



Field **GUIDE to CLEAN PLANTS**
& QUARANTINES for GRAPES
in **WASHINGTON STATE**





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This guide is designed to be a tool to assist viticulturists, vineyard workers, wholesale and retail nursery operators and managers, nursery inspectors, homeowners, and the general public in becoming informed about Washington's Grape Pest Quarantines and the importance of acquiring and using certified grapevines to protect Washington's grape and wine industries from devastating pests and diseases.

We all play an important role in safe-guarding the health of vineyards in Washington by being familiar with and following plant quarantine laws. Our agriculture-based economy depends on it.

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Contributing Authors and Acknowledgements

Technical and Editing Support by:

Michelle Moyer, Viticulture Extension Specialist, Washington State University, Prosser, WA

Naidu Rayapati, Plant Virologist, Washington State University, Prosser, WA

Rick Steigmeyer
Freelance Writer/Editor
Cashmere, WA

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What Is a Clean Plant?

A clean plant is defined as one that is free of known insect infestation or disease infection.

The most important step in establishing a profitable vineyard is planting clean plants.



Photo by Michelle Moyer, WSU

What Is a Certified Plant?

A certified plant is one that has been grown in accordance with the rules of a state Certification Program and has originated from a plant Foundation Source. The nursery source of the plant is tested and inspected regularly to assure phytosanitary cleanliness.

An individual Foundation Source vine cannot be propagated for more than 3 generations to still be considered eligible for Certification.

How Does a Plant Become Certified?

A certified vine comes from a registered nursery “Mother Block,” which comes from a “Foundation Source.” Minimum standards for the development of “Foundation”-level grapevines are determined by the Washington State Administrative Code (WAC) and the National Clean Plant Network-Grapes.

In Washington, “Foundation” grapevines can come from two main sources: the Clean Plant Center Northwest Grapes (CPCNW in Prosser, WA) or from Foundation Plant Services in Davis, CA.

A “Foundation”-level vine has undergone propagation and testing to ensure that it is not infected with specific viruses. Once the vines are deemed “clean,” the individual vines are grown out in screenhouses, and then transferred to outdoor vineyard blocks where they are grown under strict pest management regimes to reduce potential pest introduction. Foundation vines are tested annually for disease contamination and insect infestation.

Nurseries then purchase cuttings from these Foundation vineyards to establish in their Registered Nursery Mother Blocks.

The Registered Nursery Mother Blocks are strictly managed to prevent disease and pest introduction, and are routinely tested to determine if they are maintaining their “clean” status of known pests. It is from these Mother Blocks that nurseries can propagate cuttings to be sold as “Certified.”



Registered Nursery Mother Blocks are strictly managed and inspected to ensure they maintain their “disease” free status.

Photo by Cindy Cooper, WSDA

Why Should I Plant “Certified” Vines?

Planting “Certified” vines help prevent the introduction of unwanted diseases.

How Do I Know if Plants are “Certified”?

If it does not have certification paperwork from the state, it is not “Certified” plant material.

Washington quarantines only recognize certification programs in Washington, Oregon and California. Plants from elsewhere are not recognized as “Certified.”

The Clean Plant Center Northwest

The CPCNW provides “Foundation” vines to nurseries.

Anyone can get plants from CPCNW, but availability is limited. Available materials are distributed by the following priority ranking:

- 1) Nurseries producing certified plants in the Northwest;
- 2) State and federal research units in the Northwest;
- 3) Nurseries in the Northwest not participating in Certification;
- 4) Individual growers in the Northwest; and
- 5) Out-of-region or foreign clients.

Guidelines for Finding Certified Plants

Only purchase grapevines from reputable nurseries; purchase “Certified” whenever possible.

The National Grape Registry and the CPCNW, maintain lists of nurseries carrying certified plants.

ngr.ucdavis.edu/commercialnurserylist.cfm

healthyplants.wsu.edu/grape-program-at-cpcnw/

Grapevines purchased from outside of Washington State must be “Certified,” and inspected by WSDA upon arrival. As a reminder, Washington only accepts other-state certification programs from California and Oregon.

Call (360) 902-1874 for more information.

What Is a Quarantine?

A quarantine is a restriction on transporting certain plant materials across specific boundaries.

Washington State has a quarantine concerning specific pests on or in grape plant materials coming from other states and U.S. territories. Specific quarantine rules can be found in Chapter 16-483 WAC.



Photo by Jim Marra, WSDA

Federal quarantines regulate plant imports from other countries. Foreign-imported grape stock must satisfy quarantine rules through documentation or inspection at an approved import station.

Why are Quarantines Important?

Quarantines are necessary to prevent the introduction and spread of unwanted pests and diseases from one area to another.

Washington's Grape Pest Quarantine

Washington State has a quarantine for the below listed pests. The quarantine is for all locations outside of the state and covers all types of plant materials that can be used for propagation.

- 1) *Grapevine fanleaf virus* (Grapevine fanleaf disease)
- 2) *Grapevine leafroll associated viruses* (Grapevine leafroll disease)
- 3) *Grapevine virus A* (Rugose wood complex)
- 4) *Grapevine virus B* (Rugose wood complex)
- 5) *Xylella fastidiosa* (Pierce's Disease)
- 6) *Daktulosphaira vitifoliae* (Grapevine phylloxera)
- 7) *Planococcus ficus* (Vine mealybug)

Quarantine Rules

Grape stock will be admitted into Washington under several provisions. Specific provisions are listed under WAC 16-483. A generalized summary of those requirements are below.

