivity. Farmers may get real-time data on crucial factors influencing their crops with the help of IoT equipment like weather stations, crop health monitoring drones, and soil moisture sensors. IoT technology in crop health monitoring makes it easier to identify pests and diseases early on, allowing for proactive management techniques that reduce crop losses and enhance yield quality. Farmers may make better decisions on irrigation, fertilization, and soil amendments by using IoT sensors to analyze soil parameters, including moisture levels, pH, and nutrient availability. By maximizing resource utilization, this precision farming method not only increases crop productivity but also supports sustainable farming methods. This study is an empirical study based on the survey method.50 samples were collected and analyzed using simple percentage method.

Keywords: IOT, Farmers, Soil, Health

1.Introduction

The agricultural industry is changing as a result of the Internet of Things (IoT), which is opening up several chances to boost productivity and efficiency. sensors with IoT capabilities and other gadgets provide farmers with an unparalleled degree of insight into their business processes, allowing them to make better choices and maximize their resources. IoT-based agricultural systems in India are growing in popularity because they offer farmers who have access to data and insights in real time into their soil conditions and crops. Through the use of their information, farmers can proactively increase crop yields while using less fertilizer and water utilize, and boost their earnings. IoT based agricultural methods are increasingly popular. This innovation assists farmers in overseeing and managing the create a conducive environment in their respective fields, allowing them to boost agricultural output and cut expenses. Sensors used in the Internet of Things (IoT) can measure both soil moisture and temperature, Moisture and light in an outdoor area, along with monitor the health of plants and identify any pests or diseases

1.2 IOT Technologies in Agriculture

Drones in agriculture

Drones play a role in improving and streamlining different farming tasks like monitoring crops, spraying crops, analyzing soil, and mapping fields in agriculture. Indeed, drones are widely used in the agricultural sector. Drones with sensors and cameras are utilized for imaging, mapping, and surveying agricultural lands. Ground-based drones and aerial drones exist. Ground drones are robotic devices equipped with wheels that monitor the fields. Drones can either be piloted from a distance or operate autonomously following pre-programmed flight paths in their internal systems, collaborating with sensors and GPS technology. Insights about crop health, irrigation, spraying, planting, soil and field conditions, plant counting, yield prediction, and more can be derived from drone data. Drones can be used for farm surveys either by scheduling them as a service or by purchasing and keeping them near farms for recharging and maintenance. Following the surveys, the drones should be transported to nearby laboratories for the purpose of examining the gathered data, consequently aiding in optimizing the use of IoT in the field agriculture

Remote sensing in agriculture

Crop Monitoring

Sensors positioned throughout the farms observe the crops for variations in light, moisture, heat, form, and dimensions. Every abnormality spotted by the sensors is examined and the farmer is informed. Remote sensing can assist in halting disease transmission and monitoring crop growth.

Weather conditions

The information gathered by sensors on humidity, temperature, moisture precipitation, and dew detection aids in figuring out the agricultural weather conditions for appropriate crop cultivation on farms.

Soil quality

Soil health helps to identify nutrient levels and dry spots on farms, as well as soil drainage and acidity, enabling adjustments in irrigation and selecting the optimal crop type. Soil health information can also support regenerative agriculture by offering guidance on when and how to boost organic content, leading to improved soil quality and promoting climate-smart farming practices.

1.3 Review of Literature

1. **Kirti Tyagi and et.al (2020)** made a study on "**Crop Health Monitoring System".** The finding of the study states that the sensors placed in the field will gather data nonstop on physical factors like temperature, atmospheric humidity, soil moisture content, and rain detection. After spotting the disease, farmers can implement measures to contain its spread and treat it.

2. Narendra Sharma and et.al(2023) analyzed a study on "**Agriwealth: Iot Based Farming System in India".**The findings of the study states that echnology for improved agricultural practices in the country transform conventional methods of agriculture introduce a new age of digital farming. This indicates that the information provided is accurate system will allow farmers to keep track of their crops examine more thoroughly and make better

informed choices regarding how they cultivate their crops. As the number of cases rises availability of portable gadgets, detectors, and cloud technology. Farmers will be able to access real-time computing information and observations to assist them in maximizing their efficiency manufacturing.

