# **GRIMM FAMILY CENTER FOR ORGANIC PRODUCTION AND RESEARCH**



**IS MY SOIL HEALTHY?:** Emerging methods to assess soil health lack region- and crop-specificity. For instance, soil health ratings designed for corn in the Northeast may not be suitable for specialty crops in Mediterranean regions. There is also a shortage of extended field studies to establish soil health ratings and guidelines. Our objective was to develop a framework for evaluating soil health using vineyards as a case study, based on assessing grower vineyards with established soil health practices.

## THE APPROACH

- Growers were recruited based on 5 year adoption of management practices including cover cropping, compost, livestock integration, and conservation tillage.
- Growers sent composite soil samples from beneath the vine and alley and completed a survey to report on management history and yield, crop quality, water, and pest management performance of vineyard blocks.
- Soil organic carbon (SOC) , mineralizable carbon (MinC;soil respiration), and aggregate stability (ASI) were analyzed.



Fig 1. Soil tests performed on samples

## SOIL HEALTH RATING FRAMEWORK

- Samples were received from 87 different vineyard blocks across California and Soil Health rating curves were developed based on percentiles across all data from the vine and alley samples
- Reports were provided to each participating grower, ranking their soil health results compared to other vineyard blocks with similar texture



**Fig 2.** Locations of the 87 vineyards involved in the study

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**Fig 3.** Example of a vineyard soil health curve, our process is modelled after the Cornell Health Assessments methodology

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### **RATING CURVES FROM STUDY VINEYARDS**



Fig 3 a-c. Soil health rating curves for Soil organic Carbon (a), Soil Respiration (b), and Aggregate Stability (c)

• Texture has a significant effect on soil health metrics and limits the extremes of the potential values for each indicator

#### **GROWER REPORT EXAMPLE**

Block	Practices	SOC Vine (%)	SOC Alley (%)	MinC Vine (mg C/kg soil/day)	MinC Alley (mg C/kg soil/day)	ASI Vine	ASI Alley
1	CC, compost, NT, Grazing	0.89	1.44	38.34	45.85	0.94	1.00
2	CC, compost, Grazing	0.89	1.06	33.87	37.51	0.74	0.88
3	сс	0.72	1.02	30.07	34.30	0.73	0.88
4	СС	0.73	0.90	17.48	29.33	0.68	0.79

SOC = Soil organic carbon, MinC = Mineralizable Carbon, ASI – Aggregate Stability Index, CC = Cover Crop, NT = No Till. Color codes represent percentile ranks compared to other blocks of similar texture. Red = 0-20% percentile, orange = 20-40% percentile, yellow = 40-60% percentile, light green = 60-80% percentile, and dark green = 80-100% percentile.

In this anonymized grower report example, soil health ratings were greater in vineyard blocks with adoption of multiple practices compared to vineyard blocks with only cover crops.

### **NEXT STEPS**

- Solicit grower feedback on reports
- Further assess links between management practices, soil health indicators, and grower evaluations of vineyard performance
- Develop outreach materials with interpretation guidelines

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