2012 NE SARE Farmer Grant
COVER SHEET

Project Title	Cold Climate Grapes- Increased Sustainability through Improved Yield and Quality
Proposal Number	FG12-006
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SARE Request	$14,819
Project Duration	Apr 1, 2012 - Mar 31, 2013
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Project Summary

Due to the harsh climate of the Northeast, the quality and yield of cold climate hybrid wine grapes often suffers, limiting their value for making quality wine. The aim of this project is to improve the quality of those wine grapes along with increasing yields for improved vineyard sustainability. This project seeks to investigate which training systems may be best suited to raise yields and quality. Since vigor of the variety may influence this, I seek to implement this trial using two examples of low to medium vigor varieties along with two medium to high vigor varieties. This study will utilize a white variety and a red variety of these two vine vigor types, on four different training systems with three repetitions of 9 vines each. Two systems will use a single canopy system and two will use a double canopy system. This project involves 432 vines using a vineyard block specifically planted in 2009 in anticipation of this proposed study. Data collection will be for a one year period in year 4 (2012) of the block. If results are similar to this years' harvest (2011), the information has the potential to vastly increase profitability and ultimately sustainability of vineyards in this region. During the project I will share the progress and findings through two demonstration meetings as well as passing on the information to Cooperative Extension Personnel for use at other meetings. I anticipate dissemination through a newsletter, a website, online forums and print articles.

Project Title:

Cold Climate Grapes- Increased Sustainability through Improved Yield and Quality

SARE request: $14,819

1. What is the problem and why is it important?

Wines made in the colder regions of the Northeast have been unprofitable due to low yield and questionable grape quality. Up until recent years there were few wine grape varieties available to withstand our cold Northeast climate that were capable of making good wine. With the development of cold climate hybrid wine grape varieties from the University of Minnesota and other breeders that is changing. However when these breeders release these new grapes, they are not released with any recommendations to guide growers towards appropriate viticultural practices for optimizing yield and quality. The Northeast has been seeing increasing interest in growing these hybrid wine grapes, but the quality of the grapes grown has typically been on the low side due to high acid levels. The lower quality of the wine made from these grapes along with low yields has discouraged growers from expanding and stalled development of a viable wine industry.

We now have multiple varieties of cold climate grapes available for use in the Northeast and other cold climate areas but little work has been done in studying the cultural practice of using the proper training systems in enhancing those varieties. In older hybrid winegrape cultivars, research has repeatedly demonstrated that both high yields and high quality can be simultaneously obtained. Through selecting a properly matched training system to these cold climate varieties the quality and yields might be improved and allow for profitable use of these grapes for wine. This has the potential to be adopted in many cold climate areas of the Northeast such as in the Thousand Islands, Champlain Valley and Capital District regions of New York, all of Vermont, New Hampshire, and Massachusetts. Other areas of the country such as Minnesota, Michigan, Nebraska and other colder areas could also adopt these practices.

 I look to build on the work begun with my previous two NE SARE Grants, FNE09-662 and FNE10-691. Those studies both showed differences in yield and quality from using different training systems and canopy management. The results were extremely encouraging but limited in scope. By continuing the study with slightly altered focus and increasing the repetitions and varieties of grapes involved, I look forward to generating new information specific to the new varieties included (Petite Amie, St. Pepin, Marquette and Mn1200). If the data collected further substantiates the results of the last two grants, many growers might potentially adopt these training systems, which may enhance the economic viability of winegrape production in cooler regions. I have had contact with vineyard growers from as far away as Missouri expressing interest in my methods and results so far.

 I will continue measuring differences between systems for quality, yield and labor involved so that a profitable crop of wine grapes may be harvested and turned into the more valuable quality wine. This measurement and data collection is very important for growers to have confidence in the methods used for a trial or adoption in their own vineyards.

