

# Nova Scotia Vegetable Industry and Research Priorities 2018 – 2019



As compiled by  
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Perennia, in conjunction with Horticulture Nova Scotia, regularly administers a variety of research projects to assist farmers in exploring new varieties of crops, improving on existing crops, determining best management practices, and managing crop pests. Approximately every two years, berry and vegetable priority selection sessions bring together berry and vegetable growers to determine what these projects should encompass. An online survey was administered to the vegetable growers in November 2017 to determine research and industry priorities for each crop and for vegetable production as a whole. A follow up in-person meeting was held in December 2017 to generate greater discussion around needs in the industry.

In many cases, some of the selected priorities have been extensively researched. The fact that the industry still selects these as a priority could indicate several important points:

1. The research that has been conducted is not being communicated well to growers
2. The research that has been conducted is impractical in an applied setting
3. There is a need for greater depth and/or breadth of research of the selected priority

A summary is presented below of the findings as determined by this survey and through discussion with growers and industry stakeholders.

## Methodology

Questions were formatted to determine needs that spanned the vegetable industry and were also broken down to address issues that pertain to each crop or crop group. Numerous priorities were identified by vegetable growers in Nova Scotia, with further priorities coming to light in subsequent discussions. Higher priorities are listed towards the top of the list.

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## General agronomy and overarching priorities

There were many areas that were identified as priorities. The top 5 priorities across all vegetables are:

- Wireworm management
- Improved crop rotations for better pest management
  - Weeds (cleaver management mentioned specifically)
  - Insect pests (wireworms and nematodes mentioned specifically)
  - Diseases of importance:
    - Fusarium basal rot (onions, garlic)
    - Potato scab
    - Club root
- Soil quality/health
- Integrating cover crops
  - Especially after late-harvested crops
  - Brown mustard and sorghum-Sudangrass for wireworm management
  - How much benefit is happening over the winter? (i.e. if fall cover crops are terminated via herbicide prior to winter, are growers losing some of the benefits?)
    - At what temperature does each species shut down?
- Improved fertility management
  - Updating nutrient recommendations from the provincial lab
  - Several organic growers expressed a desire for greater understanding of N-cycling with green manures

Other priorities mentioned at least twice as relates to general agronomy and other overarching priorities, in no particular order were:

- Erosion
- System resiliency (in the face of extreme weather conditions, etc.)

Other general agronomy priorities mentioned by growers:

- Shelf-life enhancement (production, packaging, post-harvest handling)
- Marketing
- Energy efficiency
- Market research for new crops/products
- Irrigation
- Food safety
- (Organic) Participatory plant breeding/seed adaptation for our region, especially for low-input/ecological/organically managed varieties
- Organic/non-herbicide-based no-till and minimal-till field management for vegetables
- (Organic) Nutrient Density management practices to enhance the nutrient content rather than just size/weight/yield
- (Organic) Ecological agriculture

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## Brassicas

There are over 900 acres of Brassicas cultivated in Nova Scotia. The top five priorities for Brassica crops are:

- Optimizing fertility
- Disease and insect forecasting
  - (Organic) Cutworms came up in particular
- Cabbage maggot (options other than insect netting)
- Soil health
- Clubroot-resistant varieties, crop rotations to limit clubroot

Other Brassica crop priorities mentioned in no particular order:

- Foliar nutrition (micronutrients, tissue testing)
- Transplant production
- Weed control
- Reduced tillage
- (Organic): Based on the brassica pests we have in our region, how to create an ecosystem where these pests are present but at a controlled level (identifying and encouraging native predators)
- Best management practices to attain uniformity in harvest timing for cauliflower within a given planting

## Carrots

There are over 1500 acres of carrots grown in Nova Scotia. The top priorities for carrots are:

- Weather based pest forecasting (Alternaria, carrot weevil, carrot rust fly)
- Minimum-till systems
  - Currently growers are experimenting with fall tillage and bed formation, seeding a cover crop, and then spring strip-tillage prior to carrot seeding (minimum soil disturbance)
- Fertility and soil enhancement
- Wireworm management
- Nematodes
  - Treatment/management options and efficacy?
  - Crop rotations to minimize populations
- Linuron replacement
- Seed treatments
  - Insecticides (Diazinon replacements mentioned specifically)
  - Efficacy of new products
  - Seed treatments for Pythium
  - Seed treatments for nematodes
- Cover crop options (namely: managing storage carrot fields so they do not go into the winter bare after harvest)
- Cultivar evaluations

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## Onions

There are over 570 acres of onions grown in Nova Scotia. The top priorities for onions are:

- Wireworm management (both spring and fall)
- Bacterial rot
  - Field management
  - Biopesticides
  - Treatment in storage
- Onion splitting
  - Causes
  - Crop rotation impacts (particularly residual herbicide related)
- Stemphylium
- Fusarium basal rot
- Bio-fumigation (for wireworm and disease management)

Other onion priorities that were mentioned, in no particular order:

- (Organic) Soil amendments (wood ash, compost, biochar)
- Organic matter enhancement
- Fertility research
- Downy mildew
- Weed management (chickweed, cleavers, etc.)

