

Clean planting material - an effective strategy to prevent diseases in grape vines

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Diseases..... even before planting?

- Grapevine - History and Migration.
- Wine grapes are the repository of hundreds of pathogenic diseases.
- Some pathogens, specifically viruses can stay in vines without visible symptoms for many years.
- These diseases are typically spread through infected planting stock and plant propagation material.

Why should you plant 'clean' or 'certified' grapevines?

- Planting 'clean' or 'certified' material helps prevent the introduction and spread of many unwanted diseases.
- Unlike insects and many fungal diseases, the *viruses*, *viroids*, *phytoplasmas* and *bacteria* cannot be controlled by chemical sprays after vines are infected.
- Once disease is established, it is difficult and costly to eradicate.
- Planting 'certified' vines is the best insurance for a healthy and profitable vineyard.

Long term benefits of certified planting – a case study

Table 5: Grower Net Benefits from Planting Certified Stock

	Average Annual Discounted Benefit			Present Value of Net Benefits over 50 years		
	Per vine	Per acre	Region	Per vine	Per acre	Region
	<i>\$/Vine/Yr</i>	<i>\$/Acre/Yr</i>	<i>\$Mill./Yr</i>	<i>\$/Vine</i>	<i>\$/Vine</i>	<i>\$ Millions</i>
Without Replanting	0.23	305	30.7	5.78	7,637	767.0
Replanting with Non-Certified Stock	0.27	359	36.0	6.78	8,966	900.4
Replanting with Certified Stock	0.40	533	53.5	10.08	13,327	1,338.3

Kate B. Fuller, Julian M. Alston, and Deborah A. Golino, 2013

Where does certified planting material come from?

National Clean Plant Network (NCPN) for Grape

Conducts research to improve its
diagnostic and therapeutic service.



Foundation Plant Services (FPS)

Foundation block Produce and maintain
grapevine certified nuclear stock materials that
become available to nurseries and growers in
California, the United States, and foreign
countries.



Certified Nurseries

‘Mother Block’ is planted at a nursery with vines
obtained from a ‘Foundation’ program.

Vines from the ‘Mother Block’ are propagated to
produce ‘Certified’ vines. If a vine is grafted onto
rootstock, both the scion and the rootstock have to
meet these standards to qualify as ‘Certified’.



You

Foundation Plant Services Available Tests for Protocol 2010

Group	Pathogen	Symbols	ELISA	qPCR	PCR	Herb. Index	Woody Index
Nepoviruses	Grapevine fanleaf virus	GFLV	X	X	X	X	St. George
	Tomato ringspot virus	ToRSV	X	X	X	X	
	Tobacco ringspot virus	TRSV		X	X	X	
	Arabis mosaic virus	ArMV	X		X	X	
	Strawberry latent ringspot virus	SLRSV		X	X	X	
	Blueberry leaf mottle virus	BLMV		X	X	X	
	Raspberry ringspot virus	RpRSV		X	X	X	
	Tomato black ring virus	TBRV		X	X	X	
	Grapevine deformation virus	GDefV		X	X	X	
	Artichoke Italian latent virus	AILV				X	
Closteroviruses	Grapevine leafroll associated virus 1	GLRaV-1	X	X	X		Cab. Franc
	Grapevine leafroll associated virus 2	GLRaV-2	X	X	X		Cab. Franc
	Grapevine leafroll associated virus 2RG	GLRaV-2RG		X	X		
	Grapevine leafroll associated virus 3	GLRaV-3	X	X	X		Cab. Franc
	Grapevine leafroll associated virus 4	GLRaV-4	X gen	X	X		Cab. Franc
	Grapevine leafroll associated virus 5	GLRaV-5	X gen	X	X		Cab. Franc
	Grapevine leafroll associated virus 6	GLRaV-6	X gen	X	X		Cab. Franc
	Grapevine leafroll associated virus 7	GLRaV-7		X	X		
	Grapevine leafroll associated virus 9	GLRaV-9	X gen	X	X		Cab. Franc
	Grapevine leafroll associated virus 10	GLRaV-10		X	X		Cab. Franc
	Grapevine leafroll associated virus 11	GLRaV-11	X		X		Cab. Franc
	Grapevine leafroll associated virus Car,	GLRaCV	X gen	X	X		Cab. Franc
Vitiviruses	Grapevine virus A	GVA		X	X		Kober 5BB LN33
	Grapevine virus B	GVB		X	X		
	Grapevine virus D	GVD		X	X		
	Grapevine virus E	GVE		X			
	Grapevine virus F	GVE		X			
Foveavirus	Grapevine rupestris stem pitting associated virus (all strains)	GRSPaV		X	X		St. George
Maculavirus	Grapevine fleck virus	GFkV	X	X	X		St. George
	Grapevine redglobe virus	GRGV		X	X		
Marafiviruses	Grapevine syrah virus-1	GSyV-1		X	X		
	Grapevine vein feathering virus	GVFV		X	X		
	Grapevine asteroid mosaic virus	GAMV		X	X		
DNA Viruses	Grapevine red blitch associated virus	GRBaV		X	X		
	Grapevine vein clearing virus	GVCV		X	X		
Phytoplasma	Universal detection	Phyto		X	X		
Pierce's Disease	<i>Xylella fastidiosa</i>	PD		X	X		

