

Mindset

Regeneration and Resilience

Tim LaSalle, PhD

Topics to Cover

**The World Needs
Regenerative Agriculture**

Nutrient Density

What the wine industry can do

Need for certification

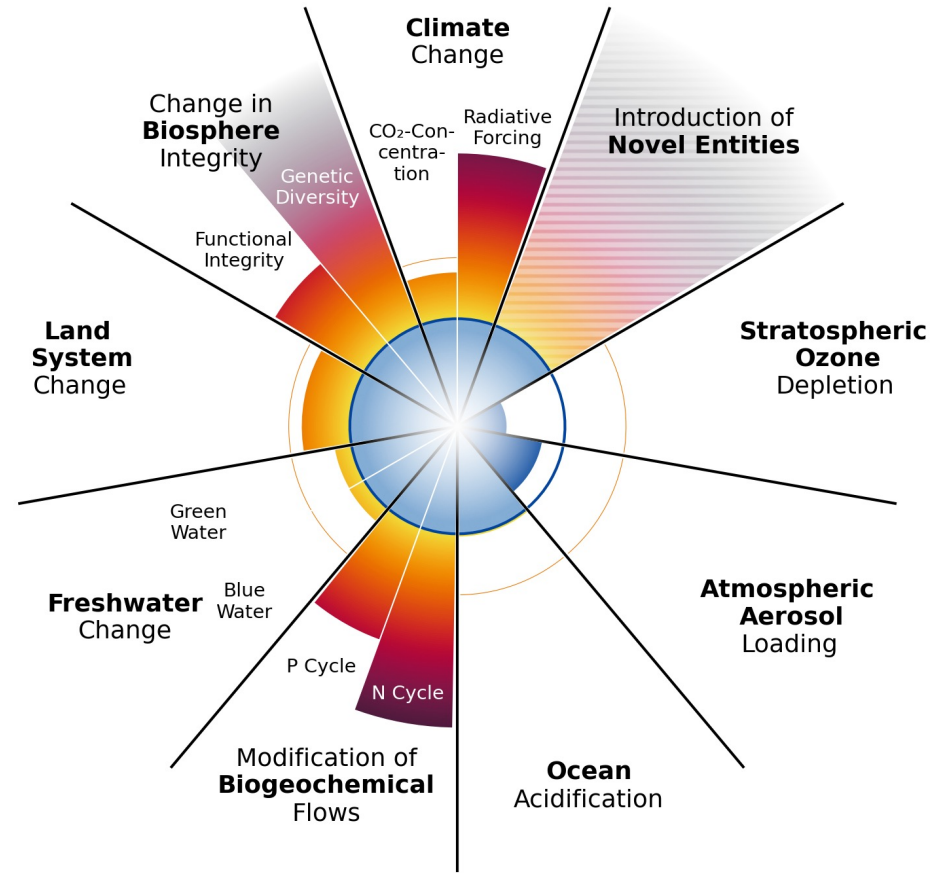


No outside inputs save seed, no-till: 5xs smallholder yields,

The need to measure impacts of regenerative agriculture

Planetary Crisis requires outcomes:

Hold Greenwashing Accountable



$\frac{3}{4}$ of the World is Getting Hotter and Drier.