2. What efforts have been made by others to solve the problem?

Dr. Richard Smart and Mike Robinson, the authors of "Sunshine into Wine" have demonstrated that through proper canopy management and use of split canopies the quality of the grapes grown can be improved. This work was done in much warmer climates using warm climate vinifera grapes. This proposal would transfer that work into colder climate hybrid grape varieties.

Research work is ongoing in canopy management in NY. Dr. Justine Vanden Heuvel of Cornell has been examining canopy management to improve wine grape quality using cool climate grapes. Those varieties are suited for the Finger Lakes and warmer regions of NY. Her research interests include cultural practices and physiology affecting development of flavor and aroma profiles in wine grapes. She works with growers in the Finger Lakes and other areas and is using vineyards at several locations in a collaborative manner as well as plantings at the Geneva Experiment Station. This work has the potential to result in higher quality wine grapes. It is the aim of my study to incorporate some of those same goals and adapt it to the harsher climates and also the hardier Cold Climate varieties that are better suited to the more northerly areas or the Northeast and Midwest. Dr.

Vanden Heuvel has agreed to act as my technical advisor for this study.

A multi-state group of researchers has won an SCRI grant for working with cold climate grapes entitled "Northern Grapes: Integrating Viticulture, Winemaking, and Marketing of New Cold-Hardy Cultivars Supporting New and Growing Rural Wineries". One of the goals of the grant is applying appropriate viticultural practices to achieve consistent fruit characteristics for winemaking. This incorporates a couple small scale training system trials to study their possible influences on quality. Tim Martinson of Cornell Viticulture Extension is one of the lead investigators and is helping out with Extension outreach for my project if it is funded also.

Work done at the Cornell Baker Farm in Willsboro NY through the Northeast Fruit Program spearheaded by Kevin Iungerman has been helping to investigate some of the best practices for growing profitable cold climate grape yields. That vineyard has served as a template for regional growers. Yield data has been an integral part of the Willsboro Trial and demonstrates to growers what is attainable to them, but has been limited to a single training system for 25 varieties. I have been involved in that vineyard for several years and was the vineyard field technician responsible for carrying out most of the practices. We have observed that the Top Wire Cordon training system used there is not always the best fit for many varieties as it was originally developed for varieties with a drooping growth habit- which many of the new hybrid varieties do not have. The vineyard was originally laid out as a variety trial so does not lend itself to extensive training systems trials. This project I am proposing looks to expand on the work done at Willsboro, in a vineyard specifically designed with a training system trial in mind.

The work I have done with FNE09-662 and FNE10-691 has yielded data that has attracted attention, but has been limited in scope. Those projects only compared three varieties using two training systems on a single repetition. Because of this there is limited confidence to adopt the practices as should be the case. This new grant looks to continue this work on a larger scale with the potential to yield even more valuable data since it incorporates four varieties and four training systems with three repetitions. That would build confidence in the reliability of the data and help promote its acceptance.

3. How will your project fit in with your farm operation?

I began farming in 1974 upon graduation from SUNY Cobleskill with an AAS in Agronomy - Plant Science, forming my own business Lamoy's Produce. It was and still is a small vegetable farm of 40 acres, currently owned and run by my brother Douglas. Since 1992 I have operated my current farm, Hid-In-Pines Vineyard, as a part time business on the west side of the original family farm. In the beginning we grew vegetables for retail sale at the local farmer's markets and had a roadside stand at the current location. In 2006 I expanded grape production to include a number of the cold hardy hybrid wine grape varieties also being grown in Willsboro at the Cornell Baker Farm Cold Climate Research Trial. The work from this grant will help me determine the most profitable way to grow the crop of grapes. I currently have three acres of vines and will be planting an additional three and a half acres of vines in the spring of 2012. These vines are aimed at growing a higher quality wine grape and resulting wines. By matching the training system of trellis and the proper canopy management, I hope for increased yield AND quality as measured by higher soluble solids and lower total acidity at harvest using less labor. As a result of the studies, I will be adopting the best combination for the varieties in those trials to get a much greater return from my current and future plantings.

