

A map of Vermont is shown, with each county labeled and associated with a specific agricultural product or scene. The labels and corresponding images are: ST. LAWRENCE (cows), FRANKLIN (sheep), CLINTON (apples), JEFFERSON (a basket of various fruits), ESSEX (potatoes), and LEWIS (a lighthouse). The map is stylized with a torn-edge effect.



Real-World Research Results for NY's Farms

The NNYADP was established in 1961 by the New York State Legislature.

Funding for the NNYADP is supported by the New York State Legislature and administered by the New York State Department of Agriculture and Markets • <https://www.nnyagdev.org>



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“The value that Northern New York Agricultural Development Program research brings to our region’s farms and economy has often also gone on to benefit New York State, the Northeast, and elsewhere in the United States.”

– NNYADP Co-Chair Jon Rulfs, Peru, NY



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ADJUNCT: Mark Savage, Boonville (Oneida County)

“New York State funding of the Northern New York Agricultural Development Program energizes critical research that addresses the opportunities associated with northern New York’s unique soils, microclimates, and geography.”

– NNYADP Co-Chair Joe Giroux, Plattsburgh, NY



Real-World Research, Practical Results for Today's Farms

To grow the state's agricultural economy, the New York State Legislature, in 1961, established a dedicated agricultural research program for the state's 6 northernmost counties - today's Northern New York Agricultural Development Program (NNYADP).

New York continues to reap the benefits of that foresight through the NNYADP's 60-year proven record of "grassroots," real-world practical solutions that meet the NNY region's unique challenges (e.g., *extreme northern weather events, microclimates, diverse soil types*); assist NNY-specific local food security and small-scale farming entrepreneurship, and create new science (e.g., *biocontrol nematodes protocol*), in support of local, regional, statewide, and national agricultural interests.

This report provides a quick snapshot of the positive impact of Northern New York Agricultural Development Program project results. As we enter 2022, we are excited to build on the momentum created by exciting recent growth indicators across the region's agricultural economy and to address persistent challenges (*see page 15*).

"The Northern New York Agricultural Development Program farmer committee has a discerning ability to identify research that will have significant impact that manifests immediately in the short term, progressively over time as with our water quality-tile drainage research, and appreciably as with the new biocontrol nematodes science."

– NNYADP Co-Chair Jon Greenwood, Canton, NY



NNYADP Organizational Hallmarks

Fiscal Efficiency:
97.5% of funding goes directly to research & results delivery

- Farmer-driven grassroots research that frequently identifies & conducts 1st-time or feasibility research, creating a foundation for larger funders to carry forward
- Unprecedented water quality/tile drainage real-farm science results sought by agencies and farm and conservation groups from throughout New York State, the Northeast, and nationally
- Highly visible research results delivered via project collaborators, Extension, regional/state/national conferences, media. NNYADP project/reports are publicly available at <https://www.nnyagdev.org>.
- NYS Legislature funding with administration through the New York State Department of Agriculture and Markets is recognized in NNYADP press releases/materials.

More Info & NNYADP Research Results:

<https://www.nnyagdev.org> • 315-465-7578

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Progressively Building Positive Impact Since 1961

Dr. Robert F. “Bob” Lucey saw a future for Northern New York as an agricultural production powerhouse and set out to create a regional agricultural research program. At his prompting, the New York State Legislature established and funded what is today the Northern New York Agricultural Development Program (NNYADP).

Dr. Lucey is remembered as “a man who could see 50 years ahead of his time.” Now 60 years later, the agricultural industry of northern New York works more than 1 million acres of land, supports a farm employee payroll of more than \$789 million, and produces an agricultural products value of more than \$776 million. The farm products value in all six NNY counties has increased since 2002, with steady growth from 2-6% to 20-34%.

With the continuing support of the New York State Legislature, the NNYADP is advancing Dr. Lucey’s vision for today’s farms by developing practical, on-farm, real-world research results to meet today’s challenges associated with climate, economics, technology, and emerging pests and diseases as well as opportunities to further grow local foods and maple production to feed not only NNY but other areas of New York State.

Inspiring the Next Generation

As the young research program was getting underway, Dr. Lucey was in the fields with farmers throughout the region and connecting those farmers with researchers, academic and agricultural institutions, students, and Extension agents around the tasks of identifying, evaluating, and optimizing the northern NY-specific factors that influence dairy farming, crops production, and other agricultural interests in the region. His work would make a lasting impression on one youngster who is now a valued researcher and educator following in Dr. Lucey’s footsteps to help farmers not only in northern New York but statewide.

