WILLSBORO RESEARCH FARM

NORTHERN NEW YORK AGRICULTURAL DEVELOPMENT PROGRAM

Final Report of Work Completed
April 1, 2008 to December 31, 2009

NYSDAM CONTRACT # C200704

February 15, 2010

New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University
Ithaca, New York

The Northern NY Agricultural Development Program
Its Purpose and Background

In NYS, no area is more economically dependent on agriculture and more challenged in terms of the profitability and long term vitality of its farm businesses than the North Country. These challenges are exacerbated by factors that include, but are not limited to, the regions climatic constraints, its soil resources, and its distance from markets

In 2008-2009, the Northern New York Agricultural Development Program (NNYADP) continued to support agricultural research projects, demonstrations, and outreach in Jefferson, Lewis, St. Lawrence, Franklin, Clinton and Essex counties to help improve agricultural productivity and farm profitability. This report documents findings, results and impacts of the projects that were conducted in the time period covering April 1, 2008-December 31, 2009. Twenty-two (22) projects were conducted in the following areas:

- Dairy herd management
- Agricultural environmental management
- Integrated pest management
- Biofuels/biomass production
- Field crop production and improvement
- Maple production
- Fruit and vegetable production

This document contains reports on five (5) projects conducted under NYSDAM Contract #C200704 entitled: Willsboro Research Farm Northern NY Agricultural Development Program.

The program is supported by funding from the NYS Senate though the long term sponsorship of the NYS senators that represent the 6-county Northern NY region. The program also receives support (funds, land, staff and expertise) from Cornell University's College of Agriculture and Life Sciences, the Cornell University Agricultural Experiment Station, the NYS Agricultural Experiment Station in Geneva, Cornell Cooperative Extension at Cornell and in each of the six NNY counties, the W.H. Miner Agricultural Institute, the U.S. Department of Agriculture, cooperating farmers and agri-service businesses.

For more information on the Northern NY Agricultural Development Program contact Jon Greenwood, Co-chair for WNNY, @ 315-386-3231, Joe Giroux, Co-chair for ENNY @ 518-563-7523 or girofarm@together.net or Dave Smith, Coordinator for Cornell University @ 607-255-7286 or rds4@cornell.edu. Additional copies of this report are available from Dave Smith.

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Ron Robbins, Dairy and crop farmer
Don Holman, Beef producer
Greg Mason, Dairy farmer
Dwight Greene, Dairy farmer
Doug Shelmidine, Dairy farmer
Harold Boomhower, Sheep producer

St. Lawrence County:

Jon Greenwood, Dairy farmer and Co-Chair
David Fisher, Dairy farmer
Bob Andrews, Dairy farmer
Kevin Acres, Dairy farmer
Bob Zufall, Dairy farmer
Earle Travis, Sheep producer
Dan Chambers, Dairy farmer

Lewis County:

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Ralph Chase, Livestock farmer
Steve Nortz, Dairy farmer
Patty Beyer, Dairy farmer

Franklin County:

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Randy Ooms Dairy farmer
Nate Beechy, Dairy farmer

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David/Ann Lincoln, Essex
Damion Gormley, Clinton
Ken Theobald, St. Lawrence
Bob Wilson, St. Lawrence
George Smith, Jefferson
Maria Chamberlain, Jefferson
George Smith, Jefferson
Larry Herr, Lewis
Donna Foley, Franklin
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Mark/Clayton Wrisley, Essex

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Dean Yancey; Lewis
Jeremy Youngman; Clinton
Kenneth Tupper; St. Law.
Haskell Yancey; Lewis
Jen Parker; Clinton

Northern NY Agricultural Development Program
2008-2009 Project Report

Project Title: Precise Nitrogen Management for Corn Production

Project Leader(s): Jeff Melkonian, Harold van Es and Robert Schindelbeck, Crop and Soil Sciences, Cornell University

Collaborator(s): Michael Davis: Manager, Cornell research farms at Willsboro and Chazy.

CCE collaborators: Anita Deming (CCE Essex Co.), Michael Hunter (CCE Jefferson Co.), and Carl Tillinghast (CCE Franklin Co.)

Cooperating Producers: None.

Background: ***Deep placement of nitrogen (N) fertilizer for corn production.*** Successful new soil tillage management practices for corn production include the use of 'strips' or 'zones' that involve deep localized soil loosening with minimal surface disturbance. These methods maintain crop residue cover, conserve soil, and increase soil health and crop yields. With these, farmers may also apply N fertilizer through deep placement (10-12") at tillage prior to planting. A three year replicated on-farm study in western NY has demonstrated that the combination of zone tillage and the deep N placement boost corn yields and improve soil health, increasing average profit by $57/acre. In this study, nitan was applied at planting (deep N placement) and contained both a urease inhibitor (slows conversion of urea to ammonium for up to two weeks to reduce ammonia volatilization) and a nitrification inhibitor to slow the conversion of ammonium (less susceptible to leaching) to nitrate (more susceptible to leaching) for up to 6 – 8 weeks, approximately when corn begins rapid growth and N uptake. Both the deep N placement and nitrification inhibitor also may reduce denitrification losses on fine-textured soils as suggested in a Minnesota study. There have not been any controlled trials that evaluated the N dynamics associated with deep vs. shallow N placement on different soil types, nor determined the potential for reduced N rates with increased soil health. We established such a trial in 2007 and have repeated it in 2008 and 2009.

Precision N application. Nitrogen management for both silage and grain corn production continues to be a challenge for economic, agronomic and environmental reasons. Year-to-year variability in weather can affect the optimum fertilizer rate to meet crop N needs without over-fertilizing. Improving crop N use efficiency is, therefore, important for maintaining or improving farm incomes, and can also reduce N losses to the environment. From past research, we quantified the effects of various fertilizer N and manure management practices on N losses associated with corn production (see Appendix 1). This research has shown a large (80 lbs/acre) year-to-year variation in optimum N rates for corn due, in part, to variability in soil N as affected by early season weather and represents an opportunity for more efficient use of N fertilizer.

Based on this research, we have developed and calibrated a decision support tool (*Adapt-N*; url: http://adapt-n.eas.cornell.edu) that is based on the Precision Nitrogen Management (PNM) computer model. The *Adapt-N*/PNM model decision support tool accounts for the impact of early season weather on soil N to provide more precise sidedress N recommendations for corn production. Dairy farmers are especially interested in such predictions, as fields are often manured based on estimated N availability, but may still require costly additional sidedressing in wet years. Given the high N fertilizer prices and the increased regulatory pressure to reduce agricultural N losses, there is a need for improved N management for corn production in northern New York. This project seeks to encourage adoption of PNM-generated recommendations in the NNY region.

Estimating the N supplied by the soil is a critical component of the *Adapt-N* tool. The N supplied by the soil in a given year depends on the readily mineralizable portion of root zone soil organic matter (SOM) and on early season weather conditions. Tillage practices can potentially affect the amount of soil N supply for corn production by altering the amount of readily mineralizable SOM. In early June 2007, we measured approximately 35 lbs/ac more available N in these no till plots (higher SOM) compared to the plow till plots (lower SOM). Greater N mineralization from SOM combined with improved soil quality in the no till plots resulted in higher plot yields compared to the plow till plot yields for the same N application in 2007 and 2008 Because of year-to-year variability in both temperature and precipitation, we continued collecting these data in 2009 to develop a more complete understanding of the tillage x SOM x N mineralization interaction. These data should help improve *Adapt-N*.

Methods:

Deep placement of N fertilizer for corn production. This study was conducted on sandy loam and clay loam plots at the Willsboro Farm. For each soil texture plot, there were subplots representing long-term continuous corn and corn after grass under plow till and no till. The crop was planted on 5/5/09 (SeedWay E224RR, 85 d RM at 35,700 seeds/acre; 6-24-24 starter (banded) at 250 lbs/acre; 8.7 lbs/acre Empower®[1] insecticide applied through the planter). On 5/6/09, herbicide was applied to all plots (3 qt/acre Lumax®[2], 8 oz/acre Atrazine 4L[3], 32 oz Makaze[3] (glyphosate)) On the no till plots, additional N (125 lbs N/acre of nitan) was applied (i) at planting through deep placement (10-12”) associated with deep tillage using a two row ripper with attached tubes behind the ripper shanks for deep N placement (Photo 1a,b) and (ii) conventional sidedress (6/16/09). On the plow till plots, additional N (125 lbs N/acre of nitan) was applied as (i) broadcast/incorporated at planting using the same two row ripper but with N applied on the surface/immediately incorporated (Photo 2), and (ii) conventional sidedress (6/16/09). A nitrification/urease inhibitor (Agrotain Plus®)[4] (recommended rate) was added to the deep N placement (no till) and broadcast/incorporated N (plow till) treatments. The same total N (140 lbs N/acre: 125 lbs N/acre (nitan) + 15 lbs N/acre through the planter) was applied in all treatments. We tracked N in the soil, crop and in subsurface drainage water from the subplots. Soil samples were collected for soil health measurements prior to planting and samples

[1] Helena Chemical Company
[2] Syngenta Group Company
[3] Loveland Products, Inc.
[4] Agrotain International LLC

for soil N (0-12") were collected periodically from planting to sidedress. All subplots were harvested on 9/17/09 for silage yield and crop N uptake.

Precision N application. We established two studies at the long-term no till and plow till experimental site at the Willsboro farm. The first study was designed to track N mineralization from SOM in fallow plots (i.e., bare soil) in order to compare 'N supplying power' of the soils in the two tillage systems. Soil samples (0 – 12") for crop available N determination were collected from these plots over the growing season. In the second study, we established different sidedress N treatments in the no till and plow till plots at the long-term tillage site. The objectives were to determine if optimum sidedress N rate varied with tillage and to compare the measured optimum N rate with the optimum N rate predicted by the PNM model Soil samples were collected for crop available soil N (0-12") were collected over the growing season. All plots were planted on 5/5/09 as described above. Subplots were established with different levels of sidedress N (nitan) (0, 65, 95, 125, 155 and 185 lbs N/acre, applied on 6/16/09) in each of the tillage plots. Unfortunately, in 2009, crop establishment on the subplots was generally poor due to excessive rainfall and ponding early in the growing season and we were unable to get enough harvest data from the subplots to analyze for N treatment/tillage differences.

Results:

Deep placement of N fertilizer for corn production.

Sandy loam plots. Preplant crop available soil N (0 – 12") was similar across all plots (45 - 55 lbs N/acre). April was warmer than normal and with below average precipitation, which likely resulting in higher soil N levels due to increased SOM mineralization and reduced N losses. Crop available soil N (0 – 12") increased 30 – 50 lbs N/acre between planting and sidedress in the no till plots (to approximately 100 lbs N/acre at sidedress) and 10 – 20 lbs N/acre in the plow till plots (to approximately 60 lbs N/acre), consistent with the higher SOM levels measured in the no till compared to the plow till plots.

There were no significant differences in harvest populations among the main treatments, or related to previous cropping history (continuous corn, corn after grass). Average silage yields (65% moisture) were higher in the sidedress plots than in the early broadcast or deep tillage/N placement plots, ranging from 25.7 tons/acre for the no till/sidedress treatment to 26.7 tons/acre for the no till/sidedress treatment (Appendix 2, Fig. 1a) while early broadcast/deep N placement yields ranged from 18.4 to 23.8 tons/acre. The differences do not appear to be the result of differences in early season N losses among the treatments. April – June precipitation at Willsboro in 2009 was close to the long-term average, and the PNM model predicted very low N losses from the root zone in all plots. Under these conditions (normal precipitation/low predicted losses) we would have expected similar yields across N treatments. We used the PNM model to estimate crop available N in the top 0 – 12" and over the entire root zone. Predicted crop available N was higher in the sidedress N plots compared to the early broadcast/deep tillage and N plots later in the season which may account for the differences in yield. The N uptake analyses by the Cornell Nutrient Analysis Laboratory have not been completed. Once we receive these, we will be able to better understand why the sidedress plots performed better than the deep tillage/N placement and early broadcast plots.

Late season stalk nitrate tests (Fig. 1b) indicated all N plots were below the optimum level. Sandy loam silage yields were higher in 2009 compared to 2007-2008, suggesting higher yield potential in 2009 and the possibility that we would have gotten a yield response to N fertilizer applications above the 140 lb N/acre applied in the N treatments here. This is consistent with the higher predicted post-sidedress soil N in the sidedress plots and the higher yields that we measured in those plots compared to the deep tillage/N placement and early broadcast plots.

Clay loam plots. Preplant crop available soil N (0 – 12") was similar across all plots (50 - 60 lbs N/acre). As in the sandy loam plots, crop available soil N (0 – 12") increased 20 – 25 lbs N/acre between planting and sidedress from SOM mineralization. We measured higher crop available soil N at sidedress in the no till plots (approximately 80 lbs N/acre) compared to the plow till plots (approximately 60 lbs N/acre).

Final harvest population among the treatments ranged from 24,200 plants/acre (no till/deep tillage and N) to 29,000 plants/acre (no till/sidedress N). Silage yields (65% moisture) were higher in the no till/sidedress (24.3 tons/acre) and no till/deep tillage and N (25.6 tons/acre) treatments compared to the plow till/early broadcast N (18.3 tons/acre) and plow till/sidedress N (21.3 tons/acre) (Appendix 2, Fig. 2a), similar to the results from 2008. We will be using the PNM model to analyze our field data, including the soil health data, on N dynamics associated with N practice/tillage/soil type. This should help us better understand possible factors responsible for the reduction in yield associated with the plow till treatments.

Lower stalk nitrate levels were suboptimal for all N treatments. As with the sandy loam plots, 2009 yields were higher than 2008 or 2007 yields for the same N inputs, indicating a higher yield potential in 2009 and, therefore, the possibility that there would have a been a yield response to additional N above the 140 lb N/acre that was applied.

Precision N application.

Crop available N from no till and plow till fallow plots: Soil N in the top 12" in fallow subplots located in the no till and plow till plots at the time of planting (5/5/09) were approximately 100 lbs N/acre in the no till plots and 50 lbs N/acre in the plow till plots (Appendix 2, Fig. 3), nearly double the N levels in the plots in 2008. It is not clear why N levels were higher in 2009 compared to 2008. April precipitation totals were similar in both years, and average April temperatures were higher in 2008 compared to 2009 (both above the long term average April temperature for Willsboro), indicating the potential for mineralization was similar or higher in 2008 compared to 2009. Much of the difference in soil N in the top12" in 2009 was due to higher ammonium-N, while nitrate-N levels were similar between the two years. Potentially mineralizable nitrogen (PMN) and active carbon, Cornell soil health test indicators of biological activity, were similar in both 2008 and 2009. Understanding the basis for such large year-to-year differences in pre-plant soil N are critical for precise N management and will be the focus of our analyses of these data. The large accumulation in soil N under both tillage practices indicates the capacity of the soil to supply N when precipitation is average to below-average and soil N losses are low. The higher soil N accumulation in the no till plots was correlated with higher soil organic matter (5.3%) in the top 6" of the soil under that tillage practice compared with plow till plots (4.3%).