I successfully obtained the necessary licenses and permits in 2010 to begin operating as a farm winery named Hid-In-Pines Vineyard. This allows me to increase the value of the grape crop by converting it into a finished wine for retail sale. I currently market in my Tasting Room, five farmer's markets in the area targeting tourists, and limited sales to liquor stores as a wholesaler of my own wines.

The past grants allowed me to determine the best practices, for the varieties involved, to be grown to increase the quality and yield. This proposed grant will lay the groundwork for additional results on several more varieties. That knowledge will lay the foundation for the expanding vineyard with the best match of variety and training system to provide profitable crops to supply my new winery. This same model can be adopted by other Cold Climate Vineyards to increase the sustainability of their farm vineyards and wineries.

The outreach portion of the grant will help increase awareness to the vineyard and winery and create extra traffic that will help raise demand for my product and increase profitability of the farm. Past outreach meetings and visiting growers have introduced many dozens of potential customers to the farm. Helping the future growers determine more profitable growing practices benefits my farm because they will become possible future sources of quality grapes for the winery. It also helps grow the community and region and contribute to a better way of life for all.

4. What will your methods be?
The project will be implemented for one (1) year in order to collect data of this training system trial.

The purpose of my project is to study the feasibility of increasing yield and quality of cold climate hybrid wine grapes through matching training systems for the vigor type of the varieties grown. This will utilize hybrid wine grape varieties well suited to the Northeast. This project will build upon information gathered in two past years (2009 and 2010) using the existing vineyard on the farm for the study. It is my goal to collect useful data to be shared with others through in field meetings, flyers and posting to an online forum and my vineyard website www.hipvineyard.com . Since the data and procedures were so promising those two seasons with FNE09-662 and FNE10-691, the project is seeking further funding with this current grant application. I planted an additional trial vineyard in 2009 anticipating this study comparing 4 cold hardy varieties- 2 reds and 2 whites (108 vines each or 432 vines total). There is a low/medium vigor red (Mn1200), low/medium vigor white (Petite Amie) and a med/high vigor red (Marquette) and med/high vigor white (St. Pepin). This past year the trellis training systems were put in place and the vines trained to them. This provides the opportunity to demonstrate to other farmers some ways to establish trellising and train the vines to it. This initial structure and training is a very important first step towards improved yields and quality. There are four training systems implemented for each variety with three replications of each. There are two single fruiting wire systems (either cane or cordon) and two split systems with two fruiting wires. By demonstrating these, other area vineyards have been and will be exposed to the differing systems they might not otherwise be familiar with especially the Scott-Henry and the Modified Geneva Double Curtain of my own design. They will be able to visualize the planning and training processes that went into the systems used in the trial project.
Summary of the Systems-
1)Single Canopy
A)Top Wire (High Wire) Cordon - TWC
B)Vertical Shoot Positioned (Mid Wire Cordon) - VSP

2)Double-Split Canopy
A)Modified Geneva Double Curtain - MGDC
B)Scott-Henry
All four of the varieties are included in each row. There are three vines per panel between posts set 20 feet apart (vine spacing 6.66 feet), with three panel repetitions in each row. The rows are set at 9 feet apart. Please see the attached sheet showing the layout for a more clear understanding of this. The 4 training systems are next to each other and the whole layout is repeated three times. The soil transitions from end to end and side to side, so each variety of grapes is on a variety of soil types ranging from sandy loam to clay loam. This layout will provide a soil profile most regional growers can relate to on their own farm.

All grapes will be monitored for proper growth and development during the growing season and cultural methods (sprays and weed control) will be as close as possible. If warranted shoot thinning will be done to reach target number of clusters. All repetitions will be handled the same way. Leaf pulling will be done to open the canopy up and help reduce fungal pressure and needed sprays, thus having less environmental impact. The time needed to implement the different training systems will be logged for the various operations needed for the particular system. A log will be kept for each system of each variety.