“I am literally a product of the Northern New York Agricultural Development Program. It has played an integral role in my career. Dr. Lucey conducted a lot of research on my family’s farm from the start of the program. My college internship and graduate research were associated with NNYADP project work, and since then I have served as a research leader or collaborator on several NNYADP projects.” – Joe Lawrence, Dairy Forage Systems Specialist, Cornell University PRO-DAIRY Program



Rick Lawrence with then 3-year-old Joey in an NNYADP field trial of ridge-tilled corn, 1985. Photo: Jack Zuzula, courtesy Watertown Times



In the 1980s, Dr. Lucey worked with Joe’s dad Richard and grandfather Edward “Ned” Lawrence to evaluate ridge tilling as a way to help corn seed make better contact in the clay soils found in northern Jefferson County. Field trials were needed to test the theory that ridge tilling would loosen the heavy soil, allow sufficient drainage, and let the land warm up and dry out to allow a corn crop to properly take root, highlighting one of the benefits of localized research. In an August 1985 “Farm & Garden” article, Joe’s dad commented on how the ridge tilling experiment was viewed at the time, noting that neighbors were skeptical that it could ever be practical. The article went on to say, “statistics are slowly proving the skeptics wrong.”

Joe Lawrence is now mentoring his own children to become good land stewards. Colin, Caroline, and Ben examine proper placement of corn seed. Photo: Joe Lawrence



Northern NY farmers like Rick Lawrence, and youngsters like Joe who become well-respected members of the agricultural community, have given their time, land, equipment, talents, and perspiration to continuing the NNYADP mission to progressively fulfill Dr. Lucey’s vision for a vibrant agricultural economy for northern New York. The NNYADP thanks the New York State Legislature for making this valued work possible.



GROWING NNY'S LOCAL FOODS SECURITY

NNYADP Food Hub Development Project & The Pandemic

The Northern New York Agricultural Development Program Food Hub project team survey and analysis of opportunities to strengthen local food systems and develop localized food hubs in 2013-2015 has proven its worth again and again, most recently during the pandemic of COVID-19.

The survey identified buyers, including consumers, restaurants, caterers, and grocers, interested in sourcing local foods and their requirements to do so. The work also evaluated the regional capacity for locally-sourced foods and food hubs and concluded there were “opportunities to expand the sales of NNY products.”

The concept of food hubs was especially of interest to the region's small, beginning, and mid-size farms' owners. This NNYADP-supported research addressed food hub organization, infrastructure, and food safety; and areas specific to farmers/growers (particularly with specialty crops), and buyers; and made next steps recommendations that farms, community organizers, and Extension have implemented.

2013-2015: NNYADP FOOD HUB FEASIBILITY PROJECT

- **2016: The Hub on the Hill, Essex, Opens**
- **2018: St. Lawrence Valley Produce Auction, North Bangor, Starts**
- **2018: North Star Food Hub, Lyons Falls, Established**

In addition to three new food hubs, the NNY region has seen a proliferation of farmstands and local foods interest from loyal foodies as well as first-time buyers during the pandemic with NNY growers and producers ready to meet the demand. See other examples of exciting recent growth in the NNY local foods agricultural sector on page 15.



Hub on the Hill: The Adirondack Food Hub

Retail Store • Discounts for Low/Middle Income Customers • Wholesale Pricing for Stores, Restaurants, Institutions • Strengthening Local Food Supply Chains • Expanding Access to Fresh Local Food • Supporting Regenerative Ag Systems • Commercial Community Kitchen • Large-Scale Value-Added Production & Co-Packing • Frozen/Cold/Dry Storage Rental...

Pandemic Response Seeds Longer-Term Benefit for Local Farms

The Hub on the Hill's food distribution network, reaching more than 2,100 miles from NNY's Canadian border to New York City, expands market access for local farmers and growers. The Hub's COVID-19 Emergency Food Packages response, in collaboration with AdkAction, that delivered local foods to people in need is now advancing longer-term growth for the regional food system. The Hub on the Hill partners include diversified growers, creameries, livestock producers, value-added producers, draft horse-powered farms, as well as caterers, an artisan breadmaker, a farm-to-school initiative and other community action entities.

Northern Climate Adaptability, Data for Diverse Communities

Filling NNY's Winter-Spring Sales Gap, Meeting Buyer Demand



In 2020, wholesale buyers sought more sprouting broccoli than the young NNY food hubs could supply. In 2021, NNYADP trials began evaluating the opportunity to grow cold-tolerant cruciferous crops (overwintered and spring-planted sprouting broccoli and miniature cabbages) to meet that demand. Harvested in the early spring, these crops help fill the sales gap between when winter storage crops are sold and before the harvest of northern New York field-grown vegetable crops in the spring.

The trials' first mini-cabbages and spring broccoli were harvested in May 2021; sprouting broccoli seedlings were planted for overwintering trial in October.

This project is also helping growers to package, price & prepare crops for wholesale & retail markets; develop food safety plans; implement Food Safety Modernization Act requirements; and assess cold-tolerant cruciferous cover crops to boost soil health and suppress pests, weeds, and diseases in high tunnel-grown crops.

“Not only is the growing season short in northern New York, so is the season for marketing fresh produce. Growers first to bring popular crops to market...have a distinct economic advantage.”

– Amy Ivy, Vegetable Specialist

Assisting the Plain Community & Wholesale Food Auctions

NNYADP-supported analysis of the first 3 years of sales at the Plain Community's St. Lawrence Valley Produce Auction in North Bangor showed 82% growth from 2018 to 2020. The project team developed sales & marketing tips related to wholesale buyer preferences, pricing, seasonality, lot sizes, and packaging. Growers also received education related to disease/pest/invasive species management, optimal plant fertility, and season extension options.