Colorado River Levels Dropping



Midwest Plains Suffering Fires

Hunger, Malnutrition, Starvation

8,500 die every day = 3,000,000 every year



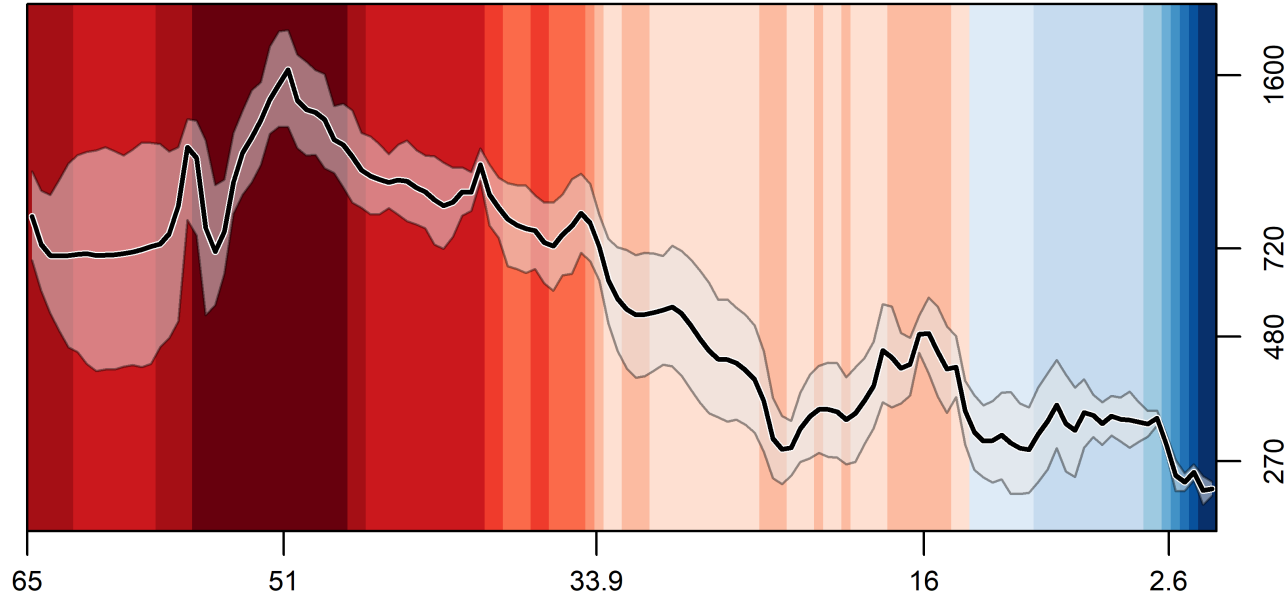
Somalia



Sudan

66 Million Years ago 1,500 ppm CO₂

Drawdown by Photosynthesis



Building Soil Carbon Addresses all 3 of These

David Brandt in 5 decades grew his soil's A horizon from 6 inches to 47 inches.



5% Increase in Photosynthesis = emissions

Center for Regenerative Agriculture and Resilient Systems



California State University **Chico**
Center for Regenerative
Agriculture and
Resilient Systems

Programs:

