An Overview of Microwave Dielectric Behaviour of Vegetable Based Soil: A Review

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Abstract
In this paper review of literature of dielectric behaviour of soil in Chhattisgarh, India, has been described from 2015 to 2021. In this literature the various parameters of dielectric behaviour of soil i.e. physical properties, chemical properties and geographical properties have been illustrated briefly. This paper helps those who are researching in the field of dielectric behaviour of soil.

Keywords: Soil, dielectric, physical, chemical and geographical properties.

Introduction
Review of literatures have its own importance. Before selecting the Topic a lot of concerned literatures have been studied. Review of literatures help to find out gap of research. There is no concrete research work has been done in present scenario. Vegetables play vital role for human being. It has been chosen Vegetable based soil for comprehensive study. Some Review of literatures have given below although it has been mentioned from 2015. In the year (2015) R. Rajesh Mohan et al. Studied about measurement of soil moisture content at microwave frequencies and suggested that the free space transmission microwave frequencies because of the need for a large structure and large amount of soil samples can be conveniently used along with a simple microstrip patch antenna and a suitable sample holder, which is immune to microwave radiation. In the year (2015), Chaudhary H.C. et al. Researched dielectric properties of soil with organic and inorganic matter at J. Band microwave frequency and found that study of physical properties, chemical properties, dielectric properties of soils with varied organic and inorganic matter is useful in agriculture to predict quality and fertility of soil. In the year (2015) Dhiware M.D. et al. Studied about physic-chemical and dielectric properties of soil sample at X-band microwave frequency of Nasik region and found that the crops like soyabean, cotton, maize, rice, tur, onion, can be taken in kharif season. Soil in Sinnar tehsil is suitable for bajra, tomatoes, maize, soyabean, wheat, onion, cotton; soil in Igatpuri is suitable for rice, wheat, pulses, tomatoes etc. In the year (2015) Tiwari Manoj et al. Observed that metal concentration in soil of an industrial region of Chhattisgarh, Central India and found that the most of the soil samples, higher concentration of selected heavy metals are observed near the surface of ground. The surface water analysis also indicated that the concentrations of Cr and Mr are higher before and after the monsoon. Pollution can be reduced by using Scientific designed dumping sites with liners and if possible the amount of industrial solid waste generation may be reduced with the help of process modification of particular products also the higher pH (alkaline) of the disposed industrial solid waste may reduce the leachate generation, so suitable alternatives can be used for the same at the time of industrial solid waste disposal or dumping near populated vicinity. In the year (2016) Navarkhele V.V. et al. Studied about study of two Indian soils and found that the resistivity decreases by adding water content and reaches to a
constant value, it is higher for white soil and lower for black soil, due to lower water resistance or higher water retentive capacity black soil is good for agriculture purpose. The colour of the soil does not matter the agricultural productivity. Due to higher percentage of calcium carbonate, the white soil is used for construction and other applications where calcium carbonate is used. In the year 2016, Martine Al and Shang Julie described about complex permittivity to detect lead in soil with various salt forms and combinations and observed to changes in lead salt concentration in soil. In general, the relative permittivity at dielectric dispersion frequency decreased, whereas, the loss factor at 200 MHz increased with an increase in lead concentration. This indication that Complex permittivity can be used to monitor lead concentration in soil. In the year (2017), Tan Giao et al. Studied about design of a new TDR probe to measure water content and electrical conductivity in highly saline soils and observed that lots of TDR probes have been designed for different requirements since time domain reflectometry theory was introduced into soil measurement field, also plenty of relationship has been proposed to calibrate apparent permittivity and volumetric water content, and the accuracy was improved greatly. In the year (2017) Nishat Syeda Ruhi et al. Described a brief review about dielectric properties of soil at various bands of microwave frequencies and observed that the dielectric constant in the soils and frequency of measurement. Dielectric constant of soils increases slowly with increase in the moisture, after where it increases rapidly with moisture content. In the year (2018), Moradizer mina et al. Studied about estimation of improved resolution soil moisture in vegetated areas using passive AMSR-E data and found that soil moisture variability is effectively captured at 5 Km spatial scales without a significant degradation of the accuracy. In the year (2018) Patel Lakhapati et al. Discussed about role of moisture content and dielectric constant in soil and found that there are a lot of effects viz water effect, texture effect, Nitesh Kumar, et al., J. Pure Appl. & Ind. Phys. Vol.9 (5), 40-55 (2019) 49 bulk density effects, organic matter content, soil water temperature, salinity effects, etc, but role of moisture content plays pivoted role in microwave remote sensing. It has been also seen that microwave remote sensing has the potential for wide spread use in soil moisture. In the year (2018) Dhiware Manisha et al. Described about the dielectric study of soil at X-band microwave frequency and physiochemical properties and found that in Niphad tahsil (NE Maharashtra) farmers from, this region usually grow grapes in their form in which pH is between 5.5 to 7.0 its major rivers are the Godavari and its tributary, the Kadwa Sugarcane is are of the most important agricultural products and the basis for a Sugar refining and alcohol distilling industry, conducted at two cooperation sugar factories. Other major crops include onions, grapes, soyabean, tomatoes and flowers, all exported internationally as well as wheat, gram and other vegetables and grains (bajra, Jowar, tur). Niphad is the largest grapes processing location in India. The dielectric constant of Niphad soil varies with the texture of the soil. These variations have been found to be strongly dependent on the texture of soils. It is observed that soil sample of this region is sandy loam, so main crop of Niphad tehsil is grapes. In the year (2018) Dhiware M.D. et al. Showed about relationship between dielectric constant and water content of soil from western ghat of Maharashtra, India and observed that there is slow increase in dielectric constant at lower percent of water content, whereas it increases sharply at higher water content and becomes constant at certain value of water content in soil. Further it has been observed that dielectric constant increases with increase in moisture content slowly up to transition moisture them in increases rapidly with increases in moisture content. The result shows the change in the electrical properties of soil before and after the addition of water, also dielectric loss is directly proportional to the microwave conductivity and transition temperature. It has been found that Emissivity decreases with increase in moisture content, in the field of remote sensing and agriculture results obtained are useful. In the year