“95% of the elderberries consumed in the U.S. are imported from Europe. The NNYADP northern-climate ‘super fruits’ research supports the opportunity to build significant local and domestic markets.”

– Michael H. Davis, Ph.D., Willsboro Research Farm

Elderberry Added to “Super Fruit” Trials

In 2021, American & European varieties of elderberry joined the NNYADP's high-phytonutrient, high-antioxidant value “Super Fruits”

research that includes honeyberry, aronia, and juneberry trials. Juneberry is a New York State Endangered Species with a “Vulnerable” global ranking. As a result of the establishment of NY's largest collection of wild and cultivated juneberry varieties at the Willsboro Research Farm in 2013, regional growers are now producing more fruit crops and value-added products.



High Tunnel Research for Northern Climates

Research conducted in the high tunnels at the Willsboro Research Farm has provided regional growers with real-world, data-based production guidelines for: **arugula • blackberries • strawberries • cherry tomatoes • fall & winter greens • summer lettuce • cut flowers • goldenberry • ground cherry • red peppers • raspberries • mizuna • strawberries • winter-grown spinach • high tunnel cover crops • non-traditional high tunnel crops: fresh baby ginger • basil • cucumbers • green beans • self-fertile zucchini • turmeric.**

NNYADP Horticultural & Local Foods Research Results: <https://www.nnyagdev.org>



GROWING NORTHERN NY'S BIG APPLES

NNYADP Research Part of NNY Apple Orchards' Success

Northern New York's apple growers have faithfully participated with NNYADP precision apple orchard research, contributing land, time, grower expertise, fruit samples, and data to a succession of projects. Project results have included insights, management strategies, and guidelines for growers regionally and beyond. NNYADP-prioritized precision apple research has included:

- **Apple pest ID and management, including IPM and use of hail netting**
- **Trials of apple rootstocks for adaptability to NNY's climate**
- **Carbaryl-free orchard thinning**
- **Computer modeling for fire blight and apple scab prediction & prevention**
- **Cropload management**
- **Harvest management, including pruning techniques**
- **Orchard irrigation**
- **Strategies for bitter pit prediction and avoidance.**



Researcher/CCE tree fruit specialist Michael Basedow ties trees for an NNYADP research project at Everett Orchards in Peru, NY. The business also operates a Farm Market & Cidery in Plattsburgh.

*For NNYADP precision apple research results:
see Horticulture/Local Foods tab:
<https://www.nnyagdev.org>.*

New 67,000 Sq. Ft. Apple Facility Responds to Buyers' Demand

Chazy Orchards is known as "The Largest McIntosh Apple Orchard in the World!" The nearly 100-year-old farm business also grows several other apple varieties. The orchard planted in Chazy, NY, in the mid-1920s includes part of an original settlement dating to 1763. This farm business began as a subsidiary of the Delaware and Hudson Railroad Corporation to generate freight shipments south to New York City and north to Montreal. Some of the apple trees from the first planting remain.

Chazy Orchards is recognized as pioneering the development of controlled atmosphere storage for apples in the 1950s. The Giroux family, well-respected as grain and egg producers, bought the business in 2010. In 2017-2018, they completed construction of a new apple sorting, packing, dry storage, and cooling facility to keep up with increased public demand. The 67,000-sq.-ft. facility allowed the business to add more modern equipment to work alongside its 1995-era systems. This expansion retained all employees, extended the off-season need for workers, and has enabled new hiring. A seasonal farm market with bakery is part of Chazy Orchards' destination popularity with local and visiting consumers. Through wholesaling and online commerce, Chazy Orchards ships apples to nationwide. nationwide.

"Science has played an important role in making the apples we grow at Chazy Orchards as great as they are."
– *Chazy Orchards website, which notes the localized NNY microclimate is well-suited to apple production*



Apple blossoms collected in a northern New York apple orchard for measurement and data entry into the Fruit Growth Rate Model evaluation component of the NNYADP precision apple orchard thinning project.

NNYADP Water Quality/ Tile Drainage Research Data in High Demand

The results of the NNYADP's high priority water quality research related to agricultural tile drainage are sought out by farming, conservation, and community agencies and groups regionally, statewide, and nationally. *



Above, below: Year-round tile drainage data station on a farm in NNY.

Latest Results: Non-Growing Season Events Play Critical Role

Year-round tile drainage research trials at a northern New York dairy farm have shown that non-growing season, weather-related events play a critical and consistent role in nutrient transport across and through soil. Progressive project data from these NNYADP trials is needed to accurately pinpoint how the interactions between weather and field conditions relate to runoff quantity and quality.

The intense data collection associated with nutrient uptake and water movement through tile-drained cropland is building a science-based body of knowledge that can be used to strategically develop and implement agronomic practices with the best opportunity to protect and improve water quality and natural resource conservation, as well as maintain New York's farm-based economy.

"These trials in northern New York are precedent-setting with insights provided only by long-term studies of the continuous year-round monitoring of nutrient movement in surface runoff and tile drainage in farm fields to capture the variability that occurs across events, soils, and on an annual basis," notes project leader Laura Klaiber, a Nutrient Management Researcher with the W.H. Miner Agricultural Research Institute in Chazy, NY.