Masters and Bachelors in RA

TAP Training

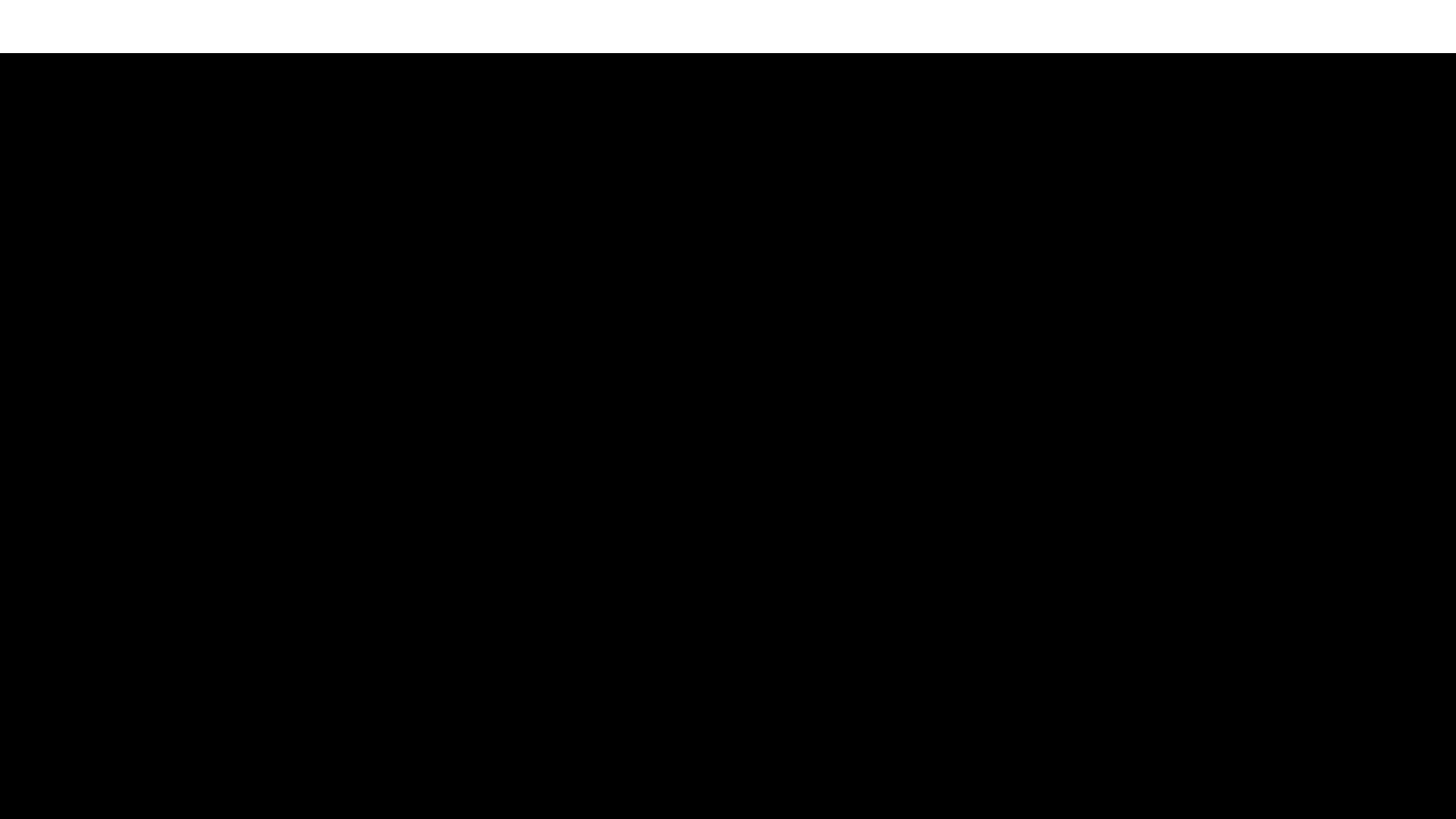
Workshops

Field Days

Research Projects



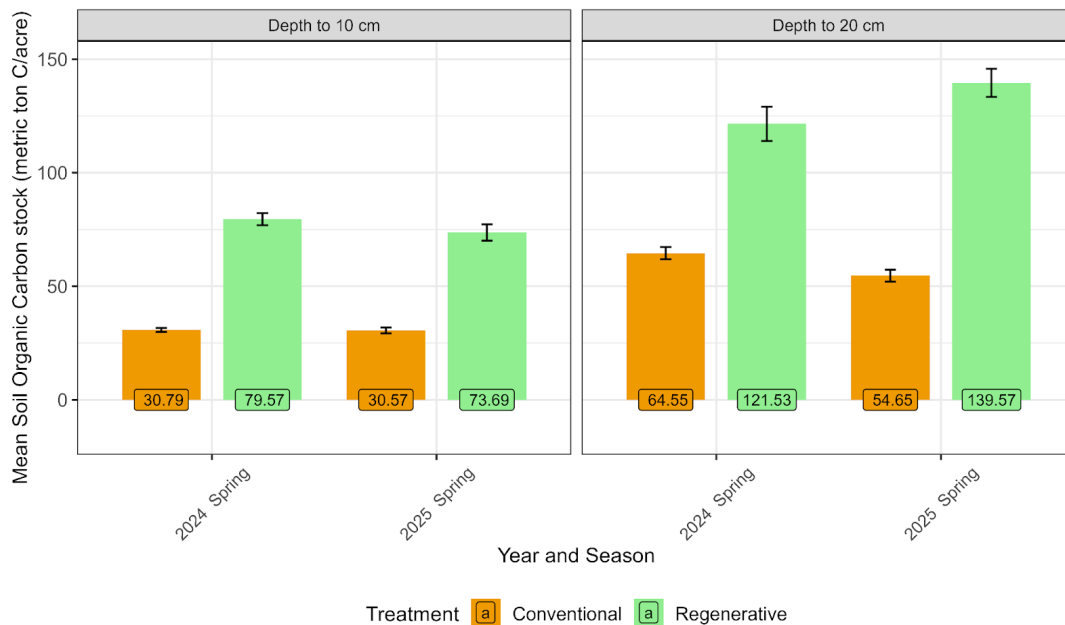
<https://www.csuchico.edu/regenerativeagriculture/>



Soil Organic Carbon

Key Findings - drawdown

UCOP Soil Carbon Accrual Project (SCAP)
Group: Soil Organic Carbon stock
Variable: Soil Organic Carbon stock (metric ton C/acre)
Data from Lemoore, CA reported by RAD Lab and Regen Ag Lab
Fields LM-C, LM-R



Number of observations per year, season, treatment, and sample type: 15; Vertical bars show std error: mean * std dev / sqrt(num obs)

Biological Community Metrics

Key Findings - biology

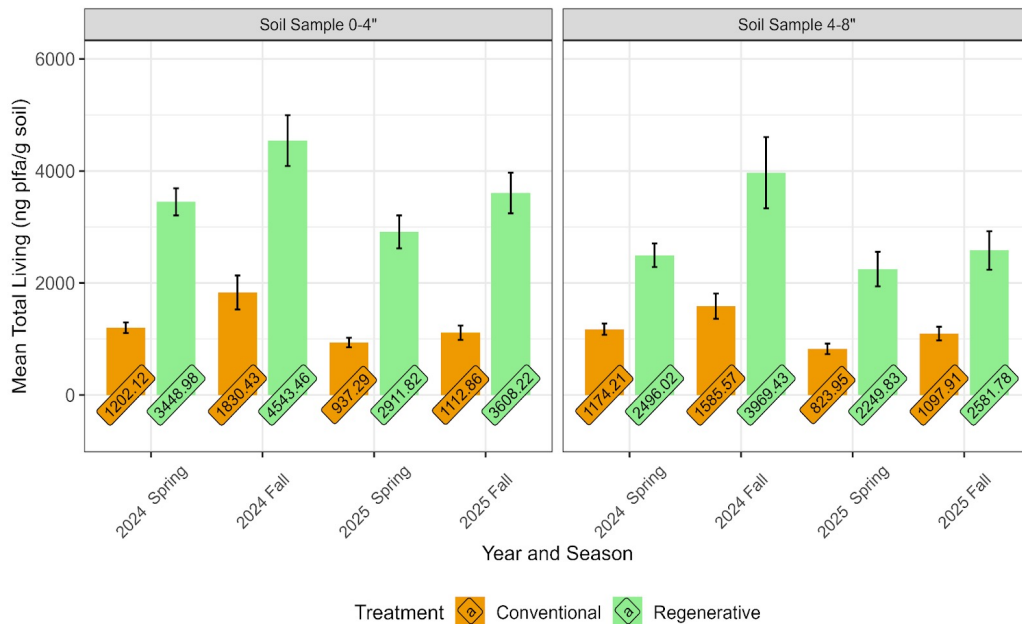
UCOP Soil Carbon Accrual Project (SCAP)