3. **G. Karuna and et.al (2024)** examined a study on "**Crop recommendation system and crop monitoring using IoT**".The findings of the study states that the aim of the project is to improve efficiency and productivity. Necessary to oversee a crop field and offer a convenient solution. Moreover, the task strives to offer details on the top crops that are well-suited for the particular type of soil season for farming. This method can tackle issues with cropping in urban regions where it occurs a lack of veteran farmers.

1.4 Objectives of the Study

- ✓ To examine the usage of IOT in crop health
- ✓ To analyze the usage of IOT in soil condition

1.5 Research Methodology

This study is an empirical study based on Survey method. Both primary and secondary method has been used. Primary data is collected with a well framed questionnaire. A sample of 50 has collected using convenient sampling method. Secondary data is collected from magazines and journals. Statistical tools like Simple percentage have been used to analyze the data

1.6 Limitations of the Study

- ✓ The accuracy of the information depends upon the respondents
- ✓ The sample size is limited

1.7 Analysis and Interpretation

An attempt has been made to identify the socio-economic profile and usage of iot among farmers in monitoring crop health, wealth and soil condition has been evaluated by using Simple percentage analysis and results are summarized in the following paragraphs

TABLE-01

SOCIO-ECONOMIC PROFILE

PARTICULARS	NO.OF.RESPONDENTS (N=50)	PERCENTAGE TO TOTAL
Age (In Years)		
Up to 30	10	20
31 to 40	15	30
Above 40	**25**	**50**
Gender		
Male	**30**	**60**
Female	20	40
Marital status		
Married	**42**	**84**
Unmarried	08	16
Educational qualification		
Up to HSC	05	10
UG	**32**	**64**
PG	06	12
Others	07	14
Family type		
Joint	**30**	**60**

Nuclear	20	40
Status in Family		
Head	**28**	**56**
Member	22	44
Family Income		
Upto Rs 25,000	17	34
Rs25,001- Rs.50,000	15	30
Rs.50,001- Rs.60,000	**18**	**36**
Ownership and possession of farmland		
With own land	**38**	**76**
Without own land(Tenant land)	12	24
Size of the Farm (in acres)		
Upto4 acres	**30**	**60**
Above 4 Acres	20	40
Years of Experience in Farming		
Upto 5 years	18	36
Above 5 Years	**32**	**64**
Educate yourself about the latest IoT technologies		
Online courses	22	44
Workshops and seminars	**28**	**56**

25(50%) of the respondents are in the age group of Above 40.30(60%) of the respondents are Male.32(64%) of the respondents educational qualification is Under Graduate.30(60%) are residing in joint family.28(56%) of the respondents status in the family is head.18(36%) of the respondents family income is between Rs.50,001- Rs.60,000.38(76%) of the respondents have their own land.30(60%) of the respondents size of the farm is up to 4 acres.32(64%) respondents years of experience in farming is above 5 years.28(56%) of the respondents educate latest IOT technologies through attending workshops and seminars

TABLE-2

IOT in Crop Health

PARTICULARS	NO.OF.RESPONDENTS (N=50)	PERCENTAGE TO TOTAL
Currently using any IoT devices to monitor crop health		
Yes	**46**	**92**
No	04	08
Crop health parameters do your IoT devices monitor		
Leaf moisture	12	24
Temperature	08	16
Nutrient levels	10	20
Disease indicator	**14**	**28**
Others	06	12
Frequency to collect data using IOT devices for crop health		
Hourly	08	16
Daily	10	20
Weekly	**28**	**56**

Monthly	04	08
Access the data collected by your IoT devices		
Mobile app	**22**	**44**
Web dashboard	12	24
E-mail alerts	16	32
Data from IoT devices to make decisions about crop health		
Adjust irrigation schedules	08	16
Apply fertilizers or pesticides	**32**	**64**
Conduct further testing	10	20
Overall satisfaction level with the IoT solutions you currently use for crop health		
Highly satisfied	**31**	**62**
Neutral	10	20
Dissatisfied	09	12
Recommend IoT solutions for crop health monitoring to other farmers		
Yes	**48**	**96**
No	02	04

