***Abstract***

Agriculture plays a critical role in sustaining global food security, but crop diseases pose a significant threat to yields and quality. Traditional methods of disease identification are time-consuming and often lack accuracy. To address this, AI-driven crop disease prediction and management systems leverage machine learning, deep learning, and computer vision to diagnose diseases in real time. By analyzing images and environmental data, these systems can predict the onset of diseases, enabling early intervention and reducing crop losses. Key technologies such as Convolutional Neural Networks (CNNs) and datasets from platforms like Kaggle enhance the precision of disease identification. Furthermore, these systems integrate with precision agriculture techniques, optimizing resource use and increasing farm productivity. The application of AI not only improves decision-making but also fosters sustainable agricultural practices by minimizing the reliance on pesticides and improving yield management strategies.