

Climate-Adaptive Vineyards

UCCE North Cost Viticulture

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UCCE – Integrated Vineyard Systems Advisor

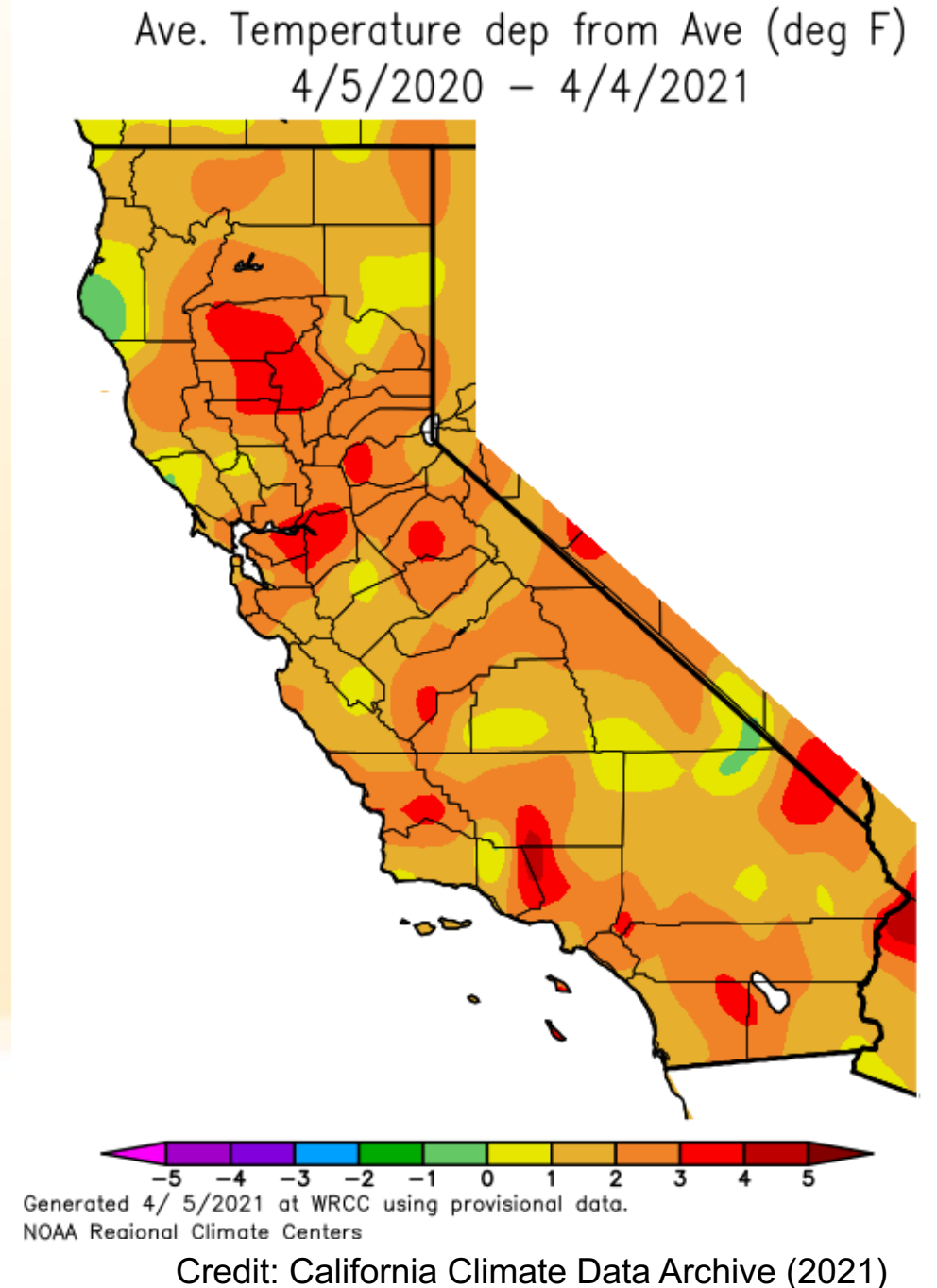
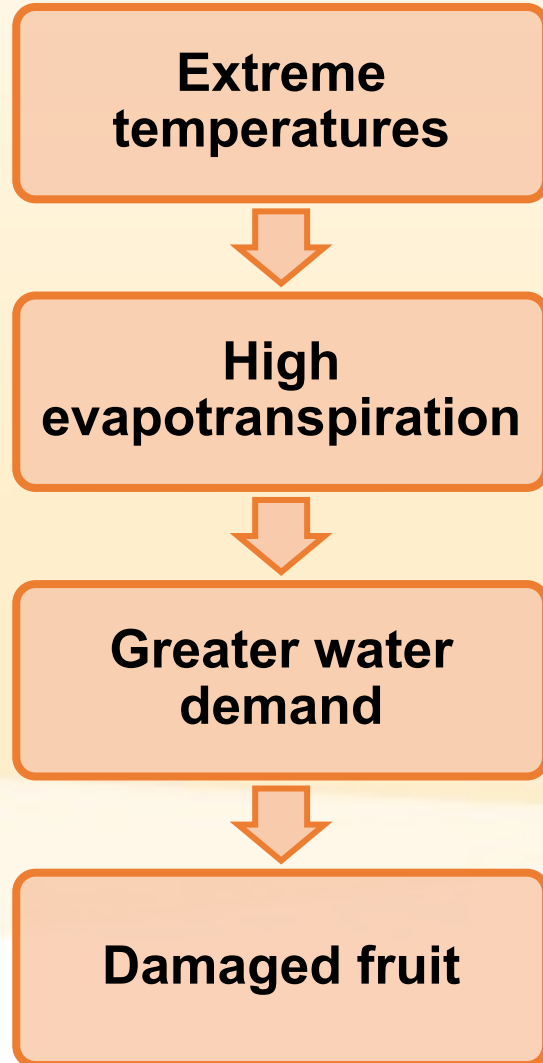
North Coast



