Department of
LAND, AIR AND WATER RESOURCES
University of California, Davis
Climate Change • Sustainable Agriculture
Environmental Quality • Landscape Processes

Is regenerative the path forward for winegrape production in California?

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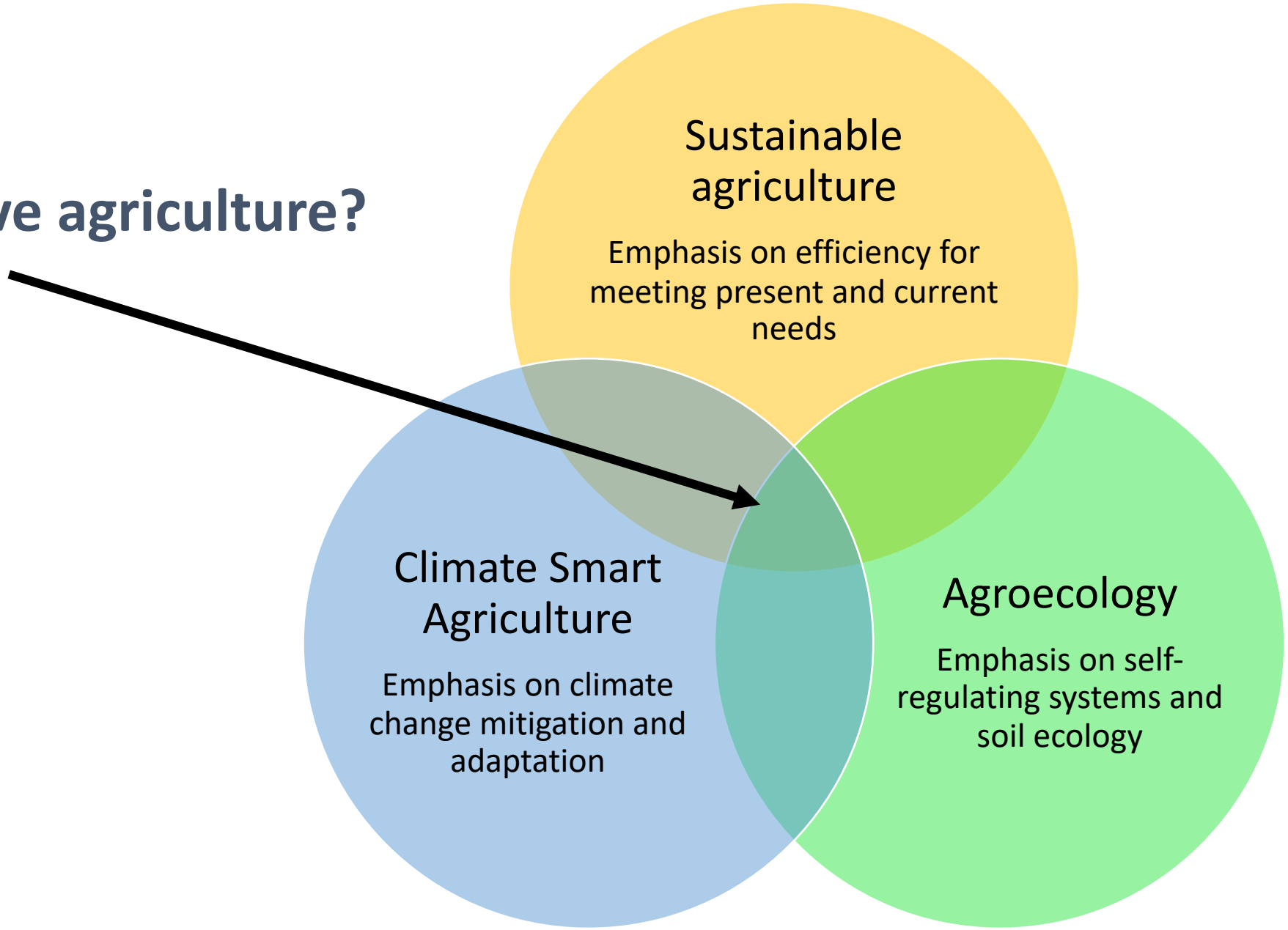
The challenges

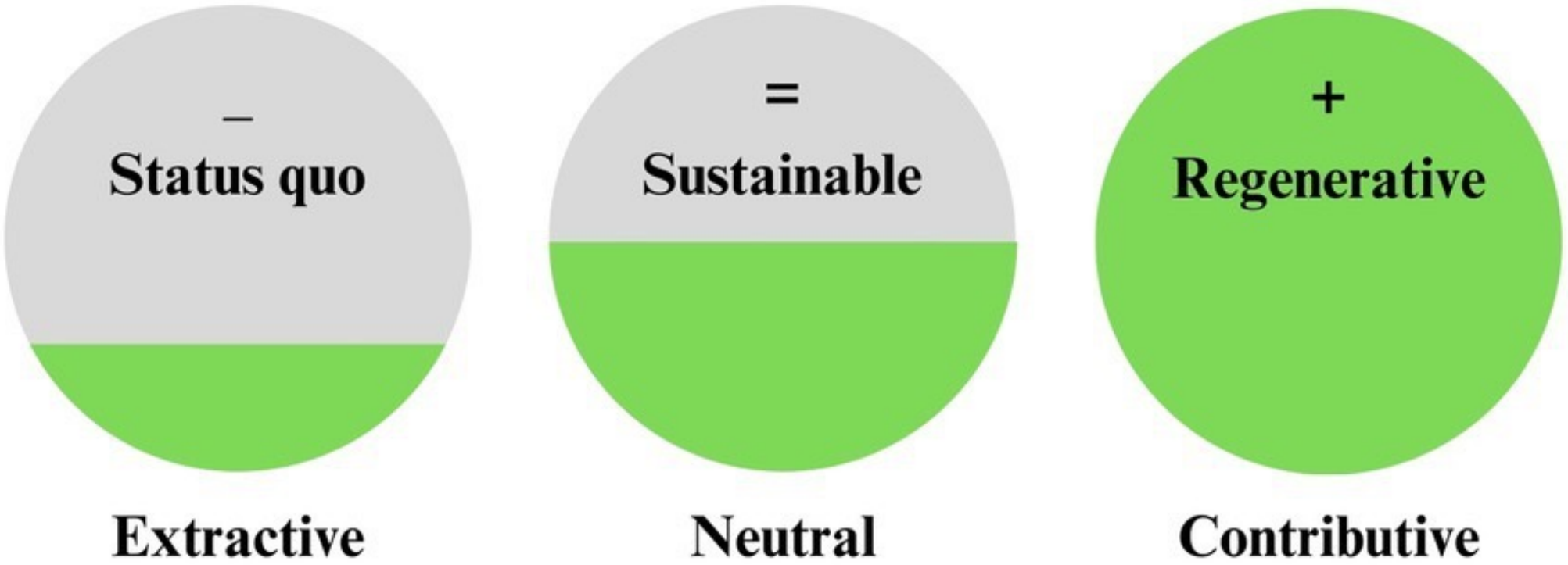
#1: Adapting to extreme weather events and climate whiplash