Optimum N rate: High precipitation combined with poor drainage resulted in very low plant numbers in most of the tillage plots. As a result, we were unable to get adequate harvest data from this experiment and no analyses were possible

Conclusions/Outcomes/Impacts

Deep placement of N fertilizer for corn production. As in 2008, there was no significant yield advantage of deep tillage/N placement/N inhibitors compared to sidedress N in the no till subplots in 2009. Deep tillage/N inhibitors would be expected to be an advantage in years with high early season precipitation since these practices are thought to reduce the likelihood of high N losses associated with precipitation. However, Willsboro has a relatively low average early season rainfall compared to other locations in the state and experienced average to below average precipitation from April – June in the three years of this study (2007 – 2009). We would suggest further testing of the deep tillage/N placement with N inhibitors as a tool for N management in locations where average early season rainfall is high (at least compared to Willsboro where long-term average rainfall from April – June is approximately 7.25") or where frequent, high intensity early season rainfalls are typical.

One suggested management practice from this study is that a cover crop should be considered in years where there was a dry early season and significant residual soil N after harvest. We measured 50 - 75 lbs N/acre in some of the subplots after harvesting in each year of the 3 year study. Past research has shown that most of this soil N is lost over the late fall-winter-early spring period when there is no crop cover and crop water uptake. Another suggested management guideline is to adjust sidedress N application rates for early season weather using tools like *Adapt-N*.

Precision N application. Tillage practice, if well established, affects both crop available N and corn silage yields. In both years of this study (2007, 2008), we measured higher crop available N and higher silage yields on the no till plots compared to the plow till plots. The data also indicates that the yield improvement is the result of an interaction between tillage and N, possibly related to the improved soil health measured on the no till plots. Unfortunately no results were obtained in 2009 due to poor crop establishment.

Based on our results at the Willsboro research farm in the two previous years (2007 and 2008) we recommend that growers who typically apply sidedress N use the PNM model for more precise N management in corn production. The PNM model-recommended sidedress N rate of 95 lbs/acre was the optimum sidedress rate for the no till and was somewhat higher that the optimum sidedress rate for the plow till plots. In both tillage plots, however, the PNM rate was below the recommended rate as a result of incorporating the effects of early season weather on soil N availability.

We will be conducting further analyses of results from both experiments using the PNM model. Results of these analyses related to N management for corn production will be made available to NNY extension staff and growers.

As a result of the NNYADP-supported work described, we have been able to obtain New York Farm Viability Institute funding to do on-farm testing of the Adapt-N tool at locations across the state, including Northern New York, for 2010 - 2011.

Outreach:

Deep placement of N fertilizer for corn production. Results of the 2008 research were presented at the 2009 CCE Agriculture and Food Systems meeting (Ithaca) and at the 2009 Northeast Region Certified Crop Advisor Training in Waterloo, NY. We also presented the results at the combined Soil Health/ PNM model workshop at Cornell University on Tuesday, March 16, 2009.

Precision N application. The *Adapt-N* tool for field or farm level N application recommendations for corn was offered for the first time in spring 2008 and was continued in 2009. A revised version *Adapt-N* will continued to be offered for all New York State growers, including those in NNY, in 2010, with the revisions and improvements based in part on the results from the three years of NNYADP-funded research at Willsboro, NY. Training for CCE staff on the use of the interface will be held at a combined Soil Health/ PNM model workshop at Cornell University on Tuesday, March 24, 2010.

Acknowledgments: We would like to acknowledge the NNY Agricultural Development Program for their generous support in 2009 and acknowledge salary support (Melkonian) for this project from the College of Agriculture and Life Sciences (Cornell). We would also like to acknowledge Mr. John Altobelli (grower) and Chuck Bornt (CCE, Team Leader, Capital District Regional Vegetable Program) for their assistance with the deep ripper/deep N applicator. We would also like to acknowledge Mr. Harold Brecht (Agrotain International LLC) for kindly supplying the Agrotain Plus urease/nitrification inhibitor.

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Photos

Photo 1a. Two row ripper unit with nitrogen (UAN) delivery hoses. (Photo courtesy of Bob Schindelbeck).

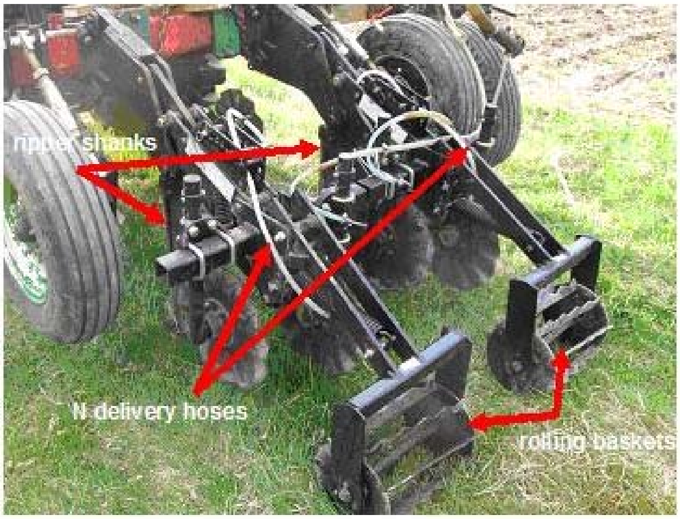


Photo 1b. Side view of ripper shank with deep N placement tube. (Photo courtesy of Bob Schindelbeck).

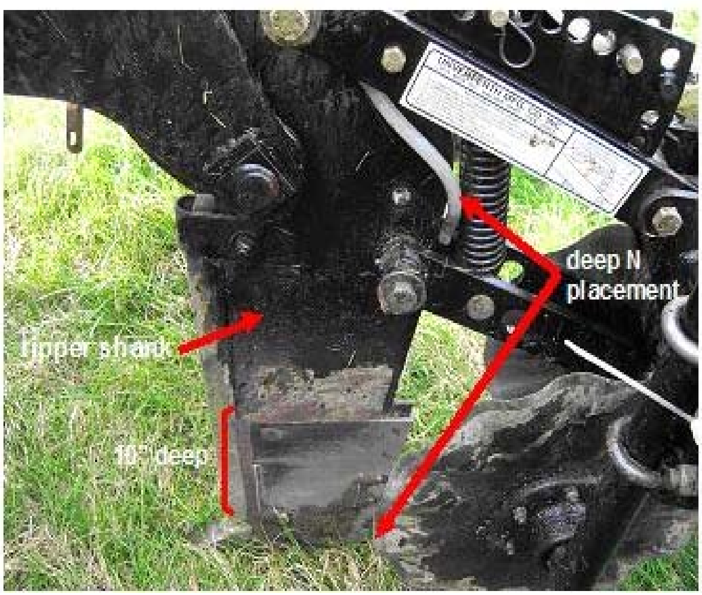
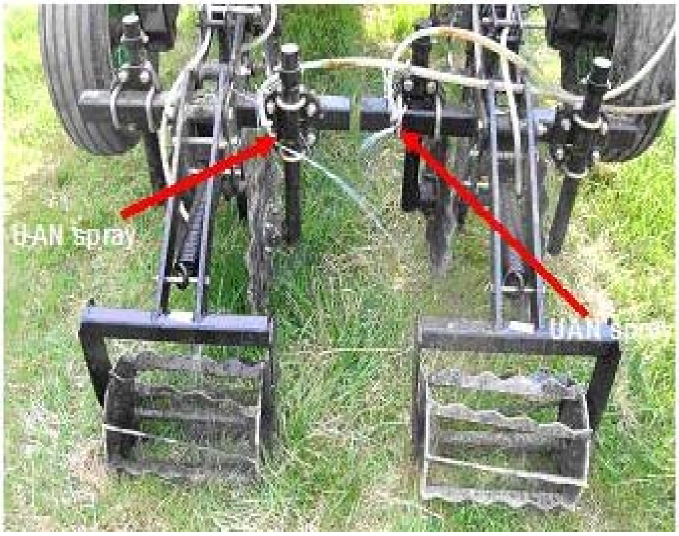


Photo 2. Broadcast N application at planting: UAN sprayed under rolling baskets (plow till subplots) . (Photo courtesy of Bob Schindelbeck).



Appendix 1

Nitrogen-related publications from research conducted in Northern NY

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van Es, H.M., J.M. Sogbedji, and R.R. Schindelbeck. 2006. Effect of manure application timing, crop and soil type on nitrate leaching. J. Environmental Quality 35(2):670-679.

van Es, H.M., J.M. Sogbedji, and R.R. Schindelbeck. 2006. Nitrate leaching under maize and grass as affected by manure application timing and soil type. J. Environmental Quality 35:670-679.

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van Es, H.M, and J.E. Delgado. 2004. Nitrate Leaching Index. *In*: R. Lal (Ed.). Encyclopedia of Soil Science. Marcel Dekker.

van Es, H.M., K.J. Czymmek, and Q.M. Ketterings. 2002. Management Effects on N leaching and Guidelines for an N Leaching Index in New York. J. Soil Water Conserv. 57(6): 499-504.

Appendix 2.

Figure 1. (a) Mean subplot silage yields in the sandy loam plots at the Willsboro research farm in 2009. NT_DeepN = no till deep tillage and N (125 lbs N/acre) placement at planting (5/05/09) and 15 lbs N/acre applied through the planter; NT_SidedressN = no till sidedress N (15 lbs N/acre) applied through the planter and 125 lbs N/acre applied as sidedress on 6/16/09); PT_BroadcastN = plow till, N (125 lbs N/acre) broadcast and incorporated at planting, and 15 lbs N/acre applied through the planter; PT_SidedressN = plow till sidedress N (15 lbs N/acre) applied through the planter and 125 lbs N/acre applied as sidedress on 6/16/09). Note that a nitrification/urease inhibitor was added to the deep N placement (no till) and broadcast/incorporated N (plow till) treatments. (Error bars: ± s.e.) (b) Late season stalk nitrate test results for the sandy loam plots in 2009. Samples were collected at harvest (9/17/09).

Fig. 1a

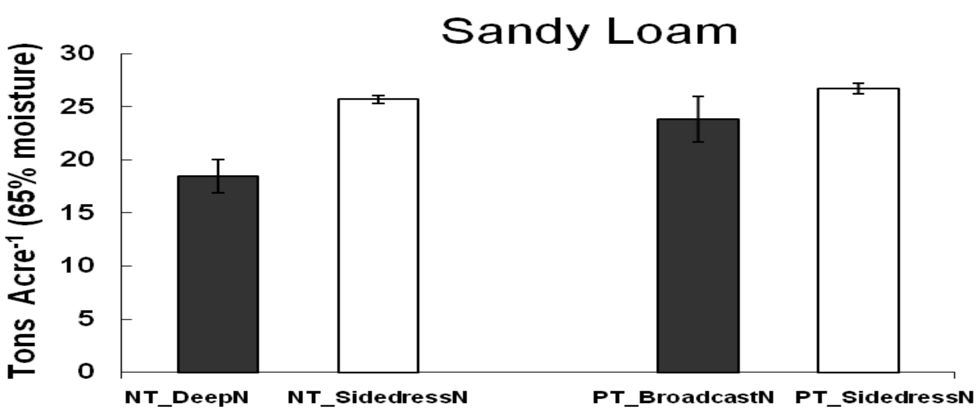


Fig. 1b

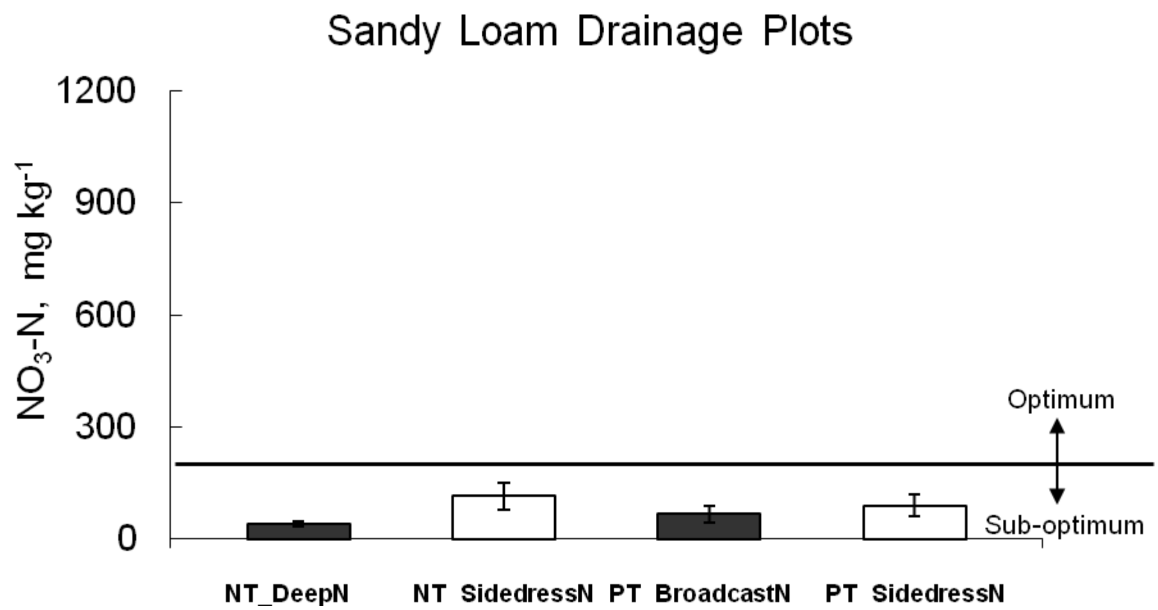


Figure 2. (a) Mean subplot silage yields in the clay loam plots at the Willsboro research farm in 2009. NT_DeepN = no till deep tillage and N (125 lbs N/acre) placement at planting (5/05/09) and 15 lbs N/acre applied through the planter; NT_SidedressN = no till sidedress N (15 lbs N/acre) applied through the planter and 125 lbs N/acre applied as sidedress on 6/16/09); PT_BroadcastN = plow till, N (125 lbs N/acre) broadcast and incorporated at planting, and 15 lbs N/acre applied through the planter; PT_SidedressN = plow till sidedress N (15 lbs N/acre) applied through the planter and 125 lbs N/acre applied as sidedress on 6/16/09). Note that a nitrification/urease inhibitor was added to the deep N placement (no till) and broadcast/incorporated N (plow till) treatments. (Error bars: ± s.e.) (b) Late season stalk nitrate test results for the sandy loam plots in 2009. Samples were collected at harvest (9/17/09).