‘Climate Change’

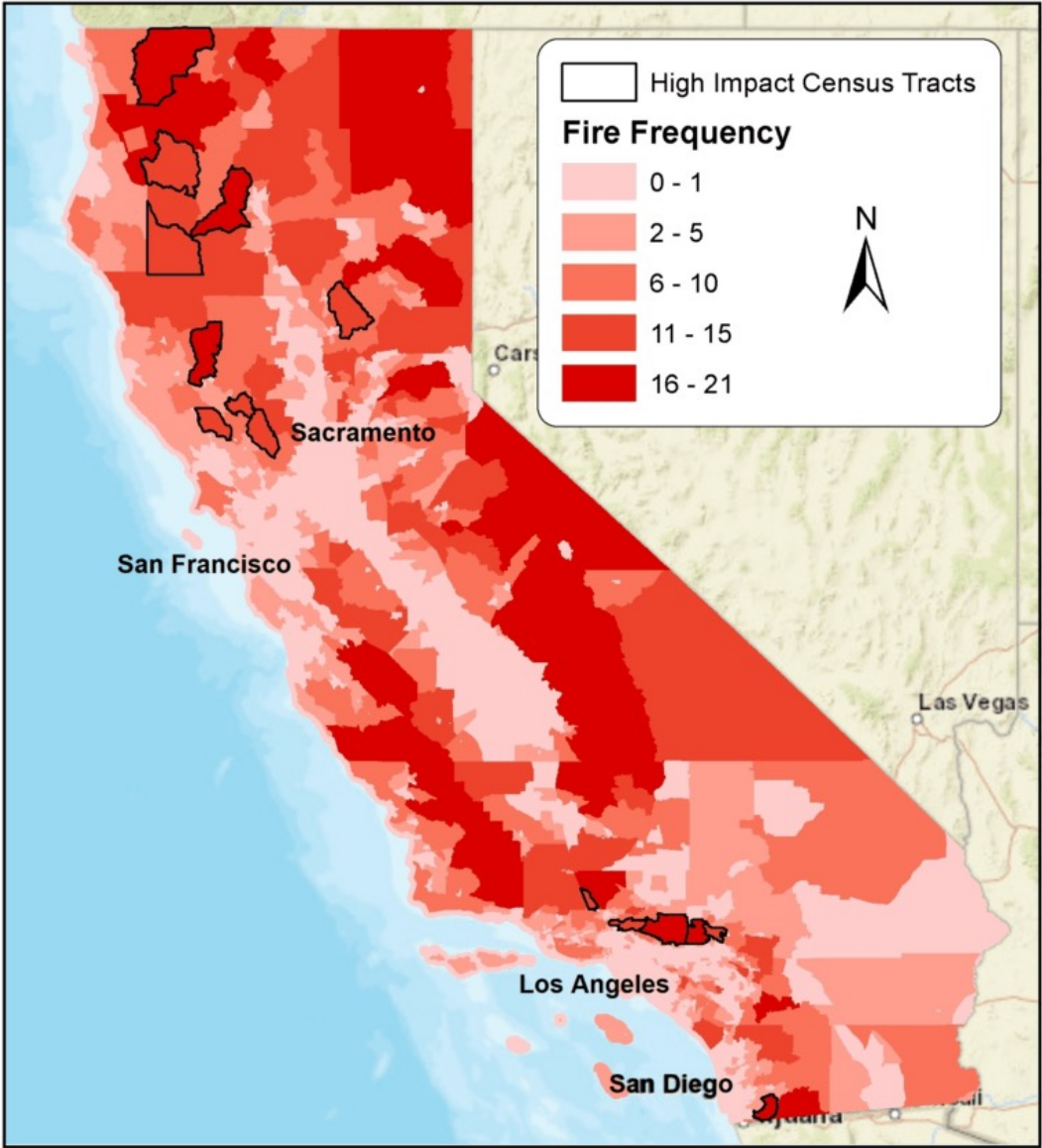
- Used to be a somewhat-taboo term
- Now most people have accepted it as fact
- The climate around ‘climate change’ has changed