- 1) All in-coming stock must have a certificate issued by the plant protection organization in the state of origin, certifying the grapevines meet Washington's quarantines requirements.
- 2) The grape stock must be certified through an official state certification program recognized by Washington.
- 3) Shipments from states known to have infestations of phylloxera or vine mealybug must also include additional statements regarding how they were grown or treated in order to ensure they are free of those pests.
- 4) All shipments from a quarantine area must be clearly marked on the outside of the package as "grapevines," "grape root stock," or "grape cuttings." Shipments also need to be labeled with the scientific and common plant name.

What To Do If a Quarantined Pest is Suspected

If a potential quarantine insect pest or disease is suspected, immediately contact the WSDA or Washington State University Extension Office near you for steps on identification and management. This is especially true for potential insects and diseases not currently found in the state (Vine mealybug, phylloxera, and Pierce's Disease).



Inspecting a vineyard for leafroll disease symptoms and sampling petioles of basal leaves for lab testing.

Photo by S.T. Sim, UC-Davis

Nursery Inspections

The WSDA Nursery Inspection Program inspects licensed retail and wholesale nurseries to enforce Washington quarantines. Nurseries must notify the WSDA within 48 hours of an out-of-state plant shipment in order to schedule an inspection. Failure to do so can result in legal recourse.

*More information on nursery inspections call:
(360) 902-1874 or send an e-mail to
Nursery@agr.wa.gov.*

Field Office Phone Numbers

Bellingham: (360) 676-6739

Chehalis: (206) 740-1213

Ephrata: (509) 201-6205

Mount Vernon: (360) 428-1663

Olympia: (360) 586-3116

Pasco: (509) 728-2032

Seattle: (206) 439-3722

Spokane: (509) 477-4796

Tacoma: (253) 471-4426

Testing for Grapevine Viruses

Viruses spread in nurseries and vineyards through the use of infected cuttings. If you plan to use cuttings from an existing vineyard to start a new vineyard, it is important to have the vines that will be used for propagation tested for viruses so unintentional disease spread is avoided.

Growers can send samples to the following labs on a fee basis:

Agri-Analysis LLC
930 Riverside Parkway, Suite #30
West Sacramento, CA 95605
info@agri-analysis.com
Phone: 800-506-9852

WSU ELISA Virus Testing Lab
24106 N Bunn Rd
Prosser, WA 99350
Tina_Vasile@wsu.edu
Phone: 509-786-9382

Eurofins STA Laboratories
7240 Holsclaw Road
Gilroy, CA 95020
juditmonis@eurofinsus.com
Phone: 888-782-5220

How to Collect a Sample for Virus Testing

Appropriate sampling techniques are critical for reliable diagnosis of viruses. Depending on the time of year, either leaf or cane samples can be taken.

If there are no symptoms of disease, gather a random sample of either whole-leaf or cane segments using a uniform pattern through the vineyard, such as a “W” or “X” pattern.

If suspect virus symptoms are present, gather samples from affected and adjacent-to-affected vines.

Leaf sampling: Leaf samples can be collected at any time during the growing season.

- 1) Collect six to eight mature leaves with petioles (*leaf stem*) from different parts of the grapevine. Use a plastic bag like a glove and drop the leaves into the bag and seal.
- 2) Label individual bags and document location of vines in the vineyard block with cultivar name and other pertinent information.
- 3) Keep the samples cool until transportation to the lab, in a cooler or refrigerator. Do not freeze.

Cane sampling: Collect cane samples when the vine is dormant.

- 1) Collect canes randomly from the grapevine. Samples should be collected from throughout the vine (i.e., both cordons or arms) and be at least two to three internodes in length. Place samples in a zip top plastic bag.
- 2) Label individual bags and document location of vines in the vineyard block with the cultivar name and other pertinent information.

Testing facilities can provide more specific guidelines for gathering samples.



Photo by Michelle Moyer, WSU

Washington GRAPEVINE QUARANTINED *Pests*



Grapevine fanleaf virus

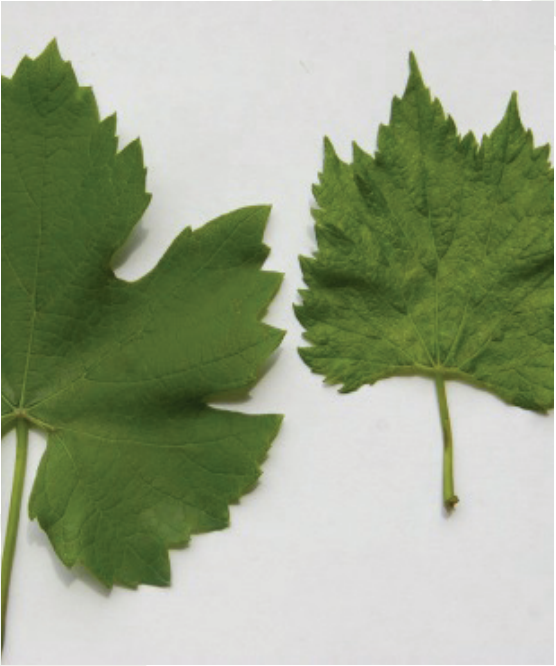


Pinot Noir leaf showing bright yellow color between veins (designated as vein-banding symptom) and deformation with no distinct lobes.

Photo by Naidu Rayapati, WSU



Grapevine fanleaf virus



Chardonnay leaf showing severe deformation, mottling, rough or 'crocodile skin' surface with abnormally gathered primary veins resulting in fan-shaped leaves (right) compared to a healthy leaf (left).

Photo by Naidu Rayapati, WSU

Grapevine fanleaf virus



Vines infected with Grapevine fanleaf virