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Review on Examination of Soil Nutritive Content Scrutiny System Using Internet of Things

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ABSTRACT: Agriculture is an important role in the economic development of our country. Crop yield mainly depends on soil fertility and moisture content. Fertilizers are normally recommended based on the nutrients apper in the soil. It is the main source of food and undeniably the main reason for the survival of living beings on this planet. In view of population growth, an optimised, informed and targeted production of diverse foods is imperative.New technologies, methods and also good practices are designed and conceived by experts and researchers in the area of agriculture.

The numerous advances in records technology (IT) are displaying wonderful symptoms and symptoms closer to green and smart agriculture. The evaluation of the soil nutrients, that's in particular accomplished the use of laboratory techniques, is essential. Manual techniques of measuring soil nutrients take some time. Many farmers forego laboratory soil trying out and exercise the identical non-stop tillage at the land, as a result the lack of soil fertility.A gadget has been proposed to adopt precision farming the use of wi-fi sensor networks that permit faraway tracking of soil fertility and parameters, specifically soil moisture, pH and temperature.This facts is transferred to the cloud and the corresponding values are displayed in a cell app. The fertilizer for use to satisfy the wishes of the favored crop, enhancing the great of the soil and consequently growing the yield.In general, the proposed system helps farmers collect real-time information about different soils, their fertility level, suggest plants and recommend the amount of water and fertilizer that improves soil quality, the convenience of the mobile application. Ultimately, this project work will help farmers to make the right decision, get better yields and get economic benefits.

KEYWORDS: Soil Moisture Sensors, Nitrogen, Phosphorus, Potassium;

I.INTRODUCTION

Agriculture is the important role for a food production. Soil is a main resource in agriculture. The physical and chemical conditions of the soil play an important role in the production cycle. Soil testing is one of the main tools for farmers to improve crop productivity. Soil testing helps determine the inputs needed for efficient and economical production.In this sense, soil analysis plays a central and main role in plant growth. Farmers can add organic or inorganic nutrients to the soil in the right proportions.Yield maximization firstly depends on the soil macronutrients, namely nitrogen (N), phosphorus (P) and potassium (K). The excessive or insufficient supply of fertilizers can drastically reduce the production rate and result in lower quality agricultural products. As the population increases, so does the demand for agricultural products.In order to increase productivity,it is imperative to automate farming practices.

The agricultural sector has recently been transformed by the application of the Internet of Things (IoT) to help farmers with the major difficulties they face on a daily basis. Recent developments in IoT applications try to solve problems by expanding production parameters such as quality, quantity, support and cost facilitation in agriculture. IoT influences farmers to monitor crop growth, soil moisture, soil temperature and moisture, soil nutrients, etc. The things that deliver the wireless technology measure various soil parameters. With the advent of technology, precision farming makes it possible to respond to requests for continuous cultivation.

The Internet has transformed people's lifestyles by providing connectivity to anything and diversity anytime, anywhere. Like many new advances in generation, sensors, processors, transmitters, receivers, etc. have come. They are now

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available at a very affordable price. Therefore, all these things can be used in our daily lifestyle. 30-50% of increesse crop yields were obtained through the use of chemical fertilizers (Stewart 2002), primary nitrogen, phosphorus and potassium (NPK) in combination with an improved crop variety, pesticides and mechanization on relatively dry agricultural soils.However, with the increase in the human population and the associated increase in food requirements in quantitative and qualitative terms, there is an increasing need to use less fertile and/or degraded land more efficiently for agriculture in order to support high-value ecosystems.

The aim of the project is to analyze soil nutrients in real time by measuring the levels of nitrogen (N), phosphorus (P) and potassium (K) through sensors. In addition, a mobile application will be developed to provide information on the NPK values present in the soil and, if the farmer wants to grow a specific crop of interest (other than the most suitable crop for that soil), to suggest the amount of fertilizer to apply. add to the soil to achieve this. Considering the importance of fertilizers for crop productivity, therefore, considering soil fertility is the important criterion for farmers. Therefore, we implement the so-called Soil Examination of Soil Nutritive Content Scrutiny System.