What is the extent of nutrient loss (phosphorus, nitrogen...) through tile drainage? How do any tile drain losses compare to surface runoff losses under typical NNY dairy forage production systems? Is there a quantifiable difference between nutrient losses from tiled fields vs. untilled fields? These are key questions beginning to be answered by the unprecedented tile drainage research that is a collaboration by the Northern New York Agricultural Development Program (NNYADP) and Miner Institute.**

Critically Needed Information & Insight

Very little research nationwide, and even less regionally, had focused on the second question above, so the NNYADP research added trials on a regional dairy farm to begin filling the information gap associated with how the installation of tile drainage impacts nutrient loss and the quality of both surface and subsurface waters.

"There has been so little research on the environmental and water quality impacts of practices such as tile drainage, cover crops, no-till, etc. in the Northeast that the data collection and analysis from these NNYADP trials in a real-world farm setting is assessing impacts and opportunities in real-time."

— Laura Klaiber, W.H. Miner Agricultural Research Institute

*Lake Champlain Basin Program, New York Phosphorus Index Revision Committee, Friends of Northern Lake Champlain, Green Mountain Dairy Discussion Group, Franklin Watershed Committee, multiple American Society of Agronomy-Crop Science Society-Soil Science Society of America Annual Meetings, Southern Extension & Research Activity-17 Meeting, UVM Extension, USDA NRCS, NNY Crop Congresses, Vermont Agriculture, Food & Markets Tile Drainage Advisory Meetings, Miner Institute Dairy Days, NYS Agri-business Association/Certified Crop Advisor Advanced Trainings, Vermont

Legislative House Agriculture & Forestry Committee & others...

** Project collaborators have included Adirondack Farms, The New York State Department of Environmental Conservation Lake Alice Wildlife Management Area, Lake Champlain Basin Program, Cornell University, State University of New York, University of Vermont, New England Interstate Water Pollution Control Commission, and agricultural/environmental consultant firms.

NNYADP DAIRY RESEARCH: *Best Care Practices*

NNYADP Climate-Related Research Insights for the Dairy Industry

- Episodic bouts of heat stress in northern NY adversely impact dairy cows.
- Periods of heat stress decreased bulk tank milk protein levels.
- >40% of variability in milk protein percentage was associated with the temperature humidity index on NNY farms where cows appeared the most vulnerable to heat stress during hot weather events.

Early Application of Metabolic Health Index for Cows

This project in 2021 is making one of the first applications of the Metabolic Health Index adapted by the Overton laboratory at Cornell University to identify cows that may be at higher risk of post-calving health issues, such as ketosis, hypocalcaemia, or poorer adaptation to lactation.

“Prior to the Northern New York Agricultural Development Program funding of this project, there has been little to no research done at scale on the impact of feeding management in the dry cow diet on cow health through the transition period”
– **Cornell PRO-DAIRY Director Thomas Overton**

The researchers are evaluating how pre-calving diet nutritional and management factors influence post-calving cow health.

Cornell University has estimated the cost of treating hypocalcaemia and ketosis to be \$335 and \$117 respectively for each case per cow.

Progressive Research Advances Best Calf Care

This timeline illustrates the series of NNYADP-funded research that has 1) identified critical focus areas for young dairy animal care, 2) developed science-based data & demonstrable application of best care options, and 3) uncovered areas of need for future attention.



- 2021**
 - On-farm barn fogging demonstrations made airflow visible to show how proper natural or mechanical ventilation influences calf health.
- 2020**
 - The most prevalent pathogens causing diarrhea in dairy calves identified (ID'd).
 - Need for validated calf-side diagnostic tests ID'd to help farms consistently & reliably identify pathogens to specifically target treatment and avoid antibiotic use when not warranted.
 - On-farm trials demonstrated how free choice water access from birth & electrolytes serve as supportive therapy for calves with scours.
- 2019**
 - Evaluated increasing nutrients in winter to support calves' increased energy need to support growth under NNY winter stress.
 - Demonstrated how different housing styles impact management & costs through winter for optimal calf health and growth.
- 2017-18**
 - Developed **Calf Health Risk Assessment Tool for NNY Dairy Farms**.
 - Year 1 Data: 8-31-day-old calves most commonly treated with antibiotics for diarrhea. Year 2 Data: 61-120-days-old an additional period for calfhood illnesses prevalence.
 - Demonstrated that *written* protocol & treatment records encourage compliance with treatment best practices.
- 2016**
 - Research showed calf health impacted by both environmental & management factors, e.g., housing type, bedding, pen density, temperature, windchill, humidity, dew point.
 - Verified respiratory illness and scours (diarrhea) as NNY regional challenge.
 - Trials show that during heat & humidity stress, adjusting calves' caloric intake improved health and growth (trials prompted by NNY ave. max. temperature-to-humidity index exceeding upper critical limit for mature/lactating cows in previous years).
- 2015-16**
 - Data results: 13.33-14.54% of dairy calves in NNY have respiratory illness; up to 50% of calves affected on per-farm basis (44..82% of farms had 0 cases).