Extreme Heat



California drought conditions through the years





Credit: UC Irvine (2021)



Climate Concerns

- Global average temperatures have risen by at least 3 °F since the start of the 20th century
- Drought persists in the West Coast
- Extreme weather events have become more frequent
 1. Large wildfires
 2. Prolonged heatwaves
 3. Unexpected freeze events
 4. Drought or excessive precipitation

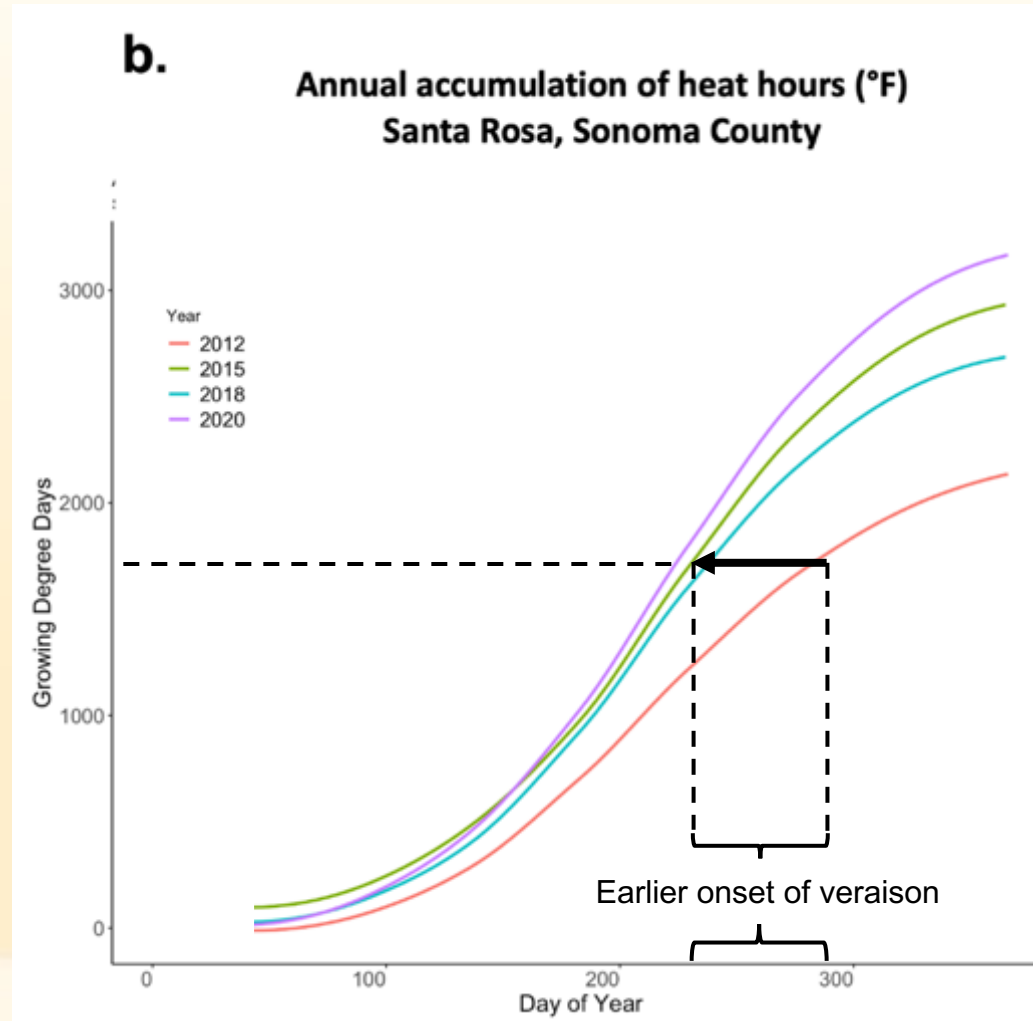


Climate Concerns with Agriculture

- Climate conditions impact many aspects of agriculture
 1. Resource availability
 2. Extreme and sudden weather events
 3. Biotic and Abiotic stressors
 4. Pest/disease success and survival
 5. Phenological timing of crops
 6. Yields
 7. Plant health



Shifting Phenology



Cumulative heat accumulation in Santa Rosa, California in 2012, 2015, 2018, and 2020; linear model. (Data from <https://cimis.water.ca.gov>)



Changes in Phenological Timing

In Central Europe the impact of warming climates has been documented in Bernáth et al. 2022 (pre-print)

