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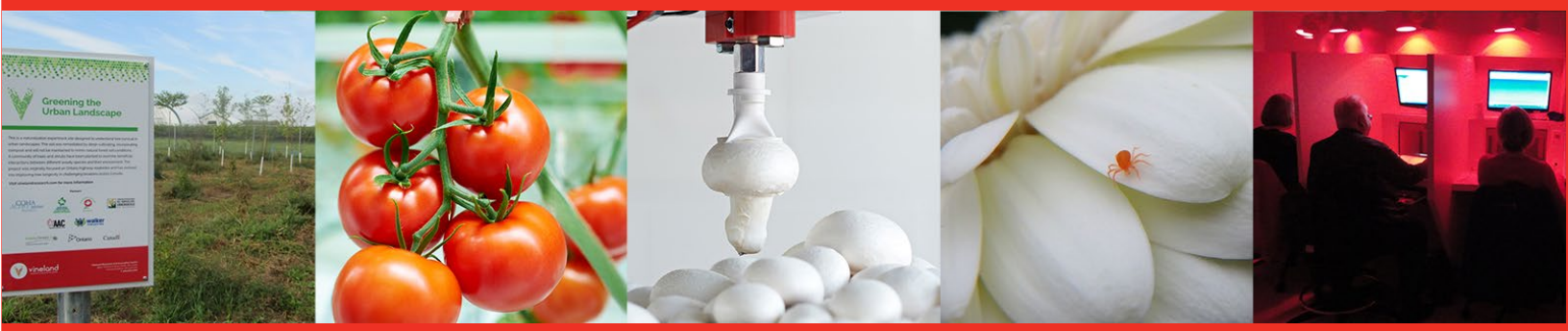

Ontario Horticulture Research Priorities

June 2025

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General Overview

As part of our renewed commitment under Sustainable Canadian Agricultural Partnership (Sustainable CAP), Vineland Research and Innovation Centre (Vineland) conducts the priority-setting process on behalf of the Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA). Vineland continues to be responsible for collecting and synthesizing research priorities from various horticultural groups. These priorities feed into OMAFA's priority setting process which is used by researchers across the province to address the gaps and needs of Ontario's horticultural sector. A similar process occurs for the livestock research priorities through the Livestock Research and Innovation Centre (LRIC).

The efforts currently underway to streamline the priority setting process and identify ways to capture high level priorities across sectors and themes is a way to improve the engagement process and usability of the results. Vineland aims to help create a meaningful set of research priorities and transition to a three-year priority setting process. Improvements will be made by addressing the needs of small, medium and large crop commodity groups while also considering short-, medium- and long-term priorities within and across these groups. Enhancing the alignment of funding and granting opportunities at the regional, provincial and federal levels will also aid these improvements. Additionally, key contacts, such as researchers and industry organizations, will be compiled to provide a resource list that supports the horticulture sector's sustainability, competitiveness and growth. Year 1 (2023-2024) of this project concentrated on identifying crop commodities' attitudes towards the previous research priority setting process to identify priority areas which were used to inform sector consultations. Year 2 (2024-2025) involved sector consultation with each of the commodity groups. All 16 groups were contacted, and consultation was completed with 13 of them to understand their opinions and concerns around priority setting which were used to develop recommendations for a new priority setting process. Year 3 (2025-2026) will involve using these recommendations and further industry consultations to establish the new priority setting process and priority list for 2026-2029.

Contact information

To learn more about the Ontario horticulture research priority setting process or to inquire about how to be involved, please contact:

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Commodity Research Priorities for 2025

Commodity groups were not required to provide updated priorities in 2025. Each group was given the opportunity to provide research priorities for this report at their discretion. The following section outlines the current research priorities for 12 of the 16 commodity groups that were provided this year. No instructions or templates were given; the priorities are printed in the format they were received. Research priorities are not ranked unless clearly stated.

