Accurate pest prediction models are an integral part of an Integrated Pest Management (IPM) program. This research aims to improve the accuracy and efficiency of collecting pest activity data, which when combined with local weather data, will contribute to more accurate prediction models and more effective pest management practices. We have looked at a number of ways to achieve this goal, focusing on image processing to reduce processing time and human error.

Pest data was collected using mostly pheromone traps on a weekly basis from mid May, 2017 until the end of August, 2017 on seven apple and peach pests from twelve orchards across Massachusetts with the use of pheromone traps. All 938 individual data points were uploaded to iPiPE.

Graphical representations of data collected over the summer depict emergence patterns and aide in the creation of more accurate forecast models.

We retrofitted a Trece Pherocon trap to house a Raspberry Pi computer and camera. The trap can be programmed to capture images based on motion activation or a timer. If connected to WiFi, images are sent back to the laboratory where pests are identified and counted. Pests can also be counted in the field through MATLAB’s color thresholding and spot detection. If a cellular signal is available, the number of pests detected by the Raspberry Pi can be sent to the laboratory as a text file.

We are currently conducting an experiment on eleven pear and six apple trees. A portion of these trees were inoculated with fire blight E. amylovora, and all of them are imaged daily by four separate cameras (red, green and blue near infrared, and standard RGB). The acquired images will undergo NDVI processing to see if disease progression can be detected in the processed photographs before it is visible to the human eye.

Fire blight, caused by Erwinia amylovora, is a bacterial disease with the capacity to destroy entire orchards. Below are the effects of the disease on one of our orchards this past summer.

The Normalized Difference Vegetation Index (NDVI) shows photosynthetically active material and has been demonstrated to aide in early detection of plant diseases.

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