



Foundation Plant Services Program Update

MAHER AL RWAHNIH, DIRECTOR

NOVEMBER 19, 2024

CDFA IAB



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Today's Updates

- Annual Vineyard Testing
- Foundation Greenhouse Collection and Update
- Phase 2 Screenhouse Update
- Fruit Tree Tissue Culture
- Quality Management
- Accepted – Feature Article



Annual Vineyard Testing

- Foundation grapevines are inspected and re-tested regularly to confirm they remain virus-free and are eligible in CDFA certification program.
- FPS testing exceeds CDFA requirement: in the fall we use leaf petiole samples to test **every vine** for GRBV and GLRaV-3, eve



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Annual Vineyard Testing of Orders

- FPS distributes dormant grapevine material
- Dormant material from every vine that material is distributed from is tested again, to ensure it is free of GRBV and GLRaV-3.



2024 Classic Foundation Vineyard Testing Results

Year	Total Vines*	GRBV Positive Vines	GRBV Incidence	GLRaV-3 Positive Vines	GLRaV-3 Incidence
2018	4,075	0	0%	0	0%
2019	4,075	1	0.02%	0	0%
2020	4,270	0	0%	0	0%
2021	4,594	0	0%	0	0%
2022	4,660	0	0%	0	0%
2023	4,634	0	0%	0	0%
2024	4,881	0	0%	1	0.02%

2024 Classic Foundation Vineyard Testing Results

For fifth consecutive year, no GRBV was detected.

Year	Total Vines*	GRBV Positive Vines	GRBV Incidence	GLRaV-3 Positive Vines	GLRaV-3 Incidence
2018	4,075	0	0%	0	0%
2019	4,075	1	0.02%	0	0%
2020	4,270	0	0%	0	0%
2021	4,594	0	0%	0	0%
2022	4,660	0	0%	0	0%
2023	4,634	0	0%	0	0%
2024	4,881	0	0%	1	0.02%

2024 Classic Foundation Vineyard Testing Results

For first time, GLRaV-3 was detected.

Year	Total Vines*	GRBV Positive Vines	GRBV Incidence	GLRaV-3 Positive Vines	GLRaV-3 Incidence
2018	4,075	0	0%	0	0%
2019	4,075	1	0.02%	0	0%
2020	4,270	0	0%	0	0%
2021	4,594	0	0%	0	0%
2022	4,660	0	0%	0	0%
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2024	4,881	0	0%	1	0.02%

GRBV and GLRaV-3

Grapevine red blotch virus (GRBV)

- Insect vector: three-cornered alfalfa hopper
- Symptoms:
 - Red or chlorotic blotches on leaves
 - Delayed fruit ripening
- Delayed fruit ripening leads to reduced fruit quality.



Grapevine leafroll-associated virus 3 (GLRaV-3)

- Insect vector: vine mealybug
- Infection can be transmitted in one hour of feeding (per Kent Daane)
- Symptoms:
 - Downward rolling and reddening or yellowing of leaves.
- Can cause significant yield loss