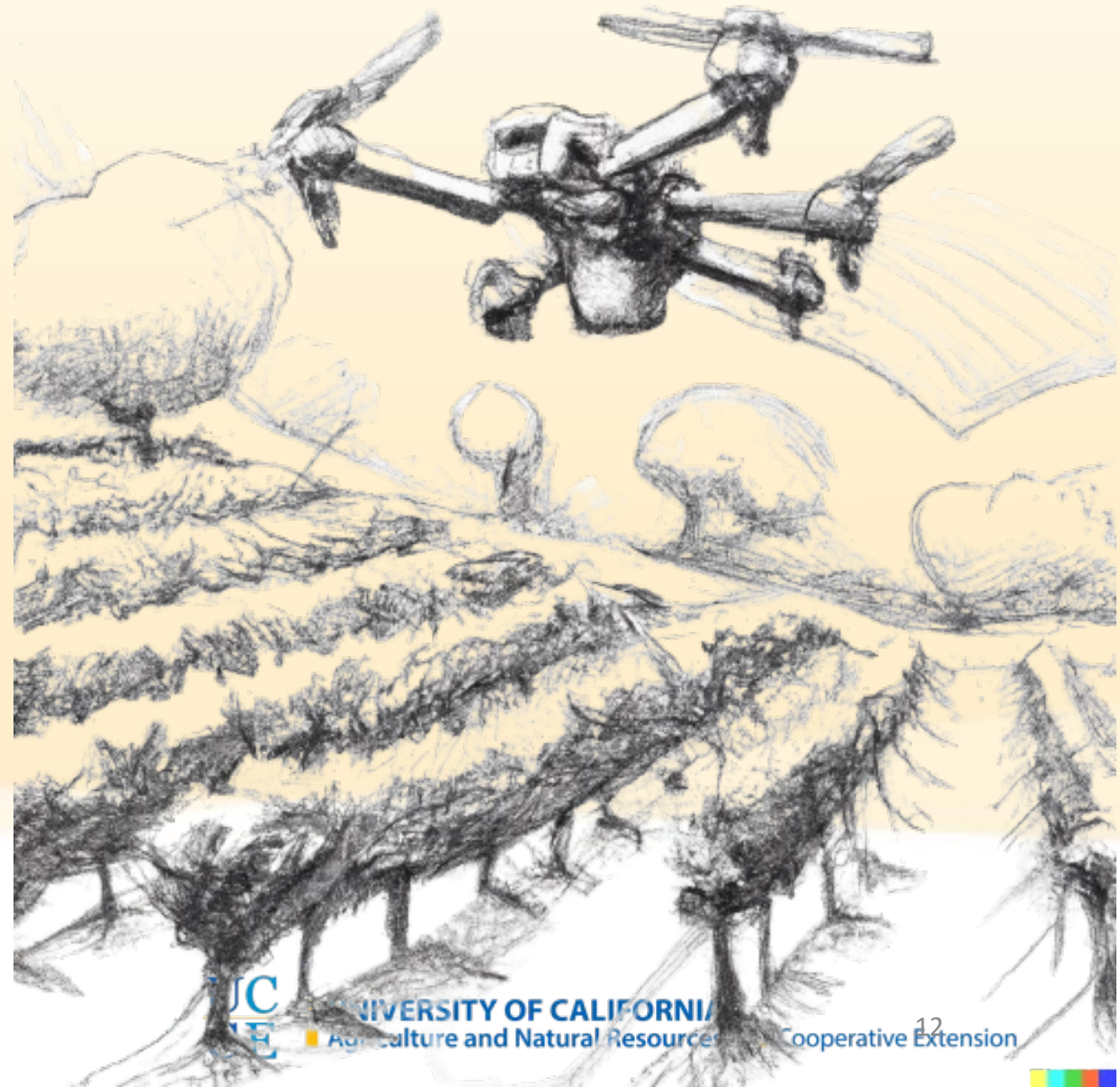
Between 1985 and 2018

- Budbreak: 5-7 days earlier
- Flowering: 7-10 days earlier
- Berry maturity: 18 days earlier
- Harvest: 8-10 days earlier

