

A Soil Health Farmer Profile

Julie Nord, Trio C Vineyard, Nord Vineyards

The Transition to Regenerative Agriculture

Julie Nord and her family have been growing wine grapes and producing world-class wines for more than 40 years in the Napa and Sonoma Valleys. Leaders in vineyard sustainability, the Nords practice regenerative farming techniques by adopting healthy soils practices such as cover cropping, compost application, mulching, reduced tillage, and nutrient management.



Julie farms the Trio C Vineyard in the Cabernet region near Yountville, on relatively flat land with dark clay topsoils atop alluvial gravels. The vineyard was established in 1992 by her father Will Nord. She now grows Cabernet Sauvignon, Cabernet Franc, Malbec, Pinot Noir, Syrah, Petite Sirah, and Chardonnay. Julie holds a degree in Chemistry and a master's degree in Soil Science.

"When I was in graduate school, I experimented with fertilizers and compared nitrogen sources," she recalls. "I noticed that plants grown with black compost teas grew larger and more vigorous."

Her interest in carbon sequestration, nitrogen fixation, dynamic soils and their relationships to healthier plants, led to her adopting regenerative farming practices at her vineyards.

"Ten years ago, I was satisfied with planting cover crops and plowing them under in the spring," explains Julie. "That would leave the ground bare

for 8 months over the year, and I wasn't seeing gains in soil organic matter."

In 2010, she began planting cover crops of multiple species with varying bloom times to boost the soil's biological activity. A blend of grasses, clovers, forbs, flowers, and brassicas are planted every other row, and barley is planted on the alternate rows. In addition, every tenth row is planted with flowering plants, which act as an insectary, providing habitat for beneficial insects.

Julie continues to experiment with different seed mixes and rates, and with different mowing heights to determine optimal cover crop management. In 2014, she began applying compost consisting of uncomposted chicken litter manure and mushroom mycorrhizae, which Julie reports has improved soil tilth and aeration, as well as increased microbial activity.

Balancing Stewardship, Crop Production, and Costs

Since 2010, when Julie introduced cover cropping, the 76-acre vineyard has flourished. Compost applications began in 2014, furthering soil microbial activity and nutrient cycling. Improved soil health has been evident from soil sampling. Soil organic matter content increased from 2.2% in 2009 to 3.4% in 2018. Yields have increased by 20% without sacrificing fruit quality. Resource benefits include better

Key Facts

COUNTY: Napa, California

WATERSHED: Napa River

CROPS: Wine grapes

FARM SIZE: 76 acres

SOILS: Clear Lake Clay

SOIL HEALTH PRACTICES:

Cover cropping, mulching, compost application, reduced tillage, and nutrient management

American Farmland Trust's **BAY AREA FOOD AND FARMING PROGRAM** supports research and on the ground programs that assist in the protection of the Bay Area's diverse farms and ranches. This soil health grower profile highlights regenerative agricultural practices that improve the environment and the grower's economic bottom line.

water infiltration and water-holding capacity, improved nutrient cycling, and greater diversity among plant species and beneficial insects. Soil bulk density has decreased and there is less compaction. The cover crops have become a mesh of layered grasses, reducing weeds. There is significantly less dust, and Julie notes greater worker satisfaction.

"The vines are healthier, well balanced; fruit and juice quality have improved," she says, "And yields have increased by 20% without sacrificing quality." Julie's goals are to achieve long-term vineyard sustainability while maintaining optimal annual crop production and fruit quality.

Cost reductions were made possible as Julie began adopting healthy soils

practices. Herbicide use decreased 40% as a result of cover cropping. Insecticide use decreased 50% as a result of the beneficial insect populations present in the cover crops and also due to vigorous, healthy vines. Decreased reliance on synthetic nitrogen fertilizers and potash occurred due to the combined benefit from composting, cover cropping, and mulching; a savings of \$38 per acre. And reduced tillage as a result of cover crop management and decreased compaction saves \$99 per acre.

The total cost reduction related to healthy soils practices is \$385 per acre.

Cost increases are attributable to cover cropping, compost applications, and a small increase for additional irrigation

pumping used to establish the cover crop. The cover crop seeder cost \$6,000. The annual cost for seeds, planting equipment, and labor totals \$50 per acre. Julie uses sprinkler irrigation to germinate the seeds and only irrigates during the winter as needed. Maintenance of the cover crop is accomplished by mowing and crimping. Tillage is only used when a flush of nitrogen is needed in the system or to replace a cover crop, and never more than a third of the cover crop is tilled at a time. The compost and spreading cost \$461 per acre every other year. Julie applies the uncomposted chicken litter manure at a rate of 3 tons per acre combined with mushroom mycorrhizae at 1 ton per acre, applied with a spreader biannually after harvest. The total cost increase from

