Chapter 17
Remote Sensing Technologies in Pest Detection

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ABSTRACT

The current book chapter provides a prospective viewpoint on the cutting-edge and historical strategies of remote sensing systems and their uses, especially for agricultural pest management. The application of a remote sensing system depends on the spectral behavior of different pest species. Nowadays, the application of remote sensing systems is an effective tool for the forecasting, detecting, and managing of different pests on different crops. The main aim of the remote sensing system is to collect information of pest species that help in making decisions for pest control and to minimize the negative impact of chemical pesticides on the environment. Remote

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sensing technology can provide accurate and fast forecasting of different pests and subsequently minimize management costs and pest damage.

INTRODUCTION OF REMOTE SENSING

Remote sensing is a way of gathering data about the Earth's surface without direct physical contact. Sensors installed on a variety of platforms to gather data through remote sensing, including drones, planes, and satellites. Data gathered by numerous applications, such as agriculture, urban planning, emergency response, and environmental monitoring (Mirzakarimova, 2023). The importance of satellite remote sensing technology as a source of agrometeorological data is becoming more widely acknowledged. Because it can effectively supplement the established techniques for gathering agrometeorological data (Daughtry et al., 2006). The abundance of observational data, products, and services from highly advanced and specifically outfitted environmental observation satellites is now available for use by meteorologists worldwide (Roarty et al., 2019).

Remote sensing has emerged as a crucial method for achieving large-scale salinization monitoring as more satellites are launched. To monitor salinization scientists have created a two-dimensional feature space information by applying inverse typical characteristics derived from remote sensing pictures. They have achieved an overall accuracy rate of 80-90%, demonstrating their success (Guo et al., 2023). The ecological environment and food security are now gravely threatened by soil degradation, which has become a worldwide problem. Because it is very effective, time-saving, and has a broad spectrum of applications, remote sensing has been utilized extensively to study soil degradation (Wang et al., 2023). Remote sensing is used to monitor pollution, desertification, salinization, and soil erosion. The direct such as soil moisture content, organic matter, mineral composition) and indirect such as vegetation, land use, and coverage change) indices are used to estimate and assess soil deterioration using remote sensing. Remote sensing might advance and be used to monitor soil degradation (He et al., 2021).

Along with other technologies like robotic systems, weather forecasting, the Internet of Things, and global positioning system (GPSs), remote sensing is the factor driving success in precision agriculture. More precisely, the administration of spatially and temporally variable agronomic inputs as well as the utilization of multispectral imaging (MSI) and hyperspectral imaging (HSI) has enabled the monitoring of field crop health, facilitating informed decision-making (Omia et al., 2023). Remote sensing (RS) technology involves the acquisition and analysis of data on specific properties of events, objects, or materials without physical contact (Kundu et al., 2021). Electromagnetic radiation, consisting of remote sensing data,