The Climate-Adaptive Vineyard

The Climate-Adaptive Vineyard

1. Water Use Efficiency
2. Heat/Drought tolerant varieties
3. Pest-tolerant rootstocks



The Climate-Adaptive Vineyard

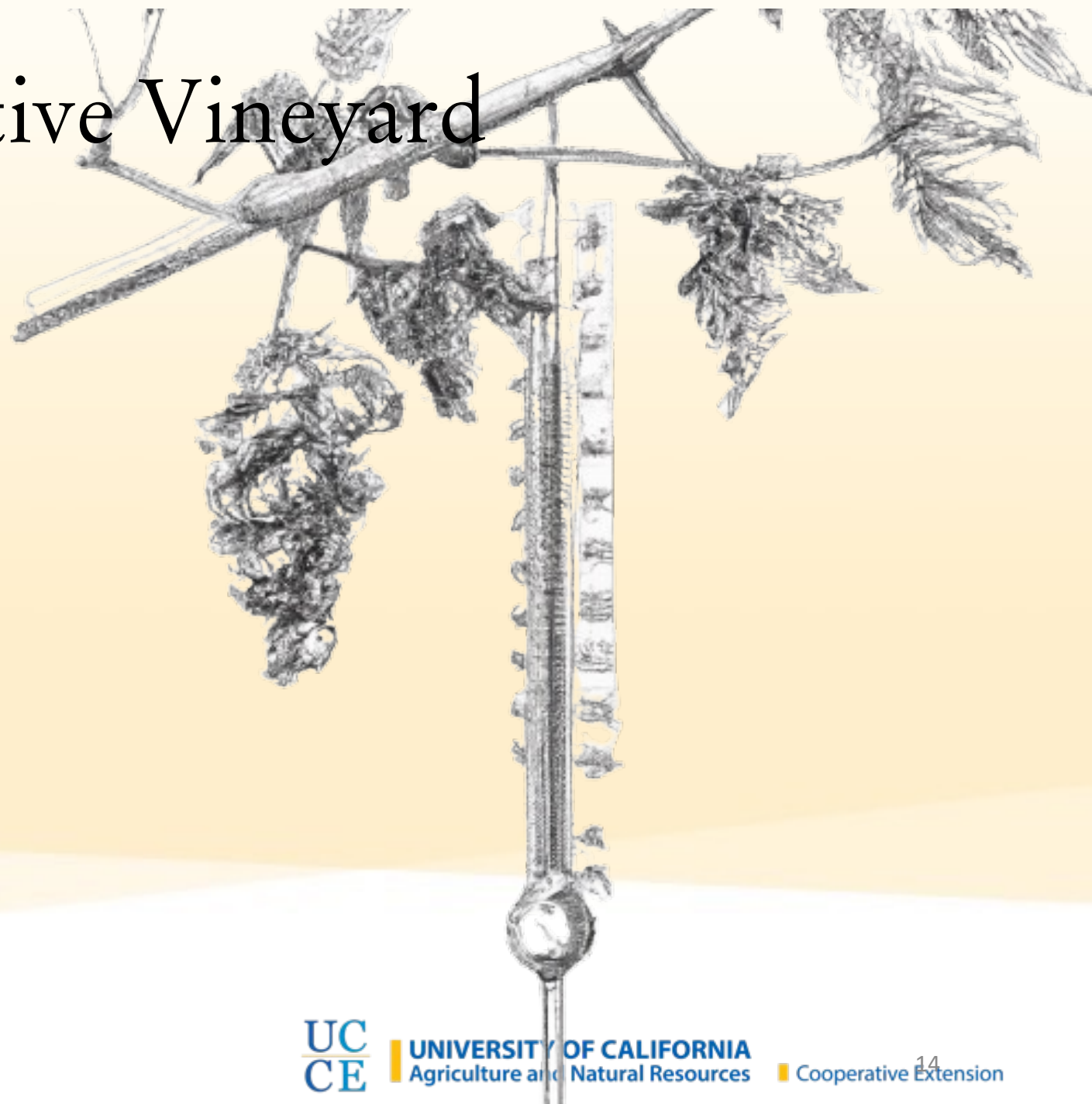
4. Efficient management practices
5. Improving soil health
6. Desirable employment