The crop commodity groups contacted were:

1. Apples
2. Berries
3. Brassicas & Leafy Vegetables
4. Bulb Vegetables
5. Fruiting Vegetables
6. Ginseng
7. Grape and Wine
8. Greenhouse Vegetables
9. Honeybees and Pollinators
10. Maple Syrup
11. Mushrooms
12. New and Specialty Crops
13. Ornamental Horticulture (including Turfgrass)
14. Potatoes
15. Root Vegetables
16. Tender Fruits (including Fresh Grape)

Apples

1. **Technology, Mechanization, Automation & Efficiencies**
   - Increased production efficiencies using the latest technologies and precision agriculture that take into consideration the economic viability for apple growers. Research could include:
     - Labour efficiencies
     - Pest management and crop protection efficiencies
     - Weather risk efficiencies
     - Water use efficiencies
     - Modelling (for example, Ontario solutions using existing models for crop load management and integrated pest management)
     - Remote sensing, software development and robotics
     - Technology in storage and packing efficiencies
     - Orchard design

2. **Sustainable Practices**
   - Optimizing sustainable cropping practices for conventional or organic production according to variety and climatic conditions. Research could include:
     - Crop load management
     - Training systems
     - Carbon capture
     - Irrigation
     - Fertigation
     - Soil management
     - Nutrition

3. **Maximizing Quality & Minimizing Losses**
   - Crop maturity management and post-harvest storage conditions and treatment strategies with the goal of delivering a larger percentage of high-quality fruit for the fresh market. Research could include:
   - Post-harvest research developing storage regimes for in-demand varieties
   - Optimal harvest management and timing
   - Strategies to reduce storage disorders

4. **Variety & Rootstock Development and Evaluation**
   - Variety and rootstocks development and selection according to consumer preferences and their performance in the different regions with the goal of achieving greater market share. Research could include:
     - New variety breeding and evaluation
     - Scion and Rootstock evaluation (i.e., winter hardiness, drought efficiency)
     - Genomics
     - Consumer preference studies

Berries

1. **Insect and Disease Management**

   - **Spotted Wing Drosophila –** has become very common in all berry growing areas of Ontario
     - Pest management products with short harvest intervals, cultural management, education, biological controls
   - **Neopestalotiopsis** – a new disease of strawberries this pathogen is very aggressive damaging strawberry roots, crowns, leaves and fruit
     - Pest management product development including fungicides, surveying and sequencing for better detection.
   - **Anthracnose**
     - Additional disease management products due to resistance, disease resistant cultivars, propagation management techniques
   - **Cyclamen Mite** – with the loss of endosulfan this pest has caused an increased amount of damage in strawberry.
     - Additional products and alternative management strategies
   - **Bacterial Diseases –** Angular leaf spot affects the leaves and calyx in strawberries.
     - Control options, including cultural controls
   - **Virus Complex –** virus complexes have caused significant damage to the Ontario strawberry industry.
     - Virus management, detecting and recognition, clean plants
   - **Western Flower Thrips**
     - More effective control products, evaluate use of biological controls
   - **Soil Borne Diseases**

    - Soil health optimization, soil borne disease management other than fumigants, access and supply of clean plants

2. **Production Systems/Robotics/Labour** –

- Investigation and optimization of labour-saving technologies
    - Cultivation robots to help with tillage, spraying, night application and weed management
    - Seek and test new production systems, artificial media, protected culture, season extension techniques
    - Labour optimization
- Weather prediction model for yield forecasting and flower mapping

3. **Pest Management Products**

- Maintenance or replacement of broad-spectrum products – effective alternatives to broad-spectrum pest control products
- Resistance management practices including cultural control methods and grower education, must have workable pre-harvest and re-entry intervals
- Application trials to improve accuracy and effectiveness of pest management products, including volume/volume and per-acre application rates
- Explore other management options including ozone, peracetic acid, UVC technology, microbiological methods, and bee-vectoring methods
- Registration of new products and harmonization with the U.S.A
- Limit worker exposure, reduce crop residues, increase efficacy using drip irrigation pest management treatments

4. **Product and Quality Marketing**

- Develop and expand the trend of buying local by promoting the advantages of Ontario-grown berries
- Educating grocery retailers on sustainability, lower pesticide residues, superior flavor, freshness, and quality of Ontario berries to reduce the risks associated with local supply chains and their positive impact on economic growth
- Further brand awareness through Foodland Ontario could strengthen recognition of local products, especially given Ontario's high immigration rate and new first-generation Canadian demographics. These groups may benefit from additional information on the health benefits of berries and resources on their nutritional value, helping build demand. Highlighting the year-round availability of Ontario berries, particularly in the frozen sector, can also increase competitiveness with other sources, such as wild or imported frozen berries.