GLRaV-3 infected grapevine



mealybug

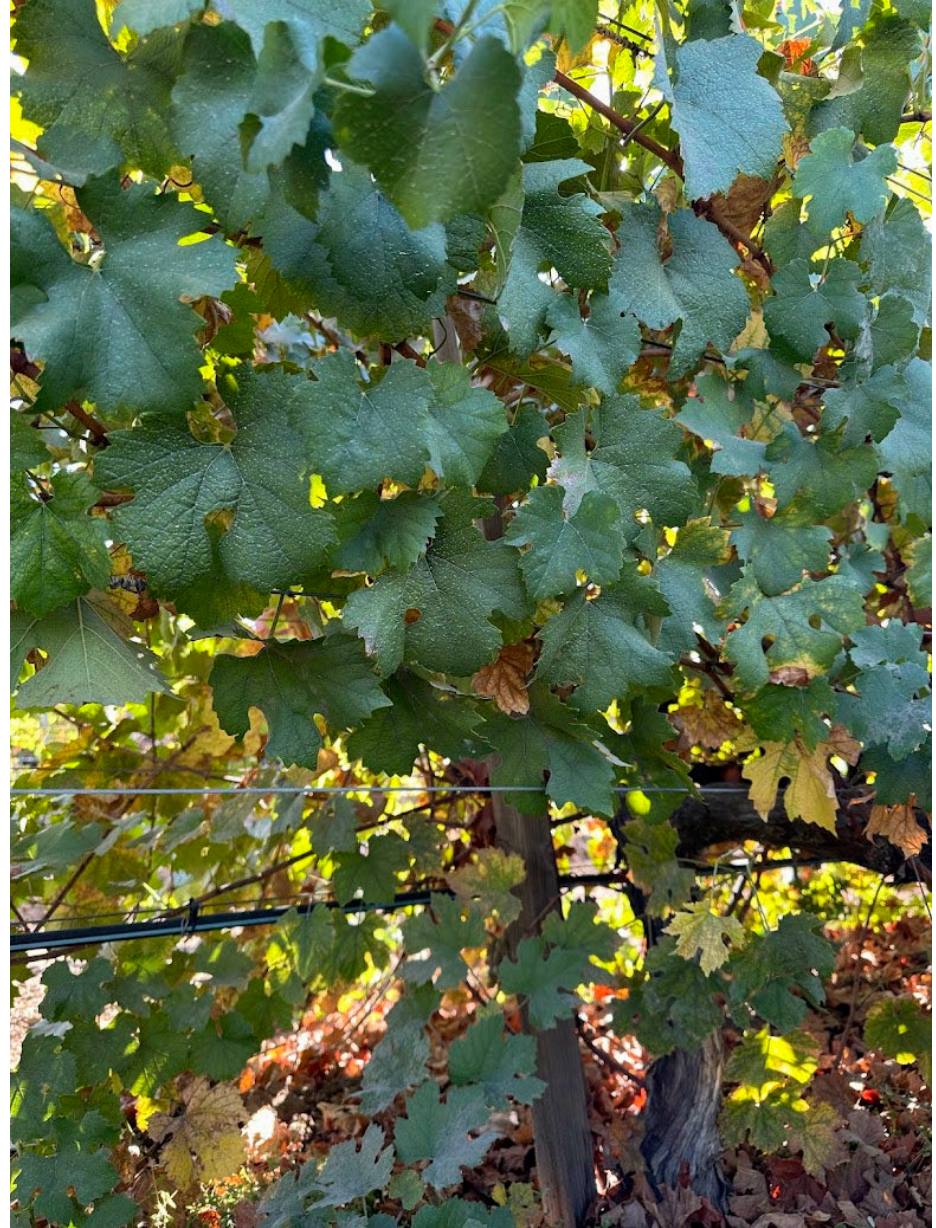


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GLRaV-3 Positive Grapevine at Classic Foundation Vineyard

- Chardonnay [46]
- Asymptomatic at visual inspection.
- Low CT value (16) in RT-qPCR result indicate virus at high levels in vine.
- Repeated testing to confirm infection.
 - Repeated testing of neighboring vines to confirm their negative status.



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GLRaV-3 Positive Grapevine at Classic Foundation Vineyard

- Infected vine was immediately removed
- Arms on trellis were wrapped in plastic to quarantine.
- We will continue to test all surrounding vines
 - Multiple times over course of next year.



GLRaV-3 Positive Grapevine at Classic Foundation Vineyard

- Budwood was collected for greenhouse propagation in January 2024.
 - GLRaV-3 **negative** when tested at collection
- Leftover is in cold storage.
 - Re-tested after the positive in the field vine, **confirmed negative**.



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negative.

GLRaV-3 Positive Grapevine at Classic Foundation Vineyard

- Vines propagated from the January 2024 collection were tested
 - **Negative** – no GLRaV-3!

This indicates a recent infection of the field vine!



Remember: We will test again!

Orders and Foundation propagation

- **Test to order policy:** all orders are retested as dormant canes prior to distribution (2nd round of testing, after 1st testing of petioles)
- All foundation GH material is tested before propagation
- Neighbors of the GLRaV-3 positive will be tested throughout 2025



Foundation Greenhouse Collection

- GLRaV-3 recent infection highlights the risk to the foundation vineyard.
- Increases the urgency for the greenhouse collection.