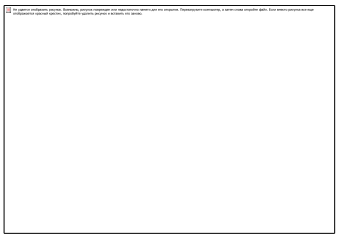
II.METHODOLOGY

A system is being developed to maximize agricultural yield through nutrient analysis. The most remarkable properties of the proposed system are:

- Soil macronutrients, nitrogen, phosphorus and potassium, as well as other soil properties such as moisture, pH and temperature are determined by means of a sensor.
- It is a real-time soil nutrient analysis system
- Database consisting of Soil Nutrients (NPK) for various crops, including vegetables, fruits, etc.
- Calculate and suggest fertilizers for any desired crop to adjust the soil nutrient levels to the ideal nutrient levels for bring a higher crop yield.
- An easy-to-use mobile application has been developed to display soil information and the recommended amount of fertilizers for different crops according to the nutrient levels present in the soil.

IOT DEVICES

Soil Moisture Sensor:



The soil moisture sensor is used to measure the volumetric water content in the soil. Soil properties such as electrical resistance or dielectric constant are determined, which are used to measure soil moisture. The soil moisture sensor contains two probes. By driving these probes into the soil, the moisture level is determined. The data obtained from the sensor serves as an assistance system for farmers to control the irrigation system more efficiently.

Properties Of Soil:

Soil is a mixture of gases, liquids, organic matter and organisms that support human life. It is considered one of the most important terrestrial ecosystems. There are different types of soils. Each type of soil is made up of mineral particles, organic matter, air and water. All of these particles give soil properties such as texture, structure, porosity, color, strength and consistency.

Texture:

Sand, silt and clay particles combine to form various types of soil. The proportion of these particles along with organic matter forms the soil texture. Sandy soils are rough when rubbed between fingers whereas silts are smooth like flour and clay is sticky and mouldable. Sand and are the inactive part of soil as it does not have the ability to absorb water or nutrients. Clay is the active portion of soil and absorbs water as it has large amount of surface area per unit mass.

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Structure:
The soil structure is called the arrangement of soil particles. It is referred to as aggregates of primary soil particles such as sand, silt and clay into compounds or clusters of primary particles. It is expressed in terms of grade, class and aggregates and is scored from 0 to 3. Grade is defined as the degree of aggregation and the four main grades scored are 0 as less structure, 1 as weak, 2 as moderate and 3 as strong.

Porosity:
The pores in the soil are called soil porosity. This influences the movement of air and water. Healthy soils have many pores within and between aggregates, while poor quality soils have few visible pores and cracks. Pore size varies greatly and is classified into micropores and macropores. Pore size also affects the ability of plants and other organisms to access water and oxygen. A large pore allows the transmission of air, water and dissolved nutrients through the soil, while the small pores store water.

Colour:
Soil color can be visualized and is determined by its organic matter content and degree of oxidation. Based on the color of the soil, the characteristics of the soil can be determined. The soil color is due to various iron minerals. Soils that contain more iron minerals are orange-brown to yellowish-brown in color and soils rich in organic matter are dark brown or black in color.

Resistivity:

Soil resistivity is called the measure of the resistance of the ground to the flow of electricity. The electrical resistivity of the ground also affects the rate of corrosion of metallic structures in contact with the ground. The corrosion rate can be increased by decreasing the resistivity and increasing the conductivity. Soil resistivity range from 2 to 1000 Ω-m. Soil resistivity also depends on moisture content, salt content and temperature.

Consistency:

Soil consistency refers to aggregates that can be crushed with your fingers. It depends on the moisture content of the soil and is classified into moist soil, moist soil and dry soil. Dry soils are extremely hard, wet soils are extremely firm, and wet soils are sticky. In construction, soil consistency estimates the soil's ability to support buildings and roads.

NPK Tester:

In order to measure the quantity of nitrogen, phosphorus and Potassium present in the soil, the soil fertility tester is used. The use of the above elements are as follows: Nitrogen – Helps in promoting the growth of foliage and vegetation. It plays a major role in photosynthesis and protein production. Phosphorus – Helps in promoting the growth of roots and survive unpleasant climate. Potassium – Helps in promoting fruiting, flowering and translocation of sugars. The soil fertility tester must be implanted in the soil. A chemical reaction would take place, resulting in a change in the analog deflection voltage which is then converted to a digital value.