The ripeness will be monitored by a combination of brix (to measure soluble solids), pH, and TA (total acidity). Samples of 100 grape berries will be collected from each repetition of each variety (12 rows x 4 varieties= 48 samples) every week to 10 days beginning mid to late August through picking. This will provide 4-6 sample collection periods. The 100 grape samples will be collected in zip lock type bags, crushed and used for samples. Prior to crushing, the samples will be weighed to provide average grape berry weight. Electronic testers will be used for measuring the pH and TA (acids) at the vineyard. Brix (soluble solids/sugars) will be measured with a refractometer.

Maximizing return and quality demands that results of any testing be available quickly so on-farm testing will be used. When optimal ripeness and quality is reached, the grapes will be harvested by variety and all grapes

weighed and recorded on a per vine basis along with a cluster count. This weight and cluster count information is useful in determining the potential of the variety to produce fruit on that system, as well as the number of retained buds at subsequent dormant pruning. This process was used these past years with FNE09-662 and FNE10-691 and was very useful in putting values to the yields and quality obtained for comparative and analytical purposes. This process was also used in the Willsboro Cold Hardy Grape Trial and the information shared through newsletters and the field pruning educational seminars.

By measuring and recording results for each variety trained to the four different systems, the best training system or systems can be determined for each grape type. This assumes that there will be a "best method or system" for each type, such as low vigor white wine grape. This may or may not be the case and is what this training system trial is to determine.

5. How will you measure results?
The results of the trial will be measured using both quantity and quality, testing each variety on each training system. Wine grape quality will be measured through a combination of measurements through the use of brix (measuring soluble solids), pH (to make sure it is in the proper range for the type of wine style and longevity in bottle) and TA (for an acceptable level of total acids for the style and finish of the wine). The brix will be measured using a refractometer and later a hydrometer at crush. The pH is measured with a digital pH meter being calibrated as necessary to ensure accuracy. The TA will be measured with the Hanna HI-84102 digital test meter.

Quality grapes also need to be relatively free of disease and insect damage. Openness of the canopy will be evaluated, scored and logged. Any disease or insect damage will be checked visually and scored on a linear scale and recorded. This information can be used to see what effect the degree of openness (for less disease pressure and ripening) and insect damage can have on the quality of the fruit. The IPM principal of balancing the degree of damage tolerable while maintaining quality helps lower the number of sprays needed and lessen environmental impacts. This method has been used in the past three years in the vineyard and, even with wet summers, allowed the number of sprayings required to be lowered from the typical average of 12 down to 6 for the year – a savings of 6 sprayings. This can greatly increase environmental and economic sustainability.

For maximum profitability you need a combination of quality and quantity. It does no good to get 20% more money for the higher quality crop if you only get 50% of the yield. I will perform a simple economic analysis using a spreadsheet where the average price per ton, and yield in each system are input to calculate how much money you need on a per ton basis to make up for any lost yield. The greater the yield while keeping acceptable or higher quality, the greater the return. Yield will be measured by gathering weights per individual vine using a digital scale at harvest. All weights will be recorded per vine for each training system and will be logged for further data evaluation. Each vine will have the clusters counted to determine average individual cluster weights and total vine weights of all vines. Getting solid data is extremely important for the report. I will be collecting much of the sample data along with an assistant field technician in the vineyard. We will also conduct all the lab testing procedures using standard practice procedures and equipment. Anita Deming of Essex County Cooperative Extension will assist in statistical analysis of the data. Summaries of the findings will be tallied and distributed at the end of the project study in the final report.

