

Shifting Away from Herbicides in Grapes and Other Small Fruits

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As a Northeast fruit grower, I became increasingly interested in evaluating alternatives to herbicides such as glyphosate, paraquat, and simazine for under-canopy weed management. I grow grapes, along with currants and blueberries in the Mid-Hudson Valley.

I became interested in how repeated herbicide use may influence soil condition, weed communities, and overall vineyard management. The adverse soil attributes that may occur: hard and compacted soils; increasingly less soil tilth, organic matter content, and fewer beneficial earthworm & microorganism populations; lower retention of soil moisture; and more noxious weeds that cannot be easily controlled. This led me to explore alternative practices that could control weeds while enhancing soil health and long-term productivity. This article summarizes observations from a five-year on-farm effort (2021–2025) to reduce reliance on herbicides and evaluate practical alternatives suitable for small- to medium-scale growers in the Northeast.

Weed Management Program Goals

One goal for an under-canopy weed management program is to minimize weed growth to maximize fruit yields and improve vine health. Uncontrolled weed growth creates competition for grape and small fruit crops to receive needed water, sunlight, and nutrients. Further, high weeds can reduce air circulation within the grape canopy or fruit bush to create conditions that foster fungus disease. An effective weed management strategy prevents the spread of weeds *before* they grow too large; not eliminate weeds *after* they have established. This is a more effective strategy; tailoring a weed program to *your* farm to curtail weeds in a timely manner. Such a strategy can rely on many different ways to manage weeds, tailored specifically to the growers' operation.

On-Farm Trial Overview

This article is for Northeast growers, especially small acreage growers, who can evaluate various practices on a small scale, as these techniques are not capital intensive. These techniques (Table 1) may assist small growers who want to farm “sustainably” or have an interest in organic, bio-dynamic, regenerative, or other alternative farming practices.

Over a five-year period, I evaluated approaches to managing weeds under the canopy in grapes and small fruit plantings at Cedar Cliff Vineyards & Nursery (Athens, NY). The primary goal was to identify cost-effective and practical alternatives that:

- reduce or eliminate herbicide use,
- are not excessively capital nor labor-intensive, and
- contribute positively to soil condition and crop performance.

The rolling farm has Valois-Nassau Complex silt loam soils, with fifteen percent glacial till of sandstone, limestone, and shale, with some hard-pan clay soils, which has areas of well drained to not very well drained soils. Under our previous glyphosate application practice, we used a backpack sprayer. It took about eight hours to treat the entire three-acre vineyard and deer fence line with two applications each year. The alternatives below will be compared to this previous practice.

Weed Control Alternatives Evaluated

The following practices were tested under field conditions. Their effectiveness will vary depending on soil type, slope, crop, and management goals of each grower. The practices described below were selected because they could be implemented without major capi-

Table 1. Weed Management Practices Comparison*.

Practice Evaluated	Weed Control Effectiveness	Labor Costs	Equipment & Capital Costs	Yearly Task Obligations
Black Plastic	High	Medium	High	Medium
Stone Mulch	Medium	Medium	Medium	Low
Organic Mulch**	High / Medium	Medium	Medium / High	Medium
Under-Canopy Cultivation	Medium	High	Medium	High
Promoting Low-Growing Ground Cover	Medium	Medium	Low	Low / Medium
Planting Understory Fruit Crops	Medium	High	Low	High***
Mowing and Mechanical Vegetation Control****	High	Medium	Low	Medium / High
Organic Herbicides	Undetermined in this study	—	—	—
Grazing Animals	Medium	High	High	High
Glyphosate Application*****	High	Medium	Low	Medium

* Observations at Cedar Cliff Vineyards, Athens, New York (2021-2025)

** Added benefit of enhanced soil health, fertility, and water retention

*** Added benefit of an additional fruit crop and profits derived from such crop

**** Expected to increase biodiversity, soil tilth and health, & earthworm populations

***** Did not factor in the possible adverse effects to soil health, water retention, & soil productivity

tal investment and adapted to different parts of the farm depending on soil type and crop. In limited situations, the practices below did not preclude the establishment of noxious weeds, roots, and rhizomes that could only be controlled with conventional herbicides.

1) Black Plastic. Rolls of black plastic reduced weed pressure, but was relatively expensive to install, maintain, remove, and dispose of the plastic. It did not contribute organic matter to soils and diverted rainfall away from the root zone. With specialized equipment, this approach may be more feasible for some growers.

2) Stone Mulch. Applying gravel or small stones under the canopy moderately suppressed weed growth and helped to retain soil moisture. Once stones are placed, this practice works well and is relatively permanent, however, it is helpful to occasionally place more stones to freshen-up your stone mulch. This method was relatively low in cost when materials were locally available and required minimal maintenance once established. Stones may also help reduce surface compaction under

some conditions and beneficially re-direct heat back to vines.