5. **Breeding and Evaluating New Cultivars**

- Develop varieties suited to Ontario conditions, including greenhouse strawberry varieties, early strawberry varieties that are heat and disease resistance, machine harvest-ready cultivars.
    - This can be accomplished by plant breeding in Ontario as well as evaluation of new cultivars developed in jurisdictions outside of the province.
- Research on the four types of growing systems, field, plastic, tabletop, and greenhouse.
- Improved cultivars and more education of management could expand the industry and increase grower profitability
- Continue to support the SPUD Unit, which is a clonal repository for strawberries and raspberries, as it plays a vital role in risk management for the industry

6. **Fertigation/Irrigation**

- Modernized benchmarks for irrigation and fertilization of berry crops for different growing systems
- Recommendations for growers that promote sustainable and efficient use of fertilizer and water
- New production systems, including day-neutral strawberries, fall-bearing raspberries, protected culture, and soilless media production, need targeted guidance
- Fertigation schedule for highbush blueberries under Ontario conditions requires refinement
- Optimizing drip line location and positioning
- Survey designed to facilitate knowledge transfer on fertigation and irrigation practices, including drip line setup, would greatly benefit berry growers.

Brassicas & Leafy Vegetables

1. **Cabbage maggot on Brassica crops**
    - The loss of the broad-spectrum insecticide chlorpyrifos has severely impacted producer's ability to manage cabbage maggot. There are few registered, economic alternatives for cabbage maggot control and resistance management concerns are also of critical concern with this pest.

2. **Alternaria on Brassica crops, especially Brussels sprouts, cauliflower, and broccoli**
    - Alternaria is a fungal pathogen that creates lesions on the heads, leaves and sprouts of Brassica crops. Fungicides are required to protect the crop against Alternaria infection. Broccoli heads with black beads and cauliflower heads with brown/black curds are not marketable. In Brussels sprouts, the entire field is abandoned, resulting in total crop loss if the percentage of infected Brussels sprouts are too high. Currently, a lack of available pest control products result in

many days without protection against Alternaria and those products that are registered are under extreme selection pressure for Alternaria resistance.

3. **Improve fertility guidelines for head Brassicas including broccoli, Brussels sprouts, cabbage, and cauliflower**
   - Develop strategies to improve soil and nutrient management. Strategies should consider multiple interacting variables including nutrients, plant cultivars and soil type. Head Brassica nutrient guidelines were last updated several decades ago on cultivars no longer grown commercially in Ontario.

4. **Clubroot of Brassica crops**
   - Clubroot (Plasmodiophora brassicae) causes an estimated yield loss of 10-15% in Brassica crops worldwide and in severely infested fields a 30-100% yield loss can occur. Spores of clubroot can persist in the soil for over 23 years. Effective cultural and chemical management options as well as breeding for clubroot-resistant cultivars are needed.

5. **Aphids on Brussels sprouts**
   - Effective aphid control strategies to replace the use of Admire™ systemic insecticide use.

6. **Production Systems / Robotics / Labour**
   - Investigate efficiencies for the use of precision agriculture to improve planting, weed management, harvesting, and sorting through automation and autonomous and semi-autonomous vehicles. Improvement of IPM modelling which would include forecasting pests and diseases, determine the ideal use of crop protection products while taking into account past, current and forecasted weather data.

7. **Breeding and evaluating new broccoli cultivars**
   - Most broccoli cultivars are not bred for the summer conditions in Southwestern Ontario which can result in an uneven, and unmarketable crown. Broccoli crowns that are uneven fail to shed water and are more likely to have issues with bacterial pathogens as well as physiological disorders like brown bead. Cultivars that have been developed for conditions like those seen in Ontario often lack traits (such as disease resistance, especially for clubroot), storability, and/or are not as high yielding).

8. **Post harvest quality**
   - Determine ideal storage parameters for extending shelf life as well as alternatives to using ice to remove heat from the field as well as in transit.

9. **Downy mildew on Brassica crops**
   - Downy mildew (Hyaloperonospora parasitica) is an oomycete pathogen that creates yellow spots on the upper leaf surface with corresponding greyish-white growths on the underside and is a problem when conditions are cool and wet.

Research should focus on improving existing management strategies with fungicides.

10. **Celery and lettuce weed management**
    - Herbicides registered for celery and lettuce are limited and more options are required to reduce labour and soil erosion from excessive mechanical cultivation.

