

# Literature Review – Crop Disease Solution Using Machine Learning

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**Abstract:** *As the global population continues to increase, it is estimated that agricultural productivity will need to double by 2050 to meet future food demands. However, crop diseases present a significant obstacle to achieving this goal, leading to substantial losses in agricultural yields. Traditional methods of detecting and managing plant diseases rely heavily on manual inspection and the excessive use of chemical pesticides, which can be inefficient, time-consuming, and environmentally harmful. In light of these challenges, the development of efficient, automated solutions for early disease detection, identification, and prediction is crucial. This paper provides a comprehensive review of the role of Machine Learning (ML) in addressing these challenges in the agricultural sector. ML techniques, particularly those involving image classification and pattern recognition, have shown considerable promise in automating the detection and diagnosis of crop diseases. By analyzing large datasets, these models can detect diseases based on visual symptoms in crop images, allowing for early and accurate diagnosis. This automation not only enhances the efficiency of disease management but also reduces the need for broad-spectrum pesticide use, leading to more targeted and sustainable treatment approaches. The review emphasizes the application of ML to tomato crops, a major focus due to their economic significance and vulnerability to a wide range of diseases. The use of ML techniques in detecting and classifying diseases in tomato plants has proven effective in promoting smart farming and precision agriculture practices. Through the integration of ML, farmers can minimize the environmental impact of agricultural activities by reducing pesticide use, while simultaneously improving crop quality and yield.*

*Overall, this paper highlights the potential of ML-driven solutions to revolutionize crop disease management, enabling farmers to enhance productivity, preserve crop health, and contribute to more sustainable agricultural practices in the face of growing global food demands.*

**Keywords:** Machine Learning, crop productivity, pest and disease detection, agricultural crops, classification, prediction, smart farming, precision agriculture, image processing, Android Studio, disease detection system, agricultural technology