III.EXISTING SYSTEM

There are multiple methods of measuring the soil nutrient content like using some optical sensors or using the spectrometer. But the spectral analysis method is not convenient and the drawback is the data are only 60-70% correct. While comparing the spectral analysis method with traditional wet chemistry methods, the accuracy of the products is yet to be fully resolved.

Soil parameters such as temperature, moisture, pH, humidity and light are monitored by various sensors [8]. The obtained values are converted to digital with an analog-to-digital converter and sent serially to the cloud via a Raspberry Pi. Finally, the output is displayed on the laptop or in a mobile application. The system monitors the general properties of the soil using IOT [9, 10]. In order to maintain efficient crop productivity, soil parameters,

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namely: pH, soil moisture, temperature and humidity are continuously monitored by sensors.Through the development of optical converters, a system is being developed in which soil fertility can be improved and soil quality can be increased [11].

NPK amounts are reported as low, medium, and high. An Arduino microcontroller is used for data acquisition and the analog output is converted to digital. A system is designed in which a microcontroller-based device is connected to the EC sensor, the pH sensor and the color sensor [12]. The values are read from the sensors and transmitted to a mobile app via Bluetooth serial communication. A system for recording soil parameters and pH was proposed using artificial neural networks and image processing techniques respectively [13]. The process involved in this system is to use a color recognition process to develop a soil nutrient analyzer and determinepH.

IV.CONCLUSION

The developments associated with the Soil Health Tool will help bring a greater appreciation for microbiological soil nutrient cycling to soil testing laboratories and researchers; More importantly, however, we hope that the Soil Health Tool contributes to increasing fertilizer use efficiencies through accurate determination of plant available nutrients by soil testing laboratories and appropriate fertilizer application rates. Because it is these improvements will ultimately benefit the environment through decreased nutrient losses to the atmosphere and water resources and that will benefit the farmers and ranchers that we rely upon to feed the world.

REFERENCES

[1] Shylaja.S.N and Dr.Veena M.B, "Real time monitoring of soil nutrient analysis using wireless sensor networks", International Conference Energy Communication, Data Analytics and Soft Computing(ICECDS), IEEE, pp.3059-3062, 2017.
[2] Dhanunjaya Naik and Dr. G.Prasanthi, "IoT Based Soil Moisture and Temperature Monitoring Device for Irrigation Water Pump", International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES), Vol. 3, Issue 10, pp.39-43, October-2017.
[3] Madhumathi R, "Elucidating Farmers towards Smart Agricultural Farm Building through Cloud Model", International Conference on Computing, Communication and Networking Technologies (ICCCNT), IEEE, 2019.
[4] Salve Akshay, Sagar Sonali, Patne Mahesh, Jangam Omkar," Soil nutrient identification using arduino and electrochemical sensor", International Research Journal of Engineering and Technology [IRJET], Vol.
[5] Akshay Badhe, Sandeep Kharadkar, Rushikesh Ware, Pratik Kamble Prof. Shilpa Chavan, "IOT Based Smart Agriculture and Soil Nutrient Detection System", International Journal on Future Revolution in Computer Science & Communication Engineering, Vol. 4, Issue 4, pp.774 – 777, 2018.
[6] Muthunoori Naresh, P Munaswamy, "Smart Agriculture System using IoT Technology", International Journal of Recent Technology and Engineering (IJRTE), Volume-7 Issue-5, pp.98-102, 2019.
[7] P.R. Harshani, T.Umamaheswari, R.Tharani, S.Rajalakshmi, J.Dharani, "Effective crop productivity and nutrient level monitoring in agriculture soil using IoT", International Conference on Soft Computing and Network Security (ICSNS), IEEE, 2018.
[8] MarianahMasrie, Mohamad Syamim, Aizuddin Rosman, Rosidah Sam and ZuriatiJanin, "Detection of Nitrogen, Phosphorus, and Potassium (NPK) nutrients of soil using Optical Transducer", 4 th International Conference on Smart Instrumentation IEEE, 2017.
[9] Prachi Sharma and Dr. D.V. Padole, "Design and Implementation of Soil Analyzer using IOT", International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), IEEE, 2017.
[10] John Carlo Puno, Edwin Sybingo, Elmer Dadios, Ira Valenzuela, Joel Cuello, "Determination of Soil Nutrients and pH level using Image processing and Artificial neural networks", IEEE, 2017.

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