VineBalance 2022 - Version 2

Edited by Chris Serra and Whitney Beaman

Introduction to VineBalance

This workbook is designed to provide grape growers in New York and other regions of the northeastern United States with guidance in evaluating and adopting best management practices that minimize environmental impacts, reduce economic risks, and protect worker health and safety. These practices include: soil management to reduce erosion, runoff and leaching; use of integrated pest management (IPM) practices for insect, disease, and weed management; nutrient management, with a particular focus on nitrogen use; pesticide management and spray technology; and cultural practices used in viticulture.

Viticulture in New York and the Northeast is diverse. Wine and juice grape varieties are drawn from three general classes of cultivars - native *Vitis labrusca* type grapes, *Vitis vinifera*, and interspecific hybrids (also known as 'French Hybrids'). These cultivars have different growth habits, training systems, and disease and insect susceptibility, and are grown for different markets – from commodity-priced bulk wine and juice grapes to premium estate grown wine grapes. Moreover, the major grape growing regions – Champlain Valley, Finger Lakes, Hudson River Valley, Lake Erie, Long Island, and the Niagara Escarpment – have unique soils, slopes, and climates that greatly influence 'best management practices'.

The impetus for developing this workbook came from industry groups across New York State – from juice grape cooperatives and large wineries based in the Finger Lakes and Lake Erie to the small-winery segment in the Finger Lakes and on Long Island. All of these groups, represented on the steering committee, were looking for a way to promote and document the use of sustainable production practices by growers, processors and wineries.

The workbook's format and content evolved from three previous efforts. The first VineBalance workbook in 2007 was developed using The Long Island Sustainable Viticulture Program draft workbook developed by Cornell Cooperative Extension of Suffolk County and the New York Agricultural Environmental Management (AEM) vineyard worksheets developed by the Cornell Cooperative Extension Finger Lakes Grape Program and the Yates County Soil and Water Conservation District. This workbook represents a synthesis of these three previous efforts, as well as standards drawn from other respected certification programs. The workbook is designed to serve as a reference for all growers across New York – from bulk Concord and hybrid producers to premium V. vinifera growers.

Acknowledgements

Thank you to the authors of the VineBalance Grower Self-Assessment Workbook (2007) and the VineBalance Long Island Grower Self-Assessment Workbook (2015) for providing the foundation for this version of the workbook and paving the way for regional adaptation: Alice Wise, Tim Martinson, Jamie Hawk, Tim Wiegle, and Libby Tarletan.

Thank you the authors of the PA VinES Grower Self-Assessment Workbook (2017) for deepening the foundation around native and hybrid grape varieties: Andy Munza, Tim Weigle, Luke Haggerty, Kevin Martin, Bryan Hed, and Jody Timer.

Thank you to our 2021-2022 Technical Review Committee for asking the tough questions and testing the rigor of our standards: Justine Vanden Heuvel, Hans Walter-Peterson, Jennifer Russo, Tim Martinson, and Tom Eskildsen.

Thank you to our 2021-2022 Grower Sustainability Advisory Committee for countless hours of review, debate, and pragmatic feedback: Norliah Asma-Kalmar, Paul Brock, J Steven Casscles, Mike Colizzi, Ria D'Aversa, Jordan Harris, Cameron Hosmer, Suzanne Hunt, Rich Olsen-Harbich, John Ingle, Andrew Knight, Duncan Ross, Matt Schrader, Matthew Spaccarelli, John Wagner, and Josh Wig for their many contributions.

We hope this workbook will provide grape growers throughout New York with a valuable resource for identifying and adopting practices that protect the environment, reduce economic risk, and protect workers' health and safety.

Editor's Note: Chris Serra, Executive Director of LIVE

I am quite thrilled about the good work your industry is about to undertake.

My view of sustainability has expanded over the past few years from one of stewardship and conservation to one of an intense active improvement the lands and social conditions with which we interact. Further, I believe those of us who participate in good faith in this work must do so in a way that doubles and triples our past efforts. There is a critical urgency in our time and there exist good workable solutions to address these problems.

The serious environmental and social issues that exist as of the writing of these standards are well-known and can be dispiriting. I believe we must now move on from this deep feeling of despair to one of imagination, solutions, and an inclusivity. Industries tend to be careful with adopting new ideas and changing. What I appreciate about the grape industry is that it is a small (yet global), agile, and collaborative community that encourages movements away from agricultural status quos when they no longer serve to be healthy.

The work in these standards have been carefully stitched together from fine scientific minds and proven research. It is all available for us, right now. The job of certifying bodies is to aggregate this work, present it in an auditable and transparent format, and to get growers excited about improving their farms, crops, and communities. I hope that we have accomplished that, because our futures, especially those of marginalized communities, depend on getting this right. From my wonderful experiences working with grape growers around the world, I have every confidence we will.

LIVE is a 501(c)(3) not-for-profit certification of sustainable winegrowing in the Pacific Northwest. Chris Serra has been with LIVE since 2007.

Editor's Note: Whitney Beaman, Sustainability Program Manager

I am humbled by the generous the contributions of time and knowledge that the New York wine community have dedicated to Version 2 of VineBalance 2022.

Version 2 of VineBalance 2022 was reviewed, workshopped, and revised through a robust six-month stakeholder engagement process involving over 40 New York viticulturists, winemakers, grape growers, and conservationists with the support of the USDA Natural Resource Conservation Service and Yates County. The resulting workbook is designed to broadly apply to all winegrowing regions and grape varieties of New York State.

The goal of the workbook is to codify a comprehensive manual of sustainable winegrowing best management practices and provide a pathway towards continuous improvement. In the spirit of continuous improvement, the workbook will be updated annually to reflect the last science-based recommendations, best practices, and technologies for sustainable winegrowing.

The mission of the New York Wine and Grape Foundation Sustainability Program is to advance the environmental, social, and economic sustainability of New York's wine and grape industry through regionally defined sustainability standards, third-party certification, grower education, and stakeholder engagement. Our vision is to elevate New York State as a world class wine and grape region that protects the environment, conserves natural resources, and improves the lives of stakeholders.

Version 2 of VineBalance 2022 will serve as the foundation of the New York Wine and Grape Foundation Sustainability Pilot Program in 2022, and future iterations will be the basis for New York's first statewide sustainable winegrowing certification.

Program Objectives

Below are the nine objectives that the New York State Wine & Grape Foundation has defined for sustainable winegrowing. Click on an objective to access the portion of the VineBalance Workbook that pertains to it, or use the tabs at the bottom of this workbook to navigate. Many items that fall under each objective could easily fit into others within this workbook - sustainability is intersectional. Each item was assigned to the objective that best represents the goal of the practice.

1. **To promote the use of practices that reduce reliance on off-farm inputs.**
2. **To build, regenerate, and conserve healthy soils for future generations.**
3. **To protect surrounding reservoirs and waterways from pollution.**
4. **To improve energy efficiency and reduce greenhouse gas emissions.**
5. **To conserve natural resources, reduce waste streams, and recycle.**
6. **To encourage healthy ecosystems, biodiversity, and wildlife habitat.**
7. **To increase climate resiliency and promote climate-smart farming.**
8. **To provide education and pathways for continuous improvement.**
9. **To foster a socially equitable and economically viable industry.**

How to Use this Workbook

Read through the items under each objective. Give yourself the score (1-4) that most closely matches your current practice. Your final score will be automatically tallied both at the bottom of each Objective and at the end of the workbook.

To pass this workbook, a grower must earn 75% of the total available score.

After you have finished with this workbook, you will develop an action plan that outlines how you plan to address any lower-scoring items in future attempts, as well as how to ensure that the practices that lead to your high scores are maintained. Any items with scores of 1 must be remedied via corrective action prior to being eligible for certification.

Objective 1. Input Reduction

One of the benefits of sustainable management is the ability to do more with less through increased efficiency of vineyard operations. Through regular recordkeeping, testing, scouting, and maintenance, it is possible to reduce off-farm inputs. Thoughtful planning and Integrated Pest Management (IPM) practices can reduce the need for chemical intervention. This minimizes the risk that excess chemical inputs will drift, leach or runoff into the surrounding environment causing adverse ecological effects.

	My Score	1	2	3	4 (Best Practice)
1.1 Recordkeeping					
1.1.1 Vineyard Map	4	No map exists. **OR** Map information is inaccurate.		An accurate map exists, but it lacks detail or is incomplete.	Grower maintains a detailed map of the vineyard, including acreage, varieties, drainage tiles, irrigation mains/submains, buildings, roads, areas of runoff, water bodies (lakes, ponds, streams) and wells. **AND** Map information is tied to production records.
		Comments (Optional):			
1.1.2 Nutrients	4	No nutrient records are kept. **OR** Nutrient records are inaccurate.		Nutrient records are accurate, but they lack detail or are incomplete.	The grower maintains detailed records of all nutrient applications, including date, location, acreage, product name and description, analysis of % NPK plus micronutrients, and amount applied per acre.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.1.3 Pesticides	4	No pesticide records are kept. **OR** Pesticide records are inaccurate.	Pesticide records are accurate, but they lack detail or are incomplete.	The grower maintains detailed pesticide records, including: • Active ingredient and trade name • EPA registration number • Mode of Action resistance code (MOA) • Location applied • Date(s) applied • Amount and rate applied • Method of application • Applicator's name • Target pest • Pre-Harvest Interval (PHI) and first date of harvest • Re-Entry Interval (REI)	The grower maintains detailed pesticide records, including: • Active ingredient and trade name • EPA registration number • Mode of Action resistance code (MOA) • Location applied • Date(s) applied • Amount and rate applied • Method of application • Applicator's name • Target pest • Pre-Harvest Interval (PHI) and first date of harvest • Re-Entry Interval (REI) **AND** • Weather conditions • Stage of crop development • Stage of pest development
		Comments (Optional):			
1.1.4 Pesticide Assessment	4	Pesticides are not evaluated for efficacy or resistance.		Pesticides are evaluated annually for efficacy and resistance. **AND** Results of the evaluation are recorded in pesticide records.	Pesticides are evaluated annually for efficacy and resistance. **AND** Results of the evaluation are recorded in pesticide records. **AND** Pesticides showing resistance are not used the following season.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.1.5 Irrigation	4	No irrigation records are kept. **OR** Irrigation records are inaccurate.		Irrigation records are accurate, but they lack detail or are incomplete.	The grower maintains detailed irrigation records, including date, location, volume, justification, timing, and vine age. **OR** Established vineyard blocks are not irrigated. Irrigation is only applied to newly planted vines.
		Comments (Optional):			

1.2 Spray Equipment

1.2.1 Sprayer (Canopy)	4	Application equipment does not address drift. For example, an unmodified airblast sprayer.		Application equipment is used that increases target deposition and reduces drift. For example, a) airblast sprayer with low drift nozzles such as induction nozzles, b) modified airblast sprayer with deflectors, c) nozzle orientation adjusted to improve deposition.	Application equipment is used that increases target deposition (i.e. reduces drift) and allows for a reduction in the amount and/or rate of pesticides used. For example, a) recycling sprayer, b) tower sprayer, c) directed deposition sprayer.
		Comments (Optional):			

More on Canopy Sprayers

The *NY and PA Pest Management Guidelines for Grapes* provide an overview of spray drift management and nozzle types, including air induction nozzles. Air induction nozzles are well-proven with herbicide applications and are recommended. Canopy application trials have been successful but further season-long trials are still needed.

Top and bottom deflectors should be fitted to airblast sprayers to funnel the pesticide-laden air into the canopy. Correct nozzle orientation (to overcome the effects of the uneven airblast resulting from fan rotation) allows the spray plume to target the canopy.

1.2.2 Sprayer (Herbicide)	4	Application equipment is not designed to increase deposition or reduce drift.	A standard herbicide sprayer equipped with air induction nozzles and/or a shield in order to increase deposition and reduce drift is used.	Application equipment is used that increases deposition and reduces drift. (e.g.,, a Controlled Droplet Applicator (CDA) shielded sprayer).	No chemical weed control is used.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
More on Herbicide Sprayers	Controlled Droplet Applicators (CDAs) use a spinning disc rotary atomizer that creates a mist of similar size droplets under the dome or shield. This technology allows ultra-low volumes to be used, minimizes drift, and places the herbicide efficiently. Efficient and timely placement of postemergence materials may allow a reduction in rate of material used. Practical experience dictates that these sprayers are less effective with dense stands of weeds. Air induction nozzles (discussed in the NY and PA Pest Management Guidelines for Grapes) are well proven with herbicide application and are recommended.				
1.2.3 Nozzles Improving Spray Efficiency	**4**	Nozzle size is not appropriate. **OR** Nozzles are not replaced when worn or damaged.		Appropriate size nozzles are chosen. **AND** Nozzles are replaced when worn or damaged.	Appropriate size nozzles are chosen. **AND** Nozzles are replaced when worn or damaged. **AND** Nozzles are visually inspected for plugs during each use. **OR** An air shear sprayer is used.
		Comments (Optional):			
More on Nozzles	Dr. Andrew Landers (see *Improving Spray Efficiency* above) notes that for nozzles <150 microns in size, droplets are likely to drift, and if temperature is high and humidity low, droplets will evaporate. All nozzles can be purchased with different spray classification characteristics from “fine” to “coarse”. These classifications appear in nozzle catalogs and will soon appear on pesticide labels. If nozzle output exceeds manufacturer recommendations by >10%, the nozzles need replacing.				
1.2.4 Calibration How to Calibrate Air Blast Sprayers	**4**	Sprayer is calibrated infrequently, only after repairs, or not at all.	Sprayer is calibrated before the start of each season.	Sprayer is calibrated before the start of each season. **AND** Sprayer is recalibrated for different applications (e.g.,, spray directed at canopy vs. clusters).	Sprayer is serviced and calibrated before the start of each season. **AND** Sprayer is recalibrated for different applications (e.g.,, spray directed at canopy vs. clusters). **OR** A flow rate controller is used.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.2.5 Maintenance Maintenance Checklist	4	Service occurs only when equipment breaks.	Sprayer is serviced annually in addition to necessary repair work.	Sprayer is serviced annually in addition to necessary repair work. **AND** Sprayer is inspected before each use.	Sprayer is serviced annually in addition to necessary repair work. **AND** Sprayer is inspected and routine maintenance is performed before each use, including: • Filters • Tire inflation • Grease points • PTO shafts • Guards
		Comments (Optional):			

More on Maintenance

Additional comments from Dr. Andrew Landers: Tractor speed should be fast enough to provide a good output per hour while ensuring canopy penetration; speeds too fast result in poor penetration in a full canopy, and moving too slowly results in poor output per day. Growers should also minimize the volume of air displaced by their sprayer if possible. The airflow should be adequate to displace the air in the canopy with pesticide-laden air from the sprayer. The volume of spray should provide acceptable coverage though the grower should not spray to the point where the leaves are dripping. Grower should apply sufficient spray for the developing canopy as the season progresses. Alternative row spraying (a common early season practice with airblast sprayers) provides inadequate coverage in many instances, and where disease pressure is highest, research has shown that spraying every row is preferable.

1.2.6 Drift	4	Grower begins spraying in winds where significant drift will occur.		Grower does not begin spraying if winds are >10 mph unless using a sprayer that is designed/modified to reduce drift.	Grower does not begin spraying if winds are >10 mph unless using a sprayer that is designed/modified to reduce drift. **AND** No spraying is done when winds are >15 mph.
		Comments (Optional):			

1.3 Nutrition

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	My Score	1	2	3	4 (Best Practice)
1.3.1 Tissue Analysis Cornell Plant Sampling Guide	4	Tissue analysis is not done.	Tissue analysis is done only when there is a problem.	Tissue analysis is done on most blocks every one to two years.	Tissue analysis is done on all blocks every one to two years. **AND** Results are used in planning future fertilization.
		Comments (Optional):			
1.3.2 Soil Analysis Cornell Soil Health Laboratory	4	Soil analysis is not done.	Complete soil analysis is done less than every 4 years. **OR** Soil analysis is only done in problem areas.	Complete soil analysis is done every 3 to 4 years.	Complete soil analysis is done every 3 to 4 years. **AND** Organic matter and pH are monitored more frequently. **AND** Results are used in planning fertilization, lime, and organic matter amendments.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.3.3 Soil Applied N	4	Soil applied N rates are not adjusted annually.	Soil applied N rates are adjusted based on 2 or 3 of these criteria: • Previous year's crop level • Vine pruning weights • % soil organic matter • Historical records • Visual clues of N • Tissue analysis • Winter injury • Canopy fill • Soil type • Variety	Soil applied N rates are adjusted based on 4 or 5 of these criteria: • Previous year's crop level • Vine pruning weights • % soil organic matter • Historical records • Visual clues of N • Tissue analysis • Winter injury • Canopy fill • Soil type • Variety	Soil applied N rates are adjusted based on 6+ of these criteria: • Previous year's crop level • Vine pruning weights • % soil organic matter • Historical records • Visual clues of N • Tissue analysis • Winter injury • Canopy fill • Soil type • Variety **AND** Amendments with different N release rates are combined.
		Comments (Optional):			

More on Nitrogen

Nitrogen is the plant nutrient most susceptible to loss by leaching (movement through soil) into groundwater. Specific health problems are associated with nitrate contamination of drinking water supplies. Nitrate levels higher than 10 mg/l (designated the Maximum Contaminant Level by the US EPA and NYS) have been found in groundwater in several areas of New York, often in association with spring runoff or heavy rainfall events. It is therefore absolutely essential for grape growers to use nitrogen in a thoughtful and sparing manner.

• If winter injury has occurred, delay N decisions until after fruit set to allow evaluation of vigor level and fruit set.
• N deficiency symptoms: pale green leaves, small leaves, spindly shoots, short internodes, poor fruit set.
• N excess symptoms: dark green, "dinner plate" leaves, bullwood, succulent shoots with long internodes, poor fruit set.

1.3.4 N Application Rate	4	Vinifera and premium hybrids: >40lbs/acre actual N is applied in a given year. Bulk hybrids and natives: >100lbs/acre actual N is applied in a given year.	Vinifera and premium hybrids: 20-40 lbs/acre actual N is applied in a given year. Bulk hybrids and natives: 70-100 lbs/acre actual N is applied in a given year.	Vinifera and premium hybrids: <20lbs/acre actual N is applied in a given year. Bulk hybrids and natives: 50-70 lbs/acre actual N is applied in a given year.	Vinifera and premium hybrids: <20lbs/acre actual N is applied in a given year. Bulk hybrids and natives: <50 lbs/acre actual N is applied in a given year.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.3.5 N Fixing Cover Crops Estimating PAN Release from Cover Crops Compost C:N Ratio Considerations	4	N is not supplied by N fixing cover crops (all N is soil or foliar applied). **AND** Vines show excess vigor.	A component of the cover crop fixes N. **BUT** The total N supplied by the cover crop is not calculated. **AND** Vines show excess vigor.	A component of the cover crop fixes N. **BUT** Total N supplied by the cover crop is not calculated. **AND** Vines show balanced growth, no excess vigor.	A component of cover crop fixes N (e.g.,, legumes such as clover and vetch). **AND** Total N supplied by the cover crop is calculated and used to reduce the application rate of supplemental N. **AND** Vines show balanced growth, no excess vigor.
		Comments (Optional):			
1.3.6 Organic Fertilizer OMRI	4	Only synthetic fertilizers are used.	Less than 50% of fertilizers used are organic.	Over 50% of fertilizers used are organic.	Only organic fertilizers are used (e. g., on-farm compost, products from OMRI Listed® manufacturers).
		Comments (Optional):			
1.3.7 Spring N Application	4	N is applied to soil >2 weeks prior to budbreak. **OR** N is applied to soil when the ground is frozen.	N is applied to the soil in the period between fruit set and veraison.	N is applied during the period of maximum uptake - budbreak to fruit set. **AND** Split applications are not used.	N is applied during the period of maximum uptake - budbreak to fruit set. **AND** Split applications are used with the 30-50% of the N applied prebloom and the remainder applied postbloom.
		Comments (Optional):			

More on Spring N Application	There is little absorption of N by roots prior to budbreak. The soil is cold and roots are inactive. Early vine growth depends almost entirely on N stored in the woody parts of the vine. It is unclear whether pre-budbreak application of slower release organic fertilizers confers an advantage in terms of N availability to the plant.

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	My Score	1	2	3	4 (Best Practice)
1.3.8 Fertigation	4	Drip irrigation is installed. **BUT** N fertigation is never used.		Drip irrigation is installed. **AND** N fertigation is used to efficiently apply small doses of N to vines in dry years.	No irrigation is used.
		Comments (Optional):			
1.3.9 Foliar N	4	Foliar N is applied multiple times throughout the growing season. **OR** Foliar N is applied around harvest.		Foliar N is applied only when necessary in late spring. **AND** Use is based on visual cues from vines and/or tissue analyses reporting <1.0% N in spring.	No foliar N is applied.
		Comments (Optional):			
More on Foliar N		Early season foliar N is common in winegrape vineyards and may benefit N deficient vineyards. However, N needs are best addressed through addition of organic matter and/or ground application of N fertilizers. Clusters have a fairly high N demand around veraison. Foliar-applied urea (or other foliar feeds containing N) applied several times around veraison can increase yeast-assimilable nitrogen (YAN) in musts, particularly when drought has limited N uptake from the soil. In Cornell trials over the last few years, up to 10 lb urea in 100 gallons (5 lb actual N) has been used without burning the foliage. This is not a panacea for eliminating Atypical Aging ATA, a wine defect associated with limited N uptake in drought years in white wines), but has had a secondary role (the more major effect occurring with irrigation) in reducing ATA. It is effective in bumping up the YAN values, which may help winemakers avoid stuck fermentations. It does not appear to prolong or 'restart' shoot growth, nor delay wood maturation.			
1.3.10 Macronutrients (P, Ca, MG, K)	4	Fixed amounts of macronutrients are applied annually.	Macronutrient levels in soil are adjusted only when deficiencies occur.	Macronutrients are maintained at acceptable ranges based on soil and tissue analysis.	Macronutrients are maintained at acceptable ranges based on soil and tissue analysis. **AND** Vineyard manager can identify deficiency symptoms.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
More on Macronutrients	The application of Ca, Mg, and K as foliar nutrients is not well understood. Use can be based in part on soil/tissue analysis and visual clues. Magnesium deficiency is often addressed through the use of foliar applied Epsom salts. In general, due to the relatively large quantities required by vines, macronutrient nutrition is best addressed through the root system. Excessive amounts of P in surface water promote the growth of algae and other aquatic organisms, potentially depleting oxygen levels in surrounding water bodies. This can have profound impacts on aquatic life. Because P is less available in acid soils, simply increasing soil pH to 6.0-6.5 will increase P availability. Generally, P fertilization has not been found to benefit NY vineyards in part due to the immobility of the nutrient.				
1.3.11 Micronutrients (B, Mn, Zn)	4	Fixed amount of micronutrients are applied annually without regard to petiole and soil results.	Micronutrient levels in soil are adjusted only when deficiencies occur.	Micronutrients are maintained at acceptable ranges based on soil and petiole results.	Micronutrients are maintained at acceptable ranges based on soil and petiole results. **AND** Vineyard manager can identify both deficiency and toxicity symptoms.
		Comments (Optional):			
More on Micronutrients	There are many types of micronutrient fertilizers. The most commonly applied are boron, manganese and zinc. Because these elements are required in small quantities and petiole analysis sometimes do not reflect a deficiency (due to time of sampling, type of tissue sampled, dilution effects due to vigorous growth, etc.), it is sometimes necessary to use these fertilizers based on historical knowledge of the vineyard. It is often hard to gauge efficacy of micronutrient fertilizers as they are used in small quantities and the elements are involved in specific enzyme systems and chemical pathways. If possible, leave a section of the vineyard untreated. To judge potential benefits, evaluate subsequent fruit quality and quantity. Examine soil and petiole analyses. Over a period of time, the benefits may or may not become clear.				

1.4 Canopy, Vines, and Crop

1.4.1 Plant Material Foundation Plant Service	4	Grower chose to plant or replant non-certified plant material over a comparable certified alternative.		Grower chose to plant or replant certified plant material from a reputable nursery. **OR** A comparable certified alternative was not available and the search was documented.	No new vines were planted in the given year(s). **OR** New vines were layered or grafted from existing vines.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
More on Plant Material	The use of certified plant material can reduce the incidence of virus. However, certification is not a 100% guarantee against viral infection due to many issues including the difficulty in detecting virus in vines, the possibility of transmission by nematodes or mealybugs and transmission from non-certified virus infected material. Native varieties are included in certification programs. FPS offers Concord, Niagara, Ontario, Catawba and others in limited quantities, as these varieties are not grown in CA. Several nurseries also offer crown gall-free Niagara vines.				
1.4.2 Variety and Rootstock	**4**	Challenges to growing the specific variety/rootstock on the site or in the region are not known.	Some challenges to growing the specific variety/rootstock on the site or in the region are known. **BUT** A university extension service was consulted prior to planting.	Challenges to growing the specific variety/rootstock on the site or in the region are known. **AND** A university extension service was consulted prior to planting. **AND** A plan is in place to address and mitigate risks with each variety/rootstock.	The specific variety/rootstock are carefully selected based on winter hardiness, soil type, and site characteristics. **AND** A university extension service was consulted prior to planting. **AND** The variety/rootstock chosen do not require excessive inputs to ripen or maintain.
		Comments (Optional):			
More on Rootstock	On replant sites, hybrid varieties susceptible to tomato ringspot virus should be grafted onto resistant rootstock. This includes varieties such as Vidal blanc, Baco noir and DeChaunac.				
1.4.4 Row Orientation	**4**	Rows are oriented E-W despite minimal erosion risk to a N-S orientation.		Rows are oriented N-S to maximize sunlight interception.	Rows are oriented N-S to maximize sunlight interception. **AND** Adjustments or exceptions to N-S orientation are made where there is a high risk to erosion.
		Comments (Optional):			

Objective 1. Input Reduction

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	My Score	1	2	3	4 (Best Practice)
1.4.5 Training Systems	4	Training system is inadequate for vine vigor and growth habit.		Training system accommodates vine vigor and growth habit.	Training system accommodates vine vigor and growth habit. **AND** Training system optimizes fruit exposure and canopy density.
		Comments (Optional):			
More on Training Systems	Most *vinifera* and many hybrid winegrapes are suited to Vertical Shoot Positioned (VSP) systems. More vigorous winegrapes may be trained using the Scott Henry system. Native and bulk hybrids with procumbent growth habits are suited to top wire systems such as the Hudson River Umbrella or Geneva Double Curtain (GDC). The optimum shoot density for single curtain systems is 4-5 shoots/ft of row. Systems with more than one curtain, such as GDC and Scott Henry will have twice the shoot number.				
1.4.6 Viticultural Practices Cornell Extension	4	Canopy management practices (pruning, shoot thinning, leaf pulling, etc.) are inadequate to maintain a low input crop.		Canopy management practices (pruning, shoot thinning, leaf pulling, etc.) are adequate to maintain a low input crop.	Canopy management practices (pruning, shoot thinning, leaf pulling, etc.) are adequate to maintain a low input crop. **AND** Canopy management practices evolve with the latest university extension recommendations.
		Comments (Optional):			
1.4.7 Crop Management	4	No crop management guidelines in Appendix A are followed.	At least 2 of the crop management guidelines in Appendix A are followed.	At least 3 of crop management guidelines in Appendix A are followed.	All crop management guidelines in Appendix A are followed.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.4.8 Hilling Up Vines	4	Grafted vines are never hilled-up or buried at the graft union to prevent winter damage.	Grafted vines are hilled-up or buried at the graft union sporadically.	Grafted vines are hilled-up or buried at the graft union for the first 4 years and sporadically thereafter.	Grafted vines are hilled-up or buried at the graft union every year. **OR** Winter temperatures rarely drop below 0 degrees F for extended periods of time. **OR** Cold-hardy hybrid vines are not grafted.
		Comments (Optional):			
More on Hilling Up	Although time consuming, hilling up prevents exposing the vineyard to an unacceptable risk of vine and production losses. Hills should be removed during the growing season to avoid scion rooting. Some growers have success with burying the graft union in hay mulch or compost rather than soil. Hilling up is generally not necessary on Long Island where winter temperatures rarely drop below 0 degrees for extended periods of time, though periodic episodes of winter injury do occur. Hilling up is also not recommended own-rooted cold-hardy hybrids that have not been grafted.				
1.4.9 Missing Vines	4	Missing vines are replaced sporadically or not at all.	Missing vines are replaced every few years; layering is practiced every few years.	Missing vines are replaced every other year; where appropriate, layering is practiced every other year. **AND** Yield records are adjusted to account for missing vines.	Missing vines are counted and replaced every year. For non-grafted vines, layering is done to replace vines. **AND** Yield records are adjusted to account for missing vines.
		Comments (Optional):			
More on Missing Vines	Missing vines reduce vineyard profitability and lead to inefficiency in use of pesticides and fertilizers. Yield must be estimated with missing vines taken into consideration. If overall yield is 4 tons/acre but 50% of vines are missing, functional crop is therefore 8 tons/acre, a potential overcrop.				
1.4.10 Vineyard Profitability	4	Overall farm income and expenses are recorded only when tax returns are filled out.	Vineyard expenses and income are not broken out by variety and block but overall farm income and expenses are known.	Vineyard expenses and income are recorded by variety but not by individual block.	Vineyard expenses and income are recorded for each individual block.

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	My Score	1	2	3	4 (Best Practice)
		Comments (Optional):			
1.4.11 On-Farm Experiments SARE How to Conduct Research	4		No experimentation is being done.	Experiments (e.g., with varieties, rootstocks, training systems, cover crops, etc.) are being evaluated on a small scale. **BUT** Evaluation is anecdotal, data is not taken.	Experiments (e.g., with varieties, rootstocks, training systems, cover crops, etc.) are being evaluated on a small scale. **AND** Data is collected to measure performance.
		Comments (Optional):			
More on Experiments	On-farm experimentation can encompass almost anything from informal evaluations to formal, replicated field trials. Key ingredients that must be used to make field comparisons useful are: 1) vary only one practice at a time; 2) leave a portion of the same vineyard block 'untreated' or with your standard practice; 3) measure something objective; and 4) record your observations. Area extension programs may be useful in helping growers design informal or formal trials.				
1.5 Vineyard Floor					
1.5.1 Monitoring Weeds of the Northeast	4	Weed compositions is not monitored for noxious species.	Weed compositions is monitored for noxious species once per season.	Weed compositions is monitored for noxious species twice per season.	Weed compositions is monitored for noxious species more than twice per season.
		Comments (Optional):			
1.5.2 Ground Cover	4	<50 % of the vineyard floor is covered with plant material.	50-75% of the vineyard floor is covered with plant material.	75-99% of the vineyard floor is covered with plant material.	100% of the vineyard floor is covered with plant material.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.5.3 Non-chemical Methods	4	Grower uses only chemical weed control.		Grower uses one or more of the weed control methods listed below in rotation with chemical weed control: • Steam • Flaming • Mowing • Mulching • Cultivation • Solarization • Culinary oils • Bioherbicides • Hand weeding • Grazing animals • Biological control	Grower uses one or more of the weed control methods listed below to fully replace chemical weed control: • Steam • Flaming • Mowing • Mulching • Cultivation • Solarization • Culinary oils • Bioherbicides • Hand weeding • Grazing animals • Biological control
		Comments (Optional):			
1.5.4 Preemergence Herbicides	4	Preemergence herbicides with high leaching potential are used regardless of soil type or water table risk.	Preemergence herbicides with high leaching potential are used, but not on gravelly/sandy soils or over high water tables. • Simazine (Princep) • Diuron (Karmex) • Norflurazon (Solicam)	Preemergence herbicides with high leaching potential are not used. • Simazine (Princep) • Diuron (Karmex) • Norflurazon (Solicam)	No preemergence herbicides are applied.
		Comments (Optional):			
1.5.5 Glyphosate	4	Glyphosate is used indiscriminately.	Glyphosate is rotated with other methods and modes of action.		Glyphosate is not used.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.5.6 Postemergence Frequency	4	Postemergence herbicide is applied more twice.	Postemergence herbicide is applied twice at appropriate times. **AND** Application rates are adjusted based on soil type and herbicide characteristics.	Postemergence herbicide is applied once at an appropriate time. **AND** Application rates are adjusted based on soil type and herbicide characteristics.	No postemergence herbicides are applied.
		Comments (Optional):			
1.5.7 Spot Treatments	4	Spray is applied to the entire vineyard without regard to the presence of visible weeds.		Visible weeds are treated with a manual hand gun sprayer. **OR** Machine sprayer is manually turned off when no weeds are present.	No postemergence herbicides are applied.
		Comments (Optional):			
1.5.8 Rotation HRAC Lookup	4	Herbicide mode of action is not rotated.	Every 4 years, herbicides are rotated to another mode of action.	Every 1 to 3 years, herbicides are rotated to another mode of action.	No chemical herbicide is used.
		Comments (Optional):			
1.5.9 Mowing Reference Document	4	Grower mows for aesthetic reasons.		Grower mows for weed, water, and pest management.	Grower mows for weed, water, and pest management. **AND** Grower mows to control ticks for worker health and safety.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
More on Mowing		In regions where Lyme disease is a concern, more frequent mowing is warranted as a safety measure for workers. Mowing should be restricted to the amount necessary to allow normal vineyard operations, worker safety, or other carefully considered vineyard objectives. Mowing does not reduce water use during droughts, and excessive mowing wastes fuel, tractor time, and management time better devoted to other tasks. Using high mowing heights can greatly reduce beneficial insect and pollinator fatalities. Mowing early (before 7am) or later (after 6pm) can also protect bees and reptiles.			
1.6 Plant Protection and IPM					
1.6.2 Block History	4	Grower uses a pre-prescribed fungal disease management program based on the calendar.			Grower considers historical susceptibility to disease when planning a fungal disease management program.
		Comments (Optional):			
1.6.3 Dormant Practices	4	Pruning does not select for the presence of overwintering inoculum.	Some wood infected by overwintering Phomopsis cane and leaf spot, black rot, and/or powdery mildew is pruned off . **BUT** Spray program is not adjusted to the level of overwintering inoculum.	Some wood infected by overwintering Phomopsis cane and leaf spot, black rot, and/or powdery mildew is pruned off . **AND** Spray program is adjusted to the level of overwintering inoculum.	Most wood infected by overwintering Phomopsis cane and leaf spot, black rot, and/or powdery mildew is pruned off . **AND** Spray program is adjusted to the level of overwintering inoculum.
		Comments (Optional):			
1.6.4 Dormant Fungicide Sprays	4	Two or more dormant sprays are applied to vines with the general goal of reducing overwintering inoculum of powdery mildew or Phomopsis.			Due to data indicating marginal benefits and high costs, dormant sprays are NOT routinely applied to the vineyard.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
More on Dormant Sprays	According to Dr. Wayne Wilcox, a single dormant spray MAY be appropriate if extreme levels of powdery mildew or Phomopsis are present on canes, but only if spray coverage is maximized with an efficient sprayer. Any benefits derived from such a spray are highly unlikely if a low efficiency sprayer, such as an unmodified airblast sprayer, is used. Experiments conducted in upstate NY in the 1980s showed that dormant applications of lime sulfur reduced the viability of overwintering inoculum of the powdery mildew and Phomopsis fungi, and sometimes improved the efficacy of the standard spray program that followed. However, these trials were conducted using a rate of over 30 gal/acre of lime sulfur in 300 gal/acre of water. (Note that lime sulfur is not a mix of lime + sulfur but rather calcium polysulfide, a completely different material.) This rate is extremely expensive and impractical. Lower rates (e.g., 10-12 gal lime sulfur in 100 gal water per acre) have been advocated in California, but data on their efficacy is very limited. In one NY trial, they provided only modest benefits at a relatively high cost. Most conventional fungicides should have little or no activity if applied during the dormant season, nor are they labeled for use at that time of year.				
1.6.5 Scouting for Disease/Virus uspest.org MyPest	**4**	Scouting is not done.	Scouting is done informally or on an occasional basis. No records are kept.	Scouting is done routinely and indication of virus or disease is recorded in pesticide records.	Scouting is done May through September at key phenological stages and indication of virus or disease is recorded in pesticide records. **AND** Disease models are consulted for additional predictive planning.
		Comments (Optional):			
More on Disease Scouting	Monitoring of fungal and viral diseases requires vigilance. Particularly with fungal diseases, it is important to address any problems as soon as possible. Remedial steps tend to be much more effective in the early stages of infection. Ideally, in a given vineyard block, 5% of the vines or a minimum of 10 vines are examined weekly for signs of disease. These vines can be chosen using historical records to ensure that hotspots are the first to be scouted. Other options are randomly chosen vines or vines that are permanently tagged. Permanent tags offer the additional advantage of charting a range of measurements (e.g., vine pruning weight, disease status, etc.) from year to year. Both foliage and fruit should be examined for signs of disease.				
1.6.6 Identifying Disease UC Davis IPM	**4**	Grower cannot identify symptoms of fungal and viral diseases.	Grower can identify some fungal and viral disease symptoms but does not use publications to ensure proper identification.	Grower can identify most fungal and viral disease symptoms and life cycles with the aid of publications.	Grower can identify the following diseases and has knowledge of crop susceptibility: Fungal • Botrytis • Black rot • Phomopsis • Downy mildew • Powdery mildew Viral • Leaf roll • Fanleaf

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	My Score	1	2	3	4 (Best Practice)
		Comments (Optional):			
1.6.7 Virus-Infected Vines	4	There is no systematic removal of virus-infected material.		Virus-infected vines are removed if they are not producing sufficient quality and quantity of fruit.	Virus-infected vines are removed if they are not producing sufficient quality and quantity of fruit. **AND** Efforts to renovate sites, remediate soils, replant resistant rootstocks or control vectors follow vine removal.
		Comments (Optional):			
1.6.8 Field Staff Training	4	Grower does not provide training on grape disease and insect identification to field staff.		Grower provides training on grape disease and insect identification to some field staff.	Grower provides training on grape disease and insect identification to field staff as needed.
		Comments (Optional):			
1.6.9 Trunk Diseases	4	Trunk diseases are not managed.			Trunk diseases are managed according to the guidelines in Appendix B.
		Comments (Optional):			
1.6.10 *Botrytis cinerea*	4	Botrytis management relies on fungicides alone.	Three or fewer of the six guidelines in Appendix B are followed for Botrytis control.	Four or five of the six guidelines in Appendix B are followed for Botrytis control.	A Botrytis management plan follows all points in Appendix B.
		Comments (Optional):			
1.6.11 Leaching Potential Reference Document	4	Leaching potential is not taken into account when selecting fungicides.		Materials with high leaching potential are avoided except where no alternatives exist.	Materials with high leaching potential are not applied.

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	My Score	1	2	3	4 (Best Practice)
		Comments (Optional):			
1.6.12 Fungicides Reduced Risk Minimum Risk Biopesticides OMRI (Organic) Approved FRAC	4	Reduced risk, minimum risk, biopesticides, and OMRI Listed materials are never used. **AND/OR** Fungicide rotation is ignored.	Reduced risk, minimum risk, biopesticides, and OMRI listed materials comprise at least 10% of the fungicides used. **AND** All fungicides are rotated properly to avoid resistance.	Reduced risk, minimum risk, biopesticides, and OMRI listed materials comprise at least 25% of the fungicides used. **AND** All fungicides are rotated properly to avoid resistance.	Reduced risk, minimum risk, biopesticides, and OMRI listed materials comprise at least 50% of the fungicides used. **AND** All fungicides are rotated properly to avoid resistance.
		Comments (Optional):			
More on Fungicides		**Additional comments from Dr. Wayne Wilcox:** Reducing the application rates of fungicides can save money and reduce the potential for short-term environmental pollution. However, this is not a long-term sustainable practice for certain fungicides. Specifically, reducing rates of the DMI fungicides (also called SIs or sterol inhibitors - Elite, Nova, Procure, and Rubigan) and the strobilurins (Abound, Flint, Sovran) is known to promote the development of resistance to these materials. In contrast, reducing the rates of traditional protectant materials (Dithane, Manex, Penncozeb, coppers, sulfurs, etc.) has no impact on resistance development but can shorten the duration of their active period. Also, note that pesticide rates are typically expressed on a per-acre basis for both legal purposes and convenience, although target organisms actually respond to a rate per unit area of canopy volume. Thus, a rate of 3 oz/acre applied to a thin canopy early in the season may provide the same level of activity as 6 oz/acre applied to a thick canopy in mid-summer. In short, efforts to reduce pesticide rates should be governed not only by the particular materials in use but also by the canopy volume.			
1.6.14 Identifying Insect Pests UC Davis IPM	4	Grower cannot identify any insect pests or the damage they cause.	Grower can identify some insect pests and the damage they cause but does not use publications to ensure proper identification.	Grower can identify most insect pests and the damage they cause with the aid of publications.	Grower can identify the following insect pests and has knowledge of crop susceptibility: • Major insects • Minor insects • Mites
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.6.15 Scouting for Insects	4	Scouting is not done for insect and mite pests.	Scouting is done informally or on an occasional basis. No records are kept.	Scouting is done routinely and indication of insect pests is recorded in pesticide records.	Scouting is done every other week or at the first signs of the pest for major insects (e.g. European Red Mite, Potato Leafhopper, Japanese Beetles, Grape Berry Moth, Grape Leafhopper and Rose Chafer). **AND** Insect models are consulted for additional predictive planning.
		Comments (Optional):			
1.6.16 Economic Thresholds Reference Document	4	Scouting results and economic thresholds are never used when determining the need for a treatment.		Scouting results and economic thresholds are sometimes used to determine the need for a treatment.	Scouting results and economic thresholds are often used to determine the need for treatment. Currently, informal thresholds exist for Grape Berry Moth, European Red Mite, Potato Leafhopper, Grape Leafhopper, Climbing Cutworm and flea beetles.
		Comments (Optional):			
1.6.17 Spot Treatments	4	Spot treatment is never done. If an insect or mite outbreak occurs, the entire vineyard is treated.		Spot treatment is sometimes done.	If infestations are localized, spot treatment is done on areas with economically damaging pest levels.
		Comments (Optional):			
1.6.18 Insecticides Reduced Risk Minimum Risk Biopesticides OMRI (Organic) Approved IRAC	4	Reduced risk, minimum risk, biopesticides, and OMRI listed materials are never used. **OR** Insecticides are not rotated.	Reduced risk, minimum risk, biopesticides, and OMRI listed materials comprise at least 10% of the insecticides used. **AND** Insecticides are rotated properly to avoid resistance.	Reduced risk, minimum risk, biopesticides, and OMRI listed materials comprise at least 25% of the insecticides used. **AND** Insecticides are rotated properly to avoid resistance.	Reduced risk, minimum risk, biopesticides, and OMRI listed materials comprise at least 50% of the insecticides used. **AND** Insecticides are rotated properly to avoid resistance.

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	My Score	1	2	3	4 (Best Practice)
		Comments (Optional):			
1.6.19 European Red Mite	4	More than 50% of the spray materials used are rated as harmful to European Red Mite predators. **OR** Two or more mancozeb sprays are applied in the period after bloom.	Less than 50% of the spray materials used are rated as harmful to European Red Mite predators. **AND** One mancozeb spray is applied in the period after bloom.	Less than 50% of the spray materials used are rated as harmful to European Red Mite predators. **AND** Mancozeb is only used in sprays applied prior to bloom.	Less than 50% of the spray materials used are rated as harmful to European Red Mite predators. **AND** Mancozeb is not used.
		Comments (Optional):			

1.7 Irrigation

1.7.1 Off-Site Water Movement	4	Irrigation practices result in runoff. **AND** Runoff and erosion occur during regular rainfall events.	Irrigation practices result in no runoff. **BUT** Runoff and erosion occur during regular rainfall events.	Irrigation practices result in no runoff. **AND** Conservation practices prevent runoff and erosion during regular rainfall events.	Irrigation practices result in no runoff. **AND** Conservation practices prevent runoff and erosion during heavy rainfall events.
		Comments (Optional):			
More on Irrigation		**Growers should answer a 4 for questions 1.7.2 to 1.7.7** if established vineyard blocks are not irrigated and irrigation is only applied to newly planted vines.			
1.7.2 Irrigation System	4	A low volume system is not used.		A low volume system such as drip is installed.	Established vineyard blocks are not irrigated. Irrigation is only applied to newly planted vines.
		Comments (Optional):			

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	My Score	1	2	3	4 (Best Practice)
1.7.3 Distribution Uniformity How to Measure	4	Distribution uniformity is never checked.	Distribution uniformity is tested intermittently by measuring emitter outflows and pressure differential in each zone.	System is checked at the beginning of each growing season by measuring emitter outflows and pressure differential in each zone.	Established vineyard blocks are not irrigated. Irrigation is only applied to newly planted vines.
		Comments (Optional):			
1.7.4 System Maintenance Drip Irrigation Checklist	4	Water filters are never inspected or cleaned, and irrigation lines are never flushed.	Water filters are not regularly inspected or cleaned, and and irrigation lines are not regularly flushed at the beginning of the irrigation season each year.	Water filters are inspected and cleaned whenever pressure differences indicate, and irrigation lines are flushed at the beginning of the irrigation season each year.	Established vineyard blocks are not irrigated. Irrigation is only applied to newly planted vines.
		Comments (Optional):			
1.7.5 Flow Meter	4	Flow meter is not installed.	Flow meter is installed but not regularly used to monitor the system.	Flow meter is installed and used to monitor application rates throughout the season.	Established vineyard blocks are not irrigated. Irrigation is only applied to newly planted vines.
		Comments (Optional):			
1.7.6 Soil Moisture Monitoring	4	An irrigation schedule is maintained regardless of soil moisture or weather conditions.	Soil moisture monitoring is not done. **BUT** Weather data is recorded and seasonal rainfall amounts are considered when deciding when and how much to irrigate.	Soil moisture monitoring is done by bucket auger (judging by feel) or soil moisture monitoring devices (e.g., neutron gauge, tensiometer or gypsum blocks) are installed and used to track soil moisture depletion. **AND** Weather data is recorded and seasonal rainfall amounts are considered when deciding when and how much to irrigate.	Established vineyard blocks are not irrigated. Irrigation is only applied to newly planted vines.
		Comments (Optional):			

Objective 1. Input Reduction

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	My Score	1	2	3	4 (Best Practice)
More on Moisture Monitoring	Tensiometers reveal soil moisture potential in a specific area. They read changes in soil moisture by measuring the vacuum created by water movement through a ceramic tip. This mimics how soil moisture moves into the root zone of a plant. Tensiometers can help determine when to irrigate but not how much water should be applied. Begin irrigation when the tensiometer reads between 30 and 40 centibars. Observe the response on the tensiometer after irrigating. If it shows that the soil is wet (a gauge reading of 0-10), the system is working well. Operation times can be adjusted based upon the response of the tensiometer. There are a number of other methods for measuring soil moisture such as neutron probes and gypsum blocks. Alternatively, a more accurate method may be to measure vine water potential using pressure bombs.				
1.7.7 Determining Schedule USDA Web Soil Survey	4	Irrigation is applied systematically without regard to weather conditions or the water holding capacity of the soil.	Irrigation is applied systematically with regard to weather conditions only.	Irrigation is applied according to the water holding capacity of the soil and rooting depth, soil moisture measurement, vine demand and weather conditions.	Established vineyard blocks are not irrigated. Irrigation is only applied to newly planted vines.
		Comments (Optional):			
Objective 1 Score	260				

Objective 2. Soil Health

Healthy soil is the foundation of a healthy vineyard. It is important to keep soils under vegetation throughout the year to reduce erosion, improve infiltration, sequester carbon, and foster a diverse soil microbiome to maximize nutrient uptake in the vine.

2.1 Leaching, Runoff, Erosion

	My Score	1	2	3	4 (Best Practice)
2.1.1 Minimizing Leaching	4	Pesticide, herbicide, and fertilizer applications are made with no consideration to leaching potential.	Pesticide, herbicide, and fertilizer application rates are adjusted to limit movement. **AND** Applications of ground directed fertilizers and herbicides are delayed when heavy rains are expected.	Pesticides, herbicides and fertilizers with high leaching potential are not used, and appropriate application rates are used to limit movement. **AND** Applications of ground directed fertilizers and herbicides are delayed when heavy rains are expected.	Pesticides, herbicides and fertilizers with high leaching potential are not used, and appropriate application rates are used to limit movement. **AND** Applications of ground directed fertilizers and herbicides are delayed when rainfall is forecasted. **AND** Permanent cover crops are maintained in row middles.
		Comments (Optional):			
2.1.3 Slopes	4	Vineyard rows run parallel to the main slope and there is no erosion management plan in place.		Vineyard rows run perpendicular to the main slope. **OR** Vineyard rows run parallel to the main slope and an erosion management plan in place. **OR** The vineyard is flat, without a main slope, and erosion potential is low.	Vineyard rows run perpendicular to the slope. **OR** Vineyard rows run parallel to the main slope and an erosion management plan in place. **OR** The vineyard is flat, without a main slope, and erosion potential is low. **AND** There is an undervine cover crop to minimize erosion.
		Comments (Optional):			

More on Slopes	Vineyard rows can reduce the effective slope by channeling water across it. Such protection is less effective when the slope *along vineyard rows* exceeds 3%, when slope direction is not uniform (side hills present), or when the main slope exceeds 12%.

Objective 2. Soil Health

Healthy soil is the foundation of a healthy vineyard. It is important to keep soils under vegetation throughout the year to reduce erosion, improve infiltration, sequester carbon, and foster a diverse soil microbiome to maximize nutrient uptake in the vine.

	My Score	1	2	3	4 (Best Practice)
2.1.4 Erosion Yates County SWCD NRCS	4	No erosion management plan is in place. **AND** Corrective action is not taken where erosion is evident.	No erosion management plan is in place. **AND** Corrective action is taken where erosion is evident (e.g.,, diversions, filter strips, seeding bare soil, etc.).	An erosion management plan is in place. **AND** Corrective action is taken where erosion is evident (e.g.,, diversions, filter strips, seeding bare soil, etc.). **AND** Permanent cover crops are established in row middles.	An erosion management plan is in place. **AND** Corrective action is taken where erosion is evident (e.g.,, diversions, filter strips, seeding bare soil, etc.). **AND** Permanent cover crops are established in row middles. **AND** Other forms of semi-permeable mulch (e.g.,, straw, hay, leaves, cover crop residue, etc.) are applied to row middles where needed.
		Comments (Optional):			

More on Mulch	Application of straw mulch to row middles is a highly beneficial practice, particularly on eroded hillside vineyards. It conserves moisture, adds organic matter to the soil, and is highly effective in reducing erosion and runoff. It is commonly applied to alternate row middles, and often applied in the fall after harvest. Straw mulch can supply significant amounts of potassium to soils. It is most cost effective to use when growers bale the straw themselves and have open land that they can devote to producing it. Round bales are most often rolled out using self-fabricated tractor-mounted equipment to unroll the bales.

	My Score	1	2	3	4 (Best Practice)
2.1.5 Drainage	4	Soils are poorly drained. **AND** Standing water often persists after rain events.	Soils are moderately drained. **OR** Limited tile drainage is installed on observably wet areas. **AND** Standing water sometimes persists after rain events.	Soils are well drained. **OR** Adequate tile drainage for the soil texture and varietal is installed across newly planted areas. **AND** Standing water rarely persists after rain events.	Soils are well drained. **OR** Adequate tile drainage for the soil texture and varietal is installed across all areas with heavy soils and poor drainage. **AND** Standing water never persists after rain events.
		Comments (Optional):			

2.2 Soil Analysis

Objective 2. Soil Health

Healthy soil is the foundation of a healthy vineyard. It is important to keep soils under vegetation throughout the year to reduce erosion, improve infiltration, sequester carbon, and foster a diverse soil microbiome to maximize nutrient uptake in the vine.

	My Score	1	2	3	4 (Best Practice)
2.2.1 Pre- or Re-Plant	4	No soil analysis is done prior to planting or re-planting vineyard blocks.	Only pH is tested prior to planting or re-planting vineyard blocks: a complete soil analysis is not done.	A complete soil analysis is done prior to planting or re-planting vineyard blocks.	A complete soil analysis is done prior to planting or re-planting vineyard blocks. **AND** Results are incorporated into the nutrient management plan.
		Comments (Optional):			
2.2.2 pH Adjustment	4	Soil pH is not known. **OR** Soil pH is not adjusted where needed. **OR** More than 3 tons per acre of lime is in a given year.		Soil pH is known. **AND** Soil pH is adjusted so the top 16” of soil is approximately 6.0-7.0 for V. vinifera, 5.5-6.5 for hybrids, and 5.0-6.0 for natives. **AND** Less than 3 tons per acre of lime is applied in a given year. **OR** No lime addition is necessary.	Soil pH is known. **AND** Soil pH is adjusted so the top 16” of soil is approximately 6.5 for V. vinifera, 6.0 for hybrids, and 5.5 for natives. **AND** Less than 3 tons per acre of lime is applied in a given year. **OR** No lime addition is necessary.
		Comments (Optional):			

More on pH

Three major types of grapevines are grown in New York: natives, hybrids, and *V. vinifera*. Native labrusca are adapted to acid soils, with optimum pH around 5.5. *V. vinifera* are more adapted to neutral soil pH (6.5-7.0) and can exhibit nutrient deficiencies in acid soils. Interspecific hybrid varieties are hybrids of American (often acid-adapted) *Vitis spp*. and *V. vinifera*, so are thought to have an adaptation to intermediate soil pH (6.0) somewhere between the European and American parents. Although this idea hasn’t been rigorously tested for every hybrid, these guidelines seem to work reasonably well in practice.

