



Defining soil health for wine grape production: A participatory approach

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Why Soil Health matters?



(a)



(b)

Image: (a) Soil erosion at end of vineyard rows. (b) Soil erosion in newly planted vineyard (Figure 2 from Roy et al., 2017.)

Vineyard soils in California are strongly susceptible to erosion and degradation . [Battany et al., 2000](#), [Smith et al., 2008](#)



(a)



(b)

Image: (a) Soil erosion at end of vineyard rows. (b) Soil erosion in newly planted vineyard (Figure 2 from Roy et al., 2017.)



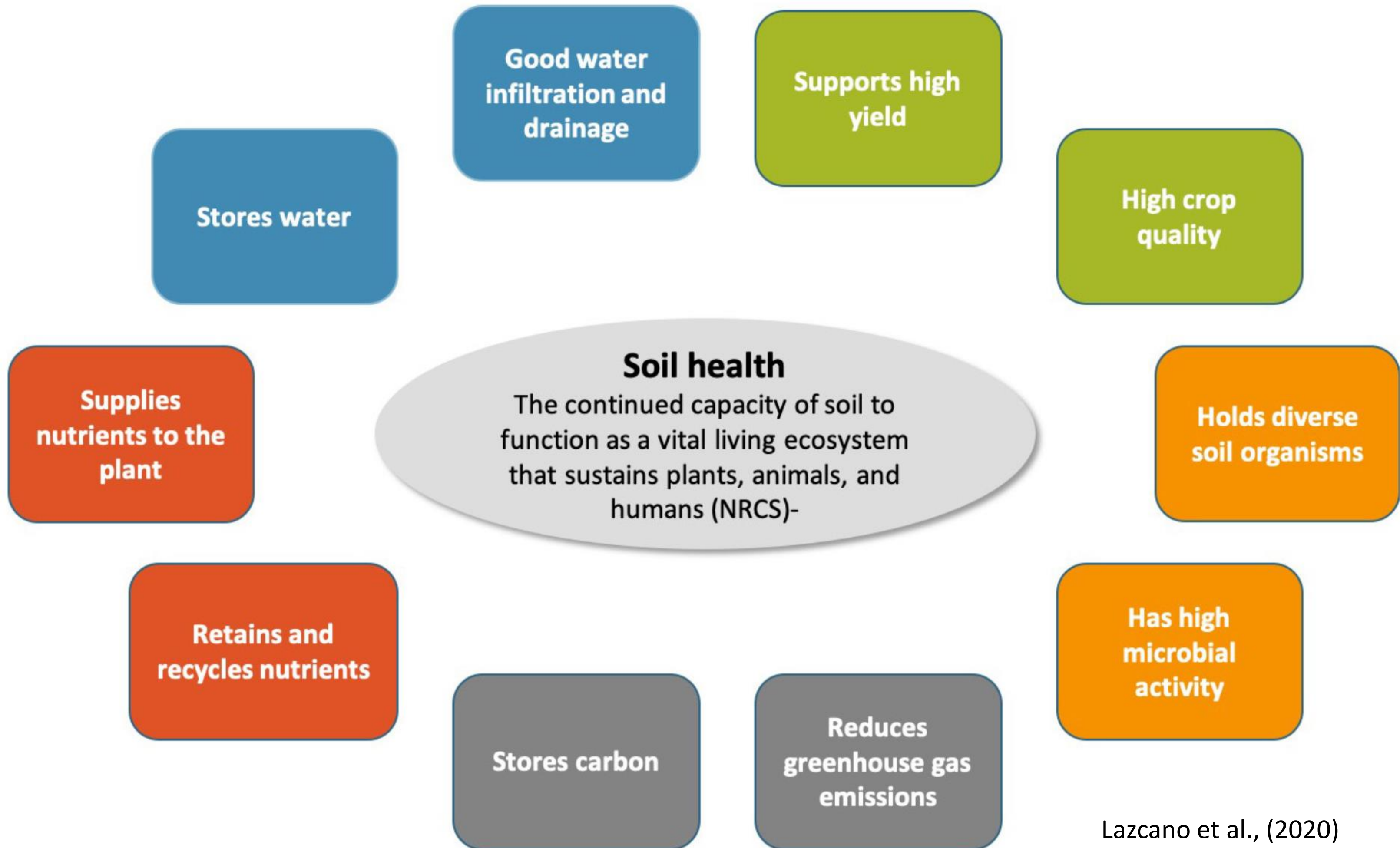
Source: Justin Sullivan, BBC news

How can
we build
resilient
vineyards?