3) Organic Mulch. Organic materials such as wood chips, leaves, straw (not hay because of weed seeds) or compost provided effective weed suppression and incorporated organic matter to soils. To remain effective, reapplication is required at least every two years due to decomposition. When using wood chips, additional nitrogen inputs may be needed to offset nitrogen immobilization during decomposition. If the mulch is laid on too thick, it can create nesting places for rodents such as mice. Use only fully composted mulch that has attained high temperatures to kill weed seeds and seedlings. The time to apply mulch is significantly longer than applying herbicides to suppress weeds, but the added benefit is healthier soils. Further, once mulch is added, the application of subsequent mulch layers is much quicker than the first application.

4) Under-Canopy Cultivation. Mechanical cultivation can effectively control weeds but may damage shallow

root systems in certain grape and currant varieties. It also requires specialized equipment and careful timing to avoid soil compaction, especially under wet conditions. This method is much more labor intensive with substantial tractor usage when compared to applying herbicides as the furrow needs to be made and peeled off each year. In the past, this was a very common way to control weeds, but is becoming less popular today.

5) Promoting Low-Growing Ground Cover. Encouraging naturally occurring or planted low-growing species (e.g., strawberries, marigolds and zinnias) helps suppress weeds and increases plant diversity under the canopy. Over time, strawberries establish themselves, expand their coverage, and curtail weeds from growing. To maintain such strawberry beds, they need to be occasionally weeded and set out new runners to expand these beds. Some plant species may also provide additional benefits such as habitat for beneficial insects.

6) Planting Understory Fruit Crops. Integrating crops such as currants beneath grape rows can provide an additional crop while reducing exposed soil. Currants ripen by July, so they do not conflict with vineyard work. They are fungus disease resistant and late spring frost tolerant. Further, birds, deer, and other wildlife are not fond of currants, so there is little wildlife damage and no netting is required. In pruning grapes to increase currant production, heighten the grape vine's under canopy so that they have sufficient sunlight and air drainage. This approach requires attention to potential competition for water, sunlight, and nutrients and may be more suitable for certain deep rooted grape varieties and site conditions.

7) Mowing and Mechanical Vegetation Control.

Using a push mower proved to be practical for small vineyards. While somewhat more time-consuming than herbicide application, it helped to maintain low ground cover and reduced the presence of larger weeds over time. Both mowing and herbicide applications were done twice a year. Using a lawn mower is not recommended for vineyards with high-profile medium-sized stones. Using a string trimmer took about twenty-five percent more time than either mowing or applying herbicides. If a string trimmer is used, care must be taken to avoid trunk damage. Our observation was that creating a low under-canopy groundcover reduced the percentage of herbicide treated ground that had barren, hardpacked soils, and increased soil health and tilth.

8) Organic Herbicides. Products such as horticultural vinegar, plant-based oils, and fatty acid formulations are used by some growers as alternatives to conventional herbicides. These were not evaluated in this trial, but should be considered in future studies.

9) Grazing Animals. Some growers use sheep or goats to control vegetation. This approach contributes to nutrient cycling and reduces mowing needs, but requires fencing, animal water access, and careful timing to avoid crop damage. Further, these grazing animals need to be taken care of for the rest of the year when not in the vineyard.

Comparative Observations. Each under-canopy weed control practice presented trade-offs in terms of cost, labor, and effectiveness. No single approach was opti-



Photo 1. Red currants grown as an understory fruit crop, with naturally occurring low-growing clover serving as ground cover.



Photo 2. Naturally occurring alpine strawberries, clover, and other low-growing ground covers helping suppress taller weeds under grapes and other small fruit crops.

mal under all conditions. It is important to tailor such weed control program to each farm's soils, fruit crops, and labor/capital needs or restrictions. After five years of evaluating different weed control practices, the best

practices for weed control studied were in order of cost-effectiveness: mowing, organic mulch, stone mulch, low-growing ground covers, and under-canopy fruit cultivation. The least cost-effective practices were



Photo 3. Push mower used to manage tall weeds under Palmer grape vines.



Photo 4. Naturally occurring wild alpine strawberries to suppress tall weeds under grape canopy.



Photo 5. Seeded low growing marigolds to suppress tall weeds. Due to their strong scent, may deter some harmful insect pests.



Photo 6. String trimmer used to manage tall weeds.

black plastic and under-canopy cultivation, with the jury out on organic herbicides and animal grazing. It is understandable why applying herbicides is popular with growers. It is effective, with low to medium labor and capital inputs to apply. However, the long-term use of herbicides may lead to less healthy soils that have less tilth, organic matter content, and ability to retain useable moisture for vine or fruit bushes.

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EDITOR'S NOTE: The observations presented here are based on a small, diversified planting (approximately three acres) and reflect practical, on-farm experience. These practices are likely most applicable to small- to medium-scale operations and may require adaptation for larger or more mechanized systems.