## Lettuce

There are over 250 acres of lettuce grown in Nova Scotia. The top priorities for lettuce are:

- Non-traditional market products (romaine hearts, wraps, leaf mixes, frisée, etc.)
  - Radicchio – how to grow, varieties
- Tipburn control
- Weed control
- Cultivar evaluation
  - Head lettuce
  - Romaine that does well in the summer
- Fertility management (losses during heavy rains)
- (Organic) For cut lettuce leaves (such as in salad mix, using multileaf/salanova type varieties):  
avoiding discolouration on the cut edge of the leaf a few days after cutting
- (Organic) Weed control in salad mixes

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## Cucurbits

There are over 580 acres of cucurbits grown in Nova Scotia. The top priorities for vine crops are:

- Cucumber beetle control
  - (Organic) Crop rotation as a management tool for reducing cucumber beetle pressure
  - A continuation of the research done by Geoffrey Zehnder using plant growth-promoting rhizobacteria to induce systemic resistance against cucumber beetles
- Squash bug control
  - Effective predators/parasitoids?
  - (Organic) Crop rotation as a management tool for reducing squash bug pressure
- Cultivar evaluation
- No-till or strip-till – cover crops (winter and/or spring killed) for weed control
- Erosion control (strip cropping, wind breaks, mulching between rows on plasticulture)

Further singularly identified priorities were:

- Production systems (plasticulture/season extension)
- Pollination

## Potatoes

There are 1700 acres of potatoes in Nova Scotia. The top priorities for potatoes are:

- Wireworm control
- Nematode management
- Replacement for neonics (Admire/imidacloprid)
- Organic matter management
- Irrigation management
- Skin set for early harvest



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## Beets

There are approximately 150 acres of beets grown in Nova Scotia. The priorities are:

- Disease
  - Scab
  - Cercospora (greens)
- Cultivar evaluation
  - New varieties
  - Colours
  - Disease resistance (especially to Cercospora)
- Fertility
  - Nitrogen management
  - Foliar application of micronutrients
  - Promoting strong top growth (for mechanical harvest)
- Weed control
  - Including herbicides with short PHI
- (Organic) Seeding beets for ideal size and yield, especially without any thinning using smaller-scale field seeders
- (Organic) Reducing rodent damage (voles)

## Rutabaga/Turnip

There are approximately 150 acres of rutabagas and turnips grown in Nova Scotia. The top priorities for rutabagas and turnips are:

- Cabbage maggot control
  - Lorsban/chlorpyrifos resistance
  - (Organic/Small-scale) Most economical insect netting (durability x cost)
- Fertility and soil enhancement
  - Split N applications
  - Update provincial nutrient recommendations
- Weed control
- Cultivar evaluation for greens
- Foliar products to enhance top growth (ease of mechanical harvest, sunburn protection)

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## Tomatoes/Peppers

There are over 100 acres of field-grown peppers and field-grown tomatoes in Nova Scotia. The priorities for field-grown peppers and tomatoes are:

- Fertility in hoop houses/tunnels (organic and conventional)
- Production systems in plasticulture/tunnels (season extension, pruning, staking, trellising)
- Disease management – forecasting for bacterial speck, early/late blight
- Cultivar evaluation
- Weed and erosion control through strip cropping, wind breaks, mulching (between rows in plasticulture), cover crops
- Colour enhancement with reflective mulches
- Dry farming practices (in high tunnel) for flavour enhancement
- Silica for disease management (fertigated or foliar applied)

## Spinach

There are approximately 30 acres of spinach being grown in Nova Scotia. The top priorities for spinach are:

- Nutrient management (high density crop, foliar applications)
- Production systems (season extension, baby spinach, year-round production)
- (Organic) Reliable germination in high tunnels/hoop houses (possibly related to high electroconductivity? Hard to get good stands in winter production)
- (Organic) High soil nitrate levels in winter production systems (how to manage)
- Cultivar evaluation
- Multi-harvest economics
- Food safety (irrigation water, wash water, handling)
- Prevention techniques for minimizing leaf yellowing after heavy rain

## Snap Beans

There are approximately 200 acres of snap beans in Nova Scotia. The top priorities for snap beans are:

- Season extension
- Cultivar evaluation
- Post-harvest storage
- Inoculants
  - Organic availability?
  - (Organic) How to manage soils to reduce the need to use inoculants each year



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## Sweet Potatoes

Sweet potatoes are a newer crop to Nova Scotia. The top priorities for sweet potatoes are:

- Cultivar evaluation/breeding program
- Post-harvest handling/storage diseases
- Production systems (irrigation, plasticulture)
- Wireworm management
- Plant spacing