Group: Community metrics

Variable: Total Living (ng plfa/g soil)

Data from Lemoore, CA reported by Regen Ag Lab, NE

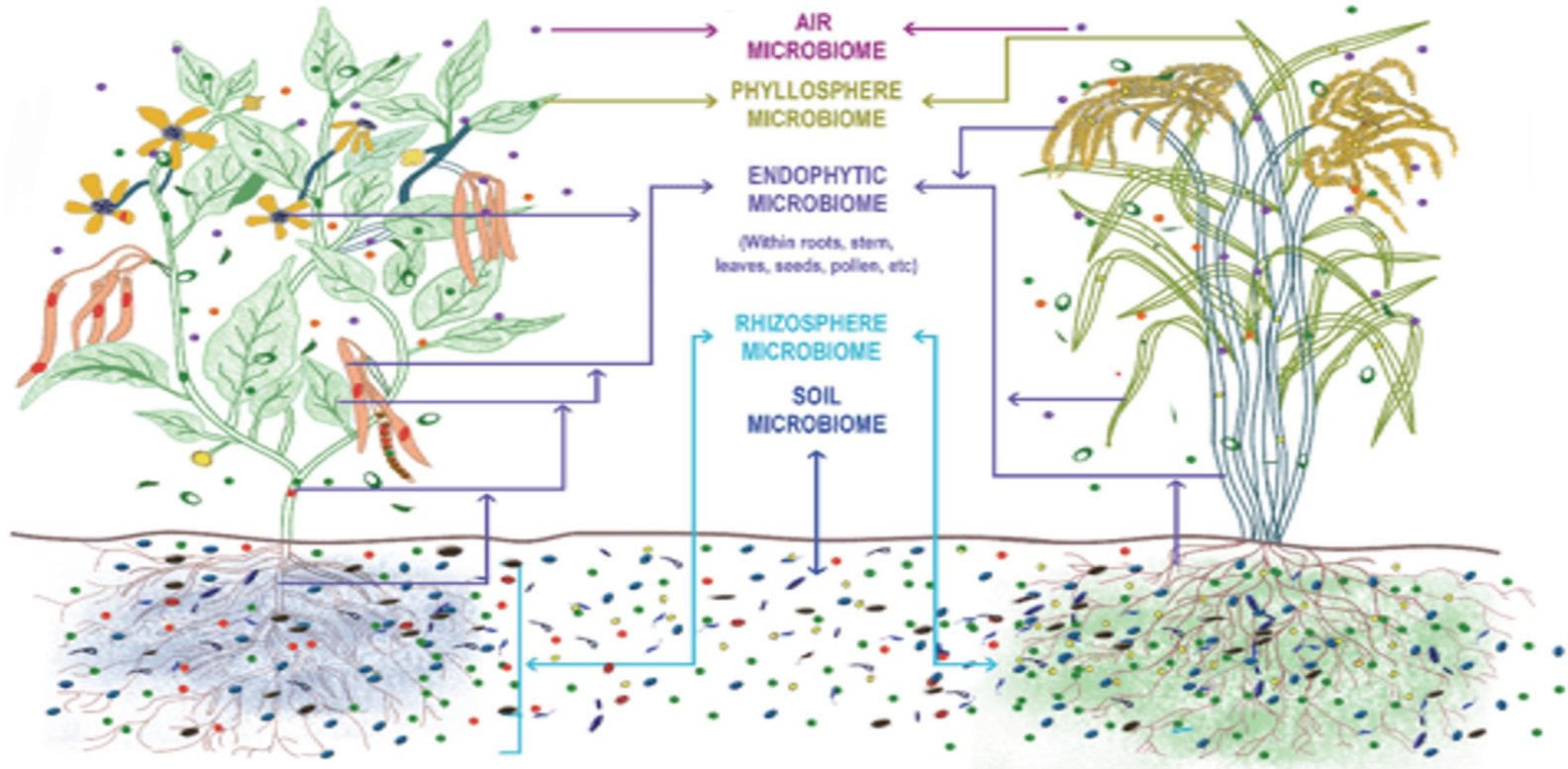
Fields LM-C, LM-R



Number of observations per year, season, treatment, and sample type: 15; Vertical bars show std error: mean * std dev / sqrt(num obs)

