

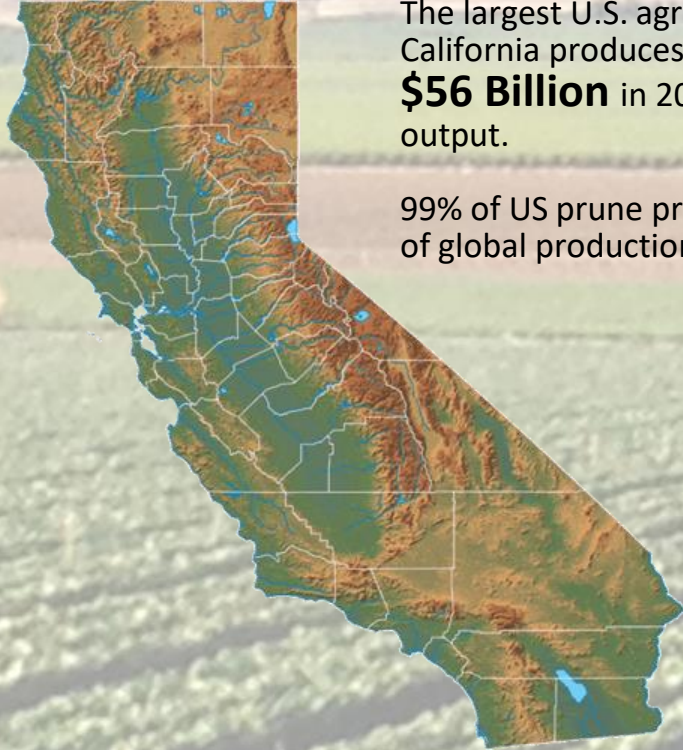


# Tech to Farm: Innovation for a Strong Future for California Prunes

Presented to the Prune Board  
December 13, 2023



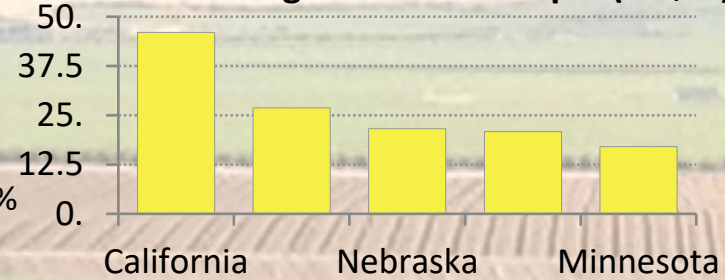
# California is an Agricultural Powerhouse



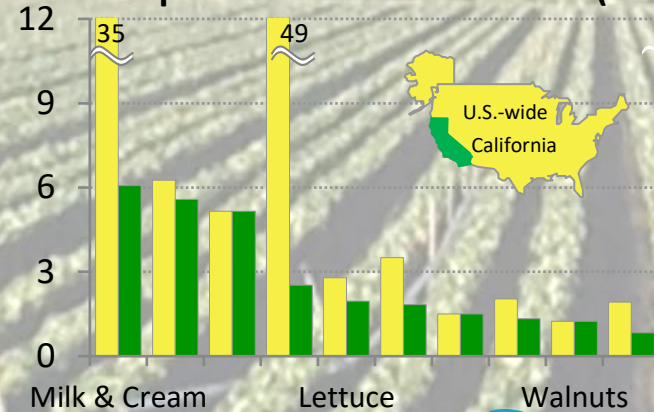
The largest U.S. agricultural state, California produces **\$56 Billion** in 2022 agricultural output.

99% of US prune production, and 40% of global production.

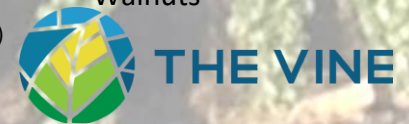
### 2022 Total Agricultural Receipts (US\$ B)



### 2016 Specific Production Values (US\$ B)



source: USDA NASS California Agricultural Statistics 2016; USDA NASS reports (2016 data)





**Biden-Harris  
Administration Releases  
National Security  
Memorandum to  
Strengthen the Security  
and Resilience of U.S.  
Food and Agriculture  
November 10, 2022**

Food and agriculture systems and supply chains are designated as **critical infrastructure**, primarily owned and operated by private sector and non-Federal entities, and can be vulnerable to disruption and damage from domestic and global threats