Application of lime should be done in the year prior to planting. Additions of large amounts of lime just before planting can induce manganese, potassium, or magnesium deficiencies in vines. Also, lime applied immediately preplant may not have time to react with soil particles.

2.3 Compaction

Objective 2. Soil Health

Healthy soil is the foundation of a healthy vineyard. It is important to keep soils under vegetation throughout the year to reduce erosion, improve infiltration, sequester carbon, and foster a diverse soil microbiome to maximize nutrient uptake in the vine.

	My Score	1	2	3	4 (Best Practice)
2.3.1 Compaction Reference Document	4	Soil compaction is not directly evaluated. **AND** Soils have silt or clay layers, and/or perched water tables.	Soil compaction is not directly evaluated. **AND** Soils are primarily well-drained gravels or gravelly loams in hydrologic classes A and B, which are less prone to compaction.	Soil compaction is directly evaluated. **AND** If soils have impermeable platy layers or hard pans, corrective action is taken (e.g.,, soil ripping when the soil is dry, subsoiling prior to planting, cover cropping with tillage radishes, etc.).	Soil compaction is directly evaluated. **AND** If soils have impermeable platy layers or hard pans, corrective action is taken (e.g.,, soil ripping when the soil is dry, subsoiling prior to planting, cover cropping with tillage radishes, etc.). **AND** Soils are primarily well-drained gravels or gravelly loams in hydrologic classes A and B, which are less prone to compaction.
		Comments (Optional):			
2.3.2 Equipment Use	4	Pickers and tractors are often used within 24 hours after rain and/or when soil is saturated.		Pickers and tractors are rarely used within 24 hours after rain and/or when soil is saturated. **AND** Decisions to use equipment under these circumstances are weighed against potential crop losses.	Pickers and tractors are rarely used within 24 hours after rain and/or when soil is saturated. **AND** Decisions to use equipment under these circumstances are weighed against potential crop losses. **AND** Equipment is chosen or modified to minimize compaction (e.g.,, over the row equipment, wider or larger diameter tires, high flotation tires, etc.).
		Comments (Optional):			

2.4 Tilth

Objective 2. Soil Health

Healthy soil is the foundation of a healthy vineyard. It is important to keep soils under vegetation throughout the year to reduce erosion, improve infiltration, sequester carbon, and foster a diverse soil microbiome to maximize nutrient uptake in the vine.

	My Score	1	2	3	4 (Best Practice)
2.4.1 Cultivation (Row Middle)	4	Row middles are clean cultivated.		Row middles are shallow cultivated.	Row middles are not cultivated aside from terracing and regrading after hilling up in winter.
		Comments (Optional):			
2.4.2 Cultivation (Undervine)	4	Undervine strip is clean cultivated.		Undervine strip is shallow cultivated.	Undervine strip is not cultivated aside from terracing and regrading after hilling up in winter.
		Comments (Optional):			
More on Cultivation	Cultivation, whether in the row middle or under the trellis, can have negative consequences particularly if done in excess. It renders soils more prone to erosion, destroys soil organic matter and can alter the quantity and diversity of soil microbial populations. Under Long Island conditions, row middle tillage may negate the benefits of a row middle cover crop (no net increase in organic matter). However, row middle tillage can and should be done to periodically renovate row middles (reduces weed populations such as dandelions) and as a vine management tool in dry years (reduces competition for water).				
2.4.3 Cover Crop (Row Middle) NRCS Code 340 Cover Crop Decision Tool	4	Cover crops are not seeded or established in row middles.	Annual cover crops are seeded in row middles following cultivation.	Annual cover crops are seeded in row middles following cultivation with a no-till drill. **AND** Cover is established in row middles most of the year.	Perennial cover crops are established in row middles.
		Comments (Optional):			
2.4.5 Cover Crop (Undervine) NRCS Code 340 Cover Crop Decision Tool	4	Cover crops are not seeded or established undervine.	Annual cover crops are seeded undervine following cultivation.	Annual cover crops are seeded undervine following cultivation with a no-till drill. **AND** Cover is established undervine most of the year.	Perennial cover crops are established undervine.
		Comments (Optional):			

Objective 2. Soil Health

Healthy soil is the foundation of a healthy vineyard. It is important to keep soils under vegetation throughout the year to reduce erosion, improve infiltration, sequester carbon, and foster a diverse soil microbiome to maximize nutrient uptake in the vine.

2.5 Amendments

	My Score	1	2	3	4 (Best Practice)
2.5.1 Organic Matter	4	No organic matter is added to the vineyard where needed. **AND** Healthy pruning wood is removed from vineyard.	No organic matter is added to the vineyard where needed. **BUT** Healthy pruning wood is chopped and remains in vineyard.	Organic matter (e.g.,, compost, hay, mulch, composted pomace, mulch, cover crop residue, etc.) is applied where needed at the appropriate rate to avoid excess nutrient leaching. **BUT** Organic matter is not analyzed. **AND** Healthy pruning wood is chopped and remains in vineyard.	Organic matter (e.g.,, compost, hay, mulch, composted pomace, mulch, cover crop residue, etc.) is applied where needed at the appropriate rate to avoid excess nutrient leaching. **AND** Organic matter is analyzed for nutritional composition as well as contaminants. **AND** Healthy pruning wood is chopped and remains in vineyard.
		Comments (Optional):			
More on Compost	It is most practical to apply compost to a swath under the trellis rather than a broadcast application. Reasons include limited availability of high quality compost, the fact that large quantities are needed, and the expense involved. Dr. Ian Merwin, of Cornell University's Department of Horticulture, has documented that compost application increases soil microbial activity (CO_2 evolution), CEC (Cation Exchange Capacity), and available P, Ca, and K. Compost application can also result in shifts in microbial community structure. Chopping the prunings may aid movement through the vineyard rows. On rare occasions, removal of vine prunings is warranted to reduce fungal disease inoculum.				
2.5.2 Pomace	4	Pomace is sent to a landfill.	Pomace is returned in the vineyard fresh and uncomposted.	Pomace is composted off-site and returned to the vineyard as mature compost. **OR** Pomace is composted off-site and applied off-site (as in the case of a vineyard without a winery).	Pomace is composted on-site, away from adjacent waterways, and returned to the vineyard.
		Comments (Optional):			

Objective 2. Soil Health

Healthy soil is the foundation of a healthy vineyard. It is important to keep soils under vegetation throughout the year to reduce erosion, improve infiltration, sequester carbon, and foster a diverse soil microbiome to maximize nutrient uptake in the vine.

	My Score	1	2	3	4 (Best Practice)
More on Pomace	Recycling of organic matter back into the vineyard is important to maintain soil organic matter and soil biodiversity. Pomace can be combined with a carbon source – leaves, for example – to create a more nutritionally balanced product that enhances the soil over and above the addition of fresh pomace. Though difficult to totally eliminate, even through proper composting, grapevine seedlings will proliferate from the spreading of fresh pomace. These seedlings are often infected by downy mildew, but are generally controlled through standard floor management practices.				

Objective 2 Score **56**

Objective 3. Water Protection

New York State has a wealth of freshwater resources including lakes, rivers, streams, ponds, and aquifers. Protective measures and sustainable irrigation practices ensure quality drinking water for all residents. The incorporation of vegetative buffers adjacent to waterways, wetlands, and riparian zones, is also essential to conserving aquatic habitat for all organisms.

3.1 Buffer Zones

	My Score	1	2	3	4 (Best Practice)
3.1.1 Mixing/Loading NRCS Code 702	4	Mixing/loading is within 100 ft of a well, surface water or watercourse.		Mixing/loading area is done down slope and at least 100 ft from any well, surface water or watercourse.	Mixing/loading area is done down slope and at least 100 ft from any well, surface water or watercourse. **AND** Mixing/loading area is done in an approved agrochemical mixing facility.
		Comments (Optional):			
3.1.2 Fertilizer Storage Building NRCS Code 590	4	Storage building is <100 ft from the nearest surface water, well or ecologically sensitive area.	Storage building is 100 ft from the nearest surface water, well or ecologically sensitive area. **BUT** Storage building is not curbed with a concrete pad.	Storage building is 100-200 ft from the nearest surface water, well or ecologically sensitive area. **AND** Storage building is curbed with a concrete pad designed to contain 125% of the volume of the stored products.	Storage is >200 ft from the nearest surface water, well or ecologically sensitive area. **AND** Storage building is curbed with a concrete pad designed to contain 125% of the volume of the stored products. **OR** Fertilizer is used as it is purchased and there is no permanent fertilizer storage on the farm.
		Comments (Optional):			
3.1.3 Spray Applications	4	Spray is applied adjacent to or over top of open water.	Spray is applied less than 35 ft from an open water source.	Spray is applied at least 35 ft from open water source.	Spray is applied at least 50 ft from open water source (e.g. ponds, lakes, streams, etc.).
		Comments (Optional):			

Objective 3. Water Protection

New York State has a wealth of freshwater resources including lakes, rivers, streams, ponds, and aquifers. Protective measures and sustainable irrigation practices ensure quality drinking water for all residents. The incorporation of vegetative buffers adjacent to waterways, wetlands, and riparian zones, is also essential to conserving aquatic habitat for all organisms.

	My Score	1	2	3	4 (Best Practice)
3.1.4 Filter Strips NRCS Code 393	4	Sediment directly enters a watercourse. **OR** No filter strips are in place.	Filter strips are present along some vineyard borders.	Vegetative buffers are 20 ft wide for suspended solids or 35 ft wide for dissolved contaminants and meet NRCS Code 393. **AND** Filter strips are present along most vineyard borders.	All vegetative buffers are over 35 ft wide and meet NRCS Code 393. **AND** Filter strips surround all water courses and vineyard borders.
		Comments (Optional):			

3.2 Water Sources

3.2.1 Pesticide Application	4	Spray tanks are filled directly from a well, pond, creek, or public water source. **AND** A Reduced Pressure Zone (RPZ) device or suitable air gap is not in place.	Spray tanks are filled directly from a well, pond, creek, or public water source. **AND** A RPZ device or an air gap equal to twice the diameter of the filler source pipe above the sprayer tank is in place to prevent backflow.	Spray tank are filled from a nurse tank at least 100 ft from open water. **AND** Water is obtained from a well, pond, creek, or public water source. **AND** A RPZ device or air gap equal to twice the diameter of the filler source pipe above the sprayer tank is in place to prevent backflow.	Spray tank are filled from a nurse tank at least 100 ft from open water. **AND** Water is obtained from a rainwater collection system. **AND** A RPZ device or air gap equal to twice the diameter of the filler source pipe above the sprayer tank is in place to prevent backflow.
		Comments (Optional):			
3.2.2 Irrigation Source	4	Irrigation water is obtained from non-sustainable, protected, or illegal sources.	Where greywater is used, water quality must comply with the WHO Guidelines on Safe Use of Wastewater and Excreta in Agriculture and Aquaculture.	Irrigation water is obtained from sustainable sources, (i.e. sources that supply enough water under normal conditions).	Irrigation water is obtained from a rainwater collection system. **OR** Irrigation is not used.
		Comments (Optional):			

Objective 3. Water Protection

New York State has a wealth of freshwater resources including lakes, rivers, streams, ponds, and aquifers. Protective measures and sustainable irrigation practices ensure quality drinking water for all residents. The incorporation of vegetative buffers adjacent to waterways, wetlands, and riparian zones, is also essential to conserving aquatic habitat for all organisms.

	My Score	1	2	3	4 (Best Practice)
More on Water Sources	Regulations concerning use of surface water (ponds) for filling sprayers vary. Long Island vineyards exclusively use wells or municipal water supplies. In other areas, growers commonly use water pumped from ponds, particularly where wells or municipal water supply are not available. When ponds are used as a source, the filling area should be below the grade of the pond, and at least 100 feet away from surface water. Nurse tanks are recommended, because they reduce the amount of time it takes to fill spray tanks. An acceptable Reduced Pressure Zone (RPZ) device contains a minimum of two independently acting check valves with an automatically operated pressure differential relief valve between the two check valves.				