(2018) Sahu Vijay et al. Explained the role of dielectric behaviour of soil in agriculture with reference to pond area and stated that soil is a heterogeneous mixture of silicate particular, humus a variety of insoluble salts and oxides of metals called the solid phase, a liquid phase and a gaseous phase. Organic matter level and structural improvement of soil can be built up, to varying degree, and maintained by continuous judicious application of manures, even under tropical conditions prevailing in India. He further suggested that the dielectric constant of soil are strongly dependent a soil moisture and soil texture, such study of soil is also useful in microwave remote sensing and agriculture in order to increase its productivity. In the year (2018), Jain Amar Kumar et al., estimated the response of organic manure, zinc and iron a soil properties, field and nutrient up take by pearmillit crop grown in inceptisol and found that the increase in NPK uptake by pearl millt with integrated application of nutrients may be due to improvement of the soil environment. More over organic manures after decomposition released nutrient which became available to the plants and thus increased NPK concentration. In the year (2019), Patel Lakhapati et al. Discussed about significance of dielectric behaviour of flood affected soil in agriculture with special reference to Bihar and Chhattisgarh, and stated that study of Physical properties, chemical properties, dielectric properties of soils with varied organic and inorganic matter is useful in agriculture to predict quality and fertility of soil. Meena Mahesh C and Meena Ramavatar. in year (2019) study and modify Ulaby model on back scattering as a function of salinity frequency and soil moisture. He describes and illustrated that due to component of the mixture and their corresponding dielectric properties, back scattering of this type of soil can be molded and monitored. The dielectric property of soil depends on soil moisture of content along with its salinity; texture & frequency. Konings Alexandra G. et al. in the year (2019) Observed about macro to micro behaviour of microwave remote sensing of plant water content for physiology & ecology and found that MRS observation how they are sensitive to plant water content. They used Q-H model GRMDM & holme parameterization scheme and found that the higher the soil salinity was the greater the decreasing amplitude of the brightness temp. Because further they observed correlation coefficient of V polarization and H polarization were 0.971 and 0.935 respectively. Soeid Gharechelar et al.in the year (2020) Study about mineral soil texture. Land cover dependency on Microwave dielectric models in an and environment and found that cover of land influenced the condition of moisture even identical soil texture type. They showed good argument in between the land cover and the dielectric constant even for the same soil texture type further he suggested that it can be useful further he suggested that it can be useful for clarifying the effect on the D.C. Kabir Humayun et al.in the year (2020) Estimated measurement and modelling of soil dielectric properties as a function of soil class and moisture content and they showed that, increasing soil moisture from oven dry conditions to 100% field capacity, both the real and imaginary components of the dielectric properties increased; however, the responses were not linear. Further they observed that the dielectric parameter of oven dry soils were very low compared with the soils with greater moisture content. So, soil moisture was the major contributor to the dielectric behaviour of soil. Prachi Patta et al. in this paper (2020) Studied the Dielectric properties of soils of Mega region (Punjab) at X-band frequency 9.0 GHz and found that Dielectric constant is a function of moisture content further they showed several of dielectric properties of soil of Mega in Punjab. Patel Virendra Kumar N et al.in the year (2021) illustrated about calculation of dielectric parameter of clay loam and silty soil with different salinity levels over low frequency range and calculated the dielectric parameter of two different types of soil with water of different salinities over the frequency range from 20 Hz to 2 MHz using a precision LCR meter. Again they asserted that dielectric constant and dielectric loss increase with decrease in frequency over the radiofrequency range. Itolikar Ashish B. et al. in the year (2021) enunciated
that dielectric response due to combine effect of soil and vegetation layer (Grass) at C-Band microwave frequency and stated that the comparative study of complex dielectric properties of bare/uncovered soil and soil covered with vegetation is a unique effort. This study provides useful information for interpretation of microwave remote sensing data of soil moisture under vegetation cover. Patel L. et al. in the year (2021) illustrated about microwave remote sensing dielectric behaviour of soil and utilization in agriculture and described a lot of results as fundamental properties of soil, soil texture, physic-chemical properties of soil, analysis of dielectric constant, dielectric constant of soil in relation to India, remote sensing characteristics of soil for farming utilization, soil parameters and dielectric parameters, microwave remote sensing behaviour of soil and fertilizers in relation to agriculture, soil testing and fertilizers for crops and applications of microwave remote sensing in agriculture. Shrivastava et al. in the year (2021) enunciated about microwave dielectric parameter of soil texture and surfaced transparently. Lots of fundamental knowledge of microwave dielectric properties of soil. Further they listed textural analysis, physical properties, chemical properties, dielectric aspects of different types of soil especially south east central region i.e. Chhattisgarh. LuleZi-Xuan et al. in the year (2022) Explained microwave dielectric properties of (0.75 ZnAl2O4-0.25TiO2)- MgTiO3 ceramics prepared using digital light processing technology and found that DLP is a promising method for preparing high performance microwave dielectric ceramics with complex structures. Further they showed that an increase in the sintering temperature, the dielectric constant and quality factor of ZTM ceramics initially increased owing to the increase in the density and diffusion of ions.

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