#2: Reducing environmental pollution and mitigating climate change

#3: Maintaining grape quality in a fast-changing environment

Regenerative agriculture?

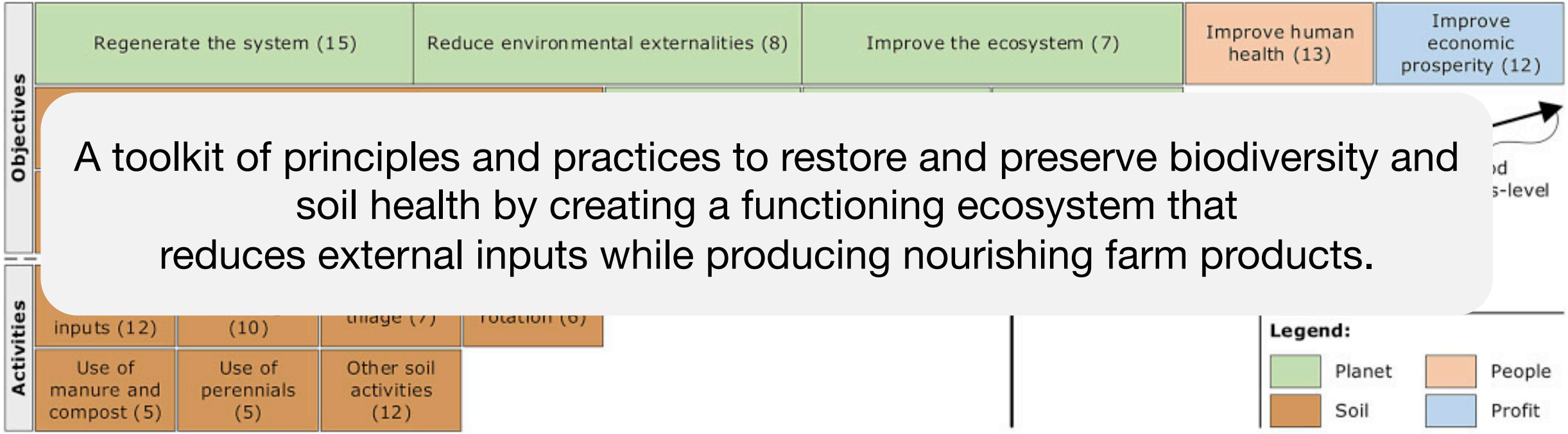




Villat and Nicholas 2024; Fitzgerald et al. 2021

So, what exactly is regenerative?