The difference between dirt and soil is that soil is alive

Howard Buffett, *40 Chances*



Arbuscular Mycorrhizal Fungi

Key Findings - fungal

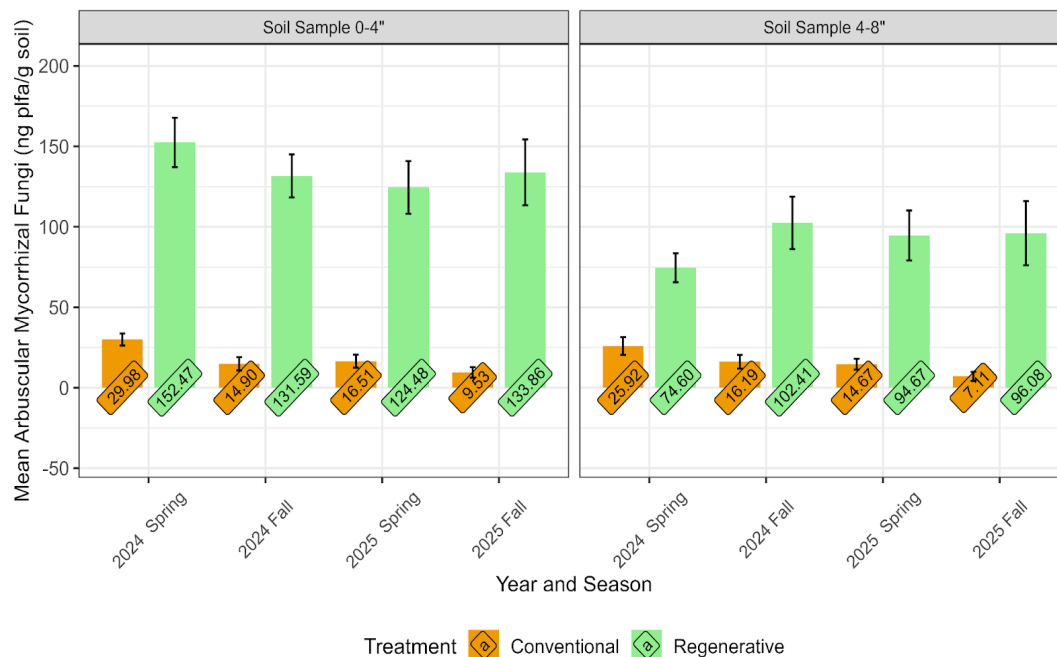
UCOP Soil Carbon Accrual Project (SCAP)

Group: Fungi

Variable: Arbuscular Mycorrhizal Fungi (ng plfa/g soil)

Data from Lemoore, CA reported by Regen Ag Lab, NE

Fields LM-C, LM-R



Fungal Network Supports Plant Vigor



Fungal networks can increase root water and nutrient access by 1,000-fold

Mycorrhizal Fungi Effect on Drought

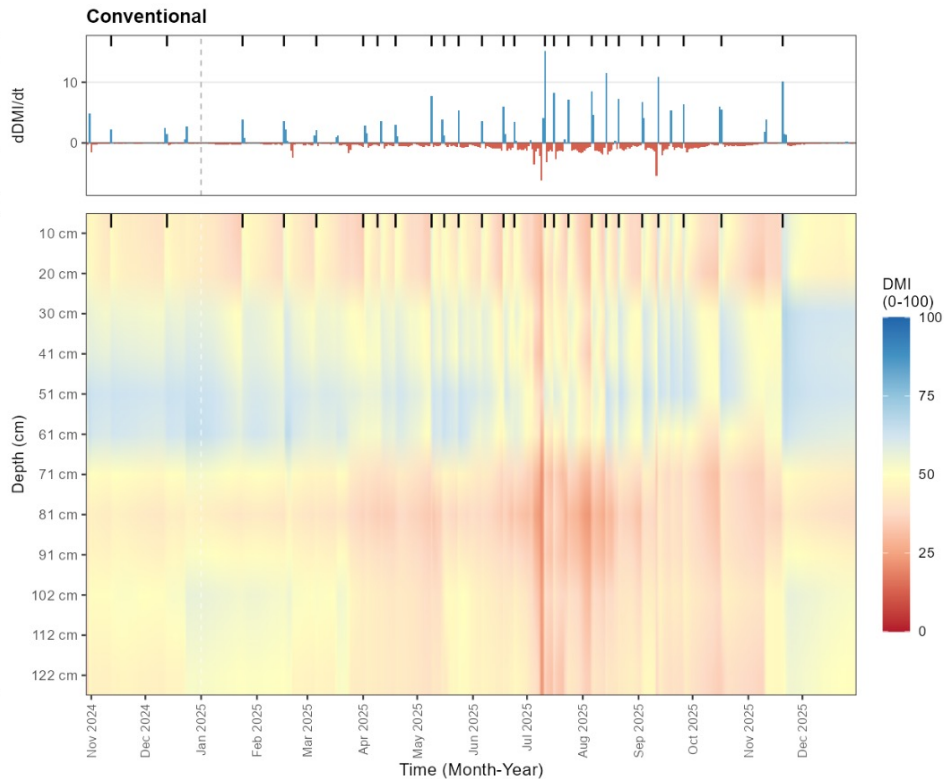
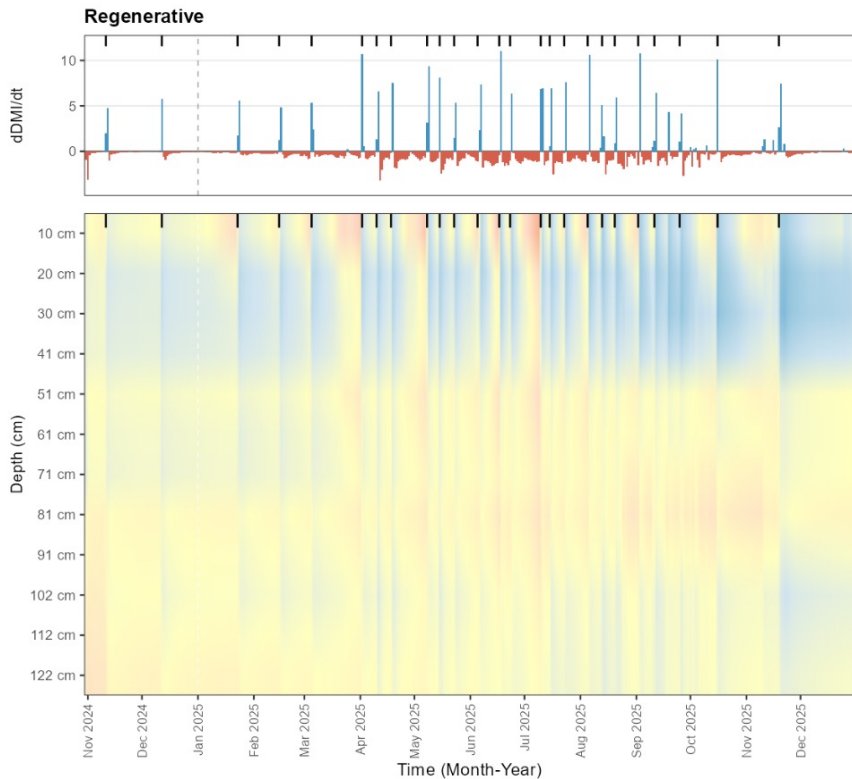
Fungal network brings water to plant root



