

Detecting Nitrogen Deficiency and Potato Leafhopper (Hemiptera, Cicadellidae) Infestation in Green Bean Using Multispectral Imagery from Unmanned Aerial Vehicle

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Abstract : Detection of crop stress is one of the major applications of remote sensing in agriculture. Multiple studies have demonstrated the capability of remote sensing using Unmanned Aerial Vehicle (UAV)-based multispectral imagery for detection of plant stress, but none so far on Nitrogen (N) stress and PLH feeding stress on green beans. In view of its wide host range, geographical distribution, and damage potential, Potato leafhopper- *Empoasca fabae* (Harris) has been emerging as a key pest in several countries. Monitoring methods for potato leafhopper (PLH) damage, as well as the laboratory techniques for detecting Nitrogen deficiency, are time-consuming and not always easily affordable. A study was initiated to demonstrate if the multispectral sensor attached to a drone can detect PLH stress and N deficiency in beans. Small-plot trials were conducted in the summer of 2023, where cages were used to manipulate PLH infestation in green beans (Provider cultivar) at their first-trifoliolate stage. Half of the bean plots were introduced with PLH, and the others were kept insect-free. Half of these plots were grown with the recommended amount of N, and the others were grown without N. Canopy reflectance was captured using a five-band multispectral sensor. Our findings indicate that drone imagery could detect stress due to a lack of N and PLH damage in beans.

Keywords : potato leafhopper, nitrogen, remote sensing, spectral reflectance, beans

Conference Title : ICGISRSA 2024 : International Conference on GIS and Remote Sensing for Agriculture

Conference Location : San Francisco, United States

Conference Dates : June 03-04, 2024