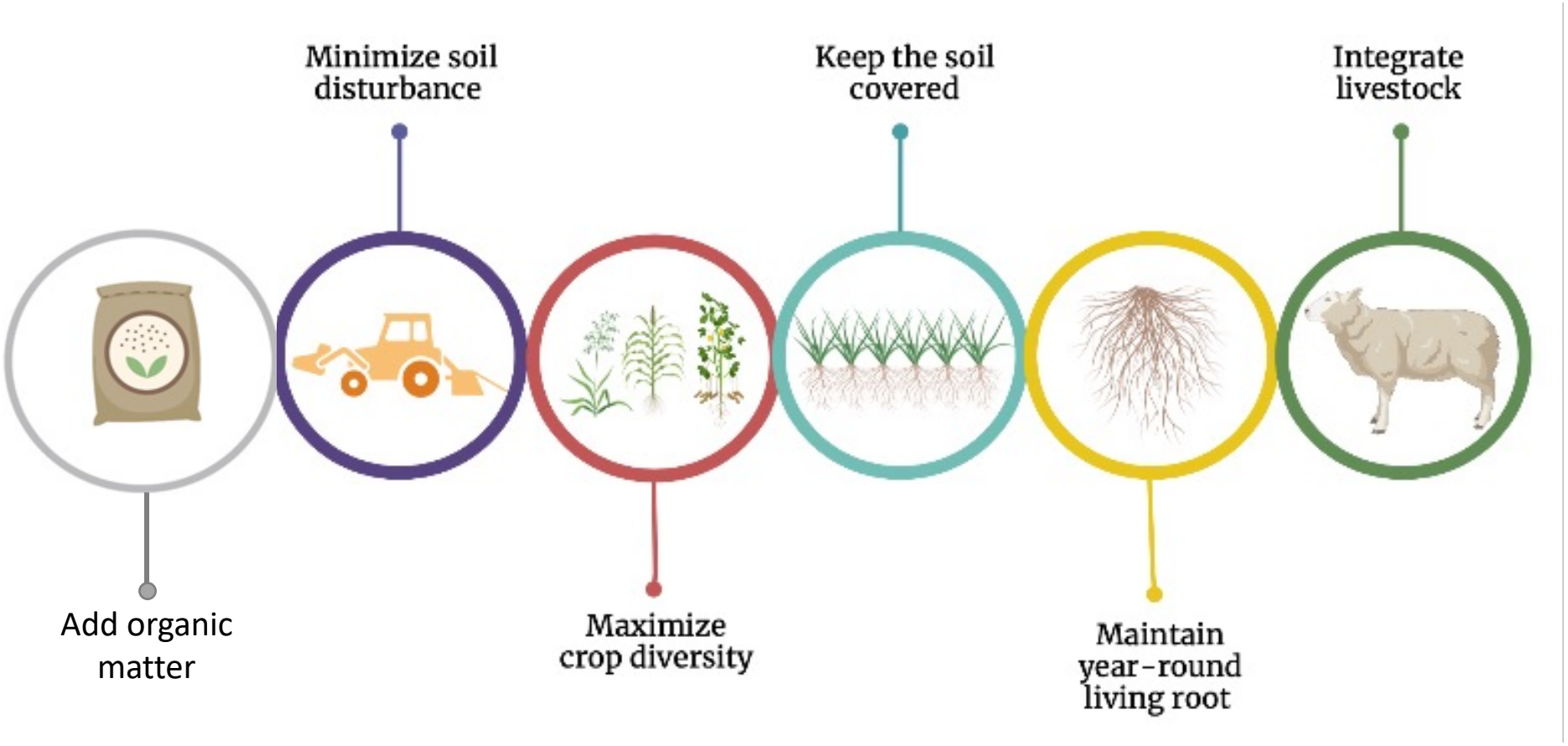
No legal definition, based on outcomes, centered on soil health



A toolkit of principles and practices to restore and preserve biodiversity and soil health by creating a functioning ecosystem that reduces external inputs while producing nourishing farm products.

Schreefel et al 2020

Principles of regenerative agriculture



Management practices for viticulture

Compost application

No till/ reduced till

Cover crops

Sheep grazing

So… What's new then?

1. Stacking practices

Reduced/ no-tillage

Cover crop/
vegetative cover

Mulching

Crop Rotation

Organic amendments

Animal integration

So... What's new then?

2. Scaling up

The Rockefeller Foundation

JUL 27, 2022
NEWS RELEASE

General Mills invests $2.3 million to advance regenerative agriculture in Canada with ALUS

The multi-year partnership will support farmers and accelerate regenerative agriculture in Manitoba and Saskatchewan, Canada.

Nestlé

Walmart

ROA | Regenerative Organic Alliance

Is regenerative the path forward for grapegrowing in California?

Can regenerative management help with adaptation to climate change across different soils?

Photo credit: Ceres Imaging

Drought

Flood

Photo credit: Justin Sullivan, Getty Images

Soil structure is critical in supporting infiltration and reducing runoff and erosion