# California Specialty Produce is Critical to U.S. Food Supply

Nutrient-dense food security is national  
security



# Critical Challenges Driving Technology Adoption

Labor

Regulatory Compliance

Water

Pest & Disease Management

Food Safety

Market Competitiveness

Cost of Production

***Producer: Does it save me time, money, headaches or bring profit?***

# UC ANR Has Been Innovating for 100 Years



Statewide IPM Project  
© 2000 Regents, University of California



Project  
University of California



UNFCCC, Photographer: Julián Alberto Parase  
CBM Project: 0268: Lagos Malilano Avoidance Project



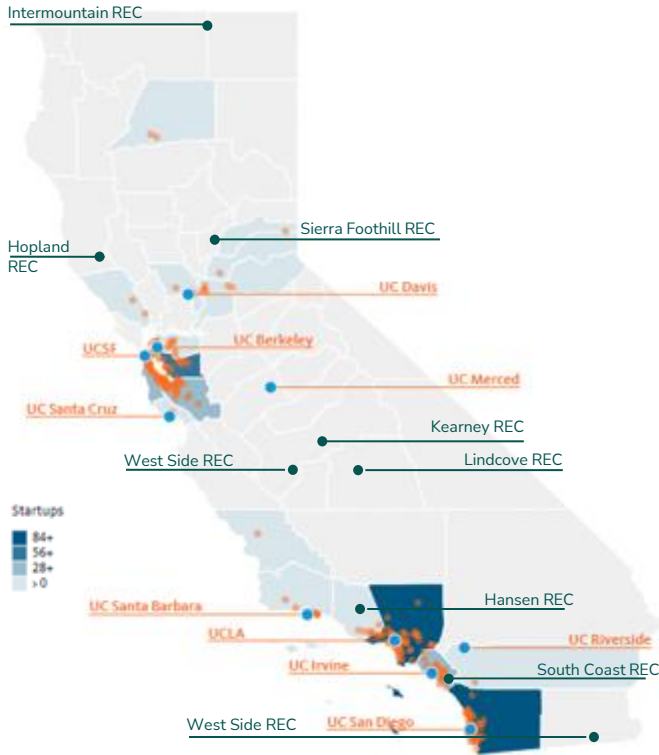
UC Statewide IPM Program  
© 2007 Regents, University of California



