



Remote sensing based classification of soybean aphid-induced stress in soybean

A method for identification of soybean aphid infestation and classification based level of infestation.

IP Status: Issued US Patent; **Issued Patent No.** 11,003,908

Applications

- Precision agriculture
- crop remote sensing

Key Benefits & Differentiators

- Does not require large reference data banks
- Sensitivity: 0.92
- Specificity: 0.81
- Accuracy: 0.86

Sensing and classification of soybean aphid infestation

Untreated soybean aphid infestations are reported to reduce soybean yields by more than 40%, making it the most economically important insect pest of soybean in the North Central U.S. When aphid populations reach an economic threshold of 250 aphids per plant, chemical control is recommended to prevent aphids from reaching the economic injury level. Erratic outbreaks of soybean aphid and fluctuating timing of colonization makes routine scouting necessary. Currently employed scouting methods, unfortunately, are not suitable for detecting and effectively quantifying the level of infestation in a timely manner.

Researchers at the University of Minnesota have developed an algorithm to classify soybean canopy images according to soybean aphid infestation risk. This remote sensing based classification algorithm is potentially capable of using imagery (ground, UAV, aircraft or satellite) that maps entire soybean fields to generate a management raster with complete coverage of soybean fields. Optimized specifically for soybean aphid, this algorithm has a classification accuracy of over 85% to determine if a particular area is infested below or above the management threshold.

Phase of Development

TRL: 4-5

Algorithm developed and validated in a small scale field experiment.

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

Technology ID

2019-360

Category

Engineering & Physical Sciences/Instrumentation, Sensors & Controls
Software & IT/Ag IT
Software & IT/Algorithms
Software & IT/Image & Signal Processing
Agriculture & Veterinary/Ag IT

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Publications

- **Detection of Stress Induced by Soybean Aphid (Hemiptera: Aphididae) Using Multispectral Imagery from Unmanned Aerial Vehicles.** Journal of economic entomology 113.2 (2020): 779-786.
- Marston, Zachary. "**Advancing Remote Sensing For Soybean Aphid (Hemiptera: Aphididae) Management In Soybean.**" (2019).