Soil Moisture – Blythe – to 4 feet deep

Soil DMI by Depth — Palo Verde, CA

Upper panel: daily rate of change in profile-mean DMI ($dDMI/dt$; blue = wetting, red = drying, no smoothing) | Lower panel: DMI by depth | depths 10-122 cm | Jan 2023-Dec 2025 | Heatmap: red = dry (DMI 0), blue = wet (DMI 100) | tick marks = irrigator



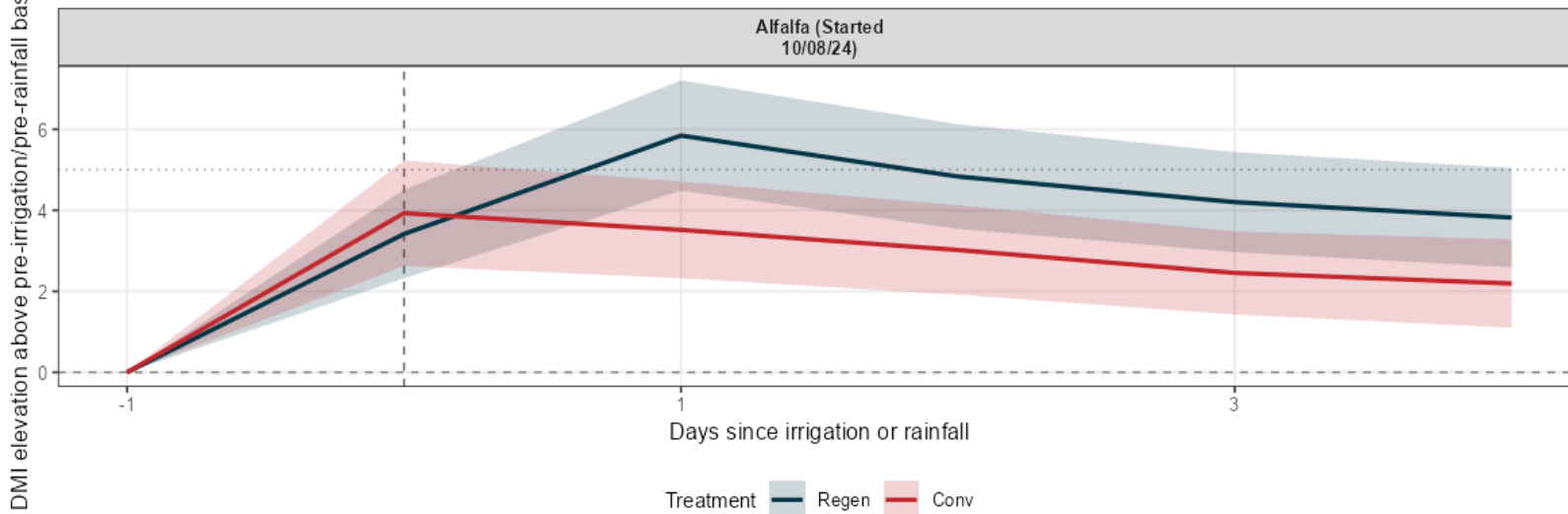
Soil Moisture After Irrigation – this is not ET