Soil Health


What is Soil Health?



Lazcano et al., (2020)



- Soil protection and strength
- Organic matter
- Biodiversity

A photograph of a vineyard on a hillside. The vines are dormant and supported by a trellis system. The foreground is filled with green grass. The sky is clear blue with a bright sun in the upper left corner.

**What is the
problem?**

**We lack clear
information about soil
health specific for
California vineyard
soils**

To understand vineyard soil health, research should include the collaboration of wine stakeholders





Our Project

With the collaboration of growers, we aim to understand:

- What are the most relevant soil functions
- Motivations, barriers and needs for building healthy and resilient vineyard soils



We conducted semi-structured interviews to wine grape growers

Napa Valley, CA

Collaboration with
Napa Valley Grape
Growers Assoc.

Summer of 2020

16 growers

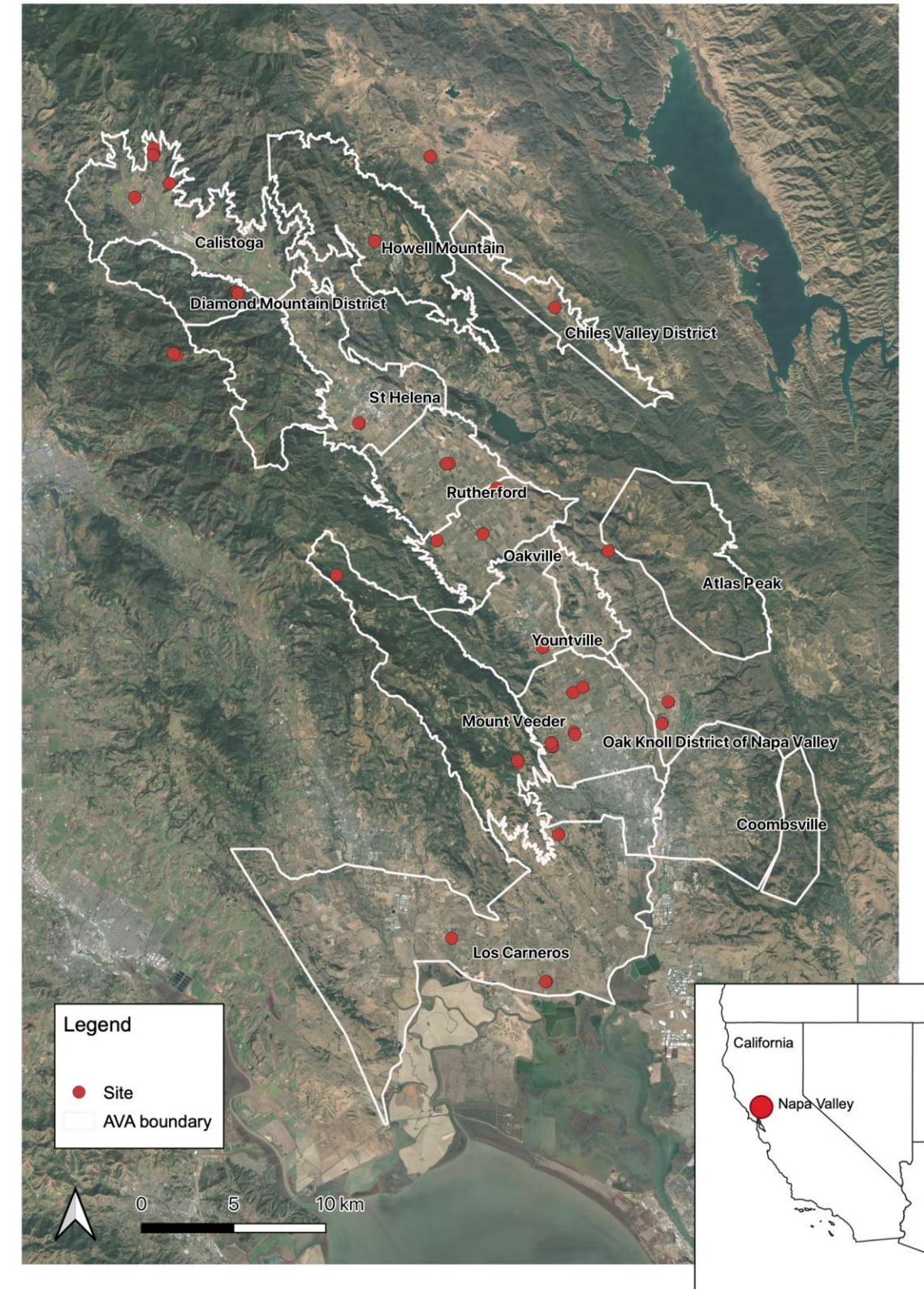
Zoom: 45-60 min

20 open-ended
questions

Inductive Coding
using NVIVO

Social Theories:

- Planned Behavior (Ajzen 1988)