The Climate-Adaptive Vineyard

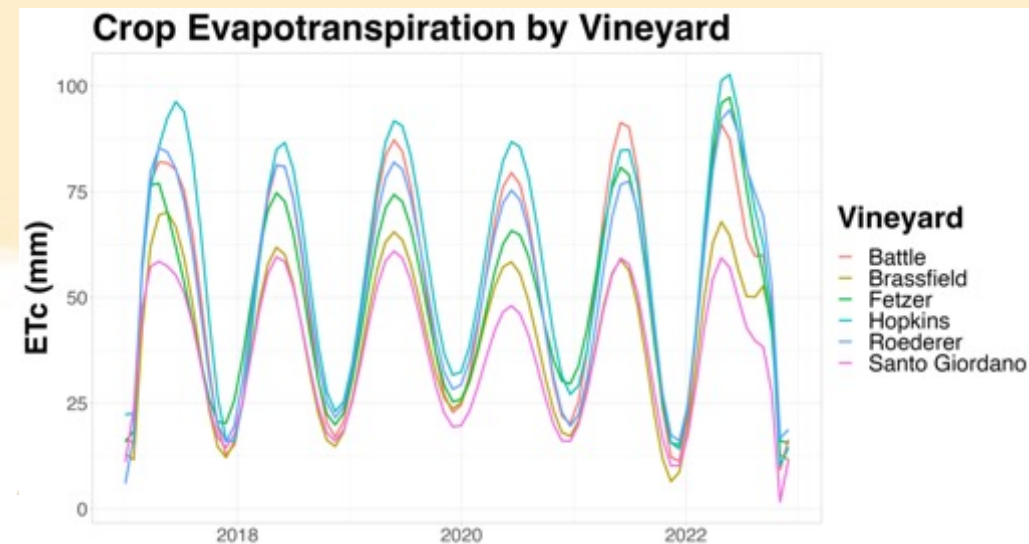
7. Consistent monitoring

8. Ready adoption of new practices



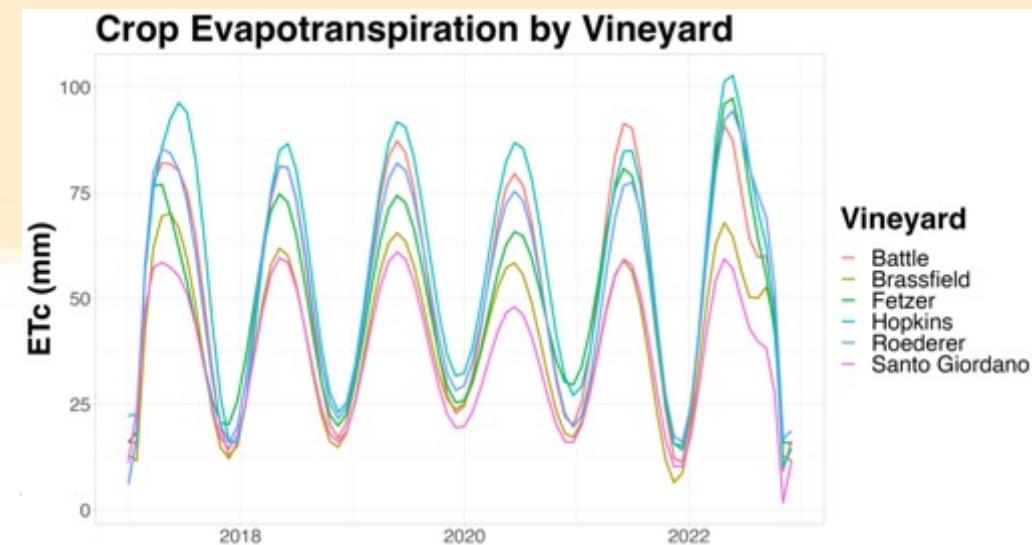
Climate-Adaptive Rootstocks Study

- Identifying unique mesoclimates in California
- Identifying the most common rootstock cultivars
- Analysis of their performance under drought



Climate-Adaptive Rootstocks Study

- 9 participating vineyards
- 8 unique AVAs covered across N. Coast winegrowing regions
- Focusing on:
 1. Soil properties
 2. Regional weather
 3. Water availability
 4. Vine performance under drought



Inversions for Frost-Protection Project

- Over 25 collaborating vineyards
- Starting in Lake County
- May influence water and natural resource conservation policy



Hopland REC Vineyards

- Hoping to install **research-focused vineyards** at the Hopland Research and Extension Center
- Will focus on **adapting our vineyards** to expected changes in climate conditions.
- Needs funding and support still



The Future Vineyard

New Climate New Cultivars

- Anderson Valley is still a cold-climate region
- Many other viticultural areas will need to adapt soon
- Varieties that can tolerate drought and heat will be essential in the future



Localized Climate Shifts

- Impacts of climate change are hyper-local
- Each AVA will have to try new varieties and techniques until they find what works
- Research and participation can make this easier





