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## "Stop Bugging Me!"

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Past and present, the Agricultural Engineering Department has been, and is, involved with a variety of fruit related post-harvest research and extension projects. The department, in cooperation with the USDA-ARS at MSU, have developed and transferred knowledge ranging from reducing fruit damage and degradation during harvest, handling, and packing and processing to developing technology to electronically and non-destructively identify fruit quality characteristics. However, our new challenge is really "bugging" us! Priorities remain in maintaining fruit quality, but there has been growing importance to address challenges related to the potential of insects reaching the final stages of post-harvest handling. The insects can occur on or near the surface of the fruit or can be deeply imbedded. For example, blueberries are challenged with the invasion of the Japanese beetle and the cherry industry has fears of plum curculio and fruit fly. This is due much in part to the loss of effective in-field control methods as a result of food safety and environmental regulations and acts.

Cooperative studies between Agricultural Engineering, USDA-ARS, Food Science, and Entomology are looking at methods to detect and/or remove the insects from the product. One such study is focusing on extending the multispectral optical technology which has been evaluated to differentiate fruit tissue characteristics. Preliminary studies are indicating insects not only have some unique visible range characteristics but identifying their presence can potentially be enhanced through capturing near-infrared and/or fluorescence information. In other words, by subjecting insects to light such as certain wavelengths of UV light, the insect will fluoresce while the tissue does not, thus, providing a distinguishing property. While combining multispectral reflectance and fluorescence signals is already demonstrating enhanced insect detection capability for insects on the surface of fruit tissue, the near-future challenge is to conceptually determine the capacity to see internal residing insects and pursue technology to further develop the concepts. Such developments/technology could be used to rapidly evaluate a sample for determining the acceptability of an incoming load of fruit at the processor, or could potentially be used on-line to sort/evaluate each individual fruit. Assuring food safety while continuing to study fruit flavor, texture and appearance remain as opportunities and challenges for the future.