11. **Food safety**
    - Improving food safety through surface sterilization, processing equipment material or through UV sterilization in the processing facility.

Bulb Vegetables

1. **Onion maggot management in onions**
    - The loss of the broad-spectrum insecticide chlorpyrifos has severely impacted Ontario's bulb vegetable producers' ability to manage onion maggot. There are few registered, economic alternatives for onion maggot control and resistance management concerns are also of critical concern with this pest.

2. **Virus-free planting stock in garlic**
    - Garlic is a vegetatively grown crop, which means that bacteria, nematodes, fungi, and viruses are more easily spread to the next generation and accumulate in the planting stock over time. In garlic, specifically 'Music', it is estimated that the yield drag from viruses is anywhere 25-50%. Access to clean planting stock of multiple cultivars is required.

3. **Stemphylium leaf blight in onions**
    - Fungus starts as yellow-tan, water-soaked lesions that develop into elongated brown to black spots which cause whole leaves to die back, and reduce plant's photosynthetic ability and yield. Most pest control products are no longer effective against this fungus due to fungicide resistance. This is putting more pressure on the remaining effective fungicides.

4. **Fusarium on garlic**
    - There are several fusarium species that attack garlic. The fusarium basal rots (F. culmorum, and/or F. oxysporum) cause different damage than the brown sunken lesions on the clove (F. proliferatum). Research aimed at Fusarium management in garlic could include fungicide testing, splitting / cracking / cleaning / sorting / planting methods to avoid bruising, as well as curing and storage techniques.

5. **Improve storage quality for garlic**
    - Determine ideal environmental storage parameters for long term storage of hardneck garlic cultivars in Ontario. Improve curing protocol to reduce cure time, improve quality and reduce pest pressure (mites, fusarium, larvae) going into storage.

6. **Improve fertility guidelines for onion and determine fertility guidelines for garlic**
   - Develop strategies to improve soil and nutrient management. Strategies should consider multiple interacting variables including nutrients, plant cultivars and soil type. Onion nutrient guidelines were last updated several decades ago on cultivars no longer grown commercially in Ontario. Garlic fertility guidelines have yet to be determined and onion guidelines have been used in the past.

7. **Fusarium basal rot of onion**
   - Fusarium basal rot is a major concern for onion growers in mineral soils. Options for management of fusarium basal rot could include; fungicide testing, irrigation water sterilization, modification of nitrogen rates and cultivar resistance testing.

8. **Production Systems / Robotics / Labour**
   - Investigate efficiencies for the use of precision agriculture to improve planting, weed management, harvesting, and sorting through automation and autonomous and semi-autonomous vehicles. Improvement of IPM modelling which would include forecasting pests and diseases, determine the ideal use of crop protection products while considering past, current and forecasted weather data.

9. **Stem and bulb nematode in garlic**
   - This nematode can survive and overwinter in the soil, but the main method of spread is through infected cloves. Currently only one nematicide is registered (Velum Prime), and resistance management is a concern. Alternative nematicides or management strategies should be investigated.

10. **Breeding and evaluating new garlic cultivars**
    - Develop new cultivars better suited to Ontario growing conditions and last longer in storage. Once new cultivars are developed, improve tissue culture methods to make clean seed production more efficient.

Fruiting and Root Vegetables

Research Priorities for Field Pepper, Tomato, Eggplant and Table Beets

1. **Updated nutrient recommendations**

2. **Updated irrigation recommendations**

3. **Phytophthora capsici control**

4. **One-spotted stink bug control/monitoring**

Grape and Wine

1. **Viticulture**
   - Spotted lantern fly
   - Winter Injury and Mitigation Technologies
   - Identification and mitigation for Leafroll and Red Blotch
     - Cover crop management (for beneficial/vector management)
   - MALB (Replacements for Synthetic Pyrethroids)
   - Quality Improvement (Canopy Management, Powdery Mildew, Black Rot, Fruit Fly, Brown Marmorated Stink Bug, botrytis, downy mildew, earwig management, etc)
   - Spotted Wing Drosophila (SWD), Sour Rot
   - Vitis Certification (Local Vine Propagation/Supply)
   - Spray Programs Strategies (Rotation, Feedback Mechanism)
     - Alternatives to delisted sprays
   - Short- and Long-Term Effects of Viruses on Plant Performance
   - Clonal and Sub-Clonal Stability (Assessing Trueness to Type)
   - New adaptative grapevine varieties
   - Extreme weather events recovery and strategy

