REMOTE SENSING APPLICATION IN AGRICULTURE

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Remote sensing is the art and science of collecting and dissipating information without any physical contact to the object of interest. Remote sensing generally works on electromagnetic spectrum of sunlight. The incident light falls on the object and part of the light reflected and reached to the sensors of the satellite. These reflected light is converted into images and analyzed to identify the object and predicts is characteristics. It has application in various earth resources such as, agriculture, forestry, water resources, urban settlements, mining, industrial and infrastructure developments and various land use and land covers etc. It can greatly contribute in monitoring of earth's surface features by providing timely, synoptic, cost efficient and repetitive information about the earth's surface.

Agriculture, though the back bone of all modern society, is lagging in using modern technology such as remote sensing satellites, drone etc. There is multi-dimensional application of remote sensing in agriculture and allied sectors including field and horticulture crop monitoring, yield prediction, weed mapping and irrigation scheduling, potential fishing zone mapping, animal grazing field identification etc. The Indian satellites such as IRS series and Cartosat series etc. and foreign satellites, such as Landsat (USA), SPOT IV (France), and European satellites with high spatial and temporal resolution, such as Sentinel 1 and 2 etc. have contributed tremendously for remote sensing application in agriculture and its allied sectors. The availability of cloud computing system along with various software such as ENVI, QGIS, ERDAS Imagine, SNAP tools and standalone software etc. facilitate the analysis and application of remote sensing images for agriculture.

Remote sensing is used to develop land use/land cover maps of the earth surface. It can be used to separate the agricultural area from other land uses. It also used to identify the change in total area under agriculture in terms of converting forest and barren lands farm land as well as using agriculture area for constructing buildings, road and infrastructure development, urbanization etc. The use of agricultural area for non-agriculture activities has shrinking the total area for agriculture leading to reduced crop production. The unauthorized misuse of agricultural area should be identified through high resolution remote sensing and pivotal steps should be taken to alter the practice.

It can be used to mask the area under particular crop from surrounding crop areas. So, growth and spreading of a particular crop can be monitored using satellite images. Particularly, growing crop for seed extraction, cooperative farming and industrial linked farming etc. can be monitored.

Remote sensing satellite images can be used for soil nutrient and soil moisture content. Soil parameters such as soil texture,

soil organic carbon, soil iron content etc. can easily be identified and mapped. The area having soil covers and soil erosion prone area can also be mapped and monitored. Soil moisture content maps in later stage can be used for irrigation scheduling, deciding farm activities such as ploughing, sowing and transplanting activities.

Remote sensing has been playing tremendously role in monitoring the standing crops including precision agriculture activity ensuring sustainable agriculture practices. Plant density and leaf area index is measured using the satellite and drone based images. Plant growth is monitored in real time and near real time basis using high resolution, cloud free images. It used to map the weed infested area for variable rate pesticide application ensuring better weed removal least affecting the crop at optimized expenses. Crop scouting in terms of identifying water stress area or nutrient deficient including pest infestation etc. is carried out from satellite images. It will facilitate the proper irrigation scheduling and in-time application of fertilizer and crop nutrients. This technology can identify emergence of unfavorable atmosphere for crop growth and help the farmers preventing crop losses. Small scale and large scale yield mapping and prediction are gaining popularity among the farmers, planners and Government organizations. In-field monitoring of crop status through precision agriculture may be practiced for unit farm plots or big farmlands using satellite images.

Remote sensing satellite images have been successfully used to identify the suitable area for fishing in the seas. It detects the mesoscale features through thermal infrared and visible sensors in mapping potential fishing zones. Identification of grazing land and its extent along with availability of grass etc. can be carried out using remote sensing satellite images.

It is a well known fact of using remote sensing and thermal images for weather prediction using temperature, rainfall, onset of monsoon, cyclones etc. which directly and indirectly affects the agricultural crops. Remote sensing can also be used for flood, draught and land slide prediction. It used to map flooding zone, predict the affected area and water depth during flood and also map the losses incurred. Remote sensing can also be used for crop loss estimation and crop insurance claim settlement etc. for Government and private organizations.