- Diffusion of Innovation (Rogers 1962)



Gonzalez-Maldonado et al., (in preparation)

Example of interview data analysis: inductive coding

Conversation about most important soil functions and properties

But what I am looking for are soils that hold moisture so I don't have to y'know, I don't have to water as much. I mean y'know if I have a really sandy soil and umm, you put out water it y'know drops right through it. That's not ideal

And if you have a soil that's anaerobic, that's heavy clay. Umm that's y'know the water can't penetrate and the moisture can't penetrate, that's not ideal. So, I think the ideal soil is something that's sort of a loam, a cobbly loam.

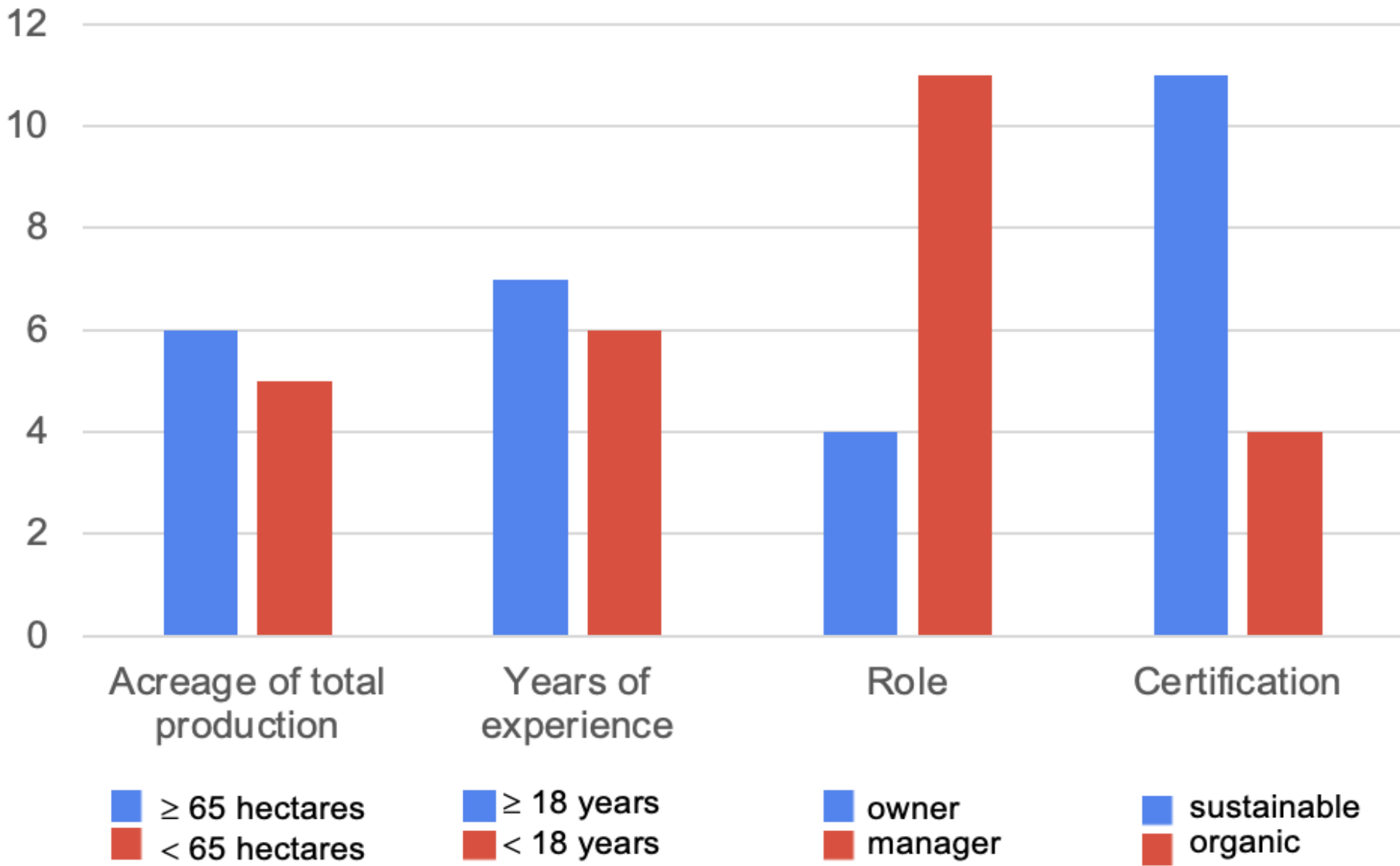
Y'know you don't want to have too many rocks. I would say we have more rocks than I'd ideally like to have in the soil because they're hard to deal with. But, you want- you do want to have rocks. You do want to have y'know cobbles in the soil. Rocks in general, y'know grape plants don't like rocks. People don't like rocks, your machinery doesn't like rocks. Y'know it makes farming more difficult.