Fig. 2a

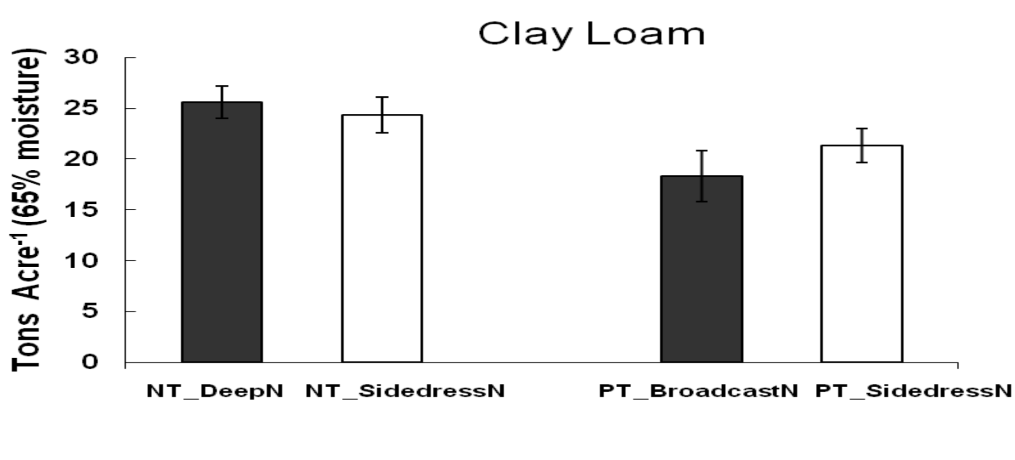


Fig. 2b

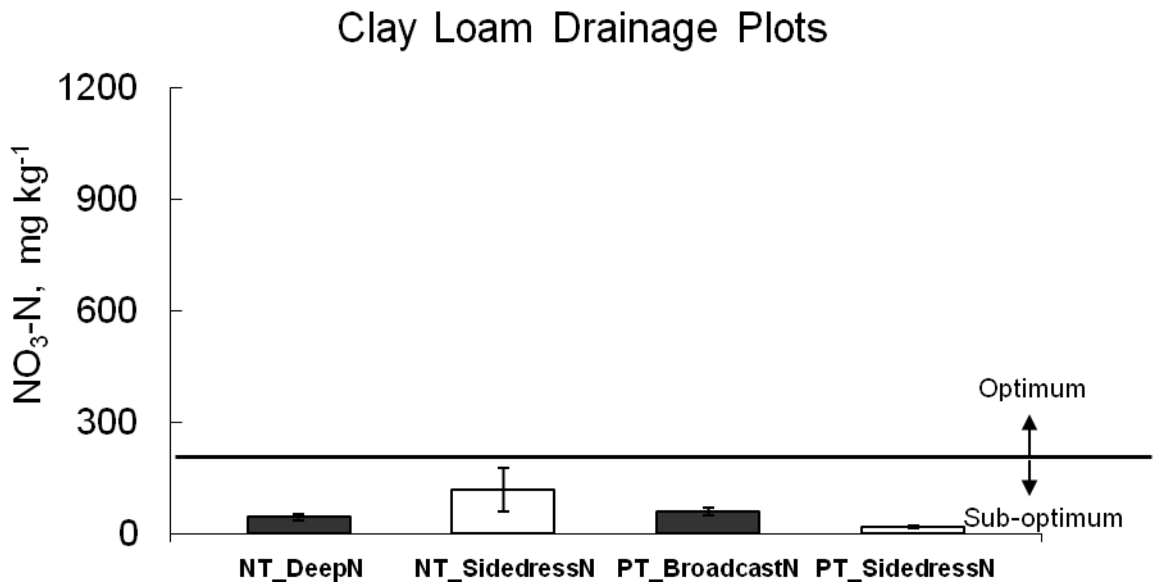
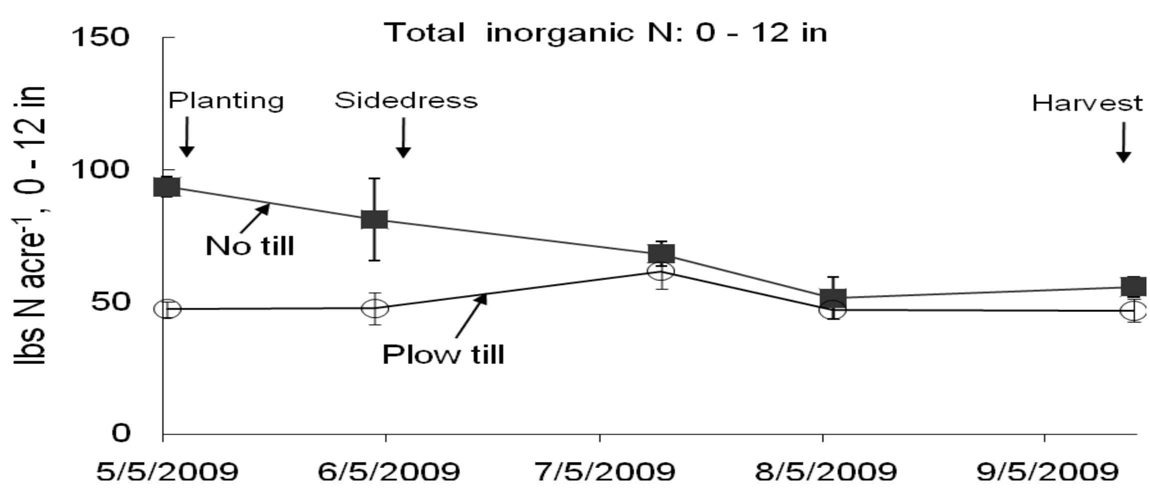


Figure 3. Crop available soil N (nitrate-N and ammonium-N; lbs N/acre) in the top 12" of the root zone of fallow subplots in the no till and plow till plots at the Willsboro research farm from planting (5/05/09) to harvest (9/17/09).



Northern NY Agricultural Development Program
2009 Project Report

Project Title: Cold Hardy Hybrid Wine Grapes: Cropping, Vigor Management, Wines.

Project Leader: Kevin Iungerman, CCE Northeast NY Commercial Fruit Program.

Collaborators. Dr. Justine Vanden Heuvel, Dept. of Horticultural Sciences, Grape Program. Dr.Wayne Wilcox, Cornell Department of Plant Pathology. Dr. Tim Martinson, Cornell Statewide Viticulture Extension Program. Dr. Anna Katherine Mansfield and Chris Gerling, Department of Food Science, Enology. Mike Davis, farm manager, Cornell Baker Farm, Willsboro. Steven Lerch, Cornell Grape Program, Geneva. Extension Associations and Fruit Growers of CCE's NENY Commercial Fruit Program. Lake Champlain Grape Growers Association and Willsboro and NENYF volunteers.

Cooperating Producers:

County	Producer	Farm/Vineyard	City/Town	State
Albany	Mike DiCrescenzo	Altamont Vineyard	Altamont	NY
Clinton	Phil Favreau	Stone House Vineyard	Mooers	NY
Clinton	Mary and Gilles Fortin	Amazing Grace Vnyrd.	Chazy	NY
Clinton	Erwin Kalmar	(New 2009. Unnamed)	Champlain	Que.
Clinton	Richard Lamoy	Hid-in-Pines Vineyard	Morrisonville	NY
Clinton	Rob McDowell	Purple Gate Vineyard	Plattsburgh	NY
Clinton	N. Peck, C. Read	North Star Vineyard	Mooers	NY
Clinton	Dan Vesco	Vesco Ridge Vnyrd.		
Essex	W. & K. Reinhardt	Blue Stone Vineyards	Willsboro	NY
Essex	Peter Rowley	Edgewater Farm	Willsboro	NY
Essex	Todd Trzaskos	Vermont Logic	(Essex Land)	VT
Saratoga	Mike Spiak	Kayaderosseras Vnyrd.	Greenfield Cen.	NY
Washington	Gerry Barnhart	Victoryview Vineyard	Schatigcoke	NY
Washington	Ken Denberg	Natural Selection Farm	Cambridge	NY
Washington	S. Knapp, D. Wilson	Slyboro Ciderhouse	Granville	NY
Orange	Ed Lincoln	Maple Gate Farm	Randolph	VT

Background: The 300-vine Willsboro Wine Grape Trial was planted in 2005 to comparatively evaluate 25-hybrid cold-hardy-wine-grape-cultivars. It has had the support of private and also land-grant collaborators. Notable funding support has come from Cornell Extension NYFVI and NNADP.

During 2005, 2006, and 2007, the vines were minimally maintained to ensure good growth and establishment, not cropping. In 2006, growth performance and vine pruning and training practices largely leveled initial differences of vine condition owing to differences stemming from original procurement. One cultivar, Petite Amie, was successful re-established from cuttings.

(See prior 2008 report for more information). The small 2007 crop - and even smaller 2006 crop- were utilized for purposes of identification and grower education not yield, as the vines were still juvenile, and only small token crop were carried to ensure acclimation going into the winters. (2006-2007; 2007-2008).

The fall 2007 acclimation period was outstanding, superior to 2006. Unfortunately, the 2007 - 2008 winter, and indeed all of the winters from 2005-2006 through December 2009, have been milder than historical norms. Contrary to expectations, virtually all of the grapes in the trial have to-date done well and virtually all have begun to produce.

In 2008 a more rigorous vine Phenology notation and pest management-monitoring regimen was instituted to support year-to-year review, and increased cropping levels and the first wine production in 2008. Both were made possible via the hiring of Richard Lamoy, the on-site 0.25 time seasonal assistant (technician). Lamoy greatly aided maturity assessment from mid-August through the September and October harvest period, and prepared juice samples for analysis at the Geneva Experiment Station.

Our June 4, 2008 day-long "Cold Climate Viticulture: Wines & Vines in the North Country" conference at Willsboro's Noblewood Park Center was well received by the 75 persons in paid-attendance. The program was repeated at the Jefferson County CCE office in Watertown on June 5.

Wines were made for the first time from some of the more promising Willsboro grapes at the Cornell Wine Lab. Results and public wine tasting and evaluation session indicated that locally made quality wines were indeed possible. The wines made were Marquette, MN 1200, Sabrevois, St. Croix, and Frontenac (reds) and ES 6-16-30, LaCrescent, Petite Amie, NY 76.844.24, Prairie Star, and St. Pepin (whites).

In sum, in each year, volunteers have been invaluable in the annual tasks of vine tying, pruning, and training; bird netting and removal, harvests, and many other seasonal tasks. These tasks have been the foundation for our "working seminars", where the format is learning by "doing", and by "in-process" discussion and give and take questioning. These and periodic field or formal sessions with Cornell Extension and College personnel, and experienced practitioners, have been the foundation for viticulture technical information to new practitioners in Northeastern NY.

2009 Results: In April and May of 2009, live node evaluations (as reported in the June Addendum to the 2008 report, Table 2) did indicate, that despite our continuing warmer than historical normative winters, differential winter injury levels were beginning to show up - but not conclusively.

We had originally included " indicator" vines in the trial: ones we thought tender for the Champlain region, and which we expected to winterkill. To-date they have not - they survive and crop - though injury is being seen. Several examples of these are Cayuga White, (nearly 60% dead nodes). Landot (25% dead), our "Not-Ravat" (a misidentified, unknown vine with 29% dead nodes), Noiret (26%),

On the other hand, Niagara only had 14% dead nodes which was not far removed from "hardier" nominees such as Edelweiss (13%) Prairie Star (12%) or ES 6-16-30 (12%). Frontenac, Frontenac Gris, LaCrescent, Louise Swenson had minimal dead nodes (fewer than 8%), and Petite Amie, St. Croix, Marquette, and MN 1200, had fewer still, at 6%, 5%, 4%, and 3%. We will be evaluating nodes again in April and May 2010. Stay tuned.
(We note again that the spring frost pattern appears to be emerging as the greater cold threat to wine grapes in the region than absolute winter cold. Fortunately, many of these hybrids are very fruitful even from secondary buds)

As noted in the 2008 report, Dr. Bruce Bordelon of Purdue University has shown that both adequate production levels and good brix levels are necessary for recouping vineyard establishment and production costs.

To wit: Twelve years of production levels at 5 tons per acre and wholesale grape prices of $600 per ton will recoup the investments, and it will happen in nine years if a price of $700 per ton is secured. Grape sugar content is the key to factor influencing market pricing - and volatility, capable of moving price from 50% to as much as 125.

One goal of 2009 was to more extensively employ canopy management techniques to address both concerns: to reduce excessive crop loads (which would diminish sugar levels) and to reduce sub-par production levels, which would retard investment recovery. More open and balanced canopies would also better position the grapes for sun exposure and better air circulation and drying, thereby promoting healthier berries; the same outcomes would also serve to reduce protectant expenditures.

Our approach then was to do some cluster thinning (very labor intensive) but primarily to employ stepped-up shoot positioning, extensive cane raking and post-verasion cane shortening; some leaf pulling (and in limited cases, cane removal). We also conducted a smaller subset evaluation of shoot thinning versus the aforementioned vineyard practice serving as a check.

Dormant season pruning and training were carried out the same on all vines. During initial growth, all tertiary shoots and some secondary shoots (where there were fruitful primary shoots) were rubbed off aiming for a given target number of shoots, regardless of spacing or potential crowding and shading.

Using three varieties GR-7, Lacrosse, and Servos. We established comparisons of shoot thinning practices as those of the check on each. Every grape cultivar has 4 panels of three vines each, or 12 vines in all. We alternated panels of the three target cultivars between shoot thinning and the control. And so, six vines of each of the three cultivars were in each treatment.

Ideally, we would hope to see fewer clusters of greater weight in the shoot thinned treatment than the control, with the implication that crop load reduction would induce greater fruit carbohydrate accumulation (sugars) due to fewer sinks, and the berries would be more valuable. Larger clusters would also be more efficient where hand harvesting was being employed.

Generally, the shoot-thinned vines carried fewer clusters of greater weight, and the trend held across both individual cultivars and for the overall treatment. (See Table 4.) Only two of the 18 shoot-thinned vines carried more clusters than did the controls. Overall yield levels in kg were petty comparable overall, except for Lacrosse. A larger experiment (i.e. more individual vines per cultivar) likely would better clarified treatment impacts. Unfortunately, in the press of multiple harvests in two crops, and the coordination of grape volunteers, the need for distinct sub-harvests in the respective cultivars - and treatments - was missed. Consequently, juice characteristics of Brix, pH, and TA could not buttress the value of the observed trend. Indeed, in a wet year, the larger berry size may have been a disadvantage to flavors development.

As to overall vineyard production (irrespective of the above comparison) we did manage to shift the modal output of the vineyard cultivars to a more desirable 5-6 projected tons per acre range (see Table 1), which was up from the 4-5 ton picture of 2008. Nevertheless, outliers were still present, and were at either ends of an even wider range than in 2008 (2.81 to 9.23 versus 3.33 to 8.62). Complicating factors were many - the weather primarily (the latter providing both a cautionary tale and highlighting a success; more of that in a moment).

Production was also affected by a switchover from a 4 arm Umbrella Kniffen system to a top wire cordon system in the spring of 2009. The change was done to facilitate more straightforward pruning with volunteers, but to also remove multiple trunk "insurance" against winter injury (as practiced in the Finger Lakes) and to allow for movement into cultivar-specific approaches in time. The removal of the "insurance" was in keeping with evaluating overall comparative tolerance to cold temperatures.

Although we believed we were leaving adequate bud counts for the most part, based upon dormant one-year wood pruning, the changeover likely induced more variability in yields and cluster counts, as some of the vines may not have had inadequate adequate remaining vine structure. However, yields were not markedly different on most cultivars.

Marked mammalian predation also occurred as a novel and unpleasant introduction! Although we had anticipated avian predation and had employed bird netting, we discovered quite near to maturity, that chipmunks and likely other pests were moving within the netting and defruiting many clusters; for some cultivars this represented fairly extensive loss. (Refer to tables 1, 2, and 4).

Returning to weather. At the time of this report, only the Brix juice values of the 10 wines being locally-made (See Table 3) were available. (The remaining harvest berry samples are in frozen storage awaiting analysis.) We do not expect values to be as favorable as 2008 due to the extent of cool, rainy, and especially cloudy conditions during the 2009 season - particularly in late summer to early fall. July's brief burst of heat did help.

Our abbreviated season (the 2009 autumn was neither as long nor as warm as 2007, or 2008) provided a heads-up as to the importance of cultivar's short-season maturation ability. While all of our "wines" brix readings were down from 2008 (varying from drops of 0.7 to 5.3) Marquette interestingly still managed to come in at 20.6 (21.8 in 2008).