UC Statewide IPM Program  
© 2000 Regents, University of California

# The University of California System

## Land Grant Innovation Powerhouse



**9**  
Field Research  
Centers (RECs)

**60+**  
Field Offices  
Statewide

**1200+**  
Annual  
Research  
Projects

**12k+**  
Active  
Inventions in  
the UC System

**5k+**  
Startups across  
verticals &  
funding stages

**\$8B**  
Annual  
research  
funding

**3**  
National  
Labs

**10**  
Campuses

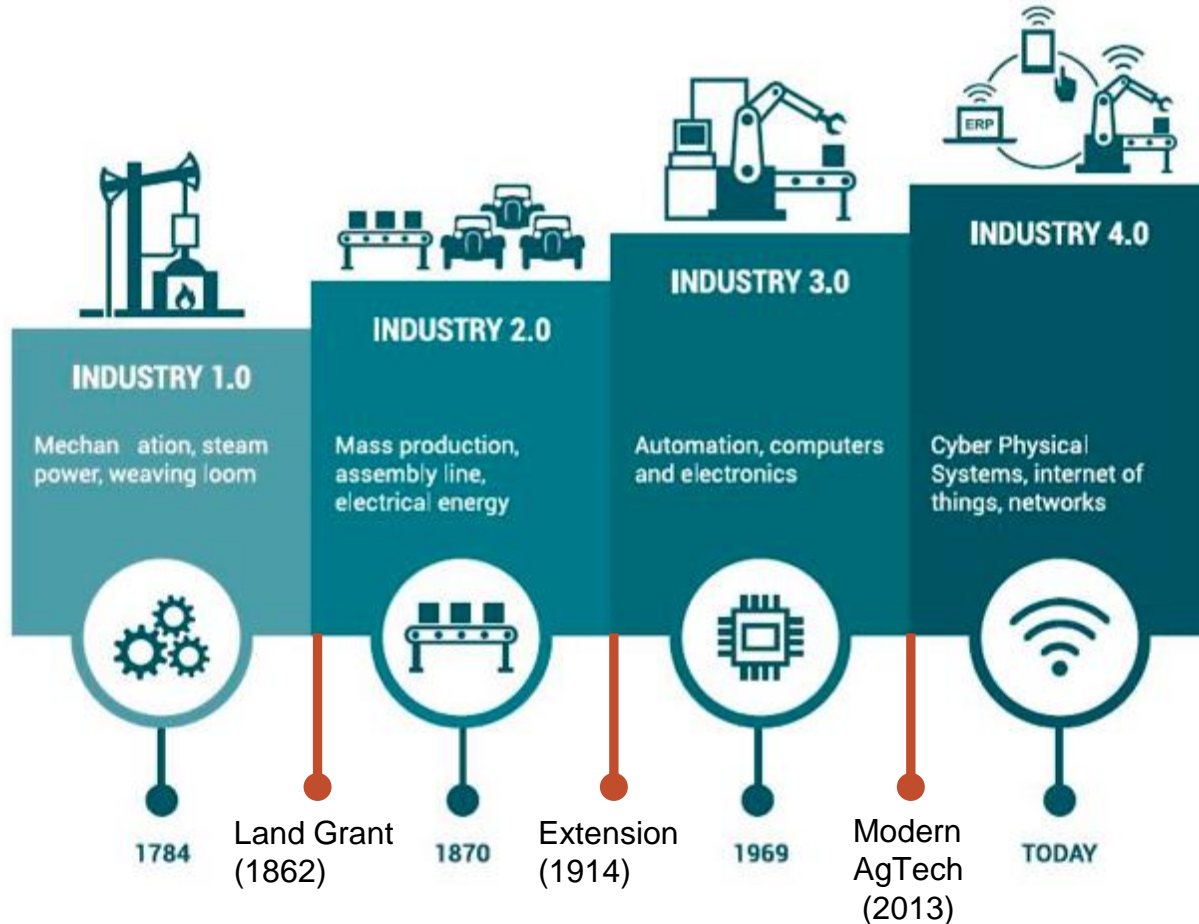
**5**  
Medical  
Centers

**230K**  
Faculty /  
Staff

**280k**  
Students

**2M**  
Living  
Alumni

# Industry 4.0 is Digitized and Automated







# What is Missing?

- **Misalignment** between Silicon and Food Valleys
- Universities **lack** AgTech commercialization
- Small farmers and farmworkers are **left out**
- Lack of **flexible** and **patient** investment capital
- **Underinvestment** in testing and validation