More NNYADP Research Dairy Research Results: <https://www.nnyagdev.org>

Dairy Labor Efficiency, Cow Comfort, Lamb Health...

Cloud-Based Dairy Workforce Education Pilot Project

This NNYADP priority research responded to a Cornell study that found insufficient training of farm employees influenced lower detection of cow health problems and poor milking technique.



GOAL: Develop cloud-based, bilingual training method and module/s to improve dairy milking employees' knowledge, skills and consistency of performance, and cow health

PHASE 1: 2019

Cooperators: 10 NNY dairy farms, 89 employees

Baseline Survey: Identified farm-specific priorities; 93% had issues with milking routine and equipment operation procedures

Module Focus & On-Farm Testing: 7 steps of proper milking routine for cow health and teat/udder hygiene

Challenges Identified: Literacy stumbling blocks; need method to determine knowledge conversion to skill; internet-related issues

Results: 6% of employees completed entire module. Average teat end cleanliness score increased 20%, but only 1 farm reached project % goal (see Phase 2 improvements)

PHASE 2: 2020

Cooperators: 15 NNY dairy farms, 95 employees

Focus: Proper function of milking equipment; detecting & addressing equipment problems or requesting help, and teat end health, flow rate, mastitis prevention

Adaptations for Phase 1 Challenges: Faster, easier access into module. Audio option. Added knowledge check questions, hands-on skill/troubleshooting test, and method to request help. Farms paid workers for 1 hour of training time.

Phase 2 Challenges Identified: Proof-of-skill testing expansion would help managers and employees confirm actual skills gain

Results: 100% of employees completed module. Most equipment issues fixed same-day if proper communication channels in place. 87% of workers reported confidence to report equipment problems to management

PHASE 3: 2021

Focus: Cow health and prudent antimicrobial drug use: proper collection of aseptic milk sample, teat prep for intramammary infusion, administration of lactating cow antibiotics, assessing milk for return to saleable milk pen, prep for dry cow therapy, and more...

LABOR SAVINGS = COW COMFORT

In 2019, veterinarian Paul D. Virkler (*above right*) worked with 45 dairy farms in NNY to demonstrate how reducing milking time per cow by ~27 seconds gains more comfortable cows and 15.8 minutes per milking shift. Adjusting the automatic setting to more quickly detach milking units alleviates the potential for over-milking and related impact on teat tissue, thus more comfortable cows and reduced risk of mastitis. The time saved could allow for milking an extra turn of cows at each shift with no added labor cost, no detrimental effects on milk production, and no loss of milk yield.

“This research provided the opportunity to demonstrate a simple milking parlor adjustment that can be made to enhance how quickly, completely and gently milking can be accomplished.” – Paul D. Virkler, D.V.M.,
Quality Milk Production Services



Summer Lamb Feeding Strategies: Pasturing or Barn Better?

Can the health of young lambs be enhanced by raising them in the protective environment of a barn vs. on summer pasture? An NNYADP comparative research project in 2021 is collecting and analyzing data re: 1) growth rates, 2) treatment costs, 3) lamb losses, 4) market prices, 5) total costs, 6) overall profitability. Results will be available in early 2022 at <https://www.nnyagdev.org>.

NNYADP SOIL HEALTH & CROPS RESEARCH

NNYADP progressive nutrient management research results are helping dairy farmers and crop growers to:

- use whole-farm nutrient balancing (WNMB) to enhance land and water conservation
- simultaneously add to high quality milk and crop production, farm sustainability, economic efficiency
- reduce import of feed and fertilizer
- better align crop and animal nutrient needs, and
- precisely apply nutrients only as needed to be more efficient and, often, save money.

Optimal Sampling for 7 Key Soil Health Indicators; Soil Compaction & Yield Research

NNYADP supported on-farm trials to establish optimal sampling levels for 7 key soil health indicators for tracking on-farm efforts to improve soil health over time. Project collaborators included Cornell Cooperative Extension crop and soil specialists and county Soil & Water Conservation Districts. Measures of soil compaction are among the 7 soil health key indicators evaluated in these NNYADP trials. In 2019, data from 9 conventionally-tilled dairy farms in NNY showed compaction at soil surface and at 6-18 inch depths. In 2021, researchers are investigating whether wide variation in soil compaction severity across a field is directly proportional to variable crop yield within that field to fill a critical knowledge gap.



2013-2021: Multi-Year, Farm-Specific Data Supports Soil-Type Yield Planning

Thanks to multiple years of NNY corn yield data from farms using yield monitors, farmers are able to determine their own soil type-specific and field-specific yield potential to support zone-based, whole farm nutrient balancing efficiency that, in turn, supports more precise, conservation-friendly use of manure resources and fertilizer.

“The farmers and farm advisors in Northern New York were frontrunners prompting re-evaluation of the Cornell corn production guidelines (starting in 2013).”