As one might expect, the wetness provided a test of our more normative pest concerns, namely several fungal diseases. It became evident to Lamoy and Iungerman, that our existing sprayer was insufficient to a mature vineyard's expanded canopy - and even less so at a time of high disease. Even well executed IPM procedures utilizing monitoring, open canopy practices, and protectant applications during bloom, still hinged on good coverage when needed. We were able to fashion a new spray apparatus from catalog parts and welded bars. Richard Lamoy ably-designed and executed the fabrication of the replacement spray apparatus.

How well did our measures do? In a season when clean vineyards were rare in NY, the Willsboro Trial was disappointing to Cornell Plant pathologist Wayne Wilcox when he visited, saying in effect, there's "nothing to see" (disease-wise). Not only was the vineyard without disease problems, it was done with minimal sprays compared to more prevalent practices. Field sessions at Willsboro and at area vineyards honed in on these IPM practices. See Table 5, and the photos following, for details on the spray program and timing, and information about the sprayers used and the cost of the spray program.

Finally, in 2009, two separate sets of wines are in process (See Table 3). Locally made wines of a "commercial" character are being made from ten of the Willsboro wine grapes cultivars; these include four reds (Marquette, Sabrevois, St. Croix, and Frontenac) and six whites (LaCrescent, Petite Amie, NY 76.844.24, Prairie Star, St. Croix, and St. Pepin).

A separate set of research wines is being made of most of the same wines at the Cornell Wine Lab. These latter wines are intended to distinguish the "skeletal" or baseline characteristics of the grapes involved (i.e. distinct from the sales appeal of a commercial marketing focus.) Due to harvest shortages of Marquette and Petite Amie, these are only being made locally.

At our well-received wine evaluation and tasting sessions of 2007 Willsboro wines at Westport and Granville in June, 2009, it was the whites that appeared to receive the more favorable reception, and accordingly, we tipped more to whites for 2009. We also elected to have the two parallel wine tracks in response to the interest for such growing out of these sessions.

Conclusions/Outcomes/Impacts:

- Hardiness differences are beginning to show, and of the 25 cultivars planted, nine appear to be doing very well, including Frontenac, Frontenac Gris, LaCrescent, Louise Swenson Petite Amie, St. Croix, Marquette, and MN 1200.
- Generally, shoot-thinned vines carry fewer clusters of greater weight, the trend holding pretty well across individual cultivars and cumulatively.
- Canopy management techniques did manage to shift the modal output of the vineyard cultivars to a more desirable 5-6 projected tons per acre range.
- Our abbreviated 2009 summer and autumn underscored the importance of cultivar's short-season maturation ability.

- Despite rather unfavorable degree-day (heat) accumulation, the Marquette grape interestingly managed to still come in at 20.6 Brix (21.8 in 2008).
- It was our Willsboro whites (2008) that appeared to receive the more favorable reception at our wine evaluation and tasting sessions at Westport and Granville in June 2009. Accordingly, we tipped more to whites for the 2009 wine making. (Marquette was the red exception.)
- We elected to have the two parallel wine tracks - one research, one commercial - to more fully explore the potential of regionally developed wines.
- Well-executed IPM procedures and effective sprayers can achieve excellent disease control in disease-intense seasons and do so with fewer sprays and at reasonable cost.

2009 Outreach:

Apr 18 Sat *- Willsboro Grape Trial Pruning and Instruction with volunteers.*
May 28 *- Evening Distance Education Grape Sessions with Drs. Wilcox and Vanden Heuvel (at Geneva) to Hudson Falls and Plattsburgh.*
Jn 2 *- Evaluation and review of 2008 Willsboro Grape Trial Wines, Westport.*
Jn 3 *- Area vineyard visits with Cornell enologist Mansfield and Extension enologist Chris Gerling in Clinton and Essex counties.*
Jn 3 *- Evaluation and review of 2008 Willsboro Grape Trial Wines, Granville.*
Jn 4 *- Area vineyard visits with Cornell enologist Mansfield and Extension enologist Gerling in Albany and Washington counties.*
Jn 4 *- Area vineyard visits with Cornell enologist Mansfield and Extension enologist Gerling in Albany and Washington counties.*
Jly 17 *- Vineyard visits with Drs. Wilcox and Vanden Heuvel in Albany, Saratoga, and Clinton counties.*
Jly 18 *- Joint Grape Extension Program with the University of VT featuring Drs. Wilcox and Vanden Heuvel, South Burlington, VT (morning) and Willsboro, NY (afternoon).*
Aug 25 *- NENYFP "Vit-L" on-line discussion of entry submission criteria to MN Wine Grape Growers Association International Cold Climate Wine Competition.*
Sep 8*. - Preparation and posting of "Vineyard Data Survey" to area grape growers soliciting plant demographic information.*
Sep 17, 18 *- Vineyard visits with Dr. Tim Martinson, of Cornell's Statewide Extension Grape Program. Clinton, Essex, Saratoga, Washington, and Albany counties.*
Sep 25, 26 *- Richard Lamoy conducts the first grape harvests at the Willsboro wine grape trial with volunteer help. Three varieties harvested.*
Oct 2 *- Lamoy oversees second Willsboro wine grape trial harvests with volunteer help. Thirteen varieties are harvested.*
Oct 10 *- Iungerman and Lamoy conducts the third and final grape harvests at the Willsboro wine grape trial with volunteer help. Nine varieties are harvested.*
Nov 12, 13 *- Iungerman participates with Martinson Mansfield, and Chris Gerling in the multi-state cold hardy grape research and extension sessions in Burlington.*

Next steps if results suggest continued work is needed in the areas of research, demonstration and/or education. Most of the region's vines were planted after the Willsboro trial (2005). In 2005, just 2 farm winery licenses were held in the five county NENY fruit program region; today, that count is 11; at the end of 2010, the count is projected to be 15. (Based upon an August 2009 grower survey by the NENYFP). In our Champlain and Upper Hudson areas, most vineyards intend to become estate wineries - a model set by several nearby VT operations. This requires development of viticulture and enology skill sets.

As 90% of vineyards are of a 'nonbearing' age, a majority of growers have yet to see a first crop; this will begin to change in 2010. Economically, practical information and demonstrations will be needed about these new cultivars for new practitioners to succeed. Growers need localized 'benchmarks' of yields, quality, fruit characteristics, and wine attributes that are attainable here, and information also about vine training, trellis construction, pest management, and wise use of protectants.

Success of wine grape growing in the North Country ultimately depends upon wine sales to consumers. To achieve their full potential, producers need to understand what flavors and wine styles are possible and how to adapt winemaking practices to bring out the best characteristics of these varieties. Wines made from the Willsboro trial will also serve as benchmarks for educating producers and illustrating wine production practices for all northern wine grape producers and winemakers

Acknowledgments: In closing, my thanks once again, to Steve Lerch, Cornell Grape Program, Geneva; Richard Lamoy who was an exceptional seasonal colleague; Mike Davis and the Cornell Willsboro Baker Farm Staff; the Willsboro volunteers Rob McDowell, Phil Favreau, Tod Trzaskos and a number of others; -- all of whom have assisted this year's work at the Willsboro Trial. Thanks too, to the Growers and CCE Extension Associations of CCE's NENY Commercial Fruit Program; CCE; and the Northern New York Agricultural Development Program, who provided the funding support for the technical and seasonal assistance and also the winemaking effort at Cornell and Hid-in-Pines Vineyard.

Person(s) to contact for more information (including farmers who have participated:

Richard Lamoy	Lamoy Vineyard	Morrisonville, NY	richl@charter.net
Rob McDowell	Purple Gate Vineyard	Plattsburgh, NY	redwine@charter.net
Will & Kathryn Reinhardt	Blue Stone Vineyards	Willsboro, NY	willkath@willex.com
Ed Lincoln	Maple Gate Farm	Randolph, VT	hvacr@sover.net
Peter Rowley	Edgewater Farm	Willsboro, NY	ewfarm38@airmail.net
Mike DiCrescenzo	Altamont Vineyard	Altamont, NY	altamontwinery@hotmail.com
Phil Favreau	Stone House Vineyard	Mooers, NY	stonehousevines@westelcom.com
Erwin Kalmar	(New 2009. Unnamed)	Champlain, NY	erwin@elso.ca

N. Peck, C. Read	North Star Vineyard	Mooers, NY	nataliepeck@yahoo.com
Todd Trzaskos	Vermont Logic	Stockbridge, VT	vino@trzaskos.net
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Gerry Barnhart	Victoryview Vineyard	Schatigcoke, NY	gerryandmary@victoryview vineyard.com
Ken Denberg	Natural Selection Farm	Cambridge, NY	krdenberg@logical.net
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Willsboro Grape Trial 2009 CCE Northeast NY Fruit Program, Cornell Baker Farm, Willsboro, NY.

Table 1: Comparative Wine Grape Vogor, Grow th Stage Phenology, Yield Information.

Nmber and ID of cultivars in Trial		Vigor[1] 2009	Representative 2009 Phenology (Grow th Stages) of vines.[2] (4)BB	(12)10cm	(19)Flow er	(23)50%CF	(27)BSet	(35)Veraison	(38)Harv	[3]kg/ Variety	[4]Proj kg/A	[5]Proj Tons/A
1	Baco	0.6	5/11	6/2	6/26	6/29	7/1	8/31	10/3	93.00	4608	5.07
2	Cayuga White*	0.4	5/20	6/11	7/6	7/10	7/15	8/31	10/5	71.70	3908	4.48
3	Edelw eiss	0.4	5/14	6/2	7/1	7/6	7/10	8/31	9/27	71.90	3265	3.59
4	ES 6-16-30**	0.4	5/20	6/8	6/29	7/3	7/10	8/26	9/27	29.80	1353	2.81
5	Foch*	0.2	5/9	5/27	6/26	7/1	7/6	8/31	10/3	91.20	4142	5.24
6	Frontenac*	0.5	5/9	5/27	6/23	6/26	7/1	8/26	10/11	141.60	6431	7.51
7	Frontenac Gris*	0.5	5/11	5/27	6/23	6/29	7/1	8/26	10/11	122.10	5545	6.10
8	GR7	0.6	5/9	5/27	6/29	7/1	7/6	8/26	10/3	123.20	5595	6.15
9	LaCrescent	0.3	5/9	5/27	6/23	6/29	7/6	8/26	10/3	138.20	6277	6.90
10	Lacrosse	0.5	5/14	6/8	6/29	7/1	7/10	8/26	10/3	158.10	7180	7.90
11	Landot*	0.5	5/21	6/11	7/6	7/10	7/17	8/31	10/11	93.30	4263	5.18
12	Leon Millot**	0.5	5/14	5/27	6/23	6/29	7/1	8/26	10/3	55.00	2725	4.18
13	Loiuse Sw enson**	0.3	5/14	6/2	6/29	7/1	7/10	8/26	9/27	59.30	2693	4.79
14	Marquette**	0.5	5/9	5/27	6/23	7/1	7/6	8/26	10/11	61.60	3052	4.08
15	Mn 1200**	0.2	5/14	5/27	6/21	6/23	7/1	8/26	10/3	22.20	1008	1.85
16	Niagara*	0.7	5/14	6/11	7/3	7/6	7/10	8/31	10/11	184.40	8375	9.23
17	Noiret*	0.5	5/14	6/2	6/29	7/6	7/11	8/31	10/3	79.90	3959	4.39
18	NY 76.844.24*	0.5	5/14	6/2	6/29	7/1	7/17	8/31	10/11	128.20	5822	6.50
19	Petiete Amie**	0.1	5/14	5/27	6/23	6/29	7/1	8/31	10/11	50.40	2747	4.17
20	Prairie Star**	0.5	5/14	6/2	6/29	7/1	7/6	8/26	10/3	85.20	3870	5.16
21	Unidentified (6)*	0.3	5/20	6/11	7/1	7/6	7/10	8/26	10/11	70.50	3202	3.74
22	Sabrevois*	0.7	5/14	6/2	6/23	6/29	7/6	8/31	10/3	135.20	6140	6.90
23	St. Croix*	0.5	5/9	6/2	6/29	7/3	7/6	8/31	10/3	119.10	5409	6.41
24	St. Pepin*	0.5	5/14	6/2	6/29	7/1	7/6	8/26	10/3	72.40	3288	3.85
25	Vignoles*	0.5	5/20	6/13	7/6	7/10	7/17	8/31	10/11	105.20	4778	5.29

1 Vineyard vigor estimation is a ratio: 1 yr dormant wood pruning weight (kg) per 14.63 m (8 ft in row spacing). Values for reps 1& 3 (50% each cultivar) Adapted from "FactorsAffecting Successful Vine Growth, Yield, and Quality", 1999 NYS Wine Industry Workshop, Dr. Helen Fisher, Univ. Guelph.

2 #s in ( ) reference Eichorn-Lorenz Phenological stages.. (Compendium Grape Diseases, APS Press, 1994, p 4.) BB is budburst; 10cm modal shoot growth; flowering begun; 50%CF is 50% flower caps shed; Bset berries growing & at R- angle to cane; veraison: onset berry maturation, coloration.

3-5 Yield in kg of each cultivar divided by # producing vines for per vn value. Times 545 (since 8' x 10'spacing) for per acre adjustment.

6 Unidentified vine: Preseumed Ravat at planting. Fruiting subsequently shown it was "Not-Ravat" (or simply unidentified).

* And * * indicates mamalian predation loss and more sever loss. See "M Loss" and "Eqv" values Table 2, and "P" Column Table 4.

Willsboro Grape Trial - 2009 CCE Northeast NY Fruit Program, Cornell Baker Farm, Willsboro, NY.

Table 2 - Comparative Vine Quality (And predation loss level estimation.)

