Phenomic Prediction Models in Maize Tar Spot Disease Detection

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October 30, 2023

Abstract

Tar spot disease in maize is the result of a fungal pathogen, *Phyllachora maydis*, and reduces yield up to 40 percent depending on severity of infection. Traditional disease monitoring techniques often suffer from limited coverage and time inefficiency. This study explores the application of drone-based imagery for phenomic prediction models in maize tar spot onset and severity detection. Using unoccupied aerial vehicles (UAVs) equipped with high-resolution cameras, multi-spectral and high-resolution images are captured of maize fields prior to disease onset and throughout the season. UAV images are processed and analyzed to extract essential phenotypic features related to plant health, including color, texture, size, and shape characteristics. The resulting data are integrated into machine learning algorithms to develop predictive models for disease detection and quantification. Tar spot detection and monitoring techniques would help with field management, minimizing overall yield loss caused by infection. The utilization of drone-based imagery for maize tar spot detection represents a significant advancement in precision agriculture, with the potential to revolutionize the way we monitor and manage crop health.

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Keywords: Tar Spot, Drone, Maize, Disease, Abstract