NEAR EARTH SENSING OF CROP CANOPY AT PRODUCTION FIELD SCALE ENABLED BY UNMANNED AIRCRAFT

DWFI-Supported Student Research

Each year DWFI leverages Robert B. Daugherty Foundation funds and additional donor funds to support graduate and undergraduate student research and creative activity. Funds are matched one-to-one by their DWFI Faculty Fellow advisors. This year we had to cancel our annual research forum, scheduled for April 2, and missed seeing the students present their work in person.

To celebrate the incredible research being done, students have shared a brief summary of their work and its impact. We're excited to share their work with you here. View more research from DWFI's supported students » **http://dwfi.us/Gx3150ze6F5**

Water for Food
DAUGHERTY GLOBAL INSTITUTE
at the University of Nebraska

Student: Suresh Pradhyun Kashyap, for a M.S. in Biological Systems Engineering

Advisor: Wayne Woldt, Associate Professor, Biological Systems Engineering, University of Nebraska–Lincoln

WHAT?

Early detection of crop stress has always been a challenge for the researchers and farmers in the field. By the time it displays visible symptoms of stress, a plant can already be adversely affected. These affects could lead to irreversible damages to the crop and yield loss. The irrigation events that are planned beforehand, will result in poor performance on the crops.

SO WHAT?

Detection of this early crop-stress would greatly simplify irrigation scheduling and avoid use of soil water sensors or even a complex soil water balance model. Using (Unmanned Aerial Vehicle) UAV hyperspectral/thermal imaging combined with ground based (Infrared Thermometer) IRT's, there is potential to locate and identify this crop stress.

Combined with the use of GIS-Spatial Analysis techniques and unsupervised classification methods, this approach can prove beneficial and more reliable, finding stress at individual pixel-scale. The computer-based algorithm that is generated in capable of clustering the required plant pixels and eliminating the background soil for accurate plant stress maps developed at the end. Based on the extracted information and selected features, the model can be able to visualize and used for stress detection.

NOW WHAT?

Finding the crop stress has a major impact on irrigation scheduling and variable rate irrigation in the field. This research project has just started, and more study is needed to bring any findings to implementation. It is expected that, this method will detect moisture stress up to five to ten days earlier than using (Normalized Difference Vegetation Index) NDVI method. In addition, the recovery of the stressed crop, based on variable rate irrigation will be documented, to define the efficacy of the method. Overall, this research work is expected to give promising results and improved management of irrigation systems at the field scale.