Classic Foundation Vineyard

Foundation Greenhouse



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FOUNDATION GREENHOUSE UPDATE

Foundation Greenhouse & Propagation

- **1,195 clonal families** now in Foundation greenhouse.
 - Each one must be tested to confirm identity and re-register in certification program
- 178 clonal families in propagation for indoor collection



Testing in Progress

- Vines have been sampled for DNA ID confirmation
- Diagnostic team collected and is processing material for virus testing
- Both ID and Diagnostic testing must be completed to register the collection as CDFA Foundation material.



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Rooting tray



4" Pot



Propagation Work Continues



1 Gallon Pot



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Phase 2 is needed ASAP

- More selections from outdoor vineyard must be added to indoor, protected collection.
- New selections arrive from international and domestic breeding programs every year, and we must have room for the collection's continued expansion.

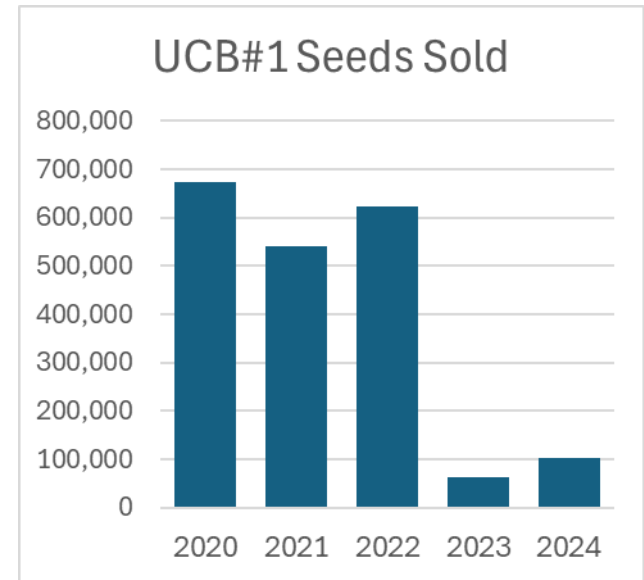
Planning Process: Phase 2 Foundation Screenhouse

- UC Davis Design & Construction Management updated plans
 - FPS paid \$257,813 for design work to initiate this project.
 - **Building plans are ready.**
- Estimate **\$3.6 million** to build 14,400 sq ft screenhouse



FPS Funding – Variable, and Varying

- Plant material sales plummeted
 - Attempting to build international markets for UCB#1 pistachio rootstock seed.
- User fees have decreased
 - Nurseries experiencing cash flow problems are not paying what is due.



FPS User Fees		
FY	Grape	Pistachio
2020	\$2,120,124	\$689,541
2021	\$1,433,752	\$640,678
2022	\$1,009,745	\$504,441
2023	\$1,673,351	\$644,999
2024	\$875,947	\$273,641

FPS Funding: National Clean Plant Network

- FY25 largest award to date, and likely the cap of what NCPN can provide

YEAR	TOTAL PROPOSED	TOTAL AWARDED	% FUNDED
2019-2020	\$ 1,376,671	\$ 1,378,060	100%
2020-2021	\$ 1,801,165	\$ 1,566,937	87%
2021-2022	\$ 1,643,769	\$ 1,620,647	99%
2022-2023	\$ 2,031,918	\$ 1,820,646	90%
2023-2024	\$ 2,168,695	\$ 1,885,768	87%
2024-2025	\$ 2,438,756	\$ 2,277,000	93%

FPS Funding: National Clean Plant Network

- Requested \$3,140,928 for FY26
- FPS Grape Advisory Committee sent letter of support for increased funding

FPS Funding: CDFA Improvement Advisory Board

Year	Total Proposed	Total Funded	% funded
2019-2020	\$ 1,104,221	\$ 1,104,221	100%
2020-2021	\$ 1,159,378	\$ 1,159,378	100%
2021-2022	\$ 1,343,470	\$ 1,343,470	100%
2022-2023	\$ 1,771,350	\$ 1,771,350	100%
2023-2024	\$ 1,832,402	\$ 1,564,342	85%
2024-2025	\$ 1,993,657	\$ 1,564,342	78%



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Additional Sources of Funding

- High priority project for the PD Board
 - With support from PD/GWSS, we can continue the propagation and testing of up to 500 more selections.
- Presented the project at November 4 meeting.
 - Will submit full proposal for FY26 funding.