Key:

X Test performed at FPS.

X = test is available;

X gen.= ELISA using generic antibody which detects GLRaVs-4, 5, 6, 9 and Car in a single test;

qPCR= quantitative PCR= real time RT-PCR with TaqMan probe; PCR= will include RT-PCR for RNA viruses.

Can crown gall be prevented via clean material?



- Currently in research funded by NCPN, shoot tips and meristems collected from plants grown from cuttings taken from crown gall infected vines are being propagated.
- Currently results indicate that plants free of the crown gall pathogen can be generated (Tom Burr and Tim Martinson, NCPN Grape)

Perform detailed Inspection of your planting material



- Make sure that the planting material came in a dormant condition and was still moist.
- vines should look clean, bright and have an earthy aroma.
- If there are bad odors indicative of rotting vines then identify the batch and avoid planting the entire batch.

Perform detailed Inspection of your planting material



A bundle of healthy grafted grape vines. These vines are moist, have healthy roots, and are clearly labeled.

- Vines should be uniform in size, without scars or damaged buds. Shriveled branches or dried vines are indicators of non-vigorous vines.
- Similarly, roots should be healthy, untwined, downward pointing with fibrous cream-colored branch roots.
- Vines with excessively curvy shoots could be difficult to train on the trellis system and should be sorted out.

Make sure planting material was shipped promptly



A bundle of grape vines that have broken dormancy and started to grow before arrival at the vineyard. These vines will be weakened and should be rejected.



Vines with broken dormancy when planted in the field, shoot from the primary bud died within hours.

Pay close attention to the graft union



Examples of healthy graft unions on these grape vines.

- Graft union should be completely healed without bulging.
- The scion (upper portion) and the rootstock (lower portion) should be of matching thickness.
- Destructive testing of a few randomly selected vines
- Visit the nursery before you order materials for the first time.

Avoid green bench grafted vines



Jim Wolpert and Andy Walker, UC Davis

- Green grafting is popular with some nurseries.
- Only four to five months are required between ordering and delivery.
- Green-growing vines with some leaf area but very small root systems are not robust, and periods of prolonged hot weather can cause considerable damage to, or even kill, these young plants.

Prefer dormant bench grafts



An Omega cutter (L) and bench graft.
Photos by Mercy Olmstead, Uni. of FL

- These plants start out the same as green-growing bench grafts but instead of being potted, they are planted directly into a nursery row where they grow for a full growing season.
- After rooting over the growing season, they are dug in fall, sorted, trimmed, graded, bundled, and stored for subsequent delivery in spring.
- Unlike green-growing bench grafts, dormant plants, as their name implies, are not growing when delivered, and therefore have greater stored reserves and are much hardier.

What if the nursery is not certified?

- Make sure nursery is at least reputed or in the process of improving propagation standards.
- Avoid using planting material from other vineyards.
- Ask for warranty and return policies.
- Randomly select few plantings for virus screening.

Remember

Certified material does not guarantee disease-free grapevines after planting; it only ensures that planting material is clean before it goes into the soil. You still need to follow proper cultural practices and spray programs to ensure healthy vine and quality wine grapes!

Thank You!