## Radish

There are approximately 10 acres of radishes grown in Nova Scotia. The top priorities for radish are:

- Cabbage maggot control
- Cultivar evaluation
- Weed control
- Harvesting technology
- Insect netting
- Wireworm management
- White grub management
- (Organic) Ideal timing for winter radishes
- (Organic) Producing radish seed - for farm/regionally-adapted seed
  - Particularly how to get high seed yields

## Celery

There are over 10 acres of celery grown in Nova Scotia. The top priorities for celery are:

- Cultivar evaluation
- Celery leaf curl, blackheart
- Bacterial rot
- Production systems (overhead/drip, spacing, fertility, size, plastics, covers)
- Shelf life extension (post-harvest handling/storage)
- Fertility management

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## Garlic

There are currently approximately 10 acres of large-scale conventional garlic being produced in Nova Scotia, plus numerous smaller acreages spread among small-scale and/or organic farms. The top priorities for garlic are:

- Good quality seed garlic
  - Nematodes
  - Fusarium basal rot
  - Viruses
- Nematodes
  - Management in a currently growing garlic crop
  - Management post-harvest of an infected field
- Fusarium basal rot
  - Management in a currently growing garlic crop
  - Management post-harvest of an infected field
- Fertility
- Storage issues (post-harvest diseases)
- Leek moth (new pest in Nova Scotia)
- White rot management/strategies
- Cultivar evaluation
  - Varieties suitable to NS
  - Comparisons with European varieties (cleaner seed)
  - Resistance/tolerance to wet conditions in the fall
- Weed control (mulches/plasticulture)
- Market development

## Swiss Chard

There are currently 2 acres of Swiss chard being grown by larger-scale conventional farms in Nova Scotia, plus numerous smaller acreages spread among small-scale and/or organic farms. The top priorities for Swiss chard are:

- Diseases (Cercospora leaf spot, other)
- Production systems (beds/tunnels/peat)
  - Best management practices for overwintering
  - Spacing in tunnels for overwintering
- Tarnished plant bug management
  - Organic and conventional
  - How to create a preferred habitat/area for the TPBs after haying season (that is not in the Swiss chard!)
- Cultivar evaluation

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## Specialty Vegetables

There are numerous types of specialty vegetables being grown in Nova Scotia with a wide ranging number of acres. Current speciality vegetables range from 80 acres of Chinese cabbage to smaller acreages of eggplant, fennel, dandelion greens, celeriac, collards, ground cherries, etc. Priorities across all “speciality” vegetables are:

- Market development!
- Cultivar evaluation
- Insect covers/netting
- Shelf life enhancement (temperature, packaging/storage/handling)
- Pest control (PHI, few products registered)
- Production systems

## High tunnels, caterpillars, low tunnels (soil-based systems)

Numerous crops are grown in high tunnels, caterpillars, and low tunnels using a soil-based system in Nova Scotia. Across all of those crops, the top priorities for these systems are:

- Fertigation (organic and conventional)
  - (Organic) – options other than fish
  - Optimal timing for nitrogen and sulfur applications
- Salinity management (how to effectively draw EC down)
- Foliar nutrients
- Phosphorus management (organic and conventional)
- Disease management
- Insect management
- Integrating IPM practices
- (Organic) all tillage is currently done with a rototiller. Other options? No-till? Min-till?
- Cultivar evaluation
- Weed management – in general
  - (Organic) particularly along high-tunnel edges
- Best management practices for growing salad greens in the winter

## Other

There is also significant sweet corn (~90+ acres), asparagus, and greenhouse production (predominantly tomatoes, cucumbers, and peppers) in Nova Scotia, however, none of the growers responded to the survey. Should there be interest in conducting research on these crops, please contact Rosalie Gillis-Madden and she can direct you accordingly.

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This report was brought to you by:

## Perennia:

Operational since 2001, Perennia (formerly AgraPoint) has a 37-member team including specialists with expertise in areas of horticulture, livestock, IPM, field crops, product development and commercialization, and food safety, as well as professional skills in such areas as facilitation, adult education, information technology and communication. *The mission of Perennia is to help farmers, fishermen and food processors be prosperous and profitable.* Perennia offers a wide range of production and development services to farmers, agri-businesses, co-operatives, industry associations, universities, and government. From its offices in Kentville and Truro, Nova Scotia, Perennia provides advice through workshops, field days, in-depth projects, and one-on-one consultations in person and by phone.

## Horticulture Nova Scotia:

Horticulture Nova Scotia was formed in 1998 and is a not-for-profit association. Horticulture Nova Scotia works with other horticultural interest groups to further the needs and interests of the horticulture industry. Horticulture Nova Scotia aims to promote unity and cooperation within the research community and to facilitate the identification of research priorities that will benefit the horticulture industry.