2. **Oenology**
   - Clonal Sensory Evaluation
   - Post-frost picking strategy and must handling in the winery
   - Crop Level vs. Quality in light of climate change and weather patterns (i.e. Color, Tannin Development)
   - Sparkling Wine, Icewine, Late Harvest
   - Operations of Winery (i.e. Filtration, Yeast, Nutrients)
   - Site Selection (Terroir)
   - How to remove/mitigate botrytis taint
   - How to determine optimal picking times
   - How to make dealcoholized (or low alcohol content) wine economically in Ontario

3. **Market Research**
   - Consumer Science (consumption and purchasing trends)
   - Sensory Science
   - Sparkling Wine Profiles
   - Export/Market Development
   - Forecast of “Winning” Varieties and Style of Wine
   - Promoting local

Maple Syrup

H=high priority or short-term. M=medium priority or medium-term, L=low priority or long-term

1. **Issues affecting the health of sugarbushes/woodlots.**
   - (H) What are the impacts of fertilizers/lime application on syrup production?
   - (H) Guide on monitoring health of Ontario sugarbushes.
   - (H) Effects of climate change on maple production – long-term predictions?
   - (H) What causes increases and decreases in sugar content in sap?
   - (H) Is sugar content in sap declining and why?
   - (H) What is the effect of the number of freeze/thaw cycles and temperature ranges on sap volume in a given season?
   - (H) Maple health/decline.
   - (H) How to control specific insects that harm crop trees.
   - (H) Impact of forest tent caterpillars on maple trees.
   - (L) When obtaining more sap using modern technologies, is this not the same as over-tapping?

2. **Development of markets for Ontario maple syrup.**

3. **Methods to improve food production quality.**
   - (H) Buddy sap – field paper test kit
   - (M) What degree Brix does maple syrup no longer free when stored in household freezers?
   - (M) Storing bulk syrup.
   - (M) Storage in plastic and effect on flavour.
   - (M) At what degrees Brix does maple syrup crystallize?
   - (M) Best way to clean 3/16” tubing?
   - (M) Does RO affect/change flavour of finished syrup?
   - (M) Syrup density/mould.
   - (M) What causes off flavours in syrup?
   - (M) What are the differences between hot-packed and cold-packed syrup quality?
   - (M) Why does Vermont require syrup to be a minimum of 66.9 degrees Brix versus Ontario at 66 degrees Brix?

4. **Methods to improve inefficiencies in maple production.**
   - (H) Buddy sap – how to determine when to stop production at the end of season to avoid making buddy syrup.
   - (H) Determine evaporator efficiency.
   - (M) Can a safe tolerance of % light transmission be identified re lower end of grading range and what conditions cause this darkening to occur?
   - (L) Can the cost of filtering maple syrup be reduced?
   - (M) Is the use of higher vacuum the same as over-tapping?
   - (L) Sap ladders.
   - (L) Small scale vacuum systems.

5. **Accuracy and reliability of density measuring instruments.**
   - (L) Can more accurate and relatively inexpensive/afforable instruments be developed for determining density of maple syrup?

6. **Development of value-added products.**
   - (L) Can maple sap be utilized as a substitute for some petroleum-based plastics?

7. **How to minimize environmental impacts in maple production.**
   - (H) Will 'TreeAzin) if injected, deter Asian Long-horned beetle affect the taste and are products still safe for human consumption?
   - (M) How to recycle old spiles and tubing?
   - (M) Can new products such as spiles and tubing be manufactured from recyclable plastic materials?
   - (M) Develop a field identification guide to animal-chewed/damaged sap lines with photos and suggested methods of preventing or minimizing such damage.
   - (H) The increasing threat of contracting Lyme Disease in Ontario sugar bushes and how to avoid it.

8. **Cultivation of maple trees.**
   - (M) Planting and care of maple orchards.
   - (M) Preferred sites for maple orchards.

9. **Investigate more health benefits of maple.**
   - (L) What are the real health differences/benefits of organic syrup?