Variety	# of vns	Tot # Clust.	Tot kg	kg/vn	Cluster Wt (g)	M loss # Clust.	Eqv* # Clust	Eqv* Wt tot kg	Eqv* Wt kg / vn	Brix	pH	TA	Berry Wt (g)	Yld / P Ratios	2010 % Lv node
Baco	11	1069	93	8.45	87	0	1069	93.00	8.45	-	-	-	-	5	-
Cayuga White	10	327	71.7	7.17	219.27	16	343	74.80	7.48	-	-	-	-	5.7	-
Edelw eiss	12	521	71.9	5.99	138	0	521	71.90	5.99	-	-	-	-	6.5	-
ES 6-16-30	12	355	29.8	2.48	83.94	318	673	56.30	4.69	-	-	-	-	1.9	-
Foch	12	1189	91.2	7.60	76.7	178	1367	104.80	8.73	-	-	-	-	18	-
Frontenac	12	1031	141.6	11.80	137.34	63	1094	150.30	12.53	18	3.06	17.7	-	9.4	-
Frontenac Gris	12	833	122.1	10.18	146.58	12	845	123.90	10.33	18.8	2.88	15.1	-	8.7	-
GR7	12	1253	123.2	10.27	98.32	0	1253	123.20	10.27	-	-	-	-	6.6	-
LaCrescent	12	1294	138.2	11.52	106.8	0	1294	138.20	11.52	17.2	2.95	15.2	-	12.5	-
Lacrosse	12	1229	158.1	13.18	128.64	0	1229	158.10	13.18	-	-	-	-	10.4	-
Landot	11	586	93.3	8.48	159.22	10	596	95.00	8.64	-	-	-	-	8.5	-
Leon Millot	11	797	55	5.00	69.01	331	1128	76.70	6.97	-	-	-	-	3.3	-
Louise Sw enson	12	575	59.3	4.94	103.13	389	964	95.80	7.98	-	-	-	-	4.5	-
Marquette	11	830	61.6	5.60	74.22	178	1008	74.90	6.81	20.6	3.02	10.5	-	2.9	-
Mn1200	12	635	22.2	1.85	34.96	426	1061	36.90	3.08	-	-	-	-	3.1	-
Niagara	12	942	184.4	15.37	195.75	2	944	184.70	15.39	-	-	-	-	9.8	-
Noiret	11	547	79.9	7.26	146.07	4	551	80.50	7.32	-	-	-	-	4.9	-
NY 76.844.24	12	870	128.2	10.68	147.36	6	882	130.00	10.83	14.6	2.83	13.5	-	7.8	-
Petite Amie	10	525	50.4	5.04	96	204	729	69.60	6.96	15.4	3.00	8.2	-	10.3	-
Prairie Star (*1)	12	981	85.2	7.10	86.85	225	1206	103.20	8.60	18.6	3.21	11.4	-	6	-
Ravat 34-not	12	404	70.5	5.88	174.5	22	426	74.80	6.23	-	-	-	-	6.9	-
Sabrevois	12	1165	135.2	11.27	116.05	27	1192	138.20	11.52	15	3.10	12.7	-	7.3	-
St. Croix	12	1233	119.1	9.93	96.59	71	1304	128.30	10.69	15	3.07	10.8	-	8.1	-
St. Pepin	12	752	72.4	6.03	96.28	52	804	77.10	6.43	19.6	3.06	10.1	-	4.2	-
Vignoles	12	761	105.2	8.77	138.24	5	766	105.80	8.82	-	-	-	-	8.2	-

Notes:

1. "M loss" and "Eqv" consider animal predation and estimate equivalent yield otherwise. ((Total Cluster Weight) / # Clusters) x (# intact clusters + empty clusters))
2. Thus "Eqv kg / vine" is adjusted weight of both intact ans predated clusters divided by # vines.
3. (*1) Prarie Star trained differently - to a 4 arm kniffen, not a top-wire cordon as its new spring cane growth is markedly sussceptibility to breakage by winds.
4. Brix, pH, and TA values for juice pressed in Morrisonville at Lamoy's Hid-in-Pines Vineyard & Winery in coooperation with CCE NENYF. All grapes from Trial.
5. The " - " entries refer to harvest samples yet to be processed (in frozen storage) - available later in Spring 09, as will be the % live 2010 buds data.

Willsboro Grape Trial - 2009 CCE Northeast NY Fruit Program, Cornell Baker Farm, Willsboro, NY.

Table 3 - Preliminary 2009 Wines Information

2009 Research "Skeletal" Willsboro Wines - CCE NENYF and Cornell Wine Lab, Geneva.														
Cultivar / R or W		Wine Lab	Harv.	Juice Analysis			Treatment / Yeasts				Wine Bottling Information			
		V&B Code	2009	pH	TA	Brix				MLB	pH@	TA(g/L) @	Date	# bottles
Prairie Star	W	09-52	10/3	3.34	13.12	18	-	-		-	-	-	-	-
St. Pepin	W	09-53	10/3	3.20	14.00	19.9	-	-		-	-	-	-	-
La Crescent	W	09-54	10/3	3.10	19.04	18.3	-	g In Process (Jan 20		-	-	ıg In Process (Jan 2010)		-
Sabrevois	R	09-55	10/3	3.16	15.06	15.2	-			-	-			-
St. Croix	W	09-56	10/3	3.23	12.60	15	-			-	-			-
76.0844.24	W	09-87	10/11	3.04	17.38	15.6	-			-	-			-
Frontenac	R	09-88	10/11	3.06	22.44	18.6	-			-	-			-
Frontenac Gris	W	09-94	10/11	3.09	20.96	19.7	-	-		-	-	-	-	-
2009 "Commercial" Willsboro Wines - CCE NENYF and RL Wines (Hid-in-Pines Vineyard), Morrsionville.														
Cultivar		NENYF/RL_	Harv.	Juice Analysis			Treatment / Yeasts				Wine Bottling Information			
		V&B Code	2009	pH	TA	Brix	Chaptalized	Yeast		MLB	pH@	TA(g/L) @	Date	# bottles
Prairie Star	W	09-52RL	10/3	3.21	11.4	18.6	21brix	Cotes des Blancs		none	-	-	-	-
St. Pepin	W	09-53RL	10/3	3.06	10.1	19.6	21brix	Cotes des Blancs		none	-	-	-	-
La Crescent	W	09-54RL	10/3	2.95	15.2	17.2	21brix	Cotes des Blancs		none	-	ıg In Process (Jan 2010)		-
Sabrevois	R	09-55RL	10/3	3.10	12.7	15	21brix	RC212		none	-			-
St. Croix	R	09-56RL	10/3	3.07	10.8	15	21brix	Pasteur Red		none	-			-
76.0844.24	W	09-57RL	10/11	2.83	13.5	14.6	21brix	71B-1122	&&&	none	-			-
Frontenac	R	09-58RL	10/11	3.06	17.7	18	21brix	71B-1122	&&&	Bacchus	-			-
Frontenac Gris	W	09-59RL	10/11	2.88	15.1	18.8	21brix	71B-1122	&&&	none	-	-	-	-
Marquette***	R	09-60RL	10/11	3.02	10.5	20.6	21brix	RC212		MBR31	-	-	-	-
Petite Amie***	W	09-61RL	10/11	3.00	8.2	15.4	21brix	Cotes des Blancs		none	-	-	-	-

Notes:
1. All of these wines being made from grapes grown in the CCE NENYF Wine Grape Trial, Cornell Baker Farm, Willsboro, 2009.
2. The " - " indicates winesIn process as of January 29, 2010. Bottling will not occur until later in 2010.
3. The *** indicates Insufficient amount to supply quanitity need of Geneva Wine Lab. Retained for NENYF local wine making.
4. The &&& indicates that this yeast converts up to 40% malic acid to lactic acid.

Willsboro Grape Trial - 2009 CCE Northeast NY Fruit Program, Cornell Baker Farm, Willsboro, NY.

Table 4 - Canopy Manaagement - Shoot Thining

Mgmnt	Variety	Panel	Cluster Data Vine 1 #	"P"	Wt kg	Equiv Wt.*	Cluster Data Vine 2 #	"P"	Wt kg	Equiv Wt.*	Cluster Data Vine 3 #	"P"	Wt kg	Equiv Wt.*	Panel Sums # Cls	Eqv * Cls #	kg Total	Eqv * Wt - kg	Panel kg / Vn	Means - Vns, Cls Eqv * Wt kg / vn	Eqv * Wt g/Cls	Projections MT/A	Eqv * MT / A	Mean Proj. Eqv * MT / A / Var	/ Trt
Shoot Thinned	GR7	3.2	87	0	9.8	9.8	69	0	6.8	6.8	94	0	11	11.3	250	250	27.9	27.90	9.30	9.30	111.60	5.1	5.1		
	GR7	7.10	105	0	12	11.6	75	0	7.9	7.9	156	0	15	15.2	336	336	34.7	34.70	11.57	11.57	103.27	6.3	6.3		
			192	0	21	21.4	144	0	15	14.7	250	0	27	26.5	586	586	62.6	62.60	10.43	10.43	107.44	11.4	11.4	5.69	
	Lacrosse	3.3	85	0	13	13.1	90	0	12	11.5	51	0	6.9	6.9	226	226	31.5	31.50	10.50	10.50	139.38	5.7	5.7		
	Lacrosse	7.5	85	0	13	13.4	80	0	12	12.4	83	0	13	12.6	248	248	38.4	38.40	12.80	12.80	154.84	7.0	7.0		
			170	0	27	26.5	170	0	24	23.9	134	0	20	19.5	474	474	69.9	69.90	11.65	11.65	147.11	12.7	12.7	6.35	
	Sabrevois	1.8	80	0	11	10.6	108	0	13	13.2	100	0	12	11.7	288	288	35.5	35.50	11.83	11.83	123.26	6.4	6.4		
	Sabrevois	7.6	83	0	11	11.3	98	0	11	11.4	120	0	13	12.6	301	301	35.3	35.30	11.77	11.77	117.28	6.4	6.4		
			163	0	22	21.9	206	0	25	24.6	220	0	24	24.3	589	589	70.8	70.80	11.8	11.65	120.27	12.9	12.9	6.43	
	All Shoot Thinned		525	0	70	69.8	520	0	63	63.2	604	0	70	70.3	1649	1649	203.3	203.3	33.9	33.7	124.94	36.9	36.9	All	6.16
Control	GR7	3.7	115	0	9.7	9.7	112	0	9.8	9.8	125	0	13	13.2	352	352	32.7	32.70	10.90	10.90	92.90	5.9	5.9		
	GR7	10.7	78	0	7.8	7.8	118	0	10	10.4	119	0	9.7	9.7	315	315	27.9	27.90	9.30	9.30	88.57	5.1	5.1		
			193	0	18	17.5	230	0	20	20.2	244	0	23	22.9	667	667	60.6	60.6	10.1	10.1	90.73	11.0	11.0	5.50	
	Lacrosse	4.8	201	0	15	15.0	109	0	15	15.1	120	0	16	15.8	430	430	45.9	45.90	15.30	15.30	106.74	8.3	8.3		
	Lacrosse	10.2	97	0	14	14.4	108	0	14	13.6	120	0	14	14.3	325	325	42.3	42.30	14.10	14.10	130.15	7.7	7.7		
			298	0	29	29.4	217	0	29	28.7	240	0	30	30.1	755	755	88.2	88.2	14.7	14.7	118.45	16.0	16.0	8.01	
	Sabrevois	3.6	105	0	11	10.8	113	0	13	12.6	111	0	14	13.7	329	329	37.1	37.10	12.37	12.37	112.77	6.7	6.7		
	Sabrevois	9.9	56	27	6.2	9.2	115	0	13	13.0	76	0	8.1	8.1	247	274	27.3	30.29	9.10	10.10	122.63	5.0	5.5		
			161	27	17	20.0	228	0	26	25.6	187	0	22	21.8	576	603	64.4	67.39	10.73	11.23	117.70	11.7	12.2	6.12	
	All Controls		652	27	64	66.9	675	0	75	74.5	671	0	75	74.8	1998	2025	213.2	216.2	35.5	36.0	108.96	38.7	39.3	All	6.55

* "Eqv" refers to calculations done to offset mamalian predation impact ("P"). All clusters - stripped and intact were counted. Intact were weighed, averaged, and then applied to stripped cluster. In this particular population of vines for the cnopy management comparison, only one panel - Sabrevois in Panel 9.9 - were so affected. Damage occurred in other discrete locations in the vineyard. This "Eqv" calculation was done across the grape trial where this problem was noted. Overall, it reflected damage that had not been experienced before (Vines were netted against birds.) Chipmunks and perhaps other animals/birds caused the loss. Missing clusters counted and weight calclations were made to help adjust dorman pruning levels in Spring 2010.

Other Notes: Each Treatment included 18 vines (2 panels each of 3 varieties, each panel having 3 vines)
Panel number refers to row, first and then panel postion within row. Rows progression E to W.
Ten panels are in each row. Each panel has 3 vines of a given cultivar. Vines, panels are numbered S to N.
Spacing: 8'x10' (545 vines /acre). Total area approximately 0.7 acres.

Colors: Relative panel position on slope.
Upper Third (P 7-10)
Middle Third (panels 4,5,6)
Lower Third (panels 1-3)

Willsboro Grape Trial - 2009 CCE Northeast NY Fruit Program, Cornell Baker Farm, Willsboro, NY.

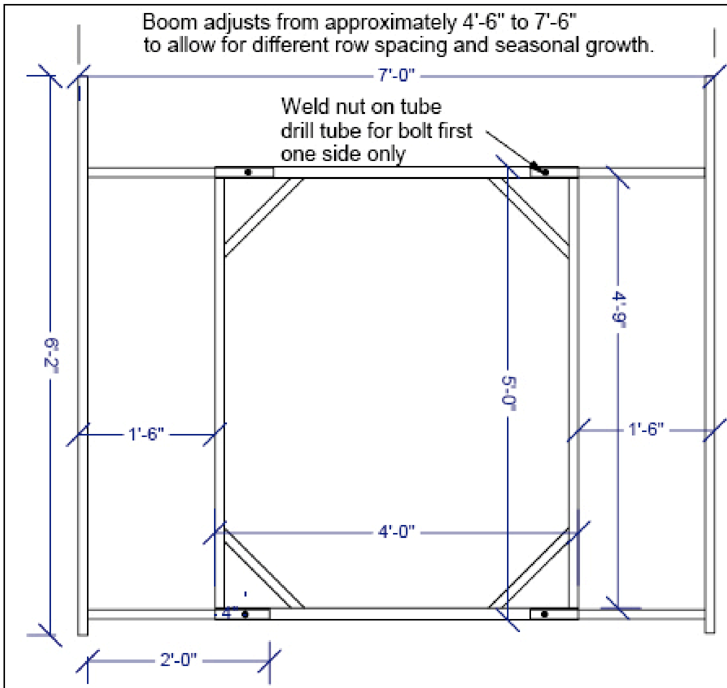
Table 5 - Willsboro Vineyard IPM Program - Spray Events, Pests, Cost.

# Spray	Events, Date	Purpose,	Product Name,	Type	EPA Reg No.	Rate	Total Product	Tot. Gal. Sol.	application Method	Cost Per Unit	Cost This Application
1	4/30/13	Perennial Weeds	Roundup	H	524-475	2 qt./ A.	1 qt.	30	Spot Sprayer	$30.25	$30.25
2	6/4/13	powdery mildew	Rubigan	F	10163-273	3 oz../A.	2 oz.	25	Mini-Airblast	$4.15	$9.30
		powdery mildew	Manzate 75 Pro	F	1812-414-352	4 lb./A.	2.5 lb.			$8.08	$20.20
3	6/25/13	Anthracnose	Rally	F	62719-410	5 oz./ A.	3 oz.	25	Mini-Airblast	$4.89	$14.67
		Black Rot	Manzate Pro	F	1812-414	4 lbs./A.	2.0 lb.			$8.08	$16.16
		Rose Chafer	Sevin XLR	I	264-333	1.5 qt/A.	1.5 pt.			$9.73	$7.30
4	6/25/13	Perrenial & Annual Weeds.	Roundup	H	524-475	8 oz./5gal.	1/2 qt.	10	Spot Sprayer	$30.25	$15.13
5	7/11/13	Anthracnose, Powdery Mildew	Rally	F	62719-410	6 oz./ A.	4 oz.	75	Grape Boom Sprayer	$4.89	$19.56
		Downey Mildew	Captan 4L	F	19713-156	1.5 qt/A.	1 qt.			$8.00	$8.00
		Rose Chafers, Japanese Beetles,	Carbaryl 4L	I	34704-447	1.5 qt/A.	1 qt.			$9.73	$9.73
6	7/24/13	Powdery Mildew	Rubigan EC	F	10163-273	6 oz. / A.	4 oz	55	Grape Boom Sprayer	$4.15	$16.60
		Black Rot, Downy Mildew	Captan 4L	F	51036-181	2 qt./A.	1.25 qt.			$8.00	$10.00
		Downy Mildew	Prohy	F	42519-22-5905	2 qt/A.	1.25 qt.			$12.75	$15.94
		Japanese Beetle	Sevin XLR	I	264-333	2 qt/A.	1.25 qt.			$9.73	$12.16
7	9/2/13	Powdery Mildew, Botrytis	Flint	F	264-277	4 oz. / A.	3 oz	60	Grape Boom Sprayer	$7.09	$21.27
		Downy Mildew	Captec 4L	F	51036-181	2 qt./A.	1. 5 qt.			$8.00	$12.00

Notes:

Total Acreage: 0.66acres. "Spot Sprayer" - Hand-held wand.
"MiniAirblast": A 30 gallon BDI P-30 small acres sprayer, featuring aCifarelli 5HP gas engine blower with single-sided fan-type sprayhead. A 12V pump powers the agitator and supplies the sprayhead.
"Grape Boom Sprayer": A modified spray boom apparatus , with adjustable booms on each side (move in or out), each with 6 spray nozzles, the top having angling capability. Spray volume tank of 50-100 gal., sprays from 40-60psi. Apparutus and mounting frame fashioned by program technician Richard Lamoy.