From: To:		2025	2026	2027
BUDGET CATEGORY				
PERSONNEL: Salary and fringe benefits.		\$168,968	\$169,148	\$166,038
TRAVEL		\$0	\$0	\$0
MATERIALS & SUPPLIES		\$60,000	\$59,000	\$56,000
EQUIPMENT		\$0	\$0	\$0
CONSULTANT		\$0	\$0	\$0
SUBRECIPIENT or UC PARTNER		\$0	\$0	\$0
TOTAL DIRECT COSTS		\$228,968	\$228,148	\$222,038
Indirect (F&A) Costs	0.00%	\$0	\$0	\$0
TOTAL ESTIMATED COSTS PER YEAR		\$228,968	\$228,148	\$222,038

PPA7721 Funding Suggestions

- Plant Protection Act Section 7721: Plant Pest and Disease Management and Disaster Prevention Program Funding
- Submitted 1-year, \$494,000 proposal for greenhouse propagation funding
 - Unlikely to be funded due to PPA 7721 budget.
- Submitted research proposals for USDA PPA 7721 funding, total >\$530,000
 - Mainly to support staff where operational shortages exist.
 - Only partial funding is expected, again due to budget constraints.

FPS Current Financial Challenges

- Service awards from NCPN and IAB are of highest importance to continue operations and avoid staff layoffs.



FPS Funding for Phase 2 Screenhouse

- Met with FPS Grape Advisory Committee, who was supportive in brainstorming other federal and state grant options.
- Advisory committee connected with California Association of Winegrape Growers (CAWG), who organized meetings with state and federal lobbyists to discuss funding sources.
 - Too late for Farm Bill
 - No viable state options
 - CAWG concluded industry should urge UC Davis to pledge more direct support.
- CAES Dean's Office is very supportive of the need for this project.
 - Thank you Dean Helene Dillard for prioritizing the project!

FPS Fundraising for Phase 2 Screenhouse

- FPS supporter John Dyson has committed 10% of projected screenhouse cost (\$360,000)
 - FPS will receive if matching donations can be secured.

A New Screenhouse to Safeguard our Landmark Foundation Plant Collection

The Challenge
In 2017, spread of grapevine red blotch virus in the Russell Ranch Vineyard forced FPS to discontinue distribution of material from that vineyard—a costly reminder that vines maintained outdoors cannot be sufficiently protected from insects and other vectors. Using cuttings from clean vines in the current Classic Foundation Vineyard, FPS is propagating plants that will spend their entire lives indoors—an intensive.

Partners in Preservation
Thanks to generous industry support, FPS has already completed greenhouse already completed grape selections. Now, we are building a new screenhouse to safeguard our selections and allow room for more.

Phase 1 (complete): Covering 14,400-square-foot greenhouse. Already housing 1,000 grape selections. \$5.25 million project. Industry support, including:

- CDFA Fruit Tree Improvement Act
- California Grape Foundation
- California Grape Growers Association

Protecting Irreplaceable Grapevines
A New Screenhouse to Safeguard our Landmark Foundation Plant Collection

Expect Greater
From UC Davis. For the World.

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Protecting agriculture through clean plants

For more than 70 years, UC Davis Foundation Plant Services (FPS) has provided grape growers

Fruit Tree Tissue Culture Lab Progress

- Worked for one year with consultant John Driver.
- Great improvements to establishment and rooting of fruit trees in tissue



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Tissue Culture Lab – Cryotherapy Training

- Use of cryotherapy to tissues before meristem excision is an emerging tool in tissue culture labs.
- FPS sent two technicians to USDA-ARS/Colorado State University for cryotherapy training in September.
- This may improve our virus elimination success in fruit trees.



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Quality Management – Traceability, Data, and Personnel



- QR codes continue to improve our plant traceability.
 - Now added to tissue culture lab.

New Tools to Track and Manage Plant Material

- Intensive care unit for plants
 - Generates alerts when plants are marked 'moribund' to ensure we nurse back to health, or propagate from, to reduce risk of losing entire selections.

**Plant ICU - We need to take action!**

Clonal Family Status *without* this Plant
Motherplants: 0
TCEs: 0
Total Plants: 0

Actions to take:

- Propagate Plant
- Notify Director
- Notify Customer

Record Action Taken

[Save Action Notes](#)

Plant 105156

Plant ID 105156
Cultivar XXXXXXXXXX | (Apricot) | **Group:** 14522
Location SH | MPP | 95 | 0

[Clonal Family](#)

New Tools to Track and Manage Plant Material

- Propagation tools that were first developed for Greenhouse Ark project are being refined for use throughout FPS.
 - Used now for propagating introductions, rescue efforts, and general multiplication needs.