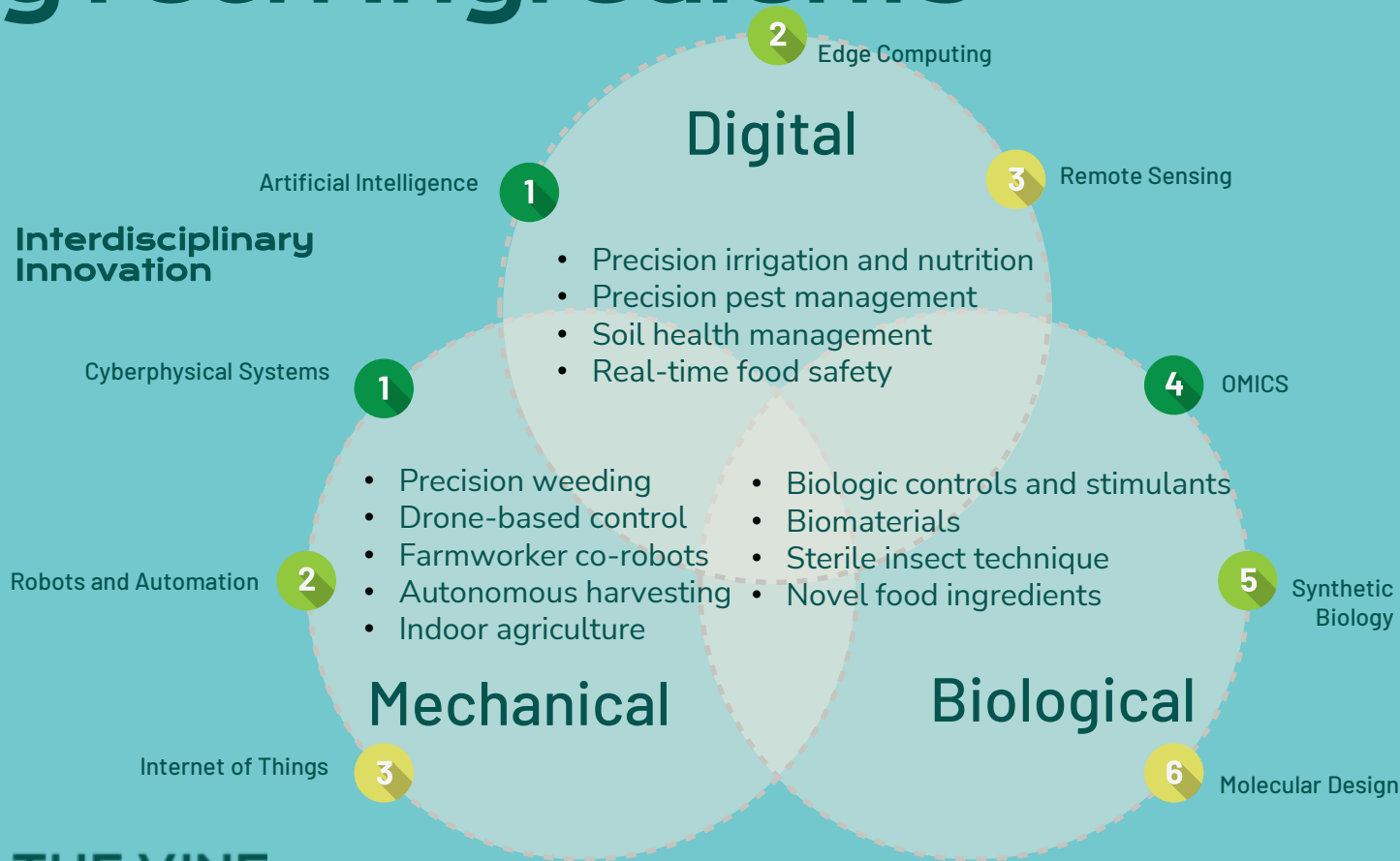




# The VINE Agrifood Innovation & Entrepreneurship

What We Do:  
Commercialize Tech  
Workforce Development  
Research Collaborations  
Economic Development

