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CROP DISEASE AND PEST DETECTION USING GEOSPATIAL TECHNIQUES

Abstract

Plant diseases and pests can affect a wide range of commercial crops, and result in a significant yield loss. It is reported that at least 10% of global food production is lost due to plant diseases. According to the Global Forum for Innovation in Agriculture, the world's population is growing, and natural resources are diminishing. This problem is well documented, but to avoid a major catastrophe the world has to find a way to produce 56% more food by 2050. Providing enough safe, nutritious food to a growing population is one of the greatest challenges facing the world today. Food and agricultural sectors are central to eradicating hunger and poverty, but current farming practices and climate change are putting pressure on our natural resources. The movement of plant pests, animal diseases and invasive alien aquatic organisms across physical and political boundaries threatens food security and creates a global public concern across all countries and all regions. Previous research has found that, on average, crop pests have been moving towards the poles at 2.7 kilometres per year, which is very close to the rate of climate change. The finding also suggests that climate change is driving their relocation, and raises major concerns about food security. The control of crop pest and diseases could be more efficient if disease and pest patches within fields can be identified timely and treated locally. This requires obtaining the information of disease infected boundaries in the field as early and accurately as possible. In Nigeria and in most sub-Saharan Africa, the most common and conventional method used is local field survey. The traditional ground-based survey method requires high labour cost and produces low efficiency. Thus, it is unfeasible for large area. Fortunately, remote sensing technology can provide spatial distribution information of diseases and pests over a large area with relatively low cost. The presence of diseases or insect feedings on plants or canopy surface causes changes in pigment, chemical concentrations, cell structure, nutrient, water uptake, and gas exchange. These changes result in differences in colour and temperature of the canopy, and affect canopy reflectance characteristics, which can be detectable by remote sensing.