AGRIBLOSSOM
ISSN-2582-8258
A monthly peer reviewed e-magazine for Agriculture & allied Sciences

Principles of Remote Sensing and its Application in Agriculture

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Introduction

Potential of remote sensing technique has been proved suit in monitoring and studying agro meteorological parameters and their influence on crop growth. The radiation plays an important role in plant growth and its development. The chemical processes leading growth of plant and chlorophyll synthesis are intimately connected with the amount of radiation intercepted. Spectral characteristics of crop canopy can be understood in terms of changing physical properties viz., Reflectance transmittance and absorbance of Electro Magnetic Radiation (EMR) why the plant canopy. Canopy reflectance or albedo of crop, depends upon appearance stage of growth, crop geometry, type of stress experienced by crop etc. The variation in reflectance, in different spectral bands are used in remote sensing to assign unique spectral signature show the crop for their identification and stress diagnosis. Therefore, the spectrum of energy distribution changes with change in canopy of the crop. Thus, by studying the actual spectrum of crop the information can be deciphered on area under the given crop, stage of growth status of soil moisture stress, incidence of pest and disease and nutrient supplying capacity of soil.

Application of remote sensing data has proved its superiority in the field of agriculture. Crop growth and development which decide the economic value of crop is usually affected due to climatic and soil conditions. Therefore, knowledge of leaf canopy spectral response affected by the environmental and cultural factors which alter crop development is important one. Accurate assessment of crop growth and radiation from spectre measurement will require further understanding of relationship between canopy development and spectral response. Spectral response of crop change under different stress conditions. Leaf reflectance in important stress indicator. Difference in Leaf Area Index (LAI) are useful for spectrally separating healthy from stress crop canopies. Spectral parameters have been used to estimate important crop canopy variables such as LAI, chlorophyll content and

biomass of crop species. In this emphasis is given on the basis of remote sensing techniques and some important researchable issues.

Remote sensing

"Remote sensing is the science and to some extent art of acquiring information about the Earth's surface without actually being in contact with it this is done by sensing and recording reflected or emitted energy and processing analysing and applying that information."

Steps in the process of remote sensing system

In much of the remote sensing the process involves an interaction between incident radiation and the targets of interest. This is exemplified by the use of imaging systems where the following 7 elements are involved. Note, how you are that remote sensing also in horse the sensing of emitted energy and the use of nano imaging sensors.

1. Energy source for illumination (A): As first requirement for remote sensing is to have an energy source which illuminates or provides electromagnetic energy to the target of the interest.
2. Radiation and atmosphere (B): as the energy travels from its source to the target, it will come in contact with and interact with the atmosphere it passes through. This interaction may take place a second time as the energy travels from the target to the sensor.
3. Interaction with the target (C): once the energy makes its way to target through the atmosphere, it interacts with the target depending on the properties of both the target and the radiation.
4. Recording of energy by the sensor (D): after the energy has been scattered by, or emitted from the target, we require a sensor (remote- not in contact with the target) to collect and record the electromagnetic radiation.
5. Transmission, Reception and Processing (E): the energy recorded by the sensor has to be transmitted, often in electronic form, to a receiving and processing station has to be transmitted, often in electronic form, to a receiving and processing station where the data are processed into an image (hardcopy and or digital)
6. Interaction and Analysis (F): the processed image is interpreted, visually and / or digitally or electronically, to extract information about the target which was illuminated.

7. Application (G): the final element of the remote sensing process is achieved when we apply the information, we have been able to extract from the imagery about the target in order to better understand it, reveal some new information, or assist in solving a particular problem.

Application of remote sensing in Agriculture

Use of remote sensing showed its application potential in different areas. To name few operational application areas in agriculture farming are crop average estimation, yield forecasting, crop identification, stress management, delineation of salt affected soils, plant nutrient deficiency diagnosis, precision farming, computation of erosion losses, sericulture, forestry, forest mapping, Assessment of health of forest. Land use cover, water resources, marine resources and costal studies and Geology/ mineral resources. However only 7-10 percent remote sensing data are utilized in agriculture. So as to harvest its full potential, basic studies in respect of spectral reflectance are needed. It is necessary to develop signatures for various earth parameter targets.

Recently, hyper spectral remote sensing is another sub routine to go into detail study of earth targets particularly crops researchable issues are

1. Identification of plant nutrient deficiencies in crop plant.
2. Discrimination of high and low levels of organic matter in soil through spectral reflectance.
3. Determination of soil moisture status in the field through spectral reflectance.
4. Judgement of soil quality through remote sensing techniques etc.

These technologies are having profound influence on R & D activities of all science fields including soil science and opened up new vistas like the development of Soil Information System (SIS).