A Survey on Detection of Organic Chemicals in Soil

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ABSTRACT

Nowadays crops yield are not nutritious and lacks vitamins. This degrades the quality of the crops. Because of the organic fertilizers used by the farmer, the soil is contaminated with the organic chemicals contained in the soil. But the soil that has been used till now might be contaminated by the organic fertilizers used. Even if a farmer decides to go for complete organic farming, the soil already contains chemicals which will be absorbed by the fruits, vegetables tested for organic contamination and they might show positive results even after using complete organic farming techniques. The farmer won't know how much the soil is been contaminated until now. So, to detect the level of organic contamination in the soil and the components of the soil we are doing a research project in which we will be trying to detect the organic constituents in the soil and with proportion and measures to overcome the contamination fully remove the organic contaminations. This system would be the first of a kind since no system like this has been developed or manufactured till now. The project would be more benefited the farmers who want to move towards fully organic farming and increased the quality of vegetables, fruits, grains, etc.

Keywords : Agriculture, Farmers, Near-Infrared Spectroscopy, FTIR Fourier Transform Infrared, Chemometrics Tool.

I. INTRODUCTION

Agriculture is essential for humans. Agriculture is the backbone of all the developing countries. Farming on the same piece of land for a long time degrades the number of nutrients in the soil, forcing the farmer to use various methods to give the soil back the nutrients or induce nutrients by means of fertilizers. The fertilizers are of two types namely Chemical fertilizers and Organic fertilizers. Chemical fertilizers have been banned by governments, which may cause serious harm to the soil making it barren. Chemical fertilizers are been taken care of. So, we need to focus on the organic fertilizers which are used in farming for the better yield of crops from the soil.

Organic fertilizers are usually made from plants and animal waste, for example, manure or compost. This manure or compost can be highly processed products. They are mainly sold as a "soil conditioner" rather than fertilizers since the nutrient's ratio is difficult to guarantee. The organic fertilizers can be processed in the factory.

Fertilizers supposed to be Organic can be made using some additives and chemicals. The extensive use of these fertilizers may lead to the imbalance of organic and inorganic nutrients in soil. So, to overcome are proposing a system that will provide a piece of detailed

information about the soil content like the organic chemicals present.

II. LITERATURE REVIEW

Marianah Masrie*, Mohamad Syamim Aizuddin Rosman[1], An optical transducer is developed to measure and to detect the presence of Nitrogen(N), Phosphorus(P) and Potassium(K) of soil. Such transducer is needed to decide how much extra contents of these nutrients are to be added to the soil to increase soil fertility. This can improve the quality of soil and reduces the undesired use of fertilizers to be added to the soil. The N, P, and K value of the sample are determined by absorption light of each nutrient. The optical transducer is implemented as a detection sensor which consists of three LEDs as light source and a photodiode as a light detector. The wavelength of LEDs is chosen to fit the absorption band of each nutrient. The nutrient absorbs the light from LED and the photodiode convert the remaining light that is reflected by reflector to current. The system utilizes an Arduino microcontroller for data acquisition therefore the output from the transducer is converted into a digital display reading. Testing on various samples of soils, showed that the optical transducer can evaluate the amounts of NPK soil content as High, Medium and Low.

J. Jayaprahas, S. Sivachandran, K. Navin, K. Balakrishnan[2] in their paper Real-Time Embedded Based Soil Analyzer(RTEBSA) the measure of the pH value of soil and electrical conductivity (EC). Here the pH value of the soil is used to identify the solution or mixture acidity or basicity. The RTEBSA is a valuable tool developed to determine the inputs required for better production. Soil tests at the best level will ensure a better application of sufficient fertilizers to meet the need of the crop while taking advantage of the nutrients already present in the soil. It also allows us to determine line requirements and diagnose the problem areas. Samples are tested as the results are only as good

as the samples you take testing is also requirement for the farms that have to maintain a nutrition management plan.

The tests are performed for the plants in three categories: Major nutrients- Nitrogen(N), Phosphorous(P) and Potassium(K) Secondary nutrients: Iron(Fe), Manganese(Mn), Copper(Cu), Zinc(Zn), Boron(B). Most commonly measured soil properties of the soil. It is also one informative and useful soil fertility aspect. A) Soil pH and Nutrient Availability: The implication of the pH and nutrient uptake efficiency and crop response is determined to function of soil pH. Liming is said to improve soil pH and hence increase availability of nutrients and use efficiency. B) pH Value: The acidity or basicity in the pH of the soil is defined negative logarithm ions(H+ or, more precisely, H_3O^+aq) from a solution. From the range 0 to 14, 7 is neutral, below 7 is acidic and above 7 is basic. C) Electrical Conductivity(EC): To check the health of the soil a very quick, simple and inexpensive method that farmers use. The EC level of the soil water is a good indication of the nutrients available for the crops to absorb.

Serpil Savci[3] Chemical Fertilizers Consumer society, in order to meet the growing need for food, agricultural land per unit area required to achieve maximum efficiency and highest quality product. It is known that the nutrition of the plant is one of the most important factors to control agricultural productivity and quality. Rates of nutrients in the soil affect the quality of yield. In the longterm agricultural land, the soil will be very poor in nutrients, as a result, inefficient. Hence the producer use fertilizers an pesticides to increase the fertility. Fertilization among these activities remains a priority at all times. Therefore according to recent studies excessive use of fertilizers is needed for lands in public environmental has reported adverse effects. Immoderate fertilization, but there were soil salinity, heavy metal accumulation, water eutrophication and accumulation of nitrate, to consider in terms of air pollution in the air of gases with nitrogen and sulfur,

giving and can give problems such as the greenhouse effect.

The overall finding of the above discussion is given below as Table Below

| Less Resources | ✔ | ✔ |
| Portable | ✔ | ✘ |

Sr. No.	Paper Name	Author	Method Proposed	Limitations
1	Detection of Nitrogen, Phosphorus, and Potassium (NPK) nutrients of soil using Optical Transducer(2017)	Marianah Masrie*, Mohamad Syamim Aizuddin Rosman, Rosidah Sam and Zuriati Janin	Integrated optical transducer with microcontroller. Arduino microcontroller as an alternative method of determination of the deficiency N, P or K in the soil is successfully developed and tested.	The method detects Inorganic nutrients in the soil, and limited to only NPK
2	Real-Time Embedded Based Soil Analyzer (2014)	J. Jayaprahas, S. Sivachandran, K. Navin, K. Balakrishnan	A soil analyzer using pH Value and Electrical Conductivity	The method detects major nutrients like NPK and minor like Fe, Mn, Cu, using pH value where human intelligence is required and detects limited number of Chemicals.
3	An Agricultural Pollutant: Chemical Fertilizer(2012)	Serpil Savci	NA	NA

III. Taxonomy Chart:

Technique	Detection of Nitrogen, Phosphorus, and Potassium (NPK) nutrients of soil using Optical Transducer(2017)	*Real-Time Embedded Based Soil Analyzer (2014)*
Detection of Organic Chemicals	✘	✘
Detection of Inorganic Chemicals	✔	✘

IV. CONCLUSION

From the above research papers we can conclude from the study of research papers, that different methods of soil analysis are effectively used in various nutrients detection process. The various methods like electrochemical sensors, pH measures, optical transducers are to detect the Inorganic chemicals and materials from the soil, thus detecting the deficiency of these material from the soil and setting the threshold values for nutrients.

V. REFERENCES

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