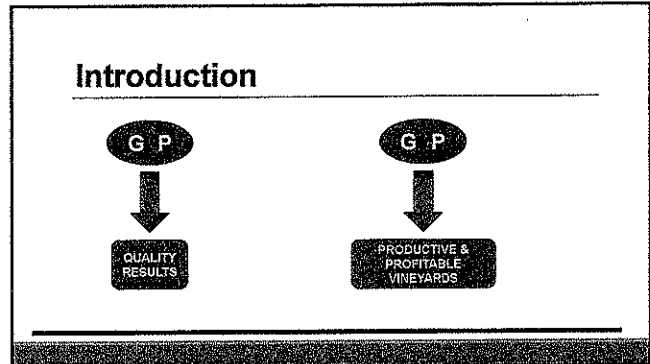


Advancing the Clean Plant Program for Enhanced Grapevine Seedling Standards

Tefera Mekuria, PhD
Director, Wonderful Laboratories-Plant Pathology Division

Contact: Tefera.Mekuria@wonderful.com
(661) 406-9919


1



2

Agenda


- What is a clean plant?
 - Definition.
 - Major pests and diseases.
- Why we need a clean plant?
 - Quality.
 - Productivity.
 - Longevity of vines: Effective Productive lifespan around 25 to 30 years.
- How we start and maintain a healthy vineyard?
 - Think ahead and Do it right
 - Start clean and stay clean approach.
 - Plant certified materials
 - Prevent your plant
 - Monitor vineyards regularly (disease and pest symptoms)
 - Assess vine health status periodically (scouting, leafing, rousing).



3

Grapevine (*Vitis* spp.)

- A major vegetative propagated fruit crop:
 - high socioeconomic importance worldwide.
 - The estimated total world production for grapes in 2021 was 73,524,186 metric tonnes (FAO).
- Susceptible to harmful pathogens, pests, or diseases that can negatively impact its health, growth, and productivity.
- Frequent exchanges of propagative material
 - contribute to spread these pathogens.
 - favoring the emergence of complex diseases.



International Organization of Vine and Wine (OIV)


4

What's a clean plant?

- A clean plant, also known as 'foundation-level' or 'GT' is a plant line, variety, or cultivar that has been
 - tested for, and found free of, economically important and/or harmful plant viruses and virus-like organisms, and
 - been maintained under controlled conditions to prevent reinfection.

<https://fcpcnw.wsu.edu/>

National Clean Plant Network Centers



NCPN promotes:

- disease and pest free specialty crops,
- rapid and safe introduction of new varieties from foreign sources,
- hygienic products for export, and
- a wholesome and abundant food supply.

5

Economically important grapevine pathogens


Viruses & Virus like	Fungi	Bacteria and like
Over 80 > GLD (GLRaV) > Nepoviruses (GFLV, ...) > Vitiviruses (GVA, -S, ...) > Grabovirus (GRBV) > Viroids (HSVd, ...) > Foveavirus (GRSPV) > Necrotovirus (GFLV, GRGV)	Many > Foliar/berry disease > GTD (Esca, Eutype, Bot., Phomopsis, ...) > Root damaging fungi	Few > Agrobacterium sp. > Pierce's Disease > Phytoplasma

(Bař et al., 2006)

6


Ecology and mode of spread

<p>Viruses/Viroids</p> <ul style="list-style-type: none"> Graft transmissible Vectored by: <ul style="list-style-type: none"> Insects: Mealybugs, Scale Insects Nematodes 	<p>Fungi</p> <ul style="list-style-type: none"> Grafting Wind Insects Farm tools Water splash 	<p>Bacteria/Phytoplasma/PD</p> <ul style="list-style-type: none"> Grafting Farm tools Insects Irrigation water
--	---	---



7

Economic impact/loss



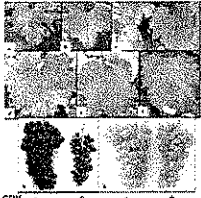
- Affect Quality (wine/Juice/resin)
 - Delayed fruit ripening/maturity
 - Lower sugar content
 - Reduced anthocyanins
 - Increased acidity
- Reduced yields
- Reduced vine viability
- Reduced economic returns

GLRD	CA	\$30k-\$230k
GLRD	NY	\$25k-\$40k
GRBV	WA	\$55k
GRBV	CA	\$60k

<https://www.nationalcleanplantnetwork.org/economic-benefits>

8

Economic impact/loss



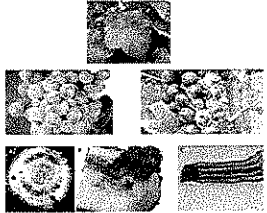
- Fan-like distortions of leaves.
- Chlorotic yellowing:
 - Ringspots.
 - Vein banding.
 - Mottling or mosaic patterns.

CPW
Mekuria et al., (2009). Phytopathology 99(12): 1394-1402

9

Economic impact: Fungi

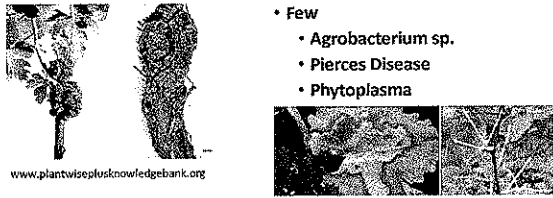
- Fungi
- Many
 - Foliar/berry disease
 - GTD (Esca, Eutypa, Bot., Phomopsis, ...)
 - Root damaging fungi



10

Economic impact: Bacteria and Like

- Bacteria and like
- Few
 - Agrobacterium sp.
 - Pierces Disease
 - Phytoplasma



www.plantwiseplusknowledgebank.org

<https://extension.ekstate.edu>

11

Agenda

What is a clean plant?