Regenerative management and soil resilience to climate extremes

Dr. Nall Moonillal,
Postdoctoral researcher
UC Davis

Sarah Brickman
PhD Student
UC Davis

Paired Site 1

SH: No-Till, Cover Crop, Sheep Grazing for >5 years

CON: Tillage and Disking, Bare Floor, No Grazing

Paired Site 2

SH: No-Till for >34 years, Cover Crop, Compost, Biochar, Sheep Grazing

CON: Tillage and Disking, Bare Floor, No Grazing

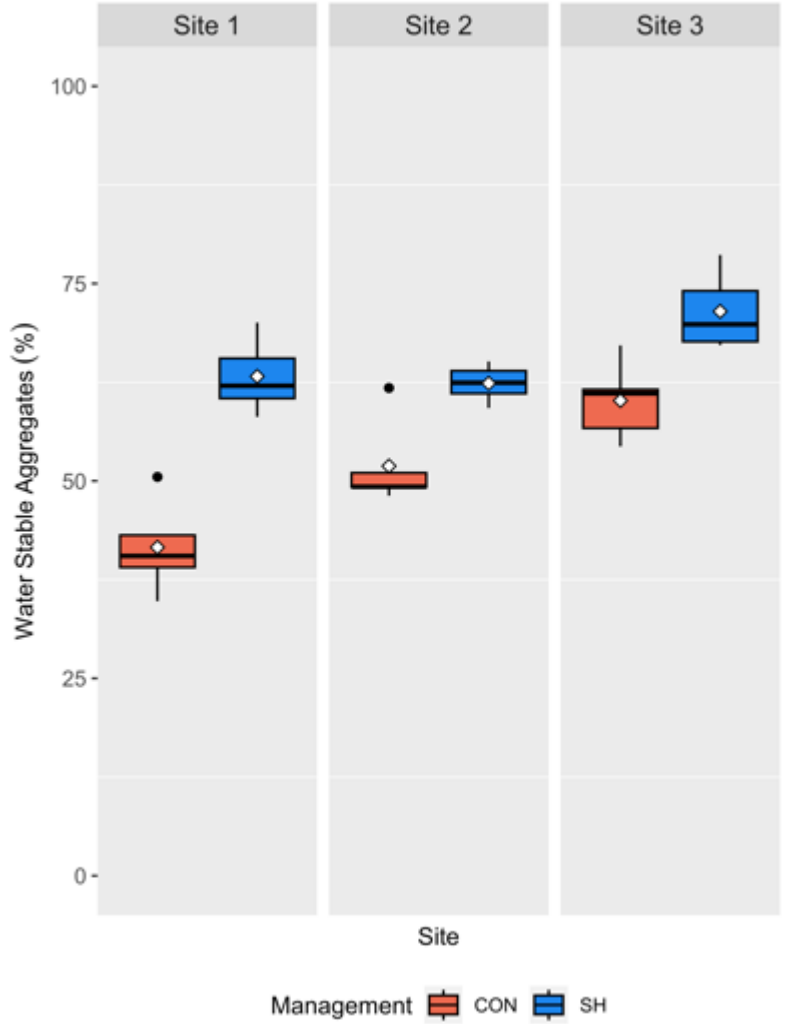
Paired Site 3

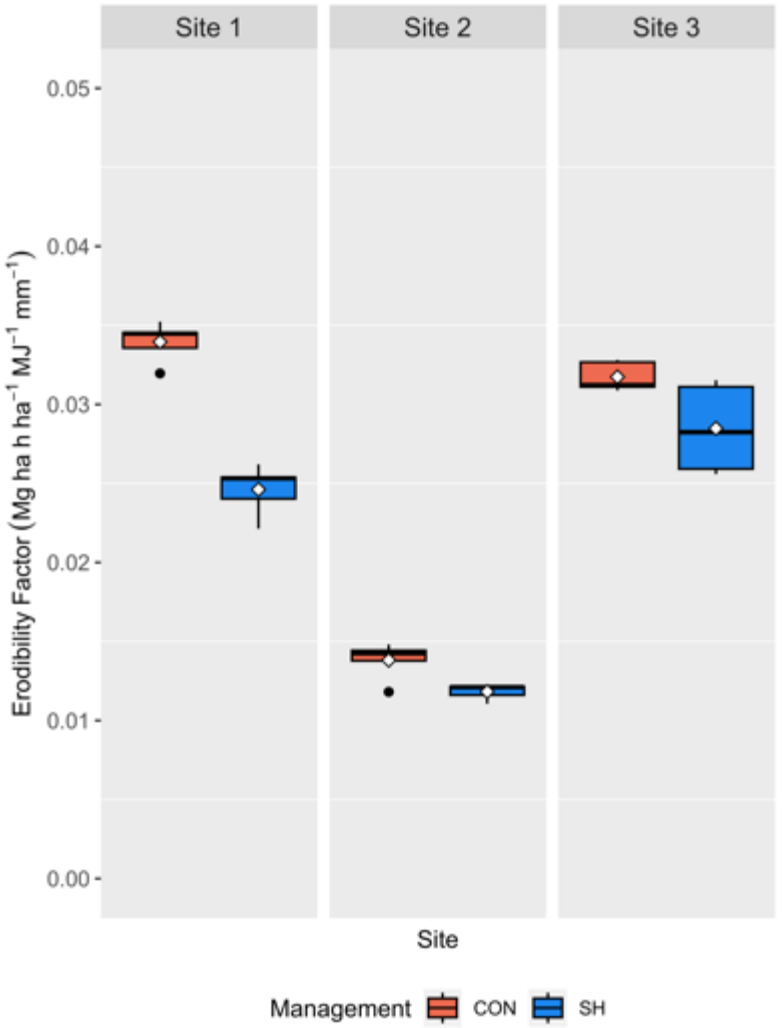
SH: No-Till, Cover Crop, Compost, and Sheep Grazing for >5 years

CON: Light Tillage, Some Cover Crop Residue Incorporation, No Grazing

USDA United States Department of Agriculture

Soils are more resistant to breakdown from water perturbation under regenerative management