Seasonal Herbicide Cost	$45.38
Seasonal Insecticide Cost	$29.19
Seasonal Fungicide Cost	$163.70
Total Seasonal Protectant Cost	$238.27
Per Acre Projection	$316.90



Top and Bottom of frame are 1 and 1/2 inch square tubing- 1/8" thick. Uprights are 1 and 1/4" square tubing 1/8" thick. Weld square and put gussets in corners for rigidity- small tube is better. The slide tubes are 1 and 1/4" tube steel 1/8" thick and slide in and out of the main frame. The nuts welded to the main frame after the tube is drilled to accept a bolt (drill a bit larger, but smaller than the nut outside). Then put a bolt in the nut and use it as a set screw.

Diagram by R. Lamoy, Technician, CCE NENYF July 2009.

Northern NY Agricultural Development Program
2008-2009 Project Report

Project Title: Increasing NNY Maple Production through Effective Producer/Landowner Collaborations

Project Leader(s): Brian F. Chabot, Professor, and Michael Farrell, Northern NY Maple Specialist, Cornell University

Collaborator(s): Extension educators: Amy Ivy (Clinton), Emily Selleck (Essex), Richard Gast (Franklin), Michele Ledoux (Lewis/Jefferson), Steve Vandermark (St.Lawrence)

Cooperating Producers: Many producers attended the workshops and engaged with landowners in order to gain access to additional trees for tapping. A partial list of these producers include Tony Corwin (Essex), Carol Gonyea (Essex), Jamie Rogers (Essex), Brad and Michael French (Essex), Michael Parker (Clinton), Evan Zehr (Lewis), Haskell Yancey (Lewis), Mark Burnham (Jefferson), Jim Mueller (Franklin), Joseph and Paul Schork (Franklin), Roger Hastings (Franklin).

Background: Maple syrup production is an important cultural and economic activity in NNY, both in terms of direct sales and as a stimulus to tourism. The demand for maple syrup is rapidly outpacing supply and prices are at record high levels. The bulk price for all grades of syrup is approximately 50% higher than just a few years ago. Maple producers are anxious to expand their production in order to fill the growing markets. However, the majority of large maple producers have already tapped all of the trees they own. Therefore, the primary ways to add taps are through purchasing more land, leasing trees from neighbors, or purchasing sap collected by a neighbor. Leasing and cooperative business arrangements are often the most practical and economical solution. Existing maple producers already have made the capital investment in facilities and equipment needed to produce high-quality syrup in a cost-effective manner. The variable costs of boiling additional sap are only a small fraction of the cost of the syrup produced. The fixed costs for starting a full operation require significant initial investment, which may make sense in some cases.

There is a vast resource of untapped trees in NNY as well as a wide variation in the utilization rates amongst the different counties (see table). Currently valued at $3.25 million, the value could grow to over $9 million annually if we were to increase the utilization rate for all of NNY to that of Vermont (2%). Note that these are also conservative figures based on the bulk price of $3/lb. If we were to account for the additional value of selling syrup in retail containers, producing value-added maple confections, and the associated revenues generated through agri-tourism events such as Maple Weekend, the economic impact would be much greater.

Table 1. Current Production Figures and Potential Growth Based on Increasing the Utilization Rate to 2% for all NNY Counties (based on current average prices of $3/lb)

County	Number of Potential Taps	Actual Taps (2000 Census)	Utilization Rate	Current Annual Revenue	Possible Annual Revenue
Clinton	5,146,949	91,618	1.78%	$687,135	$772,042
Essex	10,164,673	20,677	0.20%	$155,078	$1,524,701
Franklin	14,255,577	24,352	0.17%	$182,640	$2,138,337
Jefferson	3,862,308	12,528	0.32%	$93,960	$515,618
Lewis	12,215,797	186,977	1.53%	$1,402,328	$1,630,809
St. Lawrence	21,022,781	97,356	0.46%	$730,170	$2,806,541
Total				$3,251,310	$9,388,048

Clinton and Lewis counties already have a very strong maple heritage similar to that of Vermont. At 1.78% and 1.53%, respectively, their utilization rates are much higher than the other NNY counties and almost as high as the 2% rate achieved in Vermont. Our goal is to enhance the maple producing capacity of all of NNY counties in order to achieve the full economic development potential from our forests while maintaining the highest standards of environmental quality.

Outside the Forest Preserve lands, the vast majority of potential taps occur on privately owned forestland. Yet many forest owners, including NNY farmers, are unaware of the possibilities that exist for utilizing their maple trees. Maple syrup production is especially important during these tough economic times, as the stumpage price for maple sawlogs has fallen along with the housing market. Whereas using the forests for timber was once more profitable, landowners must now seek alternative sources of income as demand for wood products diminishes. Now that the exchange rate with Canada has equalized, there is no longer an economic advantage for US companies to purchase Canadian syrup, which opens a large market for NNY maple producers to fill. Finally, utilizing the forest for maple production through direct tapping or leasing to an existing producer may also qualify a landowner to receive agricultural assessment on that forestland, thereby significantly reducing their property tax burden. Educating landowners about these qualities and encouraging greater collaboration with existing producers is essential to expanding the NNY maple industry.

Methods: In September 2009 we surveyed 374 maple producers to acquire information on their desire to increase production via leasing additional trees or boiling additional sap that was brought to them by someone else. We also developed a brochure explaining the options to landowners for getting involved with maple production and announcing a series of seven workshops spread out over NNY in the month of October. We worked with Kara Dunn to develop several press releases and articles promoting the workshops. Michael Farrell then traveled to each of the six counties in October to deliver a presentation to landowners and maple producers. We collected survey responses from landowners and then analyzed them in November. We are also currently working on an interactive map containing information for all of the producers that wish to expand their operations.

Results: Overall the project was successful at educating landowners about the opportunities for getting involved with the maple industry, determining the perceived opportunities and barriers for landowners to getting involved, and developing a mechanism for connecting landowners who want to lease their forestland or sell sap with maple producers that want to expand. This section will discuss these three different aspects in detail.

Landowner Outreach Approximately 7,000 landowners in NNY received a brochure entitled "Getting Involved with Maple Syrup Production: Options for Landowners in NY". There were also several press releases related to this project which generated at least 82 media hits through newspaper, magazines, radio, TV and websites. I received roughly 20 calls from landowners asking about the programs and how to get involved with maple production. As a testament to the importance of media coverage, the head forester for Rayonier happened to see an article in the newspaper about the project. Rayonier is a large landowner in the ADKs with tens of thousands of acres. Several of the company's top executives visited the Uihlein Forest during a business meeting in September and have since decided to lease some of their lands to maple producers in Lewis and St. Lawrence counties.

Landowner Surveys At all of the workshops we asked the landowners who were not currently producing syrup to fill out a survey. We received 34 useable survey responses from landowners that generated interesting and useful results. A copy of the survey along with the results of all of the questions are contained in Appendix 1. The main highlights provided below.

We asked landowner what the primary obstacles to their involvement in maple production has been so far. The top response (55%) was that 'the initial cost of buying equipment was too high'. Other significant responses included 'I have never had enough time' (35%), 'I did not think I had enough tappable maple trees' (35%), 'I never thought about it as an option' (32%), and 'I wasn't aware of agricultural assessment for maple production' (29%).

We also asked what the primary reason(s) the landowners are now considering using their maples for syrup production. As a sign of the times of a depressed economy, the top result was 'I am looking for supplemental income' (52%). The next highest responses included 'I would like to obtain an agricultural assessment for my land' (35%) and 'I have a better idea on how to get started' (32%).

We also asked landowners how likely they are to produce maple syrup themselves, lease their forestland to a maple producer, or collect sap and have it boiled at a nearby sugarhouse. The responses indicated that landowners were generally interested more in direct involvement than leasing their maple trees.
54% of landowners indicated that they would be likely or very likely to produce syrup themselves after attending the workshop. For comparison purposes, only 29% of landowners indicated that they would be likely or very likely to collect sap to be boiled at a nearby sugarhouse whereas 22% would lease their forestland to another producer.

Landowner/Maple Producer Connections: From the letter and survey sent out to 374 maple producers in NNY we only received responses from 32 producers that were interested in expanding by leasing trees or buying in sap. This was disappointing, so we are advertising and explaining the project in greater detail during the winter maple schools this January. We will be handing out surveys to more producers at these meetings in order to gain a more comprehensive list of those that are interested in expansion. A final database and map will be developed and published in the coming months.

Conclusions/Outcomes/Impacts: Without doing follow up surveys next year, it will be difficult to quantify the impact that this project has had on increasing maple production in NNY. I did hear of several stories of landowners deciding to lease out their forestland to maple producers as a result of the outreach efforts, including Rayonier (a very large landowner) and several smaller landowners in Clinton and Essex counties. A lot of the work that was done this past year was planting the seeds for future development and growth. We learned that many landowners are not aware of the details regarding agricultural assessment for maple production; we also learned that they are very interested in using their maples for syrup production when they do find out about the tax benefits.

All of the survey data also indicate that landowners and producers working together will allow NNY to overcome the perceived hurdles to increasing production. For instance, the number one obstacle for getting started was that the initial cost of buying equipment is too high. However, one could just buy the necessary equipment to collect the sap and then have it boiled at a nearby sugarhouse where a producer has already made all of the investments in the building, evaporator, reverse osmosis, and other equipment necessary for producing syrup.

Outreach: At the time this report is being drafted, the project is still ongoing. Michael Farrell has presented results of this project at the NYS Maple Conference in Verona, NY on January 9 and is scheduled to present the results at the NNY Maple Schools taking place on January 23 (Lewis County), January 29 (Clinton County) and January 30 (St. Lawrence County). Brian Chabot will present this information at the maple school in Warren County on February 6.

Next steps if results suggest continued work is needed in the areas of research, demonstration and/or education; We will be posting the interactive map on a website linked from the NNYADP site and hosted on www.cornellmaple.com. When this website is ready, we will send out a press release that also includes success stories of landowners and producers becoming connected through this project. In the future, when CCE gets inquires from landowners who are interested in leasing their trees or selling sap to an existing producer, this is where they will be referred to.

We are also expanding this project to the rest of NY over the next two years with funding from the NY Farm Viability Institute. In a related project, due to the resistance of many landowners in tapping their trees due to the perceived loss of sawtimber value, we are working on a Net Present Value calculator where landowners can utilize a spreadsheet to determine whether it makes sense for them to lease their trees for syrup or manage for sawtimber production based on the characteristics of their situation.

Acknowledgments: Cornell University and the New York Farm Viability Institute are providing the funding to continue this project in NNY and expand it to the rest of the state.

Reports and/or articles in which the results of this project have already been published.

Kara Dunn handled publicity for this project and kept track of media hits in the attached Appendix 2. This final report will be posted on www.cornellmaple.com and a press release will be developed that contains results of the project along with a link to the website with the map of producers interested in expansion.

Person(s) to contact for more information (including farmers who have participated:

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Office: (518) 523 9337 Cell: (518) 637 7000

Northern NY Agricultural Development Program
2008-2009 Project Report

Project Title: Optimizing Grass Biomass Yield and Quality for Combustion

Project Leader(s):

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Q. Ketterings, Dept. of Animal Science, Cornell University
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Background: Northern NY imports most of its energy and is therefore heavily reliant on these greatly fluctuating outside energy sources. Even though many residents are unconcerned about potential global warming issues, most believe that energy prices will continue to rise and fluctuate. Grass biomass for residential and light industrial heating has the potential to be a local closed-loop energy system, with the grass produced, densified and marketed locally. The energy content in pelleted grass is similar to premium wood pellets, and the efficiency of a grass bioheat system has been estimated at 14:1 (energy output:energy input). Conversion efficiencies of other biomass processes rarely exceed a 4:1 ratio and can be considerably lower than that.

In general, the federal government continues to ignore the potential for grass bioheat, while the interest in the Northeast continues to increase. NYSERDA has funded several projects in NY to evaluate grass pelleting and the use of grass pellets for residential heating. Heating appliances are being evaluated in two NYSERDA projects for effective combustion, focusing on emissions issues. Interest in Europe also continues to increase. Mobile grass pelleting equipment is being developed in the UK. Agro-Bio-Tech in Germany has a recently developed a mobile grass biomass pelleting unit for sale in Europe. SUNY-Cobleskill has developed a mobile grass pelleting machine that is currently being tested on farms in the Hudson Valley. Enviro-Energy, LLC in Delaware County is currently pelleting grass for residential heating, and Dirk-Jan Rosse is pelleting mixed grass and goldenrod in Dutchess County for residential and light industrial heating. Other densification equipment capable of generating various briquettes also are being tested with grass in the Northeast. The northern NY region would have the most to gain from adoption of a grass bioheat industry, compared to other regions in the Northeast.

The impact of organic matter application (manure or compost) on tradeoffs between grass biomass production, composition, and carbon and soil test N, P and K dynamics needs to be investigated. Phosphorus content of grass has very little impact on combustion, but soil test P needs to be monitored to ensure P levels do not exceed the environmental (soil-specific) threshold. Recent studies with corn showed compost increased soil C content and moisture holding capacity while liquid manure tended to sustain C levels and inorganic fertilizer applications decreased C reserves and moisture holding capacity over time. It is unknown what the dynamics would be under grass systems. It is well-known that harvest management has a major impact on grass yield and composition. Warm-season grasses tend not to persist if harvested more than once a year, while cool-season grasses have optimum yield with two harvests per season. Mature grass, left cut in the field for a week or more to leach, will result in reduced ash, N, K and Cl content.

For economically viable grass production we want to maximize forage yield. The biomass should be relatively low in total ash content (primarily silica), but more importantly relatively low in nitrogen (N), potassium (K), chlorine (Cl) and sulfur (S) content. The basic factors influencing N, K, Cl, and silica uptake by grasses include plant species, soil type, plant water uptake, N, K and Cl fertilizer use, manure application, and harvest management. Warm-season grasses such as switchgrass have lower water uptake than cool-season grasses such as reed canarygrass or tall fescue, with potentially lower silica and total ash content. Water use efficiency may also result in higher yields for warm-season grasses under limited rainfall, which can be assessed by including an irrigation treatment. Silica is much more available to grasses in clay soils compared to sandy soils, which can result in increased total ash content of grasses grown on clay soils.

Switchgrass currently is the top warm-season grass of choice for biomass in much of the country. Results obtained from switchgrass in this study will readily apply to other warm-season grasses. Reed canarygrass and tall fescue were also chosen for their high yield potential, as well as their superior persistence for northern NY winters. Results from these grasses can easily be transferred to other cool-season grass species with biomass potential. Maximum yield and persistence for warm-season grasses occurs with one harvest per season, while cool-season grasses have considerably more productivity with two harvests per season.