# AgTech Ingredients



## Across the Supply Chain



# Target Technologies

Ag Robotics and Automation



Dairy Technologies



Indoor Farming



Food safety technology



Bioproducts and materials



Precision agriculture

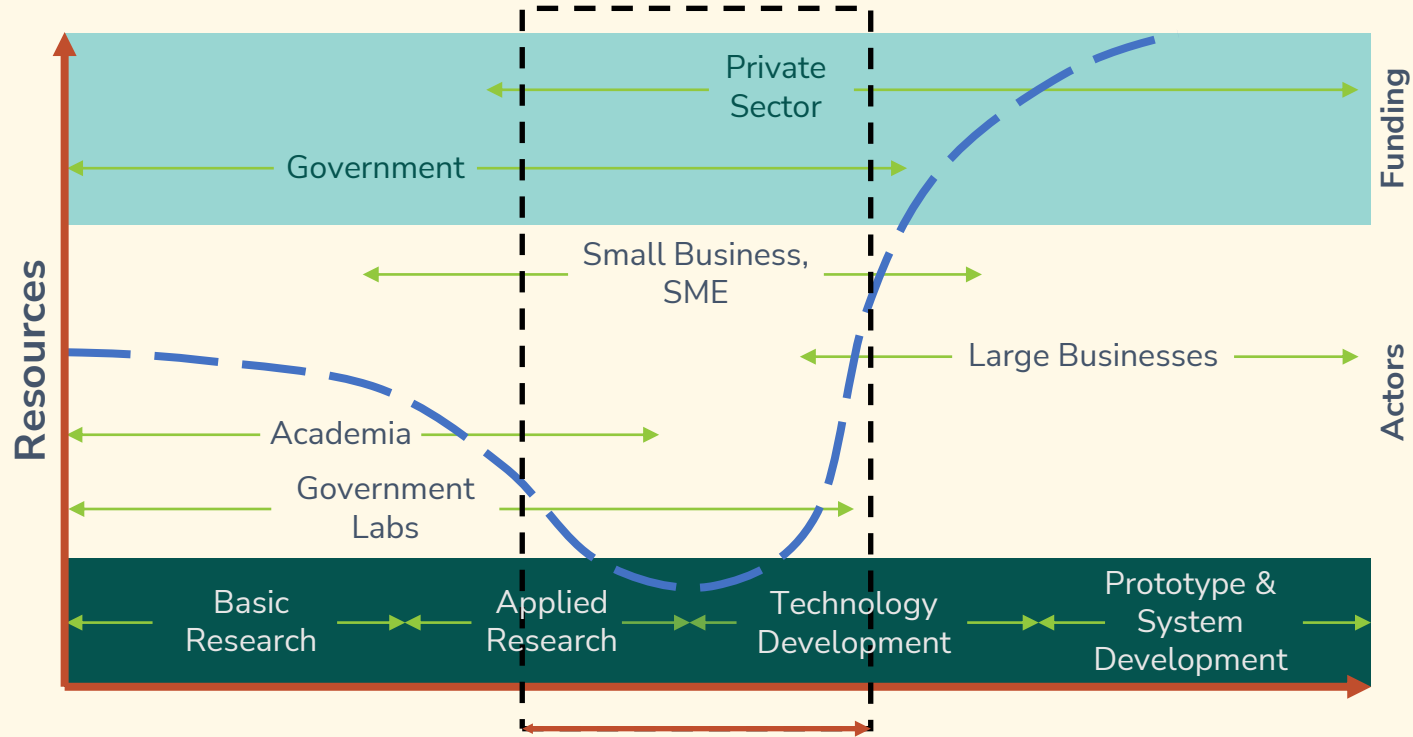


AI for input and yield management



# The VINE Bridges Lab to Market

The VINE serves as a **BRIDGE** to aid entrepreneurs avoid the “*valley of death*” as they grow and scale their companies through its strong network and open innovation activities.



# What We Do



## Connect

Entrepreneurs to Resources

Students to Agriculture

Ag Industry to Solutions



## Build

Working Solutions

Investable Companies

Trained Workforce



## Grow

CA AgTech Ecosystem

Regional Innovation Capacity

Pool of Resource & Investors

# The VINE Network

● Economic Development



▲ Commercialization



★ Research & Development





# Build

Industry-Focused  
Technology  
Roadmaps



VINE VIP  
(Evaluate and  
Scale up)



VINE Studio (New  
Solutions)



Farm Robotics  
Challenge

# Stakeholders

The VINE and  
University of California  
Academic Network

UCANR Extension Service

UCANR Farmer Network

The VINE Corporate  
Network

The VINE Investor Network

WGA Farmer Network

Government Network

International Collaboration  
Network

# VINE Commercialization Activities

VINE Studio	VINE VIP Validation of Innovation Program
A program to help <b>create</b> and/or <b>advance</b> a commercial product from research and/or prototype	A program to <b>validate</b> an existing product for California agriculture.

# 2023 Project Examples

Autonomous Electric Tractor “Swarms”

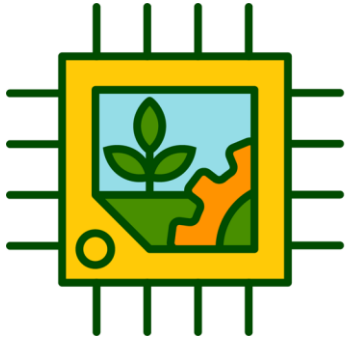


Future Feedstocks for Biomanufacturing



Biologicals Accelerator





>>>{ Farm\_  
Robotics\_  
Challenge }

Farmbot.ai



## The Challenge:

Develop a novel farm robot to perform or automate an essential farm function, applicable to a farm type of your choice.