We conducted semi-structured interviews to wine grape growers

1. What is soil health in the context of viticulture? What are the most relevant soil functions and properties?
2. What soil management practices are being done and why?
3. What are some current challenges and motivations to adopt and/or maintain practices that promote soil health in the vineyards?

Participating wine grape growers: 16



Q1: What is soil health in the context of viticulture? What are the most relevant soil functions and properties?



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Organic matter Self sustaining
Healthy vines **Balanced**
infiltration No erosion
Soil microbes **Soil life**
Minimal inputs **Sufficient nutrients**
Strong structure **Sufficient water**
aeration Healthy cover



Q1: What is soil health in the context of viticulture? What are the most relevant soil functions and properties?

A healthy vineyard soil supports:

- Vine Balance
- Targeted grape yields and quality
- Vine health
- Erosion mitigation
- Minimal inputs requirements
- Carbon sequestration



Gonzalez-Maldonado et al., (in preparation)

Q1: What is soil health in the context of viticulture? What are the most relevant soil functions and properties?

The most highlighted soil properties were:

Water cycling

Infiltration, Water Holding Capacity, structure and aggregation

Nutrient cycling

Adequate but not excess levels of nutrients and soil organic matter

Biodiversity

Beneficial soil organisms and living roots

Q2: What soil management practices are being done and why?

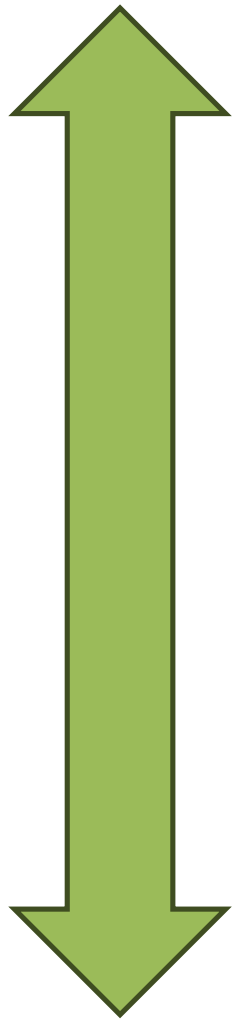


Q2: What soil management practices are being done and why?