Methods: It is impossible to evaluate all important factors and their interactions in field-scale studies, therefore small plot work is initially required. We selected three species with high yield potential (switchgrass, reed canarygrass and tall fescue) and focused on the impacts of (1) soil type, (2) soil moisture, and (3) fertility management, on yield and composition of these grass species.
Thirty-six species blocks were established [12 blocks each of switchgrass (Cave-in-Rock), reed canarygrass (Rival) and tall fescue (KY-31)], each 20’ x 60’. Of these 36 blocks, 18 are on a sandy site and 18 are located on a clay soil, both on the Willsboro research farm. It took 3 years to fully establish switchgrass at both sites. For biomass endophyte-infected tall fescue and high alkaloid reed canarygrass would be preferred, as both are more vigorous and persistent than their higher quality counterparts. No high alkaloid reed canarygrass seed is currently available, but we did find a source of endophyte-infected tall fescue. In the summer of 2009, 50 tillers were collected from each of the 12 blocks of tall fescue and tested for endophyte infection. Each block was split into six treatments in the spring of 2009. Prior to treatment applications all blocks were soil-sampled. In the fall of 2009 each individual plot was soil-sampled. The six treatments applied to each block were:

1) Check treatment with no additional manure or fertilizer.
2) Dairy manure, 40 tons/a wet-basis, early spring application.
3) Composted dairy manure, similar rate of dry matter as with dairy manure.
4) 150 lbs/a of N fertilizer for cool-season grasses, split-applied. 75 lbs/a for switchgrass, no P or K fertilizer.
5) Recommended rate of potassium as KCl (100 lbs/a of 0-0-60) (same N rate as #4).
6) 100 lbs/a of 0-0-60 plus phosphorus at 50 lbs/a of 0-46-0. (same N rate as #4).

Soil samples were collected from each species block in early April. Switchgrass blocks were sprayed with Roundup in early spring. Both dairy manure and composted dairy manure were applied in early spring at greenup of the cool-season grasses. Samples of manure and compost were taken to DairyOne labs for analysis. Nitrogen, P and K fertilizers were applied to cool-season grasses at spring green-up. Nitrogen fertilizer applied was 100 lbs/a. N, P, and K were applied to switchgrass in mid-May, with 75 lbs N/a. Due to excessive rainfall in spring and early summer, irrigation of half of all blocks was delayed and eventually dropped as an option for 2009, as the impact of irrigation would have been minimal. This meant that we had 6 replicates per site, instead of 3 replicates of irrigated and non-irrigated plots. The expectation is that this normally droughty site will be more droughty in 2010 and irrigation will be applied to half the blocks using a reel irrigation rig.

Reed canarygrass and tall fescue were harvested July 9, 2009. The remaining 50 lbs of N fertilizer was applied following harvest. The single harvest of switchgrass was taken after frost on Oct. 16, 2009. A second harvest of reed canarygrass and tall fescue was also taken at that time. Soil samples were taken from all plots following the fall harvest. Soil samples were taken to the Cornell Nutrient Analysis lab for analyses. Plant samples from all harvests were sent to Cumberland Valley Analytical Services for analysis, results are not yet completed by CVAS in time for this report.

Results: Tall fescue stands were excellent going into 2009. Fescue tillers sampled in late summer and analyzed for endophyte infection turned out to be almost 80% infected, on average. This significantly increases the tolerance of tall fescue to stresses and has no impact on biomass quality, but would be useless as a ruminant forage source. The low-alkaloid reed canarygrass, however, had weaker stands and did not appear to be vigorous throughout the 2009 growing season. Switchgrass stands were excellent in 2009, although it took 3 years to reach that status. Weeds were effectively controlled in switchgrass with an application of Roundup just prior to switchgrass breaking dormancy in the spring. Broadleaf weeds were controlled in the cool-season grasses. A few wild grasses were present in the reed canarygrass, but this would not have a significant impact from a biomass standpoint.

Switchgrass produced the highest yields, with almost 6 tons/acre on the sand site under fertilized conditions, and almost 7 tons/acre on the clay site (Fig. 1). Tall fescue yielded reasonably well on both sites if fertilized with commercial fertilizer. Reed canarygrass was relatively low yielding on both sites, and very low yielding if commercial N fertilizer was not applied.

There were no differences among the three commercial fertilizer treatments in 2009 on either site. On the clay site that is low in soil P, there was a tendency for treatments with N and P to yield better than the N-only treatment for cool-season grasses. Manure application resulted in significantly higher yields than compost on the sand site, but not on the clay site. On the sand site, compost application yielded similar to the check.

Species reacted differently to the set of treatments, resulting in an interaction between species and treatments (Fig. 1). Switchgrass has only a modest need for N fertilization, such that the response to commercial N fertilizer was small. Switchgrass check plots yielded almost as well as all other treatments. Tall fescue and reed canarygrass, on the other hand, had a very significant response to commercial N fertilizer. The response of cool-season grasses to manure application was intermediate between checks and commercial N fertilizer treatments.

Conclusions/Outcomes/Impacts: Preliminary observations: Switchgrass can be difficult to establish, but full stands were eventually achieved. Although not currently labeled for commercial production use, the application of Roundup in the early spring was very effective in controlling weeds. The only weed that Roundup could not effectively control was milkweed. Roundup was applied after switchgrass had broken dormancy with small green tillers visible. Although the new switchgrass tillers were burned back, the Roundup had no noticeable impact on switchgrass growth and development in the spring.

Tall fescue 'KY-31' seed was not guaranteed to contain endophyte, but the company believed that the seed had a low level of fungal endophyte present. When we tested the stands during the third year after establishment, the endophyte had spread to most of the plants present, with over 90% of the tiller infected in some blocks. For biomass use an endophyte infected stand is desirable, as the endophytic fungus makes fescue more vigorous and persistent. Endophyte-infected fescue is very undesirable as a ruminant forage.

The low-alkaloid reed canarygrass 'Rival' was not very vigorous, uncharacteristic of reed canarygrass in general. We collected a large group of wild-type reed canarygrass plants from across the Midwest and Northeast (including a number of plants collected in northern NY) and identified wild, high-alkaloid germplasm that is 20-30% higher yielding than all current low-alkaloid varieties. Seed is not yet available for commercial use, but release of specific biomass varieties is anticipated.

Outreach: Another year of data collection is necessary before coming to any conclusions and distributing them through meetings and publications.

Next steps if results suggest continued work is needed in the areas of research, demonstration and/or education: To evaluate the effects of manure and compost on yield, biomass composition, and persistence of perennial grasses we will need to collect three years of data from this experiment.

Acknowledgments: We gratefully acknowledge the Cornell Agricultural Experiment Station for providing the irrigation equipment that will be used in this experiment, and for purchase of a bomb calorimeter to measure energy content of biomass samples.

Reports and/or articles in which the results of this project have already been published: Another year of data collection is necessary before making any conclusions.

Person(s) to contact for more information (including farmers who have participated:

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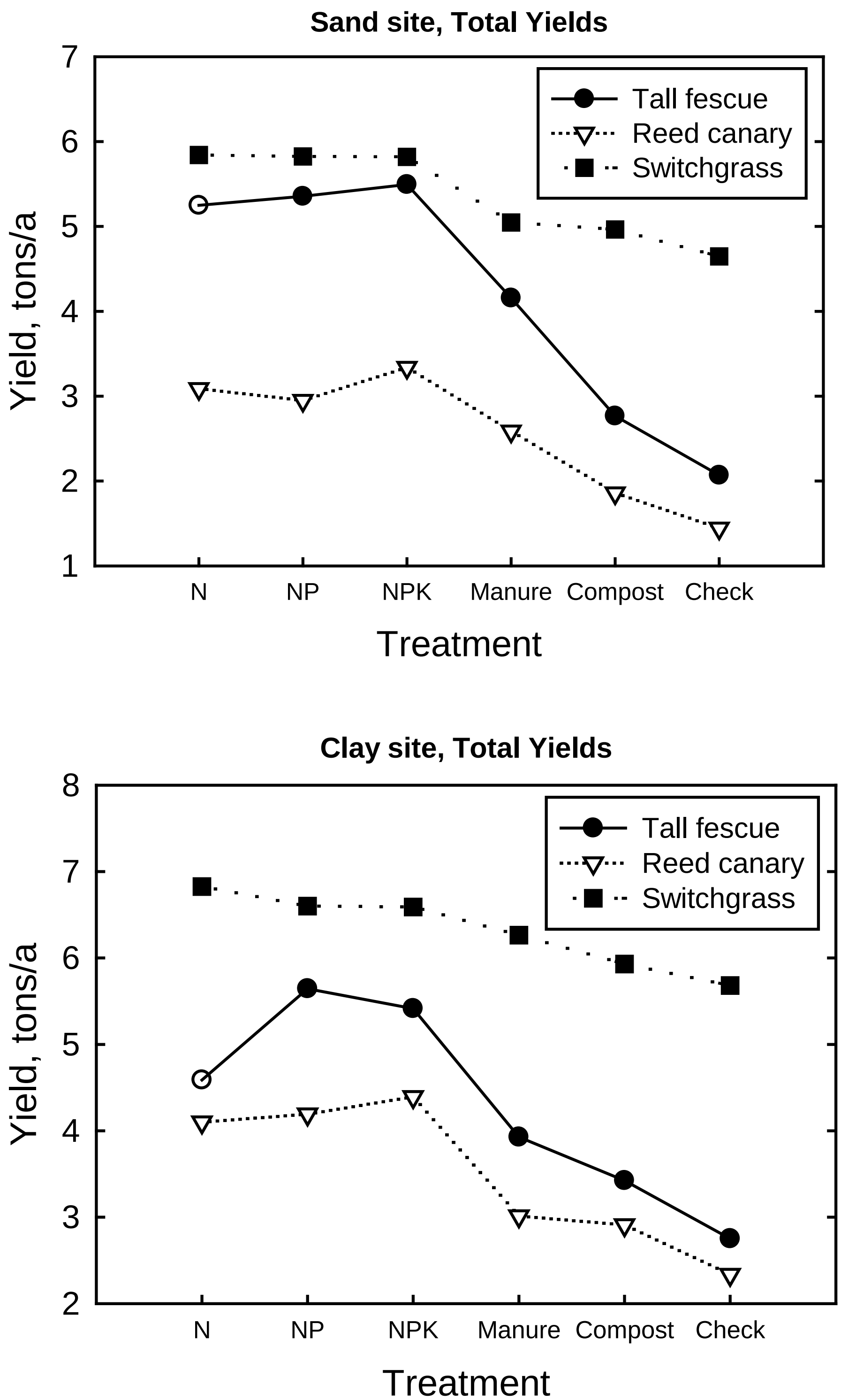

Figure 1. 2009 biomass yields of 6 treatments with 6 replications on sand and clay soils at the Cornell Willsboro Baker Research Farm. N,P, and K refer to nitrogen, phosphorus and potassium fertilization.

Northern NY Agricultural Development Program
2008-2009 Project Report

Project Title: Variety Trials for Small Grains and Food-Grade Soybeans

Project Leader: Michael Davis Cornell University Agricultural Experiment Station

Collaborators: Anita Deming, CCE Essex County;Jerry Cherney, Dept. of Crop and Soil Sciences, Cornell University Michael Hunter , CCE Jefferson County

Small Grain Variety Trials

Background: Finding varieties with solid agronomic characteristics (yield potential, maturity, disease resistance, stand-ability, quality) that are well adapted to regional growing conditions is an annual challenge for all field crop producers. Trials at the Cornell E.V. Baker Research Farm have provided NNY farmers with variety performance evaluations since the 1980's. These trials test the performance of established varieties from regional seed companies such as W.G. Thompson, JGL Inc., and Seedway, in addition to advanced lines and recently released varieties from Dr. Mark Sorrells' breeding program at Cornell.

Methods: 2008-2009 trials included 19 spring wheat varieties, 15 winter wheat varieties, one winter triticale variety, 10 oat varieties, and 4 spring barley varieties. Variety trials for spring wheat, spring barley, oats, and winter wheat were conducted at the E.V. Baker Research Farm in Willsboro, NY. A randomized complete block design was employed with three replications for each trial. Plots were located on a Rhinebeck clay loam soil with subsurface tile drainage. 200 lb/acre 6-24-24 was broadcast applied and incorporated with a spring-tooth harrow prior to planting each trial. Additionally, the winter wheat plots received a spring topdress application of ammonium nitrate (33-0-0) at a rate of 75 lbs nitrogen per acre. Plant heights, lodging scores, disease incidence, and bird damage data were collected prior to grain harvests. Grain samples from each plot were cleaned, and then tested for moisture content and bushel weight. The 2009 spring barley trial was not harvested due to extensive bird damage and lodging problems.

Results:

Winter Wheat Trial: The 2009 winter wheat trial consisted of eleven soft white (SW), two soft red winter (SRW), and two hard red winter (HRW) varieties (Table 1). Plots were planted at a 2 bu/acre seeding rate on September 24, 2008, and harvested July 28, 2009. There was no lodging and very little bird damage in the 2009 trial. Grain yields ranged from 85.9 bu/acre to 103.4 bu/acre with a trial mean of 94.6 bu/acre. Several advanced breeding lines from Dr. Sorrells' program were included in the trial and they all performed well. The two hard red winter entries, *Harvard* and *Zorro*, while predictably yielding less than the soft white and soft red varieties, also produced excellent yields. Winter grain test weights averaged 57.1 lb/bu, and moisture levels at harvest averaged 15.1%.

Table 1. 2009 Winter Wheat Variety Trial Results						
Variety	**Market Class**	**% H2O**	**Yields (bu/acre)**	**Test Weight. (lb/bu)**	**Plant Height (inches)**	**Lodging Scale 0-10**
NY03180FHB10	SW	15.3	103.4	57	39.2	0
CaledoniaRes-l	SW	15.2	102.7	57	37.8	0
NY03179FHB12	SW	14.8	100.9	56	37.1	0
E0028	SW	14.6	99.1	55	37.5	0
NY88046-7088	SW	14.7	97.9	57	41.6	0
NY03179FHB10	SW	15.1	97.6	58	38.6	0
Truman	SRW	15.2	96.7	58	36.9	0
Bess	SRW	15.6	94.9	58	35.3	0
Caledonia	SW	14.8	92.1	56	37.1	0
Cal 4PHS-10	SW	14.7	90.5	57	36.3	0
Richland	SW	14.5	90.1	56	41.2	0
Zorro	HRW	15.1	89.1	58	47.2	0
Jensen	SW	14.7	88.8	57	38.1	0
Harvard	HRW	16.2	87.1	59	39.6	0
Cayuga	SW	15.7	85.9	59	46.9	0
Trial Mean:		**15.0**	**94.6**	**57**	**39.4**	**0**

Spring Wheat Trial: Nineteen hard red spring wheat varieties were tested in 2009 (Table 2). Spring wheat plots were planted April 20, 2009 and harvested August 13, 2009. The seeding rate was 2.5 bu/acre. No lodging was observed in any of the plots and yields were markedly higher than in last year's trial with a 2009 trial mean yield of 64.1 bu/acre (compared to 43.1 bu/acre in 2008). Solid performers from past trials, including *HRS6002*, *HRS45-025J*, *Russ*, and *Hannah*, produced the highest yields in 2009. Consistently high yields with these four entries over multiple years (2006-2009) indicate that these varieties are particularly well suited to northern New York growing conditions. *Dapps* and *Coteau* produced the lowest mean yields in 2009, which is consistent with previous trial results. The continued poor performance of these two entries suggests that they are not well suited to our region and should probably not be considered for field scale production. Grain moisture readings at harvest averaged 15.4% and test weights averaged 55.4%.