BENEFIT & COST ANALYSIS T-CHART

JULIE NORD, TRIO C VINEYARD		RESOURCE CONCERNS/BENCHMARK CONDITION	
Yountville, Napa County, CA		76 acres of winegrapes established in 2000	
September 2019		Sustainably farmed with regenerative agricultural techniques	
Resource concerns include soil organic matter depletion, nutrient availability, water infiltration, water retention, and compaction			
SOIL HEALTH PRACTICES		NEGATIVE EFFECTS	
Nutrient Management—began in 2006		INCREASED COSTS	
Cover Crops—began in 2006		Cover Crop costs <ul style="list-style-type: none"> Purchase of cover crop seeder \$6,000, 10 yr amortization \$10/ac Annual planting costs including seed, equipment/labor \$40/ac Cover crop maintenance—mowing/crimping \$14/ac Cover crop termination—flail mower \$7/ac 	\$71
Mulching of Prunings—began in 2006		Compost Costs (prorated cost) <ul style="list-style-type: none"> Chicken manure \$350/ac, mycorrhizae \$100/acre (biannually) Spreading \$11/ac (biannually) 	\$231
Compost Application—began in 2006		Increased water usage for Cover Crop establishment <ul style="list-style-type: none"> Pumping costs from artesian well \$20/ac 	\$20
Total Reduced Costs		Total Increased Costs	\$322
POSITIVE EFFECTS			
REDUCED COSTS			
Decreased fertilizer usage as a result of combined soil health practices: <ul style="list-style-type: none"> Reduced nitrogen usage (CAN 17) Reduced potash usage and applications 		\$/AC/YR	
\$38			
Decreased insecticide usage and applications as a result of combined practices			
\$150			
Decreased herbicide usage as a result of Cover Crops			
\$48			
Reduced tillage as a result of Cover Crops			
\$24			
Earlier access to vineyard after rains as a result of Cover Crops, Mulching and Compost, allows for timely cultural operations			
\$50			
Reduced tillage due to reduced compaction as a result of Conservation Cover, Mulching and Compost			
\$75			
Total Reduced Costs		\$385	
INCREASED REVENUE			
Increase in winegrape sales <ul style="list-style-type: none"> 15% increase in price per ton attributable to improved fruit quality as a result of soil health practices 20% increase in yield attributable to improved soil health 		\$/AC/YR	
\$2,025			
Total Dollar Benefits = \$2,410/ac/yr		\$2,410	
\$2,410/ac/yr Total Benefits - \$322/ac/yr Total costs = \$2,088/ac/yr Net Benefits		\$322	

adoption of the healthy soils practices is \$322 per acre.

In sum, Julie's cost savings from reduced herbicides, insecticides, and tillage exceed the increased costs from cover cropping and composting by \$63 per acre.

The improved soil health has contributed to improved fruit and juice quality, which has translated to strong demand for Julie's grapes and award-winning wines from the vineyard.

Prices have increased since 2010 and Julie attributes the improved fruit profile towards 15% of the total price per ton increase, and the remaining 85% attributable to the continual and robust demand for Napa Valley grapes. When considering the increase in grape prices and a 20% increase in yield, Julie cites the value of soil health at \$2,025/acre. A cost-benefit analysis, shown below, finds a net gain of \$2,088 per acre as a result of implementing the soil health practices.

Julie has experienced financial risks and challenges with adopting healthy soils practices, and she understands many growers' reluctance towards adopting regenerative practices. "My family and I are long-time advocates for sustainable farming," she says. "We have learned that the costs for regenerative practices pay off in dynamic soils, which lead to better vine health, grape quality, grape demand, and higher prices."

Water Quality and Carbon Sequestration

The USDA's Nutrient Tracking Tool (NTT) found a 33% reduction in nitrogen losses and an 81% reduction in sediment losses, when compared to 2010 when the vineyard was conventionally farmed.

USDA's COMET-Planner tool calculates greenhouse emissions associated with different farming management practices. For the Trio C Vineyard, data entries included inputs from cover cropping, compost applications, reduced tillage, mulching, and nutrient management. COMET-Planner found a reduction in greenhouse gas emissions and the sequestering of carbon equivalent to that of 7,700 tree seedlings grown for ten years, which directly resulted from the adoption of healthy soils practices. These values show a significant benefit to soil and water quality, documenting decreases in nitrogen leaching and soil erosion, and an improvement in nutrient cycling.

Final Thoughts

Julie's background as a soil scientist, and her passion for living soils and dynamic ecosystems, translates to farming practices that not only sequester carbon, but also encourage healthy vines with strong insect and disease resistance.

"We need to learn more about the soil," she says. "And we must reduce greenhouse gases and reverse climate change. The challenge is to determine the most favorable farming system, whether that is sustainable, organic, biodynamic or kinetic. Now is the time to prove it."

American Farmland Trust utilized the following technical tools to quantify the economic and environmental benefits of soil health practices implemented on the Nord vineyard: NRCS' Level III T-Chart, USDA's Nutrient Tracking Tool, and USDA's COMET-Planner.

Funding for this analysis and grower profile was provided by the Wells Fargo Foundation and by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2018-38640-28418 through the Western Sustainable Agriculture Research and Education program under project number WPDP19-12. USDA is an equal opportunity employer and service provider. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

Authored by Paul Lum, AFT California Project Manager.