## The Platform:



Farm-ng Amiga robot



Autonomy

Course Navigation

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Artificial Intelligence

Vision & Sensing

Dataset Collection

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Attachments

Implement Design &  
Development

## Participating Universities

12

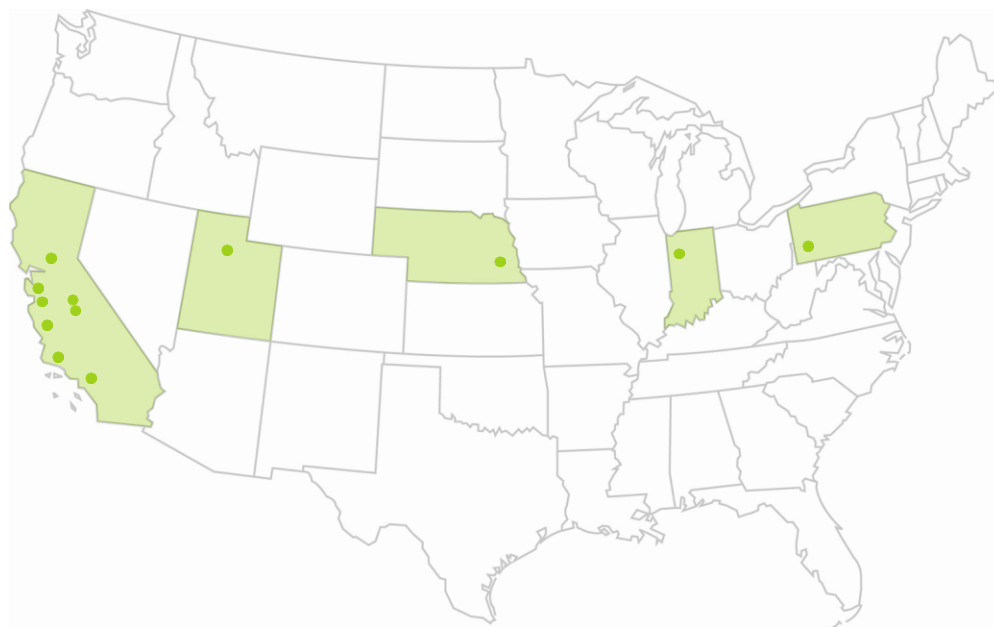
Universities

19

Teams

150

Students



UC DAVIS  
UNIVERSITY OF CALIFORNIA

Carnegie  
Mellon  
University

PURDUE  
UNIVERSITY

CAL POLY  
SAN LUIS OBISPO

Nebraska  
UNIVERSITY OF  
Lincoln

UC RIVERSIDE

BYU

UC MERCED

SANTA  
CRUZ

UCSB

FRESNO STATE

HARTNELL COLLEGE

# Grow Innovation Capacity

FIRA, is the world expert leading event series that focuses on the new era agriculture is facing, & has a huge impact on the whole value chain of Robotics . FIRA is a unique opportunity to share knowledge, explore new collaborations & design a strategy for the development of robotics to provide innovative robotic solutions to a farming process that addresses less harmful impacts on health, food production and the environment.



**The Plant @ California**, will be a world-class innovation facility and ecosystem - focussed on the intersection of ag, food, health - for industry-university collaboration & tech scaling companies, with wet-labs, food processing, greenhouses, biotechnology, meeting space, corporate office space, & a conference center



**The Fresno-Merced Future of Food (F3) Innovation Initiative**, will be a world-recognized, "Climate-Smart Food and Agriculture Systems" providing solutions to economic & environmental challenges in the Central Valley.





# \$20 Million Grant Received from USDA NIFA and NSF



*...empower the next generation to produce and distribute **sustainable, nutritious food** with fewer resources through transformative **AI technologies***

## Molecular Breeding



## Agricultural Production



## Processing & Distribution



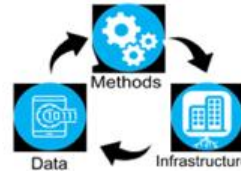
## Nutrition



*...and the people behind it*



*...with AI and technology as an enabler*





# FIRA USA

The Must-Attend Event for North American  
Agricultural Robotics

USA FIRA   
SEPT. 19-21 2023

# 2023 Event Overview

- Location: Salinas, California
- Dates: September 19-21
- 1,700+ attendees from 40 US states and 30+ Countries
- Target Audience: Growers, industrials, start-ups, OEMs, scientists, and investors
- Organized by The VINE/UC ANR, Western Growers, and GOFAR





# Exhibitions & In-Field Demos

- **Key Figures**
  - 35 robots and autonomous solutions
  - 25 in-field demos
  - 80 exhibitors
- **Demo Zones**
  - Medium-Density Vegetable Crop Solutions
  - High-Density Crop Management
  - Vineyard-Specific Technologies
  - Orchard Management Solutions

# The VINE Team



**Gabe Youtsey**  
UC ANR & The  
VINE



**Lucie Cahierre**  
UC ANR & The  
VINE



**Hanif Houston**  
UC ANR & The  
VINE



**Terri White**  
UC ANR & The  
VINE



**Kelly Scott**  
UC ANR



**Penny McBride**  
Strategic  
Advisor & The  
VINE



**Mareese Keane**  
Opengate & The  
Vine



**David  
Bubenheim**  
NASA & The  
Vine



**Paul Wagenblast**  
Stonebridge  
& The VINE



**Elif Ceylan**  
Opengate &  
The Vine



**Lon Hatamiya**  
Hatamiya  
Group &  
The VINE



**Nick Papadopoulos**  
Stonebridge  
& The VINE



**THE VINE**

**University of California**  
Agriculture and Natural Resources

# Key Takeaways and Opportunities

- Tech and business validation are missing elements (VINE Studio + VIP)
- AgTech needs a talented workforce (FRC)
- A growing AgTech innovation ecosystem will help the CA prune industry (VINE Navigator)