1. Cover Crops
2. No-Tillage
3. Alternate rows Tillage
4. Minimal tillage: disking
5. Composts
6. Sheep Grazing

Most
adopted

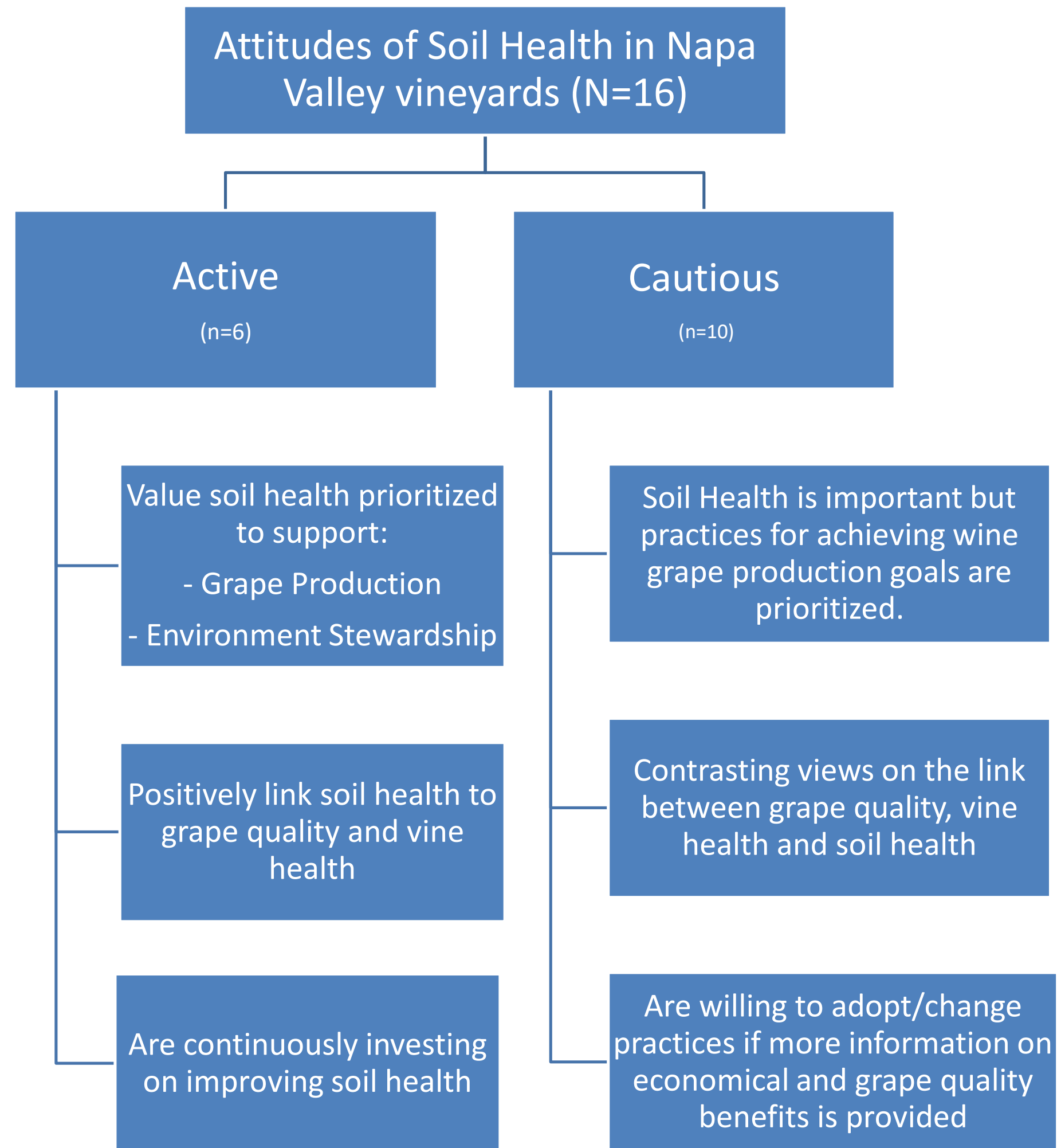


Least
adopted

Q3: What are some current challenges and motivations to adopt and/or maintain practices that promote soil health in the vineyards?



How important is soil health for wine grape production?



Q3: What are some current challenges and motivations to adopt and/or maintain practices that promote soil health in the vineyards?

Motivations

1. Manage vine balance
2. Achieve targeted yields and berry quality
3. Benefit vine health
4. Reduce soil erosion
5. Reduce inputs (labor and costs)
6. Create a self-sustaining vineyard
7. Build vineyard resiliency
8. Comply with certifications (potential added value)
9. Carbon sequestration

Q3: What are some current challenges and motivations to adopt and/or maintain practices that promote soil health in the vineyards?

Main Barriers

1. High costs and potential economical risks
2. Lack of targeted and practical information
3. Potential increase in water needs

Growers are willing to adopt more practices that benefit soil health if more targeted information is provided about benefits to soil functions and grape production.



What are
the current
soil health
research
gaps?

**How do regenerative soil
management practices impact:**

- 01 Soil Health properties like soil organic matter, biodiversity and water cycling
- 02 Climate change mitigation: C sequestration and GHG emissions
- 03 Vine health and grape production (yields and quality)

Thank you! Questions?

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