- Definition.
- Major pests and diseases.

Why we need a clean plant?

- Quality.
- Productivity.
- Longevity of vines: Effective Productive lifespan around 25 to 30 years.

How we start and maintain a healthy vineyard?

- Think ahead and Do it right
 - Start clean and stay clean approach.
 - Plant certified materials.
- Prevent your plant
 - Monitor vineyards regularly (disease and pest symptoms).
 - Assess vine health status periodically (excising, testing, roguing).



12

Need for clean vine


- ❑ Substantial economic loss due to:
 - Lower yields: Productivity associated with profitability.
 - Decreased product quality: Low-quality penalty.
 - Higher management costs.
- ❑ Longevity of vines: Effective Productive lifespan around 25 to 30 years.

13

Berry qualities: Always a priority


Grapes are used for:

1. Wine.
2. Fresh fruit.
3. Dried fruit.
4. Juice production.



Quality of wine is largely determined by:

- > Grapes (variety and rootstock)
- > Number of factors:
 - water availability,
 - climate, soil properties, and
 - viticultural-oenological practices.

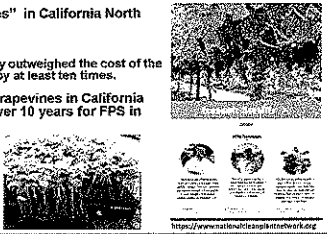


(OPV, 2016)

14

Economic value of clean vines

- ❑ The value of growing "clean-wine-grapes" in California North Coast region:
 - > \$22.5 million annually, which substantially outweighed the cost of the clean plant program at FPS in Davis, CA by at least ten times.
- ❑ An analysis of producing virus-tested grapevines in California revealed a benefit-to-cost ratio of 117 over 10 years for FPS in Davis, CA.




FACT SHEET
 Cultural Grape Rootstock
 www.nationalcleanplantnetwork.org

15

Agenda

- What is a clean plant?
 - Definition.
 - Major pests and diseases.
- Why we need a clean plant?
 - Quality.
 - Productivity.
 - Longevity of vines: Effective Productive lifespan around 25 to 30 years.
- How we start and maintain a healthy vineyard?
 - Think ahead and Do it right
 - Start clean and stay clean approach.
 - Plant certified materials.
 - Prevent your plant
 - Monitor vineyards regularly (disease and pest symptoms)
 - Assess vine health status periodically (scouting, testing, roguing).




16

Starting clean: A critical step towards advancing CPP

Common practices

1. Make their own
2. Buy from outside sources
 - 2.1 Certified Nurseries.
 - 2.2 Non-Certified Nurseries.



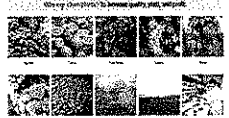
www.ardentia@ardentia.com

17

Support for starting clean

NCPN: Created to protect U.S. specialty crops from the spread of economically harmful plant pests and diseases.

1. Clean plant centers.
2. Scientists, & educators.
3. State and Federal regulators.
4. Large and Small nurseries.
5. Growers.



www.nationalcleanplantnetwork.org

Goal: Safeguarding and supporting specialty crops by providing a sustainable source of clean plant material through innovation, collaboration, translational science and outreach.

18

Support from CPN

www.nationalcleanplantnetwork.org

19

Staying Clean: Critical for enhanced grapevine seedling standard

1. **Checking the vines health status: See Something-do Something!**
 - > Periodic monitoring for disease and pest.
 - > Testing.
 - > Roguing.
 - > Re-planting.
 - > Utilizing appropriate pest control measures to maintain them.
2. **Working with your neighbors and surrounding:**
 - > Community Efforts.

20

Key Takeaway:

- ✓ Start Clean and Stay Clean.
- ✓ Implement a proactive and preventative approach.
- ✓ Never propagate from unconfirmed vine.
- ✓ Use available resources before you start.
- ✓ Work with your neighbors.
- ✓ See something do something.

<https://www.nationalcleanplantnetwork.org/>

21

Conclusions:

♦ Advancing the Clean Plant Program for enhanced grapevine seedling standards is a crucial initiative for the viticulture industry.

♦ Some steps and strategies that can be implemented to enhance Grapevine Seedling Standards:

1. **Research and Development:** for producing clean grapevine seedlings.
2. **Pathogen Testing and Certification:** rigorous testing protocols and certification process.
3. **Genetic Authentication:** plants produced are true-to-type.
4. **Collaboration with Research Institutions:** to leverage their expertise.
5. **Education and Training:** to nursery operators, growers, and other stakeholders.
6. **Standardization of Procedures:** for propagation, testing, and certification.

22

Conclusions:

7. **Monitoring and Surveillance:** field inspections, and random sampling of nursery stock.
8. **Quarantine and Isolation:** isolate new plant material.
9. **Record Keeping and Traceability:** plant propagation, testing, and certification processes.
10. **Economic Support:** incentives.
11. **Industry Collaboration and Communication:** nurseries, growers, industry associations, and regulatory agencies.
12. **Regulatory Oversight:** industry-wide benchmarks and conducting audits.

23

Happy vine-quality wine!

Start Clean

Stay Clean

24