Table 2. 2009 Spring Wheat Variety Trial Results						
Variety	**Market Class**	**% H2O**	**Yields (bu/acre)**	**Test Weight. (lb/bu)**	**Plant Height (inches)**	**Lodging Scale 0-10**
HRS6002J	HRS	15.5	83.0	57	45.4	0
HRS45-025	HRS	15.5	78.6	57	39.1	0
Russ	HRS	14.8	71.8	55	39.9	0
Hannah	HRS	16.0	71.4	56	42.0	0
2375	HRS	15.2	67.0	55	35.2	0
Alsen	HRS	16.1	66.8	56	34.5	0
SD45-015J	HRS	15.9	64.4	55	30.1	0
Parshall	HRS	15.7	63.9	57	41.2	0
Stoa	HRS	14.3	62.0	53	33.5	0
Freyr	HRS	15.6	61.2	55	36.2	0
HRS45-035	HRS	14.9	60.9	56	36.0	0
CM606	HRS	15.2	60.6	58	35.2	0
Butte 86	HRS	15.1	60.4	54	39.9	0
Profit	HRS	14.7	60.4	54	33.3	0
Knudson	HRS	15.7	58.2	54	30.4	0
Gunner	HRS	14.7	58.0	57	40.0	0
HRS6001J	HRS	16.0	53.6	55	39.1	0
Dapps	HRS	15.3	51.8	53	46.2	0
Coteau	HRS	14.9	50.2	53	45.7	0
Trial Mean:		**15.4**	**64.1**	**55**	**38.4**	**0**

Oat Trial: The 2009 oat trial was planted April 20, 2009 and harvested August 13, 2009. The seeding rate was 3 bu/acre. Lodging was not a significant problem in 2009 as *Blaze* exhibited the most lodging with a mean rating of 3 on a scale of 0-10, with 10 equivalent to 100% lodged (Table 3). Mean yields ranged from 81.5 bu/acre to 128.4 bu/acre with a trial average of 114 bu/acre. *Baker*, *Blaze*, *Esker*, *Excel*, *Ogle*, and *Spur* all produced high yields, while *Woodburn* and *Rodeo* performed relatively poorly. Grain moisture levels at harvest averaged 11.9%

Table 3. 2009 Oat Variety Trial Results

Variety	**% H2O**	**Yields (bu/acre)**	**Test Weight. (lb/bu)**	**Plant Height (inches)**	**Lodging Scale 0-10**
Baker	12.0	128.4	31	47.2	0.3
Blaze	11.7	127.6	34	45.8	3
Esker	11.5	126.2	30	46.3	0
Excel	12.1	125.2	32	42.4	0.3
Ogle	12.0	123.6	31	46.2	0.6
Spurs	12.1	120.5	33	41.3	1.3
Newdak	12.2	109.1	30	49.5	1
Robust	11.8	105.5	31	45.4	0
Woodburn	13	93.0	32	43.8	0
Rodeo	10.6	81.5	26	52.9	1.3
Trial Mean:	**11.9**	**114.1**	**31**	**46.1**	**0.8**

Food-Grade Soybean Variety Trial

Background. Demand for high quality food-grade soybeans continues to grow, and the establishment of a regionally located soybean food processing business (Vermont Soy) could serve as a solid market for organic growers in the area. Northern New York farmers have considerable experience growing grain-type soybeans and could enhance their profit potential by incorporating food-grade soybeans into their crop rotations. If growers are going to be successful with food-grade soybean production, it is essential that we identify food-grade varieties that are well adapted to northern New York growing conditions and meet the quality specifications of requirements of processors.

Methods. Thirteen commercially available food grade soybean varieties were included in the 2009 trial. A randomized complete block experimental design with four replications was employed. Food grade soybeans were grown on tile drained, certified organic fields with a Rhinebeck clay loam soil at the Cornell University E.V. Baker Research Farm. Plots were 10' wide and 20' long, and consisted of four rows with a 30" spacing between the rows. Target planting depth was 1" and all seed was inoculated with the appropriate *Rhizobium* sp. prior to planting. Plots were seeded June 4, 2009 and harvested October 12, 2009. Weed control measures included cultivation with a rotary hoe (two passes in opposite directions) when the plants were approximately 4" tall and had their first set of true leaves, and an additional between row cultivation with sweeps in midsummer (sweeps were mounted on an Allis Chalmers G tractor). Prior to harvest plant heights and the height of the lowest pod were recorded for each plot along with a lodging score.

Results. Twelve of the thirteen entries in the 2009 trial were first year entries that represent the next generation of food-grade varieties. The trial performance as a whole was superior to the 2007 and 2008 trials as the mean yield in 2009 was 52.4 bu/acre compared to 48 bu/acre in 2008 and 41.5 bu/acre in 2007. Relatively high yields in 2009 were observed in spite of a late planting date (June 4). *Acora* and *PR807228* had the highest yields while *1F44* (the lone carryover from previous trials) and *Korus* produced the lowest mean yields (Table 4). *Vinton 81*, the traditional standard food-grade variety also yielded well. No lodging was observed in the plots (Photo 1). Average grain moisture level at harvest was 12.2%.

The height of the lowest pod on the stem is an important issue at harvest time because it can be difficult for combines to pick-up low hanging pods. Average low pod heights ranged from a low of 7.5cm in *1F44* to a high of 11.4cm in *Vinton 81*.

A second year of testing on these food-grade soybean varieties is needed to better establish relative performance. It would also be interesting to see how these varieties yield when they are planted on a more favorable date.

Table 4. 2009 Organic Food-Grade Soybean Variety Trial Results

Variety	% H2O	Yields (bu/acre)	Plant Height (cm)	Low Pod Height (cm)	Lodging Scale 0-10
Acora	12.1	66.0	61	9.6	0
PR807228	13.6	63.8	56	10.0	0
10F8	11.4	57.3	54	9.3	0
Naya	12.4	56.7	43	7.7	0
Vinton 81	13.3	56.6	62	11.4	0
Destiny	11.8	54.9	52	9.3	0
PR8072A3	11.2	52.8	50	8.5	0
PR717917	12.8	52.4	48	9.1	0
Nova	12.1	49.4	46	10.5	0
Oria	12.8	47.6	49	8.9	0
Venus	11.9	47.6	51	8.0	0
1F44	11.3	39.0	46	7.5	0
Korus	12.6	37.0	40	8.5	0
Trial Mean:	**12.2**	**52.4**	**51**	**9.1**	**0**

Photo 1. 2009 Organic Food-Grade Soybean Variety Trial at Harvest.

Heritage Wheat Variety Trials

<u>Background.</u> As an outgrowth of the local foods movement, there is increased interest on the part of millers, bakers, and consumers in regionally grown and processed “heritage” wheat varieties that may have unique flavors or other defining quality characteristics. In an effort to explore the potential for heritage wheat production in New York, Elizabeth Dyck at NOFA-NY obtained several heritage varieties of winter wheat from Mark Sorrells’ breeding program at Cornell University, and spring Emmer wheat from North Dakota State University. Additionally, seed of *Red Fife*, a land-race that has been established in parts of Canada, was obtained from a grower in Vermont (Jack Lazor at Butterworks Farm). In collaboration with Elizabeth Dyck, heritage winter and spring wheat trials were conducted on the Cornell E.V. Baker Research Farm.

Heritage Winter Wheat

<u>Methods.</u> Eleven heritage varieties and ten modern varieties were included in the 2009 heritage winter wheat trial. Limited quantities of seed restricted the trial size to two replications. All plots were 6’ x 16.5’. Modern varieties were planted at a 2 bu/acre (120 lbs/acre) seeding rate. *Clarks Cream* was an exception as it was planted at 75 lbs/acre. Recommended seeding rates for the heritage varieties was much lower and two seeding rates were evaluated for each heritage variety: 95 lbs/acre (high rate) and 47 lbs/acre (low rate). The trial was conducted on a Rhinebeck clay loam soil with subsurface tile drainage. Organic production practices were followed, but the field was not certified organic. The plots followed three years of alfalfa/timothy sod and one year of spring grains in the rotation. Plant heights, lodging scores, disease incidence, and bird damage data were collected prior to grain harvest. Plots were planted on September 24, 2008, and harvested on July 28, 2009.

<u>Results.</u> The heritage varieties tended to produce taller, larger plants, and lower yields than the modern varieties (Figure 1). *Yorkstar* was a notable exception as it had the highest average yield in the trial. While it was shorter than most of the other heritage varieties, *Yorkstar* was taller than most of the modern entries (Tables 5a & 5b). Many of the heritage varieties yielded better and had less lodging at the lower seeding rate indicating that a 47 lb/acre rate is preferable to a 95 lb/acre rate. Moisture levels at harvest and test weights were very similar for the modern and heritage varieties.

The tall, competitive features of many of the heritage varieties may be advantageous in organic management systems where weed control options are more restricted.

Figure 1. Comparison of average heights and yields between modern and heritage winter wheat varieties in 2009.

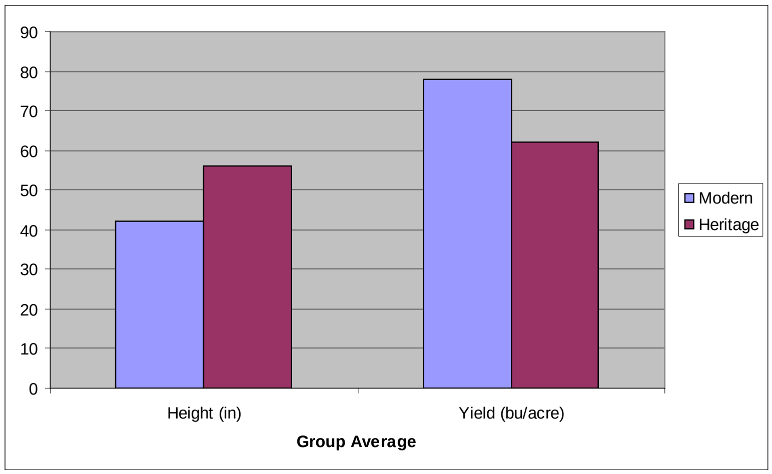

Table 5a. 2009 Heritage Winter Wheat Variety Trial - Heritage Variety Results						
Heritage Variety	**Seeding Rate**	**% H2O**	**Yields (bu/acre)**	**Test Weight. (lb/bu)**	**Plant Height (inches)**	**Lodging Scale 0-10**
Honor	High	15.2	57.7	55	60.6	9
Honor	Low	14.6	74.1	56	59.1	2
Yorkstar	High	14.5	94.2	56	50.4	0
Yorkstar	Low	15.2	82.8	56	50.0	0
Grandprize	High	15.8	57.4	58	61.4	6
Grandprize	Low	15.3	66.7	57	53.1	1
Yorkwin	High	14.9	44.8	56	60.6	9
Yorkwin	Low	14.9	37.6	57	60.6	8
Goldcoin	High	15	28.9	56	52.0	9
Goldcoin	Low	15.9	64.5	58	54.3	0
Genesee Giant	High	14.8	60.2	59	51.2	0
Genesee Giant	Low	16	58.1	56	53.5	1
Avon	High	14.7	10.3	Missing	50.0	10
Avon	Low	15.6	74.8	57	58.7	0
Valprize	High	15.1	64.8	58	58.3	3
Valprize	Low	16.1	60.0	58	55.5	2
Forward	High	14.9	56.2	58	59.1	6
Forward	Low	16.5	74.2	58	52.0	0
Pride of Genesee	High	15.8	42.8	58	69.7	9
Pride of Genesee	Low	16.7	61.5	58	65.4	7
Genesee	High	14.2	60.7	57	59.1	7
Genesee	Low	15.3	67.6	56	55.1	6
Trial Mean:		**15.3**	**59.1**	**57**	**56.8**	**4.3**

Table 5b. 2009 Heritage Winter Wheat Vareity Trial – Modern Variety Results					
Modern Variety	**% H2O**	**Yields (bu/acre)**	**Test Weight. (lb/bu)**	**Plant Height (inches)**	**Lodging Scale 0-10**
Jensen	14.6	82.7	57	40.2	0
Purcell	15.2	70.2	57	47.8	3
Geneva	14.3	81.6	57	42.5	0
Houser	14.5	69.4	53	42.5	0
Caledonia	14.9	82.2	55	37.0	0
Caledonia-resel.	15.6	89.7	57	42.3	0
Cayuga	15.5	76.6	59	46.5	0
NY Batavia	15.3	83.8	56	41.1	0
Richland	15.6	63.1	55	39.4	0
Clarks Cream	15.3	68.3	58	48.6	0
Trial Mean:	**15.1**	**76.8**	**56**	**42.8**	**0.3**

Photo 2. High seeding rate *Yorkstar* plot in the 2009 Winter Heritage Wheat Trial on the E.V.Baker Research Farm.

Heritage Spring Wheat

<u>Methods.</u> *Red Fife* (hard red spring wheat) and seven emmer wheat varieties were included in the 2009 heritage spring wheat trial. The trial was conducted on a Rhinebeck clay loam soil with subsurface tile drainage. Organic production practices were followed, but the field was not certified organic. The plots followed three years of alfalfa/timothy sod in the rotation and no fertilizer was added. A randomized complete block design was employed with three replications for each entry. Emmer varieties were seeded at 100 lbs/acre, and Red Fife was seeded at 120 lbs/acre. Plots were planted on April 20, 2009 and harvested on August 13, 2009. The trial was scored for lodging, bird damage, disease incidence and plant height prior to harvest.

Results. Note that the yields reported for the emmer varieties include the hulls (Table 6). All the emmer entries had terrible lodging problems, and as a result it is difficult to derive any meaningful conclusions from the yield data. Extensive lodging with the emmer varieties indicates that the seeding rate was too high and/or there was too much fertility associated with the plowed down alfalfa/timothy sod. It will be important to understand the effects of fertility and plant population on emmer wheat production if it is going to be viable for commercial production (Photo 3).

Red Fife yields averaged 34.5 bu/acre. The relatively low yield may be largely due to bird damage in the *Red Fife* plots. Red Fife did not have lodging problems, but since it was the only non-hulled entry in the trial, the birds focused on it and did extensive damage. An additional year or two of testing is needed to assess the performance of Red Fife in the northern New York region.

Table 6. 2009 Heritage Spring Wheat Trial Results

Emmer Variety	**% H2O**	**Yields lb/acre (w/hulls)**	**Plant Height (inches)**	**Lodging Scale 0-10**
Bowman		2147	44.2	9
Red Vernal		2435	45.8	9
Common H		2187	45.7	9
Common R		2304	43.0	9
Lucille		2590	50.5	9
Common M		2120	46.5	8
ND Common		2174	45.8	9
Trial Mean:		**2280**	**45.9**	**8.8**
		Bu/acre		
Red Fife	9.3	34.5	51.3	1.5

Photo 3. *Lucille* emmer wheat plot in the 2009 Spring Heritage Wheat Trial on the E.V.Baker Research Farm.

Outreach. Tabulated trial results are posted on the Northern New York Agricultural Development Program website www.nnyagdev.org and in the variety trial section of the online journal Plant Management Network www.plantmanagementnetwork.org. Results were also presented during research farm field days, regional extension meetings and workshops.

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