3.3 Riparian Habitat

	My Score	1	2	3	4 (Best Practice)
3.3.1 Vegetative Buffers Over 150 feet recommended	4	Waterways are not protected by buffer strips.	Waterways are protected by non-vegetative buffer strips.	Waterways are protected by vegetative buffer strips.	Native vegetation adjacent to waterways, including trees and shrubs, shades part or all of the watercourse. **OR** Farm does not adjoin riparian habitat.
		Comments (Optional):			

3.4 Wetlands

	My Score	1	2	3	4 (Best Practice)
3.4.1 Vegetative Buffers Over 150 feet recommended	4	Wetlands are not protected by buffer strips.	Wetlands and vernal pools are protected by non-vegetative buffer strips.	Wetlands and vernal pools are protected by vegetative buffer strips.	Native vegetation surrounds and buffers wetlands and vernal pools. **OR** Farm does not adjoin wetlands and vernal pools.
		Comments (Optional):			

3.5 Engagement

Objective 3. Water Protection

New York State has a wealth of freshwater resources including lakes, rivers, streams, ponds, and aquifers. Protective measures and sustainable irrigation practices ensure quality drinking water for all residents. The incorporation of vegetative buffers adjacent to waterways, wetlands, and riparian zones, is also essential to conserving aquatic habitat for all organisms.

	My Score	1	2	3	4 (Best Practice)
3.5.1 Local Conservation Yates County SWCD Finger Lakes Land Trust Canandaigua Lake Watershed Assoc. Cayuga Lake Watershed Network Keuka Lake Assoc. Otisco Lake Preservation Assoc. Owasco Watershed Lake Assoc. Seneca Lake Pure Waters Assoc. Skaneateles Lake Assoc. Lake Champlain Basin Program Riverkeeper DEC Great Lakes Peconic Land Trust	4	Grower is not engaged with local water conservation or protection organizations.		Grower is occasionally engaged with at least one local water conservation or protection organization.	Grower is actively engaged with multiple local water conservation or protection organizations.
		Comments (Optional):			

Objective 4. Energy Conservation

Reducing carbon emissions is a state, federal, and personal goal for many Americans. From enhanced fuel efficiency to renewable energy generation, there are many ways for growers to reduce their carbon footprint.

4.1 Fuel and Emissions

	My Score	1	2	3	4 (Best Practice)
4.1.1 Benchmarking	4	Neither on-farm fuel nor electricity use are tracked. **AND** No plan is in place to reduce usage.	On-farm diesel use is tracked. **OR** On-farm electricity use is tracked. **AND** No plan is in place to reduce usage.	On-farm diesel use is tracked. **OR** On-farm electricity use is tracked. **AND** A plan is in place to reduce usage.	On-farm diesel use is tracked. **AND** On-farm electricity use is tracked. **AND** On-farm diesel and electricity use have been reduced per ton year-over-year.
		Comments (Optional):			
4.1.2 Alternative Energy	4		Grower uses or sources only fossil energy sources.	Grower uses 1 renewable energy source (e.g. solar, wind, hydro, tidal, geothermal, etc.)	Grower uses at least 2 renewable energy sources (e.g. solar, wind, hydro, tidal, geothermal, etc.)
		Comments (Optional):			
4.1.3 Energy Efficiency	4		The grower does not treat multiple rows or multitask to conserve fuel.	Grower treats more than one row at a time or combines two or more tasks into a single tractor pass once per year to conserve fuel.	Grower treats more than one row at a time or combines two or more tasks into a single tractor pass twice per year to conserve fuel. **OR** Most tasks are completed by hand.
		Comments (Optional):			
Objective 4 Score	12				

Objective 5. Natural Resource Conservation and Waste Streams

It is essential to reduce waste streams and resource utilization through safe handling, storage, and disposal.
Proper waste stream management helps farms to prevent pollution and save costs.

5.1 Chemical Storage

	My Score	1 (High Risk)	2	3	4 (Low Risk)
5.1.1 Shelving	4	Shelving is permeable (e.g. bare wood). **OR** Heavy containers are on the highest shelves. **OR** Pesticide containers are stored on the floor.		Shelving is wood covered with epoxy paint or plastic sheet. **AND** Heavy containers are on lowest shelves.	Shelving is metal or plastic. **AND** Heavy containers are on lowest shelves. **AND** Powders are stored on upper shelves and liquids on lowest shelves.
		Comments (Optional):			
5.1.2 Flooring	4	The floor is permeable (e.g. gravel, dirt, or wood).	The floor is impermeable. **BUT** A spill kit is not readily available.	The floor is impermeable. **AND** A readily available spill kit contains some of the following: • PPE • Shovel • Broom/dustpan • Absorbent material • Heavy-duty detergent • Sturdy plastic container • Emergency telephone numbers	The floor is impermeable. **AND** A readily available spill kit contains all of the following: • PPE • Shovel • Broom/dustpan • Absorbent material • Heavy-duty detergent • Sturdy plastic container • Emergency telephone numbers
		Comments (Optional):			
5.1.3 Security	4	Area is exposed to activities that could damage containers, spill chemicals, or allow entry of unwanted persons.	Area is self-contained, locked, and tamper-proof.	Area is self-contained, locked, and tamper-proof. **AND** Posted with appropriate signage.	Area is self-contained, locked, and tamper-proof. **AND** Posted with appropriate signage. **AND** Used only for pesticides.

Objective 5. Natural Resource Conservation and Waste Streams

It is essential to reduce waste streams and resource utilization through safe handling, storage, and disposal.
Proper waste stream management helps farms to prevent pollution and save costs.

	My Score	1 (High Risk)	2	3	4 (Low Risk)
		Comments (Optional):			
5.1.4 Container Condition	4	Pesticides/fertilizers are not in their original containers. **OR** Pesticides/fertilizers have unreadable or missing labels. **OR** Containers have weak seams, rust, holes, tears, or missing lids that allow chemicals to leak.		Pesticides/fertilizers are in their original containers. **AND** Pesticides/fertilizers are clearly labeled. **AND** Containers have no weak seams, rust, holes, tears, or missing lids that allow chemicals to leak.	Pesticides/fertilizers are in their original containers. **AND** Pesticides/fertilizers are clearly labeled. **AND** Containers have no weak seams, rust, holes, tears, or missing lids that allow chemicals to leak. **AND** Pesticides/fertilizers are purchased in recyclable or returnable containers.
		Comments (Optional):			
5.1.5 Container Disposal	4	Containers are stored, disposed, or burned on the farm.			Triple-rinsed containers disposed of through an appropriate waste collection service or returned to the supplier for recycling.
		Comments (Optional):			
5.1.6 Unwanted Pesticides DEC Clean Sweep New York	4	Unused or banned pesticides are disposed of on the farm or at a local garbage dump. **OR** Unused or banned pesticides are stored indefinitely on the farm.		Unused or banned pesticides are returned to a supplier or disposed of through a hazardous waste collection service.	All pesticides are used.

Objective 5. Natural Resource Conservation and Waste Streams

It is essential to reduce waste streams and resource utilization through safe handling, storage, and disposal.
Proper waste stream management helps farms to prevent pollution and save costs.

	My Score	1 (High Risk)	2	3	4 (Low Risk)
		Comments (Optional):			
5.2 Disposal of Other Waste					
5.2.1 Recycling	4	Grower does not take steps to recycle waste where programs are available.		Grower recycles metal, paper, cardboard, glass, and plastic in designated recycling containers. where programs are available. **OR** Recycling programs are not available to the grower.	Grower recycles metal, paper, cardboard, glass, and plastic in designated recycling containers where programs are available. **AND** New employees are trained on recycling procedures.
		Comments (Optional):			
5.3 Loading and Mixing					
5.3.1 Station Type	4	There is no mixing/loading pad. **AND** Mixing and loading is done in the field at the same location every time.		All mixing and loading is done on an impermeable pad. **OR** Mixing and loading is done in the field at a different location every time.	All mixing and loading is done on an impermeable pad with a curb that keeps spills contained and holds 125% of maximum chemical volume. **AND** Sumps allow spill collection and transfer to storage or back into sprayer for field application. **AND** The facility meets or exceeds current standards for an approved agrichemical mixing facility.
		Comments (Optional):			

Objective 5. Natural Resource Conservation and Waste Streams

It is essential to reduce waste streams and resource utilization through safe handling, storage, and disposal.
Proper waste stream management helps farms to prevent pollution and save costs.

	My Score	1 (High Risk)	2	3	4 (Low Risk)
5.3.2 Spills	4	No spill kit is available. **OR** Spills are dealt with after major time has elapsed or not at all.	Spill kit is not readily accessible at the mixing/loading facility. **OR** Spill kit contents are missing or depleted.	Spill kit is readily accessible at the mixing/loading facility. **AND** Spill kit is fully stocked.	A spill kit is readily accessible at the mixing/loading facility. **AND** Spill kit is fully stocked. **AND** Spills are cleaned up immediately
		Comments (Optional):			
More on Spill Kits	A spill kit should contain personal protection equipment (PPE), shovel, broom, dustpan, absorbent material, heavy-duty detergent, a sturdy plastic container and emergency telephone numbers.				
5.3.3 Filling	4	Supervision is provided seldom or never.	Supervision is provided most of the time.	A certified applicator has provided appropriate training for mixers and loaders and is available for consultation as needed.	A certified applicator does the mixing and loading. **OR** A certified applicator provides constant supervision.
		Comments (Optional):			
5.3.4 Rinsate	4	Sprayer is not washed on a pad. **AND** Rinsate is dumped in-field adjacent to streams/waterways or along a fence/hedgerow.	Sprayer is not washed on a pad. **AND** Rinsate is applied to labeled crops.	Sprayer is washed on a pad. **AND** Rinsate is applied to labeled crops.	An in-field cleaning system is used. **AND** Rinsate is applied to labeled crops.
		Comments (Optional):			

Objective 5. Natural Resource Conservation and Waste Streams

It is essential to reduce waste streams and resource utilization through safe handling, storage, and disposal.
Proper waste stream management helps farms to prevent pollution and save costs.

	My Score	1 (High Risk)	2	3	4 (Low Risk)
5.3.5 Inspections	4	Plumbing and well connections are never inspected. **OR** No emergency plan or phone numbers are in place.	Plumbing and well connections are inspected only when there are breaks and leaks. **AND** Emergency plan and telephone numbers known but not posted.	Plumbing and well connections are inspected occasionally. **AND** Emergency plan and telephone numbers are centrally posted. **AND** Equipment for fire or spills is in place.	Plumbing and well connections are inspected routinely. **AND** Emergency plan and telephone numbers are centrally posted. **AND** Equipment for fire or spills is in place and inspected annually.
		Comments (Optional):			
Objective 5 Score	48				

Objective 6. Ecosystem Health

Sustainable farming is a holistic approach that acknowledges the interconnection between agriculture and natural ecosystems. Encouraging a healthy ecosystem in and around the vineyard is essential to soil health, biodiversity, and pollinator habitat.

6.1 Biodiversity

	My Score	1	2	3	4 (Best Practice)
6.1.1 Ecological Areas Reference Document	4	The entire farm is clean cultivated year-round and there are no ecological areas.	There are no permanent ecological areas. **OR** Temporary ecological areas between rows are mowed down before 50% flowering.	Permanent ecological areas total 5% of the farm acreage. **OR** Temporary ecological areas between rows are mowed down after 100% flowering.	Permanent ecologic areas total more than 5% of the farm acreage. **AND** Temporary ecological areas between rows are mowed down after 100% flowering.
		Comments (Optional):			
6.1.2 Soil Maco/Microorganisms Definition	4		Grower uses none of the following practices to enhance soil life: • Apply organic matter • Minimize undervine tillage • Minimize row middle tillage • Minimize use of copper fungicide • Minimize use of preemergence herbicides • Minimize use of postemergence herbicides • Maximize diversity of cover crops	Grower uses 2 of the following practices to enhance soil life: • Apply organic matter • Minimize undervine tillage • Minimize row middle tillage • Minimize use of copper fungicide • Minimize use of preemergence herbicides • Minimize use of postemergence herbicides • Maximize diversity of cover crops	Grower uses 4 of the following practices to enhance soil life: • Apply organic matter • Minimize undervine tillage • Minimize row middle tillage • Minimize use of copper fungicide • Minimize use of preemergence herbicides • Minimize use of postemergence herbicides • Maximize diversity of cover crops
		Comments (Optional):			
6.1.3 Mycorrhizae HRAC Lookup Definition	4	Grower uses none of the following practices to encourage arbuscular mycorrhizal fungi development: • Avoiding fumigation • Avoiding over fertilization • Avoiding clean cultivation • Avoiding Group 9 herbicide • Inoculating mycorrhizal fungi • Avoiding bare undervine strip • Planting leguminous cover crops	Grower uses 1 of the following practices to encourage arbuscular mycorrhizal fungi development: • Avoiding fumigation • Avoiding over fertilization • Avoiding clean cultivation • Avoiding Group 9 herbicide • Inoculating mycorrhizal fungi • Avoiding bare undervine strip • Planting leguminous cover crops	Grower uses 2 of the following practices to encourage arbuscular mycorrhizal fungi development: • Avoiding fumigation • Avoiding over fertilization • Avoiding clean cultivation • Avoiding Group 9 herbicide • Inoculating mycorrhizal fungi • Avoiding bare undervine strip • Planting leguminous cover crops	Grower uses 3 of the following practices to encourage arbuscular mycorrhizal fungi development: • Avoiding fumigation • Avoiding over fertilization • Avoiding clean cultivation • Avoiding Group 9 herbicide • Inoculating mycorrhizal fungi • Avoiding bare undervine strip • Planting leguminous cover crops
		Comments (Optional):			

Objective 6. Ecosystem Health

Sustainable farming is a holistic approach that acknowledges the interconnection between agriculture and natural ecosystems. Encouraging a healthy ecosystem in and around the vineyard is essential to soil health, biodiversity, and pollinator habitat.