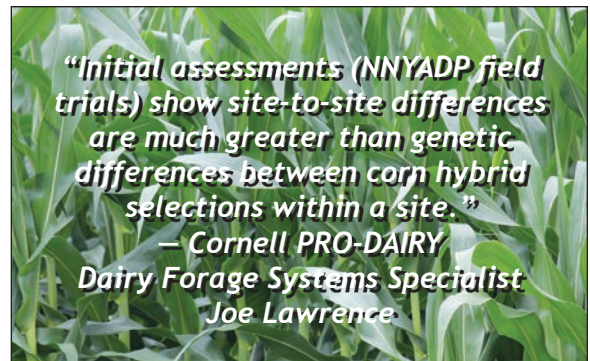
**– Cornell Nutrient Management Spear Director
Quirine M. Ketterings, Ph.D.**

Nitrogen Use Efficiency: Farm Site Differences Significant

This NNYADP project established 6 nitrogen (N) balance indicators and began testing 5 additional measures of N use efficiency. The research goal is to reach optimal fertilizer and nutrient resource use to support high quality crop production and environmental stewardship efficiency with precision N application farm-by-farm, field-by-field.

“Initial assessments (NNYADP field trials) show site-to-site differences are much greater than genetic differences between corn hybrid selections within a site.”

**– Cornell PRO-DAIRY
Dairy Forage Systems Specialist
Joe Lawrence**



BREAKING NEW GROUND: First-Time Trials



NNYADP Initiates 1st North American Trials of European Grasses for Dairy Forage Quality

“These regional trials are providing insight into alfalfa-grass combinations that can increase forage digestibility enough to significantly increase milk income using balanced rations.”

– Debbie J.R. Cherney, Ph.D.,

Cornell University Animal Science Professor

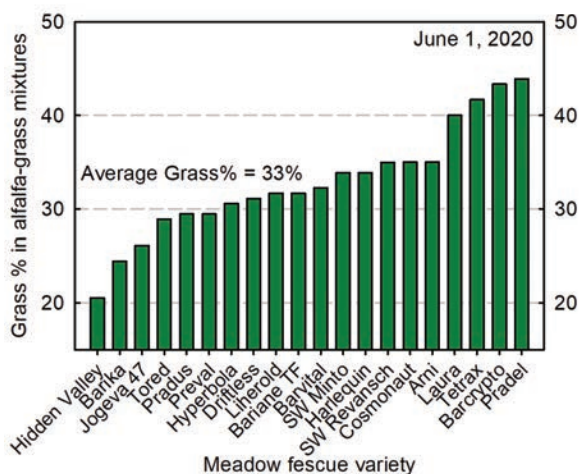
A collaboration by the NNYADP; regional farms; Cornell University soil, crop, and animal science specialists, and Extension personnel conducted on-farm planting trials in 2019-2021 to begin the first research in North America to evaluate European-bred meadow fescue (MF) varieties. The varieties were developed in harsher winter environments than those of northern NY.

MF is a cold-tolerant perennial grass. The Wisconsin-bred variety in the trial, the first modern variety of MF developed in the U.S, grew at the desired grass percentage in tandem with alfalfa to constitute a high quality forage for lactating dairy cattle.

These trials have now added three German-bred MF varieties.

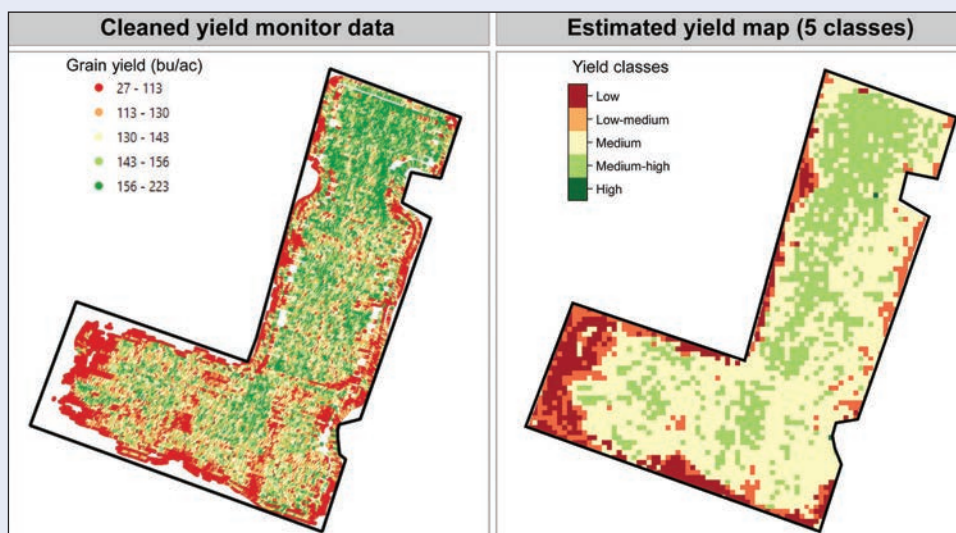
“Meadow fescue: a star in alfalfa mixtures”

– Hay & Forage Grower 2/9/21 headline of article on NNYADP research results



Testing Drone & Satellite Technology to Provide All Growers with Aerial Data Access

The first-year results of NNYADP-supported aerial imagery modeling and mapping with participating farmers show promising results. The project demonstrated the use of drone and satellite technology to map yield potential without the use of yield monitors, equipment that every farm cannot afford. This research supports farmer interest in ways to accurately and consistently support zone-based precision agriculture by exploring how to make evaluation tools more easily accessible to more or all farmers.