46(92%) of the respondents currently using any IoT devices to monitor crop health.14(28%) respondents use IOT device to monitor disease indicator.28(56%) of the respondents to collect data using IOT devices for crop health is weekly.22(44%) of the respondents use mobile app to access the data collected by IOT devices.32(64%) of the respondents to collect data from IoT devices to make decisions about crop health by applying fertilizers or pesticides..31(62%) of the respondents are highly satisfied the use of IOT.48(96%) of the respondents recommend IOT solutions for crop health monitoring to other farmer monitoring to other farmer monitoring to other farmer monitoring to other farmer.

TABLE-3

IOT in soil condition

PARTICULARS	**NO.OF.RESPONDENTS (N=50)**	**PERCENTAGE TO TOTAL**
Types of IoT sensors do you find most effective for monitoring soil conditions		
Capacitive sensors	10	20
Resistive sensors	**32**	**64**
Optical sensors	08	16
Soil parameters do your IoT devices monitor		
Soil moisture content	**18**	**36**
pH level	08	16
Nutrient levels	13	26
Organic matter content	11	22
Time of year do you find soil condition monitoring most critical		

Pre-planting	18	36
During growth	**20**	**40**
Harvest time	12	24
Often do you calibrate your IoT sensors used for soil condition monitoring		
Monthly	18	36
Quarterly	**24**	**48**
Annually	8	16
Environmental factors do you think most affect soil conditions on your farm		
Rainfall and irrigation	**28**	**56**
Temperature fluctuations	12	24
Soil erosion	10	20
Cost-to-benefit ratio of implementing IoT solutions for soil monitoring		
Highly beneficial	**24**	**48**
Moderately beneficial	15	30
Neutral	11	22

32(64%) of the respondents use resistive sensors to find most effective for monitoring soil conditions.18(36%) of the respondents use IOT device to monitor soil moisture content.20(40%) of the respondents monitoring most critical during growth.24(48%) of the respondents use IoT sensors for soil condition monitoring is quarterly.28(56%) of the respondents environmental factors most affect soil conditions on your farm is rainfall and irrigation.24(48%) of the respondents are highly beneficial implementing IOT solutions for soil monitoring.

Conclusion

Real-time monitoring of critical parameters like temperature, moisture content, and nutrient status is made possible by IoT devices like sensors and drones, which enables prompt interventions that increase yields and lower losses. By giving farmers vital information about pH levels, moisture content, and nutrient availability, soil sensors enable them to make well-informed decisions about irrigation and fertilization, resulting in healthier crops and better soil management. Additionally, the IoT-enabled data-driven method enables farmers to evaluate enormous volumes of data, supporting precision agriculture that optimizes resource allocation, minimizes waste, and boosts profitability

REFERENCES

1. Kirti Tyagi, Aabha Karmarkar, Simran Kaur, Dr. Sukanya Kulkarni(2020) Crop Health Monitoring System *International Conference for Emerging Technology (INCET)*
2. Narendra Sharma, Harsha Sharma, Prof. Dr. Srikumar Chakravarthi, M.Vijay Sekhar Babu, Brij Kishore Tiwari,Mohamed J. Saadh(2023) Agriwealth: Iot Based Farming System in India *Journal of Survey in Fisheries Sciences* 10(2S) 2090-2096
3. G. Karuna , R. P. Ram Kumar , Polepaka Sanjeeva , Palakurthy Deepthi , Hazim Y (2024) Crop recommendation system and crop monitoring using IoT E3S Web of Conferences 507, 01063 (2024) *ICFTEST-2024*

Websites

1. https://easternpeak.com/blog/iot-in-agriculture-technology-use-cases-for-smart-farming-and-challenges-to-consider/
2. https://www.iotforall.com/soil-moisture-monitoring
3. https://www.sciencedirect.com/science/article/pii/S209044792300398