6. How will the results of your project help farmers in the Northeast?
This project is aimed at improving hybrid wine grape quality and yield to increase the value of the crop while possibly reducing input needs such as labor and spray material. The utilized training systems aim at opening up the canopy foliage. Open foliage increases airflow to decrease disease and insect pressure. This could help to minimize the environmental impact by lessening needed spray applications while maintaining or increasing quality and yield. This will help in lowering the potential for pollutants entering waterways to help protect our natural resources. Past results from the previous two grants demonstrated this and I look to further validate this with this continuing project. Like previously mentioned, I was able to reduce the number of required sprays to get adequate control.

Additionally, improved wine grape quality would help increase the gross income for farmers and increase the net income due to higher prices received along with the possibility of less labor and input costs. Through

dissemination of the study results, other farmers will have an increased awareness of cultural methods that may be employed to attain better economic returns in their own vineyards while simultaneously lessening impacts on sensitive environmental areas. A number of other growers have expressed interest in adopting my methods here but were advised to move cautiously until this information can be further validated.

This trial has the potential to increase yield of these higher quality grapes, simply by choosing one type of training system over others. In this past season's harvest (2011) in the trial vineyard's first year of bearing there was up to a 250% yield increase in Marquette grapes using the Mod GDC system over the TWC, VSP and Scott-Henry. Yield increases were seen in other varieties as well. So far that information is anecdotal. The grant will help validate or refute these results.

This trial will yield new information farmers and growers can implement in their vineyards. Previously trellis recommendations for training systems have been solely based on charts of general growth habit of upright or drooping. When the trial is over, growers can review the data collected and make visits to the vineyard to better understand how matching certain grape varieties to training systems may increase yield while maintaining or improving the quality of those harvested grapes.

In summary, the project will help other farmers in the Northeast by reducing pollution of resources, increasing productivity, reducing costs and increasing net farm income. Water quality may be improved because of fewer needed sprays. Quality of life may be improved for the vineyards, employees and the farm community.

7. What is the outreach plan?

This project will be shared through several methods including but not limited to:
1) Onsite Meetings
2) Networking with Cooperative Extension meetings and personnel
3) Printed and online material
4) News Media

1) Two onsite meetings will be conducted   to demonstrate to other growers and Extension personnel the methods used in the project's planning, establishment, training, pruning and canopy management. They will also show methods used for measurements and data collection. These meetings will be planned in consultation with growers and associations such as Lake Champlain Wines (LCW) the Seaway Vine and Viticulture Association (SVVA), and the newly formed Upper Hudson Valley Wine and Grape Association. Announcements will be sent out through e-mail contact to members when possible or by contacting those association organizers along with announcements in the local press.

2) It is anticipated that Extension personnel will be a resource for these meetings through the auspices of Kevin Iungerman and Cornell Cooperative Extension NENY Fruit program and Tim Martinson, Senior Extension Associate of the Statewide Viticulture Program at Cornell. The project at my vineyard will help demonstrate the above practices in a practical application to the attendees.   This would continue on the education of attendees begun in 2009 and 2010 at several formal and informal field meetings in the vineyard. Anita Deming, Association Executive Director of Cornell Cooperative Extension of Essex County will assist me in the planning of these meetings. Amy Ivy who is the Fruit and Vegetable Specialist for Clinton and Essex Counties will also help out with the meetings and dissemination of information.

3) I will produce two printed summations of the project. The first will include the initial planning, trellising and training of the trial plot. The second will include data collection and summaries of the findings and may be in the form of the final report. These will be handed out at the onsite meetings and made available to Extension offices throughout the Northeast and others as requested. Anita Deming will also assist me in the statistical analysis of data and dissemination of the reports in the Town and Country and on the cce-cold-country-viticulture list server of 100 Northern NY and area grape growers and prospective growers. I will also post these reports on my website www.hipvineyard.com .

4) The media will be used to get general information and announcement of meetings out to the general public when possible. I will also contact Newspapers and Magazines of the Northeast offering them both press-releases

and the opportunity of site visits and interviews. In 2009 and again in 2010 multiple articles were written by the media about my projects which helped promote the potential growth of the grape and wine industry. These took the form of articles in the local press and online.