	My Score	1	2	3	4 (Best Practice)
6.1.4 Wildlife Corridors	4		The farm is fully fenced and wildlife has no passage through.	The farm is not fenced, or is fenced in a way to allow for free passage of wildlife.	The farm has dedicated corridors to allow for free passage of wildlife.
		Comments (Optional):			
6.1.5 Enhancements	4	Grower has implemented no practices to preserve or enhance biodiversity on the farm: • Bird nesting boxes • At least 15 sq ft of beneficial plant species • Ecological infrastructure outside the crop area • Minimum of ten non-noxious plant species in row middles	Grower has implemented 1 practice to preserve or enhance biodiversity on the farm: • Bird nesting boxes • At least 15 sq ft of beneficial plant species • Ecological infrastructure outside the crop area • Minimum of ten non-noxious plant species in row middles	Grower has implemented at least 2 practices to preserve or enhance biodiversity on the farm: • Bird nesting boxes • At least 15 sq ft of beneficial plant species • Ecological infrastructure outside the crop area • Minimum of ten non-noxious plant species in row middles	Grower has implemented at least 3 practices to preserve or enhance biodiversity on the farm: • Bird nesting boxes • At least 15 sq ft of beneficial plant species • Ecological infrastructure outside the crop area • Minimum of ten non-noxious plant species in row middles
		Comments (Optional):			
6.2 Pollinator Protection					
6.2.1 Pollinator Habitat	4		The grower provides no pollinator habitat.	The grower provides pollinator habitat during part of the season.	The grower provides and protects permanent pollinator habitat.
		Comments (Optional):			
6.2.2 Bee Nesting	4		The grower does not provide or identify bee nests.	The grower identifies and does not disturb bee nests.	The grower provides and protects permanent bee nests.
		Comments (Optional):			

Objective 6. Ecosystem Health

Sustainable farming is a holistic approach that acknowledges the interconnection between agriculture and natural ecosystems. Encouraging a healthy ecosystem in and around the vineyard is essential to soil health, biodiversity, and pollinator habitat.

	My Score	1	2	3	4 (Best Practice)
6.2.3 Neonicotinoids	4	Neonicotinoids have been applied in the last two years while flowers were in bloom and/or bees were present.	Neonicotinoids have been applied in the last two years while no flowers were in bloom and no bees were present.	Neonicotinoids have not been applied in the last two years.	Neonicotinoids (e.g. clothianidin, thiamethoxam, dinotefuran and imidacloprid) have not applied in the last two years. **AND** Seeds treated with neonicotinoids have not been planted in the last two years.
		Comments (Optional):			
6.2.4 Other Pesticides UC IPM Bee Precaution	4	The grower does not take into account pollinator protections when applying other pesticides.		The grower uses some pesticides that are harmful to pollinators but does so in a way that minimizes risk (e.g. spraying at night or early morning when temperatures are below 55 degrees F).	The grower uses no pesticides that are rated as Level I under the Bee Precaution system maintained by the University of California IPM Program when plants are in bloom and bees are present.
		Comments (Optional):			

6.3 Woodlands

6.3.1 Buffers	4	There are no buffers between the farm and the adjacent woodland.	A non-vegetative buffer protects adjacent woodlands. **OR** No woodlands are adjacent and the farm does not use bird boxes to enhance avian habitat and promote rodent predation.	A vegetative buffer protects adjacent woodlands. **OR** No woodlands are adjacent and the farm does use bird boxes to enhance avian habitat and promote rodent predation.	A vegetative buffer protects adjacent woodlands. **AND** The farm supplements woodland habitat with bird boxes to enhance avian habitat and promote rodent predation.
		Comments (Optional):			
6.3.3 Dead/Dying Trees	4		All dead or dying trees are removed for aesthetic reasons.	Some dead or dying trees are removed for aesthetic reasons.	All dead or dying trees remain, leaving habitat intact, unless they are a source for pests/disease or create a dangerous situation.

Objective 6. Ecosystem Health

Sustainable farming is a holistic approach that acknowledges the interconnection between agriculture and natural ecosystems. Encouraging a healthy ecosystem in and around the vineyard is essential to soil health, biodiversity, and pollinator habitat.

	My Score	1	2	3	4 (Best Practice)
		Comments (Optional):			
6.4 Headlands					
6.4.1 Buffers	4	There is no vegetation on any headlands or along roadsides.		Headlands and roadsides have some vegetation.	Headlands and roadsides are planted with native vegetation.
		Comments (Optional):			
Objective 6 Score	48				

Objective 7. Climate Resiliency

Climate resiliency involves a set of practices and capacities that are known to help withstand climate change at the farm level through carbon sequestration, adaptation, and risk mitigation. It is important for growers to understand the science of climate change and build resiliency measures into their environmental, social, and economic management strategies.

	My Score	1	2	3	4 (Best Practice)
7.1 Regenerative Practices					
7.1.1 Land Management Project Drawdown Regenerative Organic Certification	4		Grower implements none of the following practices: • Low or no-till • Reforestation • Managed grazing • Conservation cover • Multi-story cropping • Dynamic crop rotation • Planting for biodiversity • Planting for forage and biomass	Grower implements 1 of the following practices: • Low or no-till • Reforestation • Managed grazing • Conservation cover • Multi-story cropping • Dynamic crop rotation • Planting for biodiversity • Planting for forage and biomass	Grower implements at least 2 of the following practices: • Low or no-till • Reforestation • Managed grazing • Conservation cover • Multi-story cropping • Dynamic crop rotation • Planting for biodiversity • Planting for forage and biomass
		Comments (Optional):			
7.1.2 Vineyard Applications	4		Grower applies none of the following as needed: • Compost • Manure • Biochar • Mulch	Grower applies 1 of the following as needed: • Compost • Manure • Biochar • Mulch	Grower applies at least 2 of the following as needed: • Compost • Manure • Biochar • Mulch
		Comments (Optional):			
7.1.3 Soil Organic Carbon	4		Grower does not know the Soil Organic Carbon (SOC) level.	Grower knows the (SOC) level and has a plan to increase it.	Grower knows the (SOC) level and has a plan to increase it. **AND** Measures (SOC) regularly and adjusts management plan accordingly.
		Comments (Optional):			
7.2 Climate Risk					

Objective 7. Climate Resiliency

Climate resiliency involves a set of practices and capacities that are known to help withstand climate change at the farm level through carbon sequestration, adaptation, and risk mitigation. It is important for growers to understand the science of climate change and build resiliency measures into their environmental, social, and economic management strategies.

	My Score	1	2	3	4 (Best Practice)
7.2.1 Exposure Cornell Climate Smart Farming	4		Grower does not have knowledge of the changing climate patterns in the region.		Grower has knowledge of the changing climate patterns in the region including temperature, precipitation, growing season length, and drought potential.
		Comments (Optional):			
7.2.2 Sensitivity	4		Grower has no knowledge of the effects of climate change on farming.	Grower has general knowledge of the effects of climate change on farming.	Grower has extensive knowledge of the the effects of climate as they relate to: • Phenology • CO2 levels • Temperature • Soil moisture • Pests and diseases • Pest management strategies
		Comments (Optional):			
7.2.3 Adaptive Capacity	4		Grower currently has no adaptive capacities and is not working to develop them.	Grower is developing adaptive capacities.	Grower has developed adaptive capacities for pest and disease management in response to changing climate conditions. **AND** Has access to physical resources that can buffer temperature and moisture extremes.
		Comments (Optional):			

7.3 Resilience Capacities

Objective 7. Climate Resiliency

Climate resiliency involves a set of practices and capacities that are known to help withstand climate change at the farm level through carbon sequestration, adaptation, and risk mitigation. It is important for growers to understand the science of climate change and build resiliency measures into their environmental, social, and economic management strategies.

	My Score	1	2	3	4 (Best Practice)
7.3.1 Response	4		Grower implements none of the following practices: • Reduced tillage • Dynamic crop rotation • Ecosystem restoration • Integration of livestock • On-farm waste recycling • Diversification of crop species • Climate-appropriate cover crop • Diversified marketing strategies	Grower implements none of the following practices: • Reduced tillage • Dynamic crop rotation • Ecosystem restoration • Integration of livestock • On-farm waste recycling • Diversification of crop species • Climate-appropriate cover crop • Diversified marketing strategies	Grower implements at least 2 of the following practices: • Reduced tillage • Dynamic crop rotation • Ecosystem restoration • Integration of livestock • On-farm waste recycling • Diversification of crop species • Climate-appropriate cover crop • Diversified marketing strategies
		Comments (Optional):			
7.3.1 Recovery	4	Grower lacks abundance of all the following: • Savings • Insurance • Experience • Access to capital • Public assistance • Alternative energy • Community support • Knowledge and skills	Grower has an abundance of 1 of the following: • Savings • Insurance • Experience • Access to capital • Public assistance • Alternative energy • Community support • Knowledge and skills	Grower has an abundance of 2 of the following: • Savings • Insurance • Experience • Access to capital • Public assistance • Alternative energy • Community support • Knowledge and skills	Grower has an abundance of at least 3 of the following: • Savings • Insurance • Experience • Access to capital • Public assistance • Alternative energy • Community support • Knowledge and skills
		Comments (Optional):			
7.3.2 Transformation	4		Grower is not prepared to pivot farm operations if necessary or working toward this goal.	Grower is not prepared to pivot farm operations if necessary but is working toward this goal.	Grower is prepared to pivot farm operations if necessary (e.g. by diversifying crops, planting new varieties, integrating livestock, etc.)
		Comments (Optional):			
Objective 7 Score	36				

Objective 8. Education and Continuous Improvement

Continuous improvement is an critical concept of sustainability that can be achieved through grower education, goal-setting and cooperation. Together we can learn to grow, adapt, and improve as industry.

	My Score	1	2	3	4 (Best Practice)
8.1 Education					
8.1.1 Publications	4	Grower does not subscribe to industry newsletters or trade publications.		Grower subscribes to 1 industry newsletter or trade publication.	Grower subscribes to multiple industry newsletters and trade publications.
		Comments (Optional):			
8.1.2 Grower Meetings	4	Grower does not attend any grower meetings.	Grower attends 1 regional grower meeting per year.	Grower attends at least 2 regional grower meetings per year.	Grower attends at least 3 regional meetings and 1 meeting outside the region per year.
		Comments (Optional):			
8.1.3 University Extension	4	Grower does not follow any Integrated Pest Management (IPM), Worker Protection Standard (WPS), and pesticide compliance updates from university extension.	Grower rarely follows Integrated Pest Management (IPM), Worker Protection Standard (WPS), and pesticide compliance updates from university extension.	Grower often follows Integrated Pest Management (IPM), Worker Protection Standard (WPS), and pesticide compliance updates from university extension.	Grower always follows Integrated Pest Management (IPM), Worker Protection Standard (WPS), and pesticide compliance updates from university extension.
		Comments (Optional):			
8.2 Continuous Improvement					
8.2.1 Projects	4	Grower has no continuous improvement projects to be completed within the next year.	Grower has 1 continuous improvement project to be completed within the next year.	Grower has 2 continuous improvement projects to be completed within the next year.	Grower has at least 3 continuous improvement projects to be completed within the next year.
		Comments (Optional):			
8.2.2 VineBalance	4	Grower has achieved one or more low scores on this workbook and has no plans to address them.		Grower has used this workbook to develop a general plan to increase the total score.	Grower has used this workbook to develop a written plan with goals, benchmarks, and timelines to increase the total score.
		Comments (Optional):			

Objective 8. Education and Continuous Improvement

Continuous improvement is an critical concept of sustainability that can be achieved through grower education, goal-setting and cooperation. Together we can learn to grow, adapt, and improve as industry.

	My Score	1	2	3	4 (Best Practice)
Objective 8 Score	**20**				

Objective 9. Social Equity

Social equity addresses the “people” component of the so-called Three P’s of Sustainability: people, planet, and prosperity. This can be achieved through thoughtful human resource management, employee benefits, and worker health and safety measures.

	My Score	1	2	3	4 (Best Practice)
9.1 Worker Health					
9.1.1 Responsible Party	4	No member of management is clearly identified as the person responsible for worker safety, health, and welfare issues.			A member of management is clearly identified as the person responsible for worker safety, health, and welfare issues.
		Comments (Optional):			
9.1.3 Right to Know OSHA Workers' Rights	4	Workforce is given no Workers' Right to Know training.			Workforce are given Workers' Right to Know training, and all training is documented.
		Comments (Optional):			
9.1.4 Dangerous Work	4	Workforce operates dangerous equipment or in enclosed spaces without training.			Workforce operates dangerous equipment or in enclosed spaces with formal training.
		Comments (Optional):			
9.1.5 Hygiene	4	Handwashing and restroom facilities are inadequate.			Workforce has convenient access to hand washing and clean restroom facilities.
		Comments (Optional):			
9.1.6 Drinking Water	4	Workforce is not given adequate drinking water or breaks during hot weather.			Workforce is provided with adequate drinking water and encouraged to take hydration breaks during hot weather.
		Comments (Optional):			
9.2 Worker Safety					

Objective 9. Social Equity

Social equity addresses the “people” component of the so-called Three P’s of Sustainability: people, planet, and prosperity. This can be achieved through thoughtful human resource management, employee benefits, and worker health and safety measures.