AquaSpy Water Retention — Palo Verde, CA | Field(s): H-127E, H-127W

Events: farm-practices irrigation + Quanterra precip > 20 mm/day | Retention threshold: 5 units | Trace window: ± 4 days

DMI Elevation After Irrigation and Precipitation Events ≥ 20 mm

Day 0 = irrigation date | dotted line = 5 unit retention threshold



Effective Rainfall – how much water infiltrates/min?
This rain event = 0.15" of rain (3.8mm)



5 month-old Summer Cover Crop Sprouted with 2" of water in May

Positive impacts



Regenerative resilience affirmed

Positive impacts



Nutrient Density

Ergothioneine — Antioxidant and Anti inflammatory

Soil Biology

Fungal presence in soil



Economics Matters



ALFALFA 2025	REGENERATIVE/YTD	CONVENTIONAL/YTD
ACRES	35.30	38.30
CROP INPUTS TOTAL	\$18,538.66	\$30,405.23
IRRIGATION \$	\$2,764.50	\$3,211.00
ACTIVITIES \$	\$23,033.60	\$24,226.00
TOTAL \$	\$44,336.76	\$57,842.23
TOTAL COST/ACRE	\$1,256.00	\$1,510.24
PRODUCTION ALFALFA (MT)	393.00	371.40
YIELD (MT/ACRE)	10.59	10.01
COST PER MT	\$112.82	\$155.74