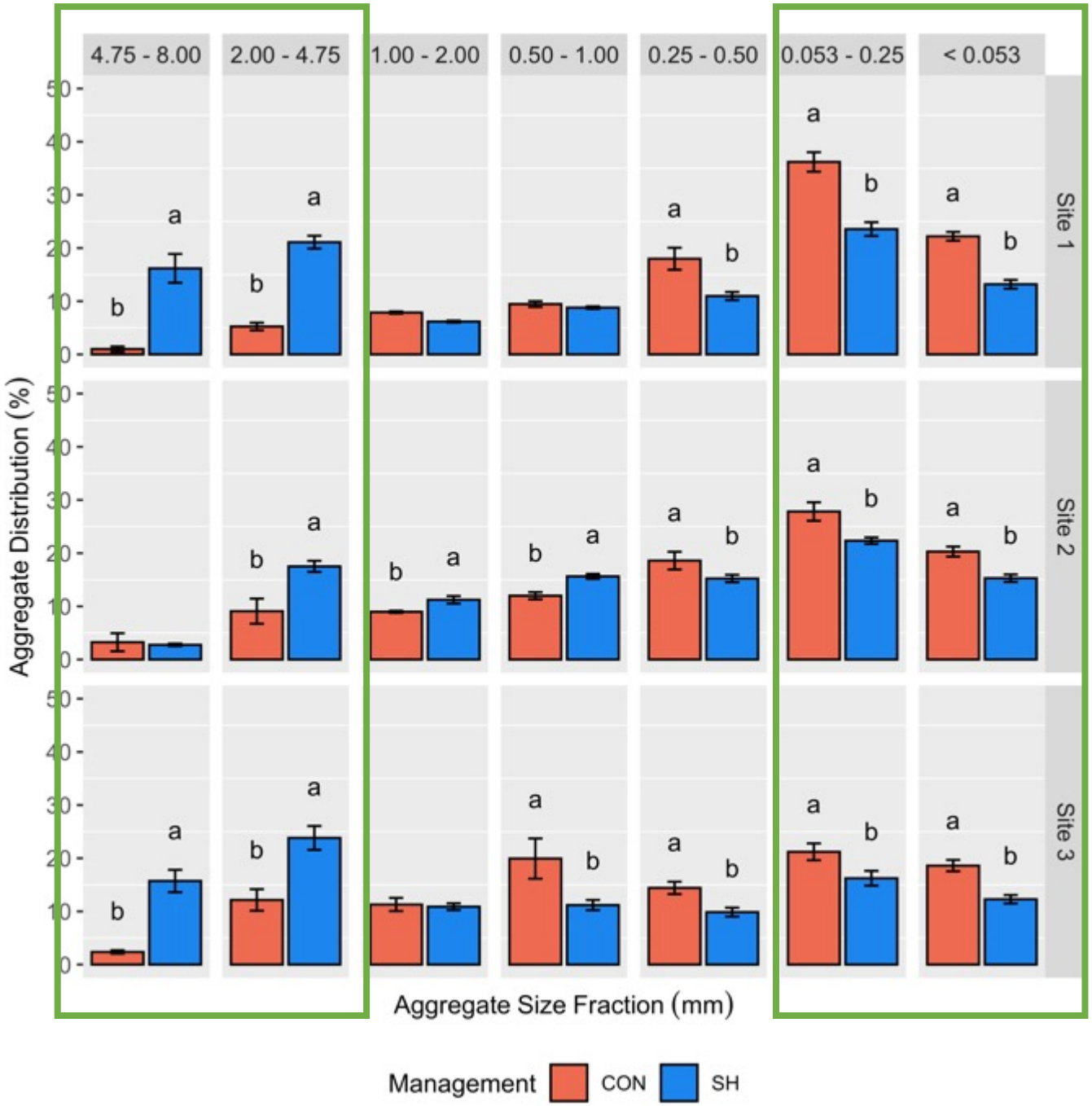




Moonillal et al, in preparation

Regenerative management increases the proportion of soil macroaggregates

This suggests higher porosity

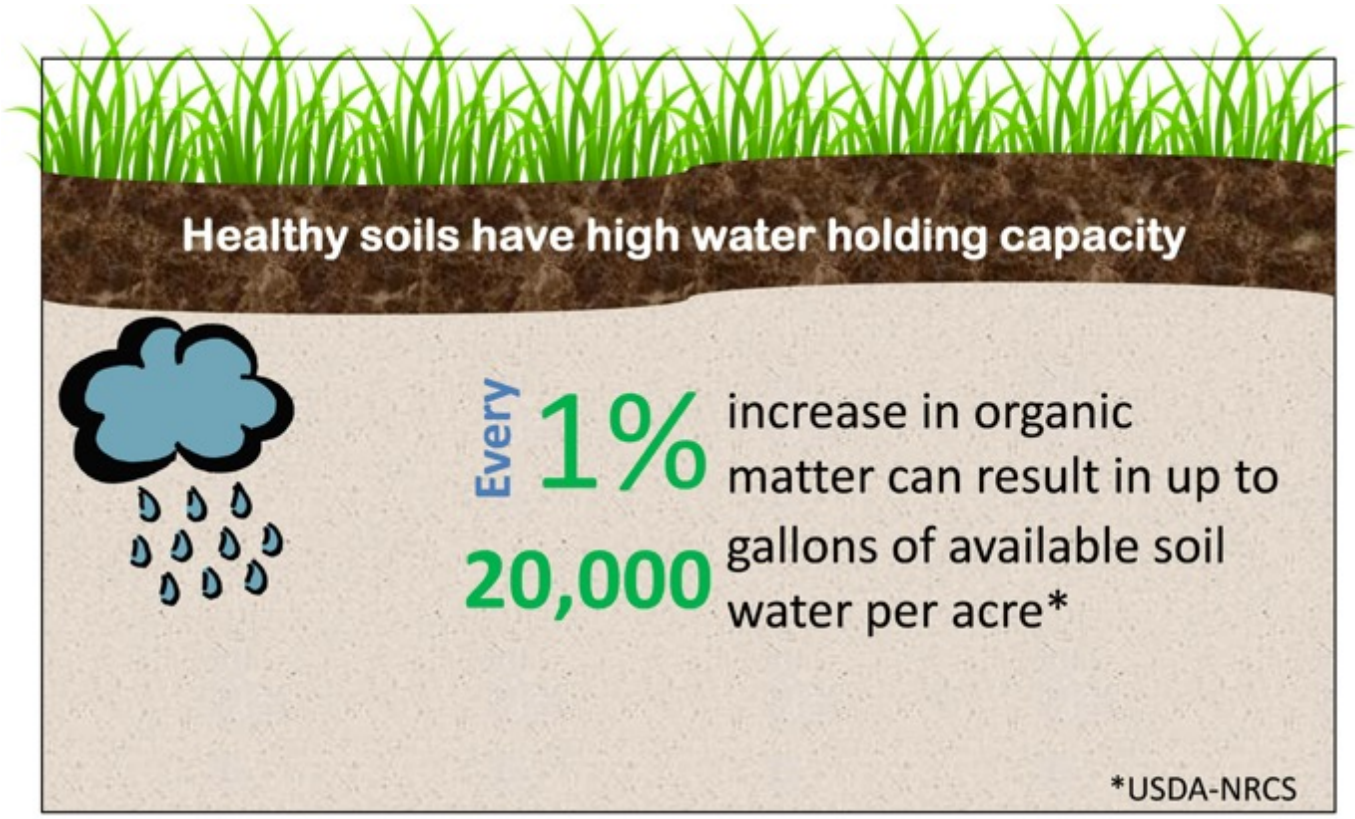


Moonillal et al, in preparation

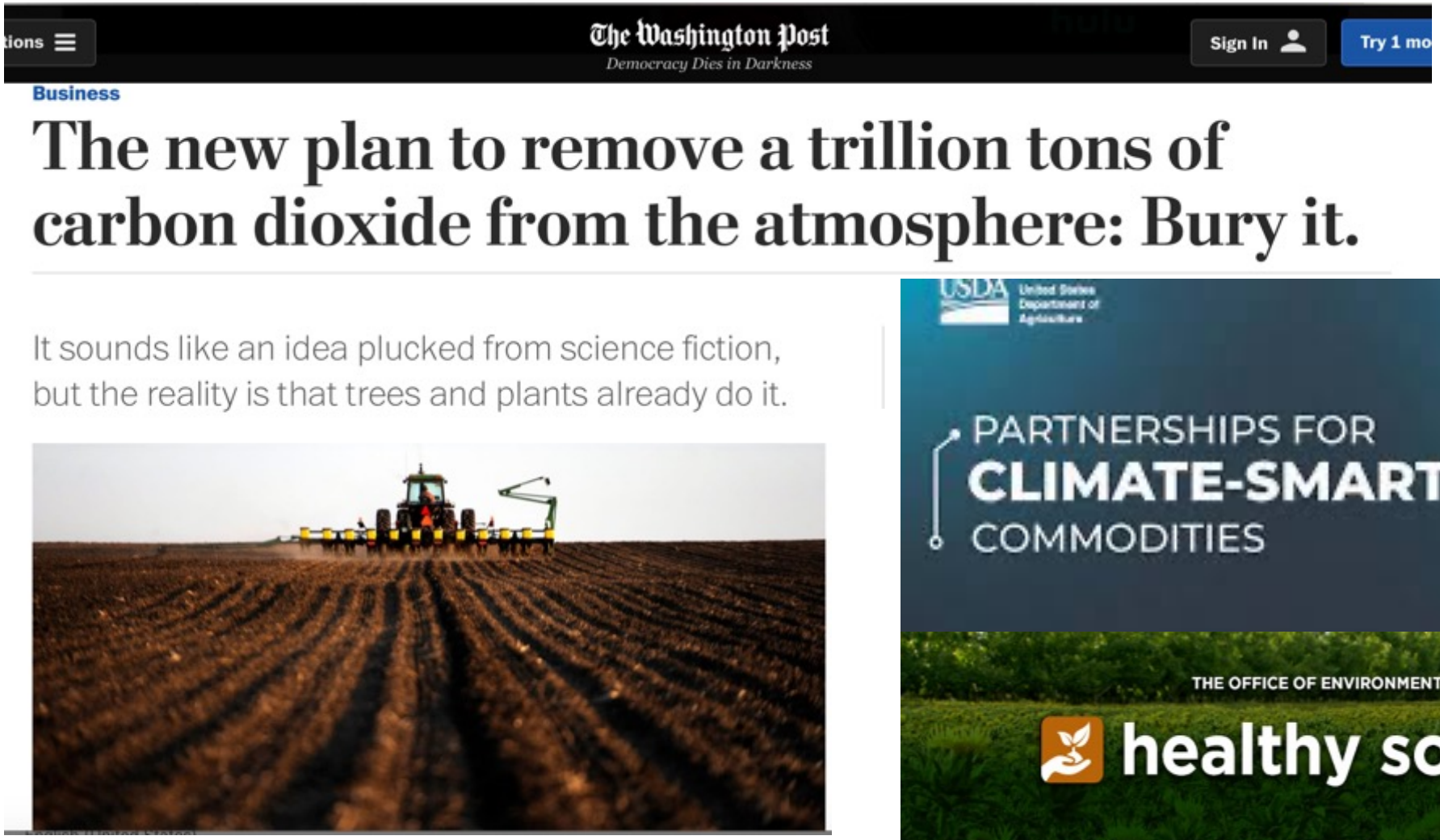
Can regenerative management increase water retention?

- Although soil organic matter increases water retention, it is not clear how much irrigation water can be saved (if any)
- Current data is limited
- We are working on measuring the relationship between soil organic matter and water retention in Napa vineyards

- What to collaborate? Reach out! clazcano@ucdavis.edu



Is regenerative farming a valid strategy for climate change mitigation?