Left: Map generated by processing yield monitor data; right: an estimated yield map based on satellite imagery and digital elevation modeling from a grain production field in northern NY — illustrating the potential to use aerial data to support precision zone-based precision.

“If images obtained with unmanned aerial (drone and satellite) imagery data can be consistently used to accurately estimate corn grain and silage yields, we can design an approach to give all corn growers access to reliable yield data without the use of that equipment for farm-specific yield stability zone management.”

– Quirine M. Ketterings, Ph.D., Cornell Nutrient Management Spear Program Director

NNY MAPLE RESEARCH: Tapping into \$15 Million Value



NNYADP Maple Research Impact

- 2021 **Alternative Tubing to Prevent Sap Line Clogging**
Results will post to www.nnyagdev.org, early 2022
- 2019 ***\$12+ million/yr: NNY maple industry value**
- 2019-20 **Retapping within Sap Season**
Regional challenges ID'd per northern climate
- 2017 **Tubing Under Natural Flow & Artificial Vacuum**
ID'd better sizing alternative for gravity systems: need more data re: yield gain with vacuum
- Cloning NNY's High Sugar "Sweet Trees"**
*Successful propagation achieved
(Cornell University adopts project forward)*

- 2015-18 **Birch Syrup Production Feasibility**
*Established baseline data. See story below.
2021: one NNY producer made syrup from 20,000 birch tree taps, 107,000 maple taps, and from walnut & beech trees*
- 2011-14 **Optimum Dropline/Spout Management**
Prompted regular replacement to boost sap yield; need cost-effective ways to clean tubing
- 2008-09 **Producer/Landowner Collaborations to Increase NNY Maple Production: ~ 7,000 landowners received educational brochure; large forest land owner/corporation leased land to maple producers in 2 NNY counties. Project leveraged larger funding to continue outreach statewide.**
- 2008 ***\$3.25 million/yr: NNY maple industry value, potential to reach \$9+ million annually**
- Climate Change Adaptation: Timing of Tapping**
preliminary results for higher elevation, colder climate producers
- 2006-07 **Improving Sugar Maple Growth in NNY**
ID'd NNY sugar bushes overstocked/overtapped, and in need of density management. Tap holes as tree health indicator analysis begun.
- *2008, 2019 estimates by Cornell University/NNY Maple Specialist and maple entrepreneur Michael Farrell. Warren County producers joined NNY in this research.*

Maple Fermented & Sweetened Wines Made in Northern NY

Joy Herfurth of Brandy Brook Maple Farm and Olde Tyme Winery (seen above) in New York's northern Adirondack Mountain region uses her farm's 100% pure certified organic maple syrup (and no cane sugar or other processed sugars, she points out) to both ferment and sweeten a diverse line of traditional-style grape and fruit sweet, semi-sweet and dry wines.

Joy and partner Allen McDonald tap sugar maples in 2 NNY counties and grow their own grapes and fruit, including 3 acres of cold-hardy grapes at their Ellenburg Center farm. "We plant crops that will survive at our 1,300-foot elevation. I plan to ferment every fruit that grows up here in the North Country," Joy says.



The pair supplies maple syrup to local restaurants, a bread baker, a fresh pressed juice business, an Albany cider maker, stores, and area farm stands. Their maple-based wines are available at some locations year-round and buyer favorites at 3 regional farmers' markets. "We are the only winery in New York devoted to maple wine. We don't utilize any other sugar besides maple in our process," Joy says.

In 2015-2016, for the NNYADP birch syrup project, Joy tapped 40 yellow and paper birch trees with 2 sizes of spouts. Their limited run of birch syrup sold at \$80/half gallon.

"I participated in the birch syrup research as a way to develop an opportunity for extra income. This type of regional research is an important part of helping landowners discover untapped resources."
– Joy Herfurth, NNY maple producer

NNYADP Maple Research Results: <https://www.nnyagdev.org>

BIOCONTROL SUCCESS: *From NNY to States Nationwide*

“We faced huge losses to alfalfa snout beetle. The farmers who direct the Northern New York Agricultural Development Program made a commitment to however long it would take to develop the real-world science needed to find a solution. Today, the success of the research made possible by that steadfast commitment is paying off not only for alfalfa growers and dairy farmers in northern New York, but for the growers of multiple crops in multiple states and Canada” – NNYADP Co-Chair Jon Greenwood



Right: This North Bangor field lush with alfalfa in 2021 once could grow nothing but grass hay. Applying biocontrol nematodes beat back alfalfa snout beetle (left) to restore this Franklin County acreage to the desired forage plan.

Farmers, Seed Sellers See Positive Impact on Corn Crops

Seed salesmen Nate Olmstead (Growmark FS), and Mark Eddy (Seedway) have farmers who are purchasing seed not treated to reduce corn rootworm (CRW). Why? Because biocontrol nematodes appear to be reducing CRW populations. Olmstead notes, “Based on field scouting and visual assessment, I have seen fewer corn rootworm adults on farms that have applied biocontrol nematodes and the growers are willing to try non-CRW treated corn. So far, we have seen no ill effect on the crop.” Eddy adds, “Where the biocontrol nematodes seem to be controlling corn rootworm, growers can plant non-CRW treated corn at a cost savings of about \$10 per acre, and reduce the opportunity for pest resistance.”