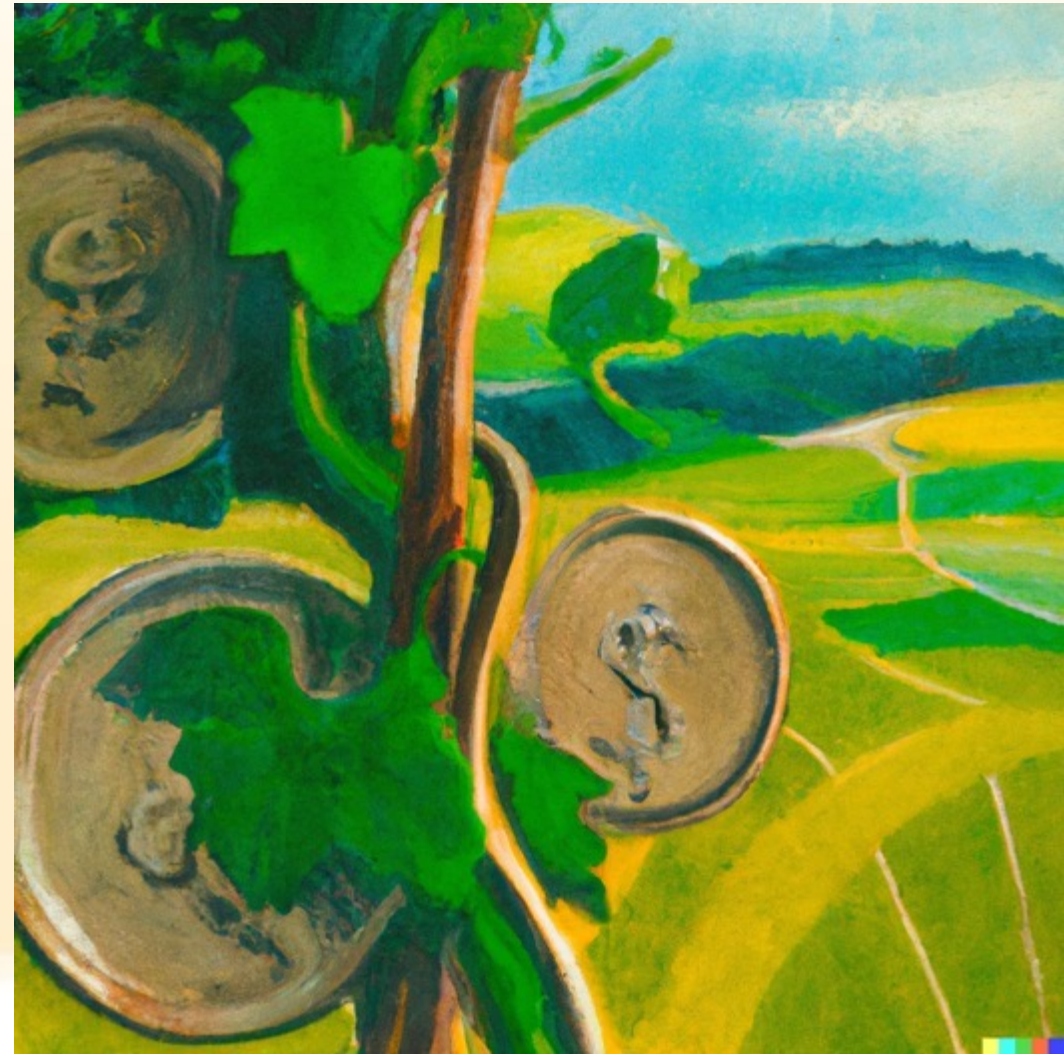
Tools for tolerance

1. Breeding and genetic solutions (GRN rootstocks; PD-resistant scions)
2. New monitoring techniques/Proximal sensing (LiDAR sensing; non-invasive disease ID)
3. Promotion of beneficials
4. Research on combined-stress responses in grapevines

Supporting Research

Funding and agricultural land

- Always need more funding for research
- Also need funding for **implementation and grower education/outreach**
- University of California only owns and operates three vineyards
 - Two for research purposes
 - One for teaching purposes
 - **None** for outreach and grower education



UCCE ~ Private Vineyard Collaboration

- Progress in climate-adaptive research relies on collaboration with private vineyard owners
- Very lucky in the North Coast to have supportive growers
- Need more collaborators in unique mesoclimates



Participate in UC Cooperative Extension

- Tell UC Cooperative Extension Advisors what research you want to see be pursued
 - We are here to address grower-facing problems
 - Our job is to listen to what our clientele needs and pursue answers
- Attend events we organize
 - This is how we make new research accessible
 - Provides an opportunity to have face-to-face conversations
- Ask us for resources
 - We will create them if we don't already have them prepared for public use



Thanks for Listening



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