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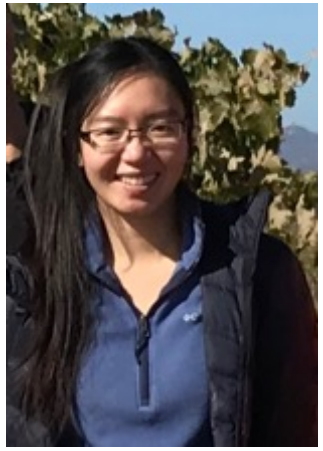
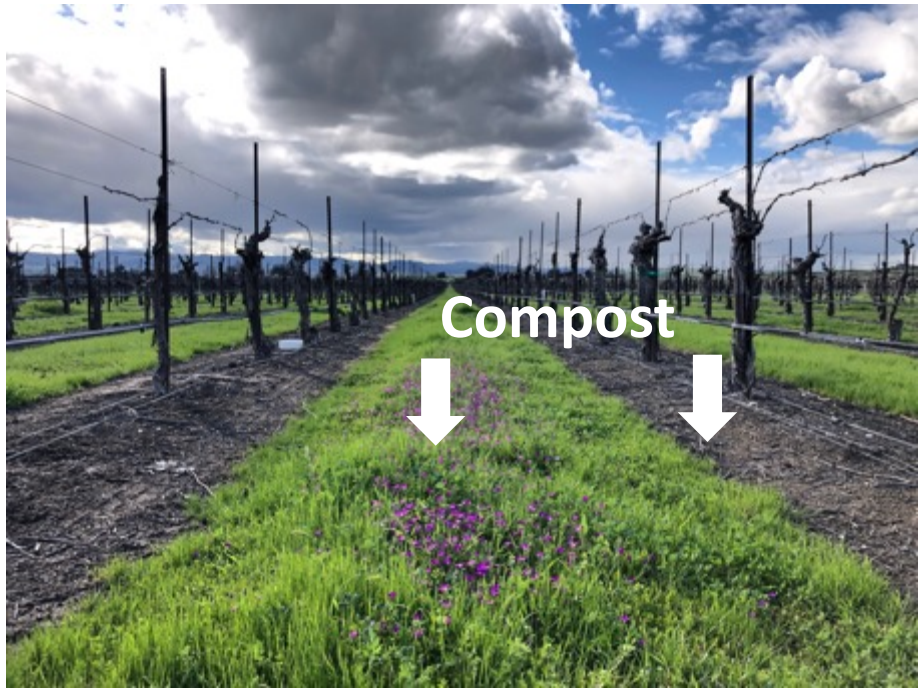
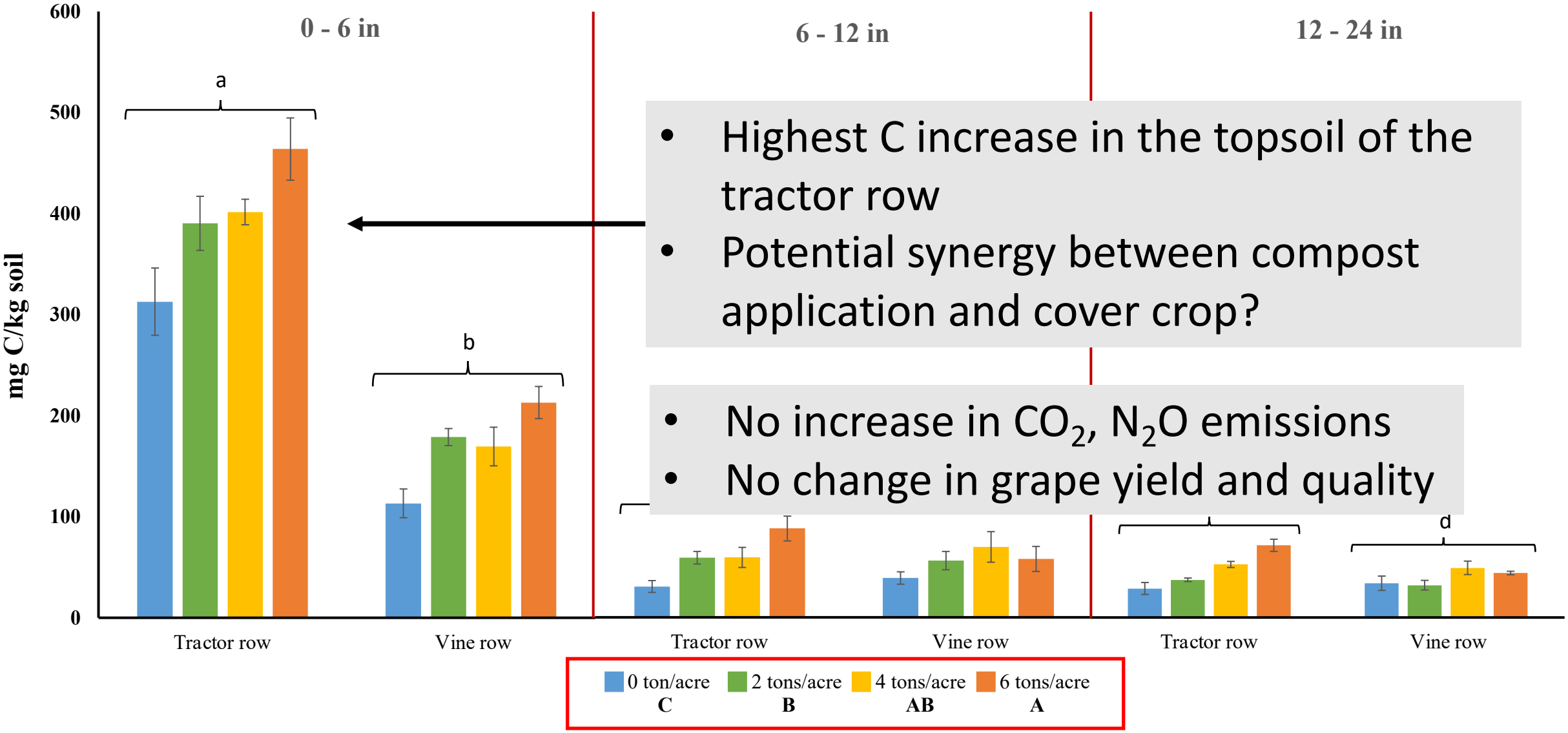


Tsz Fai (Connie) Wong (PhD candidate, UCD)
Mia Falcone (Cal Poly)
Jean Dodson-Peterson(Cal Poly)
Charlotte Decock (Cal Poly)
Cristina Lazcano (UCD)



- Four rates of compost: 0, 2, 4, 6 ton/ac
- Broadcasted once a year
- Measured soil C, CO_2, N_2O, crop yield and quality

Result: Active Carbon o POXC (Rate: $p < 0.001$; Location-Depth interaction: $p < 0.001$)



- Highest C increase in the topsoil of the tractor row
- Potential synergy between compost application and cover crop?

- No increase in CO_2, N_2O emissions
- No change in grape yield and quality

Wong et al. 2023

Regenerative management: What is the bottom line?

