

Michigan Vegetable Council FY2022 Research and Extension Priorities for Vegetable Crops

Control of Soilborne and Foliar Diseases through Predictive Modeling, Crop Rotations, Chemical and Biological Controls

- ***Phytophthora capsici***: Many vegetable crops, including all vine crops, tomatoes, peppers, eggplant and snap beans, are susceptible to *phytophthora capsici*. Once in a field, this disease persists even when non-susceptible crops are part of a rotation.
- **Soilborne diseases on asparagus, root crops, and snap beans**: *Fusarium* (asparagus, snap beans), *rhizoctonia* (root crops and snap beans), *phytophthora* (asparagus, root crops), and *pythium* (snap bean and root crops) can impact yield and quality if not controlled, but effective management practices are lacking.
- **Cucurbit downy mildew**: Downy mildew has been a significant problem in Michigan every year since 2005. Pickling and slicing cucumbers have been the crops most impacted, but all cucurbit crops are susceptible. The pathogen has shown resistance to several fungicides that had previously been effective. Given this development and the already high cost of control, downy mildew threatens the future of Michigan's pickle industry.
- **Bacterial diseases on tomato**: This disease threat is difficult to control once established in a field and can cause significant economic losses. Infections may occur through contaminated seed, in the greenhouse with seedlings.
- **Stemphylium issue in onions**.

Research and education to help growers manage these and other disease threats are vitally important to Michigan's vegetable industry. Longer term, varietal resistance to these diseases is needed.

Control of Insect and Nematode Pests through Predictive Modeling, Crop Rotations, Chemical and Biological Controls

A wide array of insect pests attack every major vegetable crop raised in Michigan. Parasitic nematodes are a major pest of some vegetable crops. Areas of special interest or concern are:

- **Predictive modeling**: Predictive models that can be incorporated into the MSU Enviroweather system to help growers time control measures.
- **Insecticide resistance**: Insecticide timing and rotation is critically important to maintain the viability of EPA registered products.
- **Invasive species**: A rapid understanding of the biology, distribution and control of invasive insect pests such as brown marmorated stink bug, swede midge, or others.
- **Chemical controls**: Testing and registration of new chemical controls with low impacts on the environment and beneficial insects or nematodes.
- **Cultural and biological controls**: Improved understanding of the effect of crop rotations, cultural practices and beneficial insects and/or nematodes on pest populations.
- **Nematodes**: Improved understanding of species present, distribution and control.
- **Vector borne diseases**: improved diagnostics and better understanding of pest sources
- **Pollination**: better understanding of the role of pollinators in vegetables and the effect of crop production practices on them.

Weed Control

- **Chemical controls**: Testing of herbicides that could be registered for vegetable crops to improve available chemical tools.

- **Other control methods:** Develop and integrate mechanical, cultural and biological approaches to managing weeds.
- **Resistant weeds:** Identify and address risks associated with herbicide resistant weeds including Powell amaranth and marestail.
- **Avoiding and Mitigating Drift** from agronomic crop herbicide applications. Drift of dicamba and 2,4-D, as well as glyphosate and other herbicides.

Improved Horticultural and Sustainable Practices

- **Varieties:** Development and testing of varieties for pest resistance or tolerance, higher yields and marketability.
- **Nutrients:** Improved nutrient management to reduce costs, improve yield and quality and reduce runoff or leaching.
- **Cover crops and rotations:** Develop practices that will improve nutrient cycling, reduce pests and control erosion.
- **Irrigation:** Test and educate growers on methods to efficiently use overhead and drip irrigation, including the use of fertigation and chemigation, to improve crop yields and quality.

Improved Soil Health Management Information and Practices.

Soil impairment is a limiting factor in crop productivity. Inputs including technological innovations may boost yields relative to past performance, but if the soil is not in optimal condition, stress on the plants exacts a toll. Growers are aware of this relationship and are increasingly seeking soil analyses to determine precise data for representative fields. However, the biodynamics within the organic portion of the soil are still not adequately understood, and soil management suffers as a result. Many growers now perceive a need for a stronger grower-university partnership to expand soil research and demonstration projects applicable to the broad spectrum of vegetable crops grown in Michigan.

Production and Marketing of Safe Food.

The production and marketing of safe food is important to both consumers and producers. Food safety problems impact all growers of the affected crop. Growers will need to practice production and handling practices to help assure a safe food supply and to comply with the Food Safety Modernization Act.