“Year 3 is when you should need to plant traited corn to manage rootworm. My third-year corn on a field treated with biocontrol nematodes showed no rootworm damage,” says Michael Kiechle of Garden of Eden Farm, Philadelphia, NY.

Kiechle was an early adopter of the biocontrol nematodes after alfalfa snout beetle was found on his farm and for the first time north of the Black River. “That discovery made me a good fit for the research. It was something I would not try on my own, did not cost me anything, and had a big potential benefit.”

Kiechle shares his NNYADP research experience with colleagues. “Seeing is believing,” he says, “and when research is local and you hear about it from someone you know, the results have more kick.”

Today, 275 acres of Kiechle’s farm are covered through direct application and natural movement of the nematodes, including some in clay soil. Kiechle has also applied them through manure spreading, proven as an efficient, time-saving, and cost-effective method of application in NNYADP-funded trials initiated by CCE Field Crops Specialist Mike Hunter.

NNY Leading the Way

The biocontrol nematode protocol developed with the long-term commitment of the NNYADP is now being applied or tested in:

- Alabama • Delaware • Illinois • Iowa • Maine • Michigan • Minnesota • Nebraska • New Brunswick • New Mexico • New York • North Carolina • Nova Scotia • Ontario • Pennsylvania • Prince Edward Island • Quebec • Texas • Vermont • Wisconsin

Potato Grower Requests Biocontrol Trial

August 2021; Moira, NY: A Franklin County producer of organically-grown potatoes contacted ag services entrepreneur Mary DeBeer to request a trial application of the biocontrol nematodes she raises in a lab on her family farm. The grower is looking to reduce a wireworm problem that damages potato roots, sprouts, and tubers.

“Biocontrol nematode applications on multiple organic farms in New York State and Canada have resulted in reduced wireworm damage to root crops and reduced soil populations of wireworms.” – Cornell University entomologist Elson Shields, Ph.D., who pioneered the science for the use of native NY nematodes as a biocontrol for crop pest management

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Let's Keep NNY's Farm-Based Economy Growing



2020-22: Dairy Farm Debuts Specialty A2A2 Bottled Milk; Will Expand Creamery, Adams



Franklin County Artisan Cheesemaker to Add A2 Yogurt Creamery, 2022



3-Generation Family Farm Opens Local Foods Store, Mooers, 2021

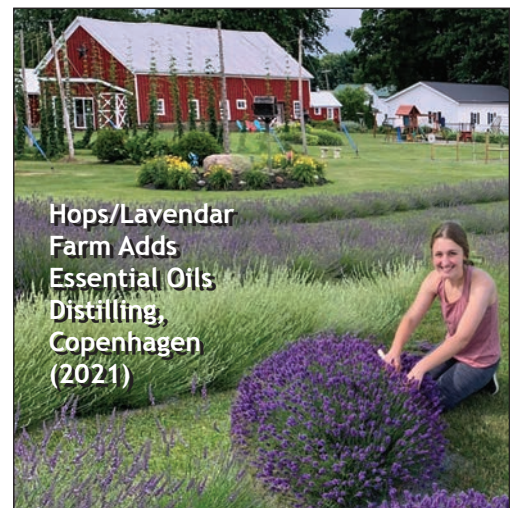
\$30 Million Dairy Plant Expansion: Chateaugay, 2021-2023



3 Regional Food Hubs Start (p. 5)



Northeast NNY Names 1st Regional Farm-to-School Coordinator



Hops/Lavendar Farm Adds Essential Oils Distilling, Copenhagen (2021)



1000 Islands Ag & Business Park Welcomes 1st Business (2021)

2017-2021:
Cut Flower Farm, Jay, Starts

- Triples Capacity
- Heats 1 Tunnel
- Adds Hydroponics
- Initiates Food Waste Composting Project

New 67,000 Sq. Ft. Apple Sort/Pack/Cooling Facility, Chazy (p. 7)



USDA Certified Meat Processor Plans Retrofit of Defunct Energy Site, Lewis County



82% Sales Increase 2018-2020: St. Lawrence Valley Produce Auction (p. 6)



Adirondack Region Producer Expands Maple-Only Wines (p. 13)



Challenges for Attention:

- Northern Weather Extremes/Events
- Climate Change/Emerging Pests & Diseases
- Pandemic & Labor Issues
- Rising Costs
- Supply Chain/Transportation
- Technology Constraints
- The "unexpected"

NNY Farmer Demographics*

- Young Farmers (<35 years old) 692
- New/Beginning Farmers (<10 years) 2,018
- "Small" Farmers (179 or fewer acres) 2,578
- Female Farmers (37% of all farmers) 2,638

Photo credits: page 14



NORTHERN NEW YORK AGRICULTURAL DEVELOPMENT PROGRAM

*Established by the New York State Legislature 1961
Real-World Research Results for NY's Farms Year'round*

<https://www.nnyagdev.org>