Dr. Axel Herrera
Postdoctoral researcher,
UC Davis

Cost-benefit analysis of regenerative vs. conventional management

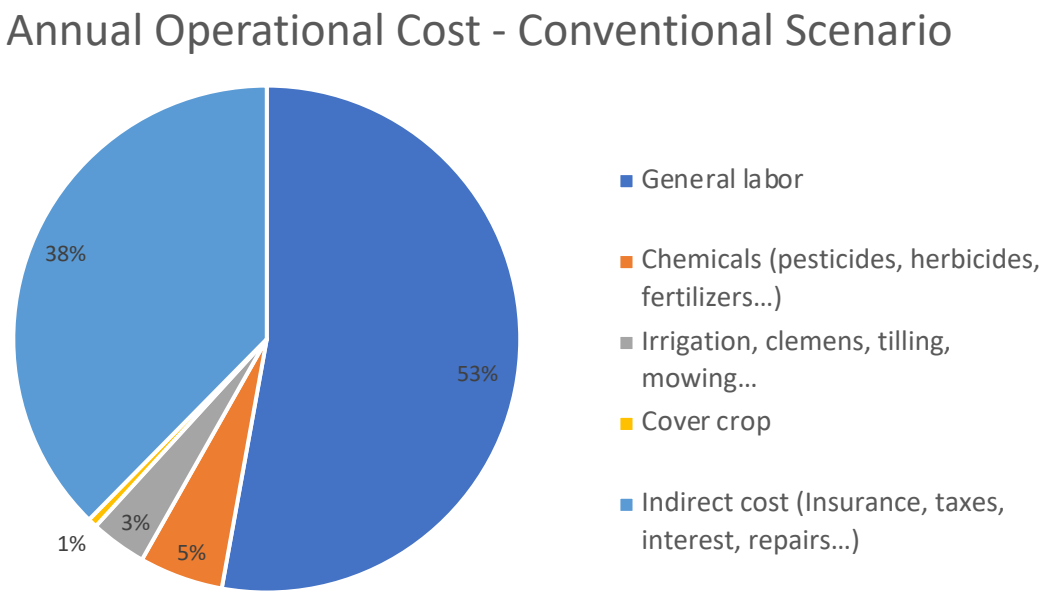
- Cost: no-till, compost, sheep grazing
- Benefits: change in nutrient inputs, C credits, change in yields (+/- 5%)
- 4 vineyards in Sonoma, CA (Chardonnay, Pinot noir and Cavernet Sauvignon)

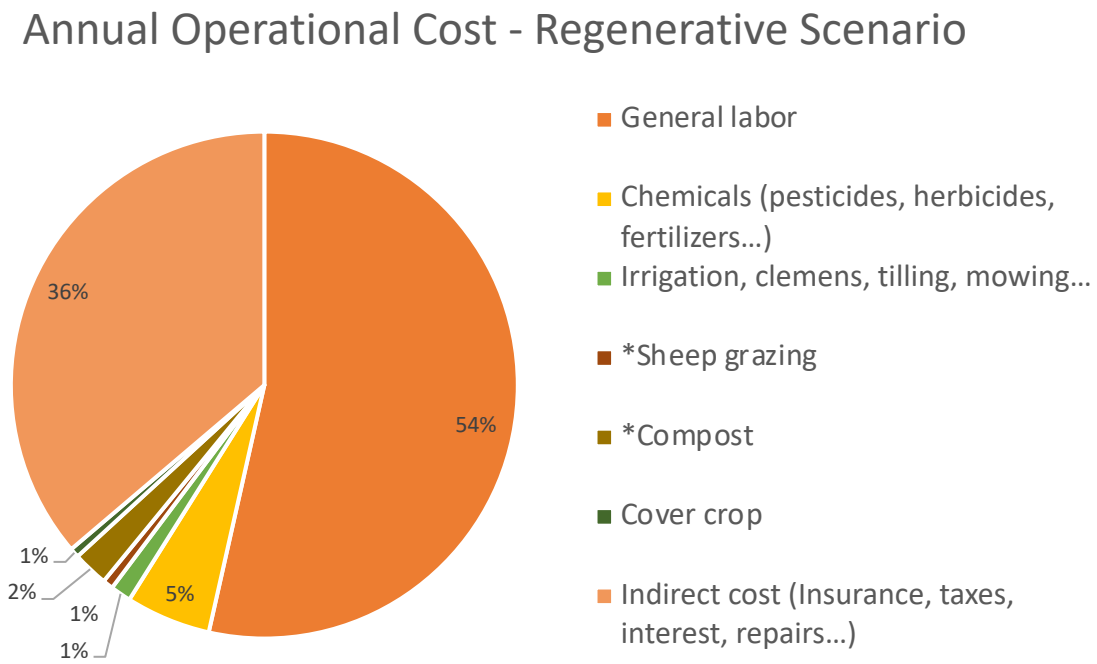
Jackson FAMILY WINES

FFAR Foundation for Food and Agriculture Research

cdfa

Operational costs of regenerative are slightly lower than conventional management





How to value improvements in diversity and resilience to climate change?

Herrera et al. in preparation

Is regenerative the path forward for grapegrowing in California?

#1: Adapting to extreme weather events and climate whiplash ✅

#2: Reducing environmental pollution and mitigating climate change ✅

#3: Maintaining grape quality in a fast-changing environment ✅

Scaling up, what do we need?

- On-farm studies: what works and where?
- What practices work best in each place with the resources available- capitalize on local knowledge
- What happens beyond 3 years of practice implementation? – we need more long-term studies

Thank you!

Want to hear more?

clazcano@ucdavis.edu

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United States Department of Agriculture