What the Wine Industry Can Do

Adoption Theory --- Human Behavior

Federal Policy

Financial Incentives

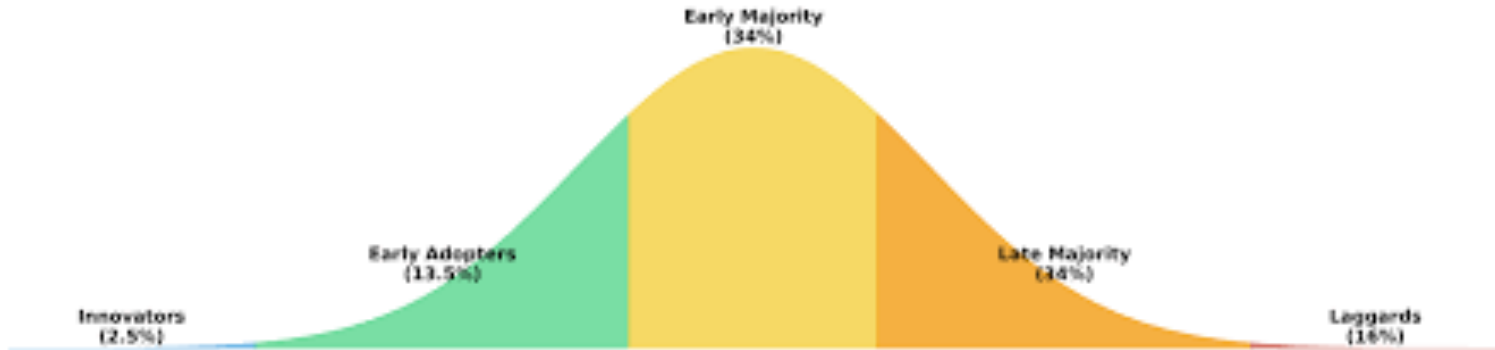
Peer Pressure

University/Science

Habits

Sales infrastructure

Beliefs





Retail / Consumer Demand / Finding a Market

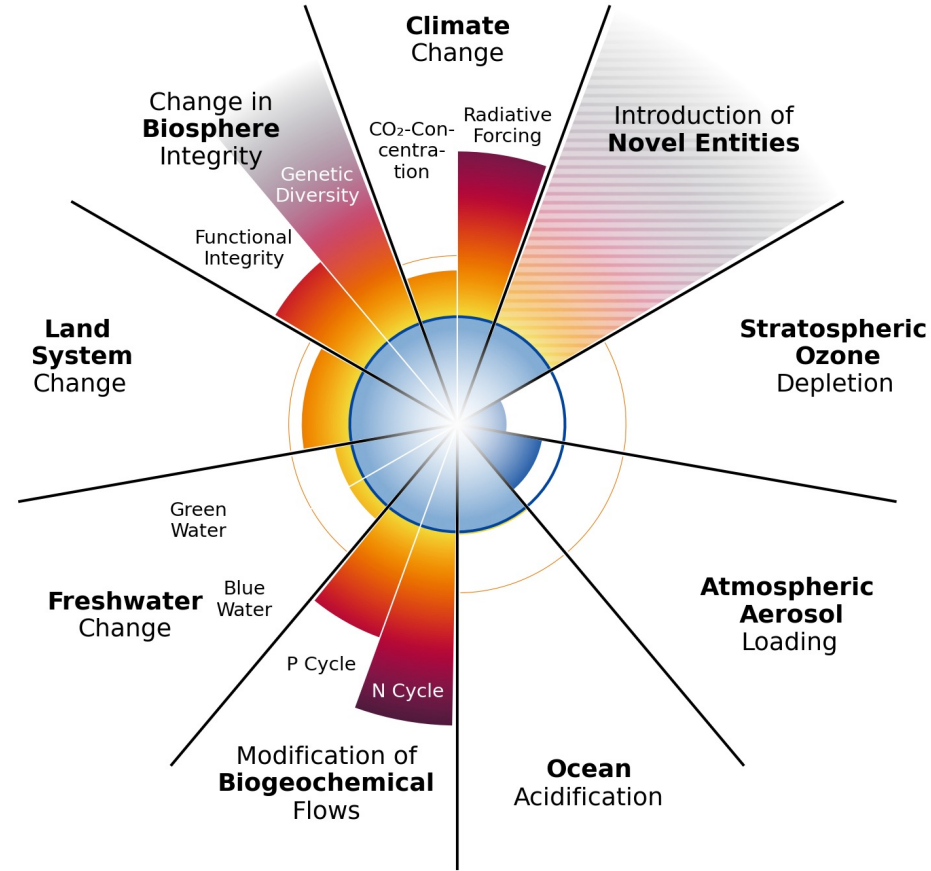


Certification

The need to measure impacts
of regenerative agriculture

Planetary Crisis requires outcon

Hold Greenwashing Accountable





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The Center for
**REGENERATIVE AGRICULTURE
AND RESILIENT SYSTEMS**

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Regenerative (Conservation) Agriculture



Minimum Soil Disturbance



Permanent Soil Organic Cover – *Living Roots 365 Days*



Species Diversification – *Multispecies with 4 or more families and 7-10 species*

Principles

FAO – we have 50 years of topsoil left

Overgrazing

On every continent



Erosion

10,000 Years of tillage



Regenerative Agriculture:

Positive Impacts



Limpopo South Africa

Research and demonstration

No-till

No outside input

Biological

Biological Conservation Agriculture

In nutrient deficient soils;
especially P and no outside
N source – nonetheless, yields
were up to **5x's** local small-
holders yields.

Tim LaSalle 2010-14



Mob, Multi-paddock, Holistic Management Grazing

Context Specific - the Context matters



Paicines Ranch

Bird species 2014 – 10 now 70 - 80

Kelly Mulville



Plant species from 10 - 120



Well managed grazing can restore desert landscapes to grasslands, bringing rain.

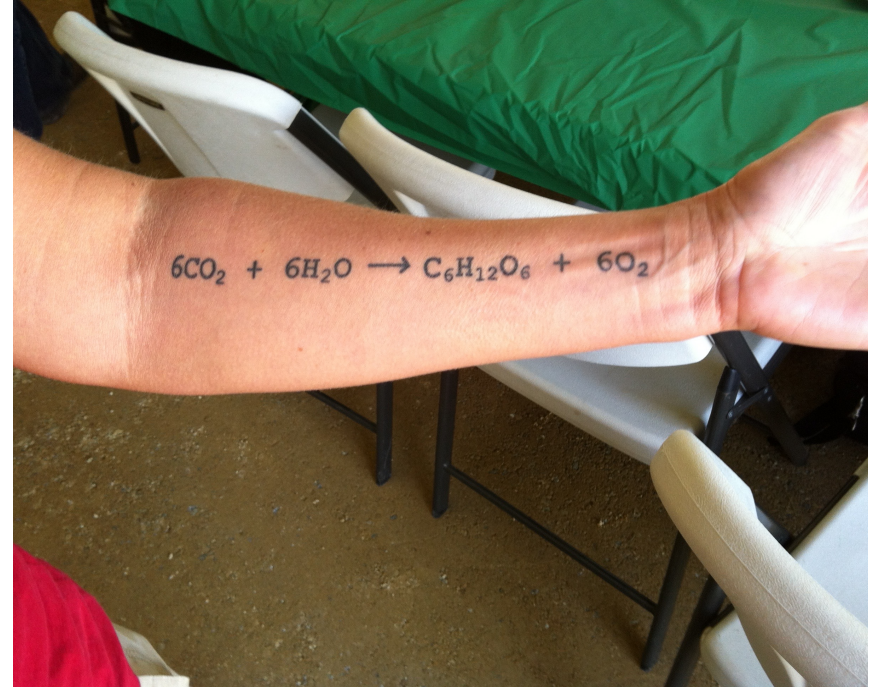
Sonora Desert



Restored Sonora Grasslands



New technologies??? **No!** Just increase photosynthesis 5%



Dr. Christine Jones, Australia. <http://www.amazingcarbon.com/>

Soil Aggregation



- (No-till)
Conservation Ag + Biological (Soil Biome)

Zero Budget Natural Agriculture

Multispecies Cash Crop Planting