The screenshot shows the ADAPT web application interface. The browser address bar displays `adapt.ucdavis.edu/Propagation/?projectId=31`. The page header includes the ADAPT logo and navigation tabs: Plants, Propagation, Contacts, Lab, Administration, Reports, and Roles. A sub-header for the Propagation section lists: Current Project, Sticking Flats, Potting Flats, Propagation Tub, Plant List, Grafting, and Project List. The main content area features a 'Project:' dropdown menu set to 'Grape Propagation from Declining Plants' and a 'NEW PROJECT' button. Below this, the project details are shown: 'Grape Propagation from Declining Plants' with an 'EDIT' button, a description 'The plants needed to be pruned back for recovery. We collected the usable material for propagation.', 'Project Owner: Lina Long', and 'Create Date: 15-Oct-2024'. There are sections for 'Comments' (with an 'ADD' button) and 'Files' (with an 'ADD' button). At the bottom, the 'Project Flats' section includes three buttons: 'FLAT LABELS', 'SCAN FLAT', and 'BY PLANT'. Below these buttons is a table with the following data:

Flats	# Plants	Type	Location	Date Started
1725	11	Perlite Sticking		15-Oct-2024

Improved Customer Tools

- Online ordering was launched in 2023
 - Now 90% of requests are submitted online.
- Online introduction forms replaced PDF forms in October.

The screenshot shows the Foundation Plant Services Customer Portal. The browser address bar displays `fpsportal.ucdavis.edu/Home`. The page header includes the Foundation Plant Services logo, the text "Customer Portal", and the UC Davis logo. A navigation bar contains links for Home, Orders, Introductions, Clonal Families, and Plant Material Received. The user's name, Lauren Port, is displayed in the top right corner. The main content area is titled "Orders" and features a "Place an order request" button with a shopping cart icon. Below this, there are three columns: "Order History" with a button labeled "ORDER HISTORY", "Introductions" with buttons for "FPS MATERIAL" and "INTRODUCTION FORMS", and "Your Clonal Families" with a button labeled "CLONAL FAMILIES". On the right side, there is a section titled "Order Deadlines" with a table listing deadlines for Grape, Fruit & Nut Tree, and other categories.

fpsportal.ucdavis.edu/Home


Foundation Plant Services
Customer Portal

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Home Orders Introductions Clonal Families Plant Material Received

Lauren Port

Orders

 **Place an order request**
Request Plant Material. [PLACE AN ORDER](#)

Order History

A history of orders made from FPS.

[ORDER HISTORY](#)

Introductions

Plant material supplied to FPS.

[FPS MATERIAL](#)
[INTRODUCTION FORMS](#)

Your Clonal Families

Plant varieties hosted at FPS.

[CLONAL FAMILIES](#)

Order Deadlines

Grape	
Dormant Grape	Nov 15
Oregon Orders	Sep 15
Flower Cluster Order	Mar 1
Seed Orders	Mar 15
Fruit & Nut Tree	
Summer	May 1
Winter	Nov 1
Seeds	Aug 15

Our Commitment to Quality Management

Ejay Dehal was hired in July as *Director of Production and Quality Assurance*.

- Previously worked at Sierra Gold Nurseries, Conception Nurseries, and Sunsweet Growers
- Leads both Nursery and Field production teams.



Accepted: Feature Article submission to Plant Disease

Long-awaited article outlines our approach to validating and seeking approval of HTS for quarantine and certification testing.

Page 1 of 30

Maher Al Rwahnih
Plant Disease

1 A New Era in Federal Quarantine and State Certification Diagnostics at Clean Plant

2 Centers in the USA

3

4 Maher Al Rwahnih,^{1,2,3,*} Vicki Klaassen,² Teresa Erickson,² Olufemi Joseph Alabi,⁴ Kristian

5 Stevens,^{2,5} Min Sook Hwang,² and Lauren Port²

6 |

7 ¹Department of Plant Pathology, UC Davis, Davis, CA, U.S.

8 ²Foundation Plant Services, UC Davis, Davis, CA, U.S.

THANK YOU