	My Score	1	2	3	4 (Best Practice)
9.2.1 First Aid Kits	4	There are no first aid kits available in the vicinity of the work area.			First aid kits are available and accessible in the vicinity of the work area.
		Comments (Optional):			
9.2.2 Written Procedures	4	There are no written accident or emergency procedures; all communication is verbal.		Written accident and emergency procedures clearly identify emergency contacts and phone numbers (doctor, ambulance, fire-department, hospital, police, etc.) and make the nearest phone accessible at all times.	Written accident and emergency procedures clearly identify emergency contacts and phone numbers (doctor, ambulance, fire-department, hospital, police, etc.) and make the nearest phone accessible at all times. **AND** Written accident and emergency procedures are accessible within 30 feet of the pesticide storage facilities and all mixing areas.
		Comments (Optional):			
9.2.3 PPE	4	Workforce is not offered personal protective equipment (PPE).			Workforce applying pesticides in open cab tractors wear personal protective equipment (PPE).
		Comments (Optional):			
9.2.4 Applicators	4	Pesticide applicators applying restricted use pesticides are not certified by NYS.			Pesticide applicators applying restricted use pesticides are certified by NYS.
		Comments (Optional):			
9.2.5 Hazard Signage	4	No permanent and legible signs are posted to indicate potential hazards (e.g. waste pits, fuel tanks, electrical equipment, pesticide and fertilizer storage, etc.).			Permanent and legible signs are posted to indicate potential hazards (e.g. waste pits, fuel tanks, electrical equipment, pesticide and fertilizer storage, etc.).

Objective 9. Social Equity

Social equity addresses the “people” component of the so-called Three P’s of Sustainability: people, planet, and prosperity. This can be achieved through thoughtful human resource management, employee benefits, and worker health and safety measures.

	My Score	1	2	3	4 (Best Practice)
		Comments (Optional):			
9.3 Rights and Benefits					
9.3.1 Child Labor	4	Certification will be permanently denied If illegal child labor is used.			Illegal child labor is not used and workers under 18 do not: • Handle hazardous chemicals • Work while school is in session • Risk physical or mental well-being **AND** The grower posts conditions and restrictions for employment of child labor.
		Comments (Optional):			
9.3.2 Forced Labor	4	Certification will be permanently denied If forced labor is used.			Forced labor is not used.
		Comments (Optional):			
9.3.3 Base Compensation	4	Certification will be permanently denied if wages paid are below minimum or wage.	Wages paid for regular working hours meet minimum wage. **OR** Hourly equivalent for piecework is equal or greater than minimum wage.	Wages paid for regular working hours exceed minimum wage.	A living wage is paid based on local cost of living. Growers can find the living wage for Yates County and Suffolk County using MIT's Living Wage Calculator. **AND** Agricultural exempt employees are paid overtime wages.
		Comments (Optional):			

Objective 9. Social Equity

Social equity addresses the “people” component of the so-called Three P’s of Sustainability: people, planet, and prosperity. This can be achieved through thoughtful human resource management, employee benefits, and worker health and safety measures.

	My Score	1	2	3	4 (Best Practice)
9.3.4 Benefits	4	Certification will be permanently denied if benefits offered are below legal minimum.	Workers are offered 1 of the following (including where normally exempt): • Housing • Childcare • Healthcare • Transportation • Additional paid time off • Paid maternity/paternity leave	Workers are offered 2 of the following (including where normally exempt): • Housing • Childcare • Healthcare • Transportation • Additional paid time off • Paid maternity/paternity leave	Workers are offered 3 of the following (including where normally exempt): • Housing • Childcare • Healthcare • Transportation • Additional paid time off • Paid maternity/paternity leave **AND** The grower offers professional development opportunities (e.g. paid continuing education).
		Comments (Optional):			
9.3.5 Well-being	4	Labor and management never meet.	Labor and management meet once before the start of the season.	Labor and management meet regularly to discuss matters of health, safety, and well-being.	Labor and management meet regularly to discuss matters of health, safety, and well-being. **AND** Worker well-being is documented, and corresponding workplace improvements are made.
		Comments (Optional):			
Objective 9 Score	60				

Appendix A: Crop Management Guidelines

Yield Adjustment

Yield should be adjusted for the following:
Variety
Vine size
Vine health
Historical yield/quality data

Labrusca and bulk hybrids: yield is determined by crop estimation at 30 days post-bloom. Crop reduction takes place at that time if necessary. For every 3 days the bloom date is earlier or later than the long-term average, an additional ton of fruit can be ripened (when it's early) or must be removed (when it's late).

***Vinifera* and premium hybrids**: Yields are adjusted according to the parameters above. In general, due to cooler eastern climate, lower yields are necessary to ripen late-maturing varieties such as Cabernet sauvignon.

Crop Thinning

Labrusca:
• Thinning is done between 30 days postbloom and veraison.
• If done mechanically, there is minimal leaf removal and damage to berries and shoots.
• Crop is adjusted to ensure ripening to processor quality standards.

Vinifera:
• Thinning is done soon after fruit set. Prebloom cluster thinning is avoided except where improvements in berry set are desired.
• When thinning takes place, diseased or damaged clusters are first removed, overlapping clusters are thinned to facilitate airflow and drying, and clusters on short shoots are thinned or removed totally.
• A target number of clusters per vine is determined based on estimated cluster weight. The number is adjusted up or down depending on vine size.

Yield Estimation

Labrusca*:*
Yield estimation is based on crop estimation practices done 30 days postbloom.

Vinifera: In the Finger Lakes, long-term records are used in conjunction with average cluster weights taken at 1200 growing degree days (50°F base). At that point, clusters should weigh approximately half of their final weight. This method is somewhat less reliable on Long Island due to heavy cluster thinning and the use of irrigation.

Vigor

To increase vine size: leave fewer buds at pruning, increase nitrogen fertilization, reduce crop level, till row middle cover in spring, and/or increase irrigation.

To decrease vine size: leave more buds at pruning, reduce nitrogen fertilization, delay cluster thinning until veraison, establish permanent cover in row middles, and/or decrease irrigation.

Appendix B: Pest and Disease Management

Trunk Diseases

Grapevine trunk diseases: The fungi that cause them, how they develop and spread, and how they are managed, by Jose Ramon

Update on Trunk Injury and Disease Surveys in Minnesota and New York, by Tim Martinson

Eutypa dieback: vines are double pruned and/or cut well below the canker. Vines are flagged during the growing season for future observation. Dead wood and prunings are removed each year and disposed of by burying or burning.

According to Dr. Wayne Wilcox (Dept. of Plant Pathology, NYSAES, Geneva), Eutypa canker has long been known as a cause of declining grapevines. More recently, vine decline has been recognized as a disease complex associated with a number of potential trunk-infecting fungi. Eutypa and some other fungi typically infect through pruning wounds, and then cause cankers that slowly expand down and around the infected arm, cordon or trunk. A cross-section through such cankers typically reveals a distinctive wedge-shaped zone of dead wood radiating from the center of the cylinder. Another group of vine-decline fungi do not cause such cankers. Rather, cross sections through trunks of symptomatic vines often display black spotting or gumming whereas longitudinal sections reveal black streaks through the water-conducting vessels of the wood. Current research suggests that decline symptoms from these infections are unlikely to occur unless the vines are subjected to stress. Therefore, viticultural practices designed to minimize vine stress should help to prevent/minimize the occurrence of such forms of vine decline. These practices would include timely irrigation, balanced nutrition, minimized trunk injury from machine implements and so on.

Crown gall: Vines, or portions of vines, rendered unproductive by crown gall are either removed or a new trunk is trained up. Preparations designed to rid the vine of crown gall should not be used, as efficacy has been poor in both research and grower trials.

According to Dr. Tom Burr (Dept. of Plant Pathology, NYSAES, Geneva) scion and rootstocks differ in their susceptibility to crown gall. In addition, the younger the vine is at infection, the greater the impact on the vine. Crown gall compromises the wound healing process by preventing normal differentiation of cells that are generated in the cambial zone following wounding.

Fungal Diseases

Botrytis cinerea:

• Conscientious canopy management is done; especially leaf pull to improve light, air and spray penetration into the cluster zone.
• Cluster thinning is done in such a way that clumps of overlapping clusters are loosened/thinned.
• Susceptible vinifera varieties are treated, particularly during bloom.
• Sprays are directed at the cluster zone; GPA of water and the need for a surfactant follow pesticide label recommendations.
• N fertilizers applied so that vine growth is balanced.

Major Insect Pests

European Red Mite
Potato Leafhopper
Japanese Beetle
Grape Berry Moth
Grape Leafhopper
Rose Chafer

Minor Insect Pests

Cutworms
Flea Beetle
Thrips
Aphids
Girdlers
Gallmakers
Scale
Grape Plume Moth
Grape Cane Borer
Banded Grape Bug
Grape Rootworm

Mites

European Red Mite
Two Spotted Spider Mite

A note on dormant miticide sprays: Dormant oils, when applied properly, can provide some control of overwintering European Red Mites (ERM) in tree fruit, particularly apples. High water gallonage (200-300 gal/acre) and rates based on time of year/stage of growth are used. In apples, mites become progressively more susceptible to control with dormant oil as spring arrives.

Horticultural oil research has been conducted statewide. Sprays were applied at multiple timings with a backpack sprayer. Treatments were unsuccessful in controlling subsequent mite populations. Grower experience with airblast sprayers has been similarly disappointing. The location of mites in cracks and crevices and under bark makes control more difficult than in tree fruit. For areas with potentially high overwintering ERM populations, an efficient sprayer that achieves excellent coverage would be the best choice for dormant oil application. Coverage must be sufficient to penetrate areas where overwintering mites reside. Be sure to use an oil product labeled for dormant use in vineyards.

IPM for insect/mite pests can be found in the latest version of the *New York and Pennsylvania Pest Management Guidelines for Grapes*, available for purchase here:

https://cropandpestguides.cce.cornell.edu/.

Scores

Objective 1	260 of 260
Objective 2	56 of 56
Objective 3	36 of 36
Objective 4	12 of 12
Objective 5	48 of 48
Objective 6	48 of 48
Objective 7	36 of 36
Objective 8	20 of 20
Objective 9	60 of 60

Total Score

576 **432 To Pass**

PASS!

Definitions

arbuscular mycorrhizal fungi: a soil fungal network that uses hyphae as the site of nutrient exchange with plants called an arbuscule. AMF help plants to capture nutrients such as phosphorus, sulfur, nitrogen and micronutrients from the soil.

biomass: energy generated from the burning or processing of carbon rich feedstocks such as agricultural waste, waste from mills, or sustainably grown perennial plants that are then replenished after burned. Biomass energy is a true solution only if it uses Using annual grain crops like corn and sorghum depletes groundwater and requires high inputs of energy. Using native forests as feedstock, especially from the Global South, is not sustainable.

conservation cover: establishing and maintaining perennial vegetative cover to protect soil and water resources on land retired from agricultural production or other lands needing permanent protective cover that will not be used for forage production

ecological [area/infrastructure/compensation area]: interchangeable terms that refer to areas on the farm that are used to preserve or increase its biodiversity and ecological function. As a reference, the following areas are recognized for direct payments to growers in Switzerland: low intensity grassland; litter meadows; conservation headland; wildflower strips; rotational fallows; hedges; woodland patches; hedges; high-stem fruit trees. Other areas could include: low intensity pasture; silvopasture; large single trees or tree alleys; ditches and ponds; stone heaps or walls; unpaved farm trails

headland: the area at the end of a vineyard row

hydro: hydroelectric power; energy generated from the harnessing of moving water via a turbine, either on a large utility-level or small farm-level scale

luxury consumption: the absorption and accumulation of nutrients by a plant far in excess of its actual immediate needs, sometimes due to over-fertilization

macroorganisms: small insects and arthropods visible to the naked eye; groups include organisms like earthworms, millipedes, centipedes, ants, spiders, slugs, snails, termites. They perform important ecological functions such as soil bioturbation and litter removal.

microorganisms: small springtails and mites, nematodes, and protozoa, among others, that generally live in the soil-water film and feed on microflora, plant roots, other microfauna and sometimes larger organisms. These organisms help to release immobilized nutrients.

riparian: the area bordering surface watercourses such as rivers or streams

tidal: energy generated from the harnessing of rising and falling ocean tides via large turbines placed on the seafloor

variegated landscape: Landscape types include *intact (*where over 90% of the landscape is still under the original native habitat); *variegated* (where 60-90% of the native habitat remains); *fragmented* (where 10-60% of the native habitat remain); and *relict* (where less than 10% of the native habitat remains). Most agriculture falls under the fragmented and relictual categories. These definitions are based on a model of ecosystem fragmentation by Sue McIntyre and Richard Hobbs.

vernal pool: seasonal depressional wetlands

wetland: permanently or seasonally flooded ecosystem

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Other Sustainability Certification Programs

Certified California Sustainable
californiasustainablewine.com

LIVE (Oregon, Washington, Idaho)
livecertified.org

Lodi Rules (California)
lodigrowers.com

Long Island Sustainable Wine
lisustainablewine.org

Napa Green
napagreen.org

SIP (California)
sipcertified.org

Sonoma County Sustainable Winegrowing
sonomawinegrape.org/scw/sustainability/

Sustainable Winegrowing New Zealand
nzwine.com

Sustainable Wine South Africa
wosa.co.za/swsa/en/Integrity/

VIVA (Italy)
viticolturasostenibile.org/EN/Home.aspx

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