10. **Other**
    - (L) Determine maple syrup quality and taste from different areas of Ontario.
    - (L) Standard protocol across all contests for judging, including taste.
    - (H) How do we compile already existing maple research?
    - (M) New grade of Amber (50-74% light transmission) would be better described for colour and flavour at 50-65%. Golden should be 66% and up.
    - (L) Identify best layout and materials for sugar house construction.
    - (L) Comparison between sugar maple and soft maple sap quality and quantity.

Mushrooms

(in order)

1. **Automation and other technology** to address the high costs and availability of labour

2. Analysis and validation of the **nutritional value** and potential **health benefits** of mushrooms, especially on immune system responses, brain health and the potential for treating or mitigating the effects of certain chronic health conditions.

3. **Sustainability**, both in production practices and packaging

4. **Peat alternatives** and other **input shortage solutions**

5. Improving **energy efficiency** and reducing the carbon footprint of mushroom production

6. **Value-added** use of mushroom production **by-products** for functional food and nutraceutical ingredients

7. Strategies for improving **food safety** and **preventing contamination**

Ornamental Horticulture

The Landscape Ontario Nursery Growers Group have determined that their priorities fit into the following 8 categories (ranked list):

1. Cost of production (which includes labour, automation and efficiency)
2. Water Quality & Use
3. Pest Management
4. Marketing
5. Crop nutrition & Soil health
6. Reducing & Reusing Waste
7. Root Zone management
8. Education

The following themes should be captured throughout all categories and incorporated into research:

- Find ways to improve industry resilience
- Incorporate sustainability throughout each criteria
- And get "greener", reduce waste, and improve green messaging in marketing to drive demand

In 2024, the group prioritized their top three research questions for the top three subcategories:

1. **Reducing Cost of Production (Labour efficiencies and Automation)**
    - Investigating and evaluating an automated alternative for spacing and condensing potted plant material within polyhouses.
        - The technology has to be adaptable to various hoophouse sizes, ground materials (weed barriers, gravel, slopes, etc.) while also adaptable to different pot sizes and spacing requirements.
    - Develop efficiencies in inventory management
        - Such as validating drones and expanding image recognition software into shrub/perennial plants or other machine learning tools for various canopies and plant varieties. Specifically, inventory management tools that can be used in in polyhouses for container plants with the end goal

that data can be integrated into a user-facing inventory management software for sales and forecasting.

- Improving blow over prevention strategies for large nursery stock that integrate with current inventory logistics
    - (ie. still easy to pull inventory from).

2. Water Quality & Usage

- Evaluating methods to mitigate increasing media pH due to alkaline irrigation water in outdoor container production systems
    - What factors in the pot are impacting pH and what kinds of amendments or changes to the media could be done to mitigate pH other than just adjusting irrigation water.
- Evaluating automated watering techniques that utilize sensors and models with the goal of removing the need for human decision-making.
    - Technologies are needed that can determine when to water plants in order to find water savings and cost-efficiencies for field & container production systems. For field: Can soil mapping technologies be integrated into calculations to further improve models for watering needs?
- Improving irrigation water quality by finding better algae control measures that can be used in large-scale collection ponds throughout the summer/warm months.
    - Evaluate control measures that are cost-effective on a large scale and effectively tie up phosphorus and/or use plants/bacteria that integrate with water intake systems (i.e. do not clog/get sucked up and cause blockages or negative plant impacts to nursery stock).

3. Pest Management

- Evaluating macro-biological controls for managing outdoor nursery pests in both container & field nursery stock
    - Research is needed to determine which bios are cost-effective and can be utilized based on longevity in an outdoor setting, mobility (ability to spread), and the control levels they offer based on rate of release. Additionally, understanding is needed on how they can be applied in an outdoor setting that fits with current production systems (i.e. compatible with overhead irrigation) or what processes need to be adjusted to ensure the survival of beneficials.
    - Pests of interest include: Two spotted spider mites, Aphids, red headed flea beetle, leafhoppers, Japanese beetle adults and grubs, Spotted lanternfly, Box tree moth, broad mites, and others.
- Research into emerging/invasive species and development of IPM programs
    - Establish and promote early research (working with the US where possible) on new and emerging pests that are either already present in Ontario or will eventually cross the boarder to Canada including, but not limited to: Box Tree Moth, Hemlock woolly adelgid, Spotted Lanternfly, Red headed flea beetle, Root weevils, Strawberry blossom weevil, beech leaf disease, elm zigzag sawfly, jumping worms, oak wilt, beech bark disease, phytophthora species and others.

    - Develop and refine integrated pest management strategies for new/emerging pests, specifically identifying prevention strategies and biological and chemical management tools for nurseries and landscape plantings.
- Determining alternatives to herbicides
    - Such as improvements to mulches for container and field production that are cost-effective and sustainable/renewable sources.
    - Research specifically should take into consideration the longevity of a tool (i.e. rice hulls blow away) and water permeability.

Turfgrass

1. **Sustainable turfgrass management and best management practices**
2. **Plant protection with an emphasis on insect pests and pathogens; alternative management and improved diagnostics**
3. **New instrumentation, robotics, and software technologies**
4. **Improved turfgrass species and varieties**
5. **Wear tolerance, management, and recovery**
6. **Nutrient management and nutrient sources**
7. **Water conservation and water quality**
8. **Effects of climate change on turfgrass and pests**
9. **Economic impact of turf management decisions**
10. **Comparison of economics, environment, and playability of synthetic turf & natural turf**
11. **Societal benefits of turfgrass**

Potatoes

1. **Pest Management**
   - Evaluate cultural, biological and chemical methods to reduce the incidence of soil-borne diseases and blight.
   -
2. **Variety Development**
   - Identify and evaluate new potato lines that can help to provide a 12-month supply of high-quality potatoes to the Ontario fresh and chip processing industries through value-added traits such as early maturity, long term storage ability, nutritional potential, varieties that provide improvement in taste and appearance, increased resistance characteristics to disease/pests and require reduced inputs (nutrients, water, etc.), any of which would serve to enhance the competitiveness and profitability of the Ontario potato industry.
   - Identify and evaluate tablestock lines for value-added traits that may have a positive effect on human health.

3. **Potato Breeding**
   - Develop a breeding program that considers disease resistance, focusing heavily on common scab and/or; low N, P, K requirements and/or; drought tolerance as priority traits.

4. **Soil Health and Regenerative Agriculture**
   - Improve soil health, marketable yield, and quality by integration of alternative crops, cover crops, tillage, and/ or other innovative or regenerative practices into potato production systems.

5. **Irrigation Management and Water Use Efficiency:**
   - Exercise regional best management practices for the sustainable use of water that supports the production of high-quality potatoes, while mitigating production risks due to climate change.
   - Develop water management BMPs to increase water use efficiency such as the use of new technology to monitor and manage irrigation programs, including variable rate, research on irrigation management needs to focus on availability, measurement, and management.
   - Identify selections and cultivars that are adapted to environments with lower fertility and water availability. Improve water use efficiency by altering timing and use of new irrigation technologies.

6. **Greenhouse Gas Emissions, Environmental Performance, and On-farm Adaptations**
   - Enhance agronomic practices that reduce greenhouse gas emissions and strengthens the environmental performance of potato production in Canada.
   - Conduct research in agronomic practices leading to the optimal use of inputs with specific emphasis on 4R Nitrogen management and N2O reductions; soil and nutrient conservation and carbon sequestration.

Tender Fruit

1. **Increase Labour and Operational Efficiencies**
   - Improved processes and systems that reduce impacts of and/or costs for:
     - Pruning, thinning harvesting and packing
     - Pest and disease management
     - Adverse weather management

2. **Pest and Disease Management:**
   - Top Disease: Fire Blight, Black Knot, Bacterial Spot
   - New variety acquisition, development, best management and commercialization processes that result in:
     - Higher value varieties suited to Ontario growing conditions and marketplace needs
     - Varieties that can better withstand climate change pressures such as excessive heat and drought
     - An increase in organic production
     - Fast tracking of virus-free commercial production of promising varieties
     - Disease resistance - especially to Fire Blight, Black Knot and Bacterial Spot.
   - Increase post-harvest quality:
     - Optimal harvest, packing, cold chain management systems, treatments and practices to increase quality and shelf life.
   - Irrigation, water, and nutrient use:
     - Processes and systems to maximize efficiencies.
   - Invasive species management:
     - Strategies to combat new invasive species such as Brown Marmorated Stink Bug (BMSB), Spotted Wing Drosophila (SWD) and Spotted Lantern Fly (SLF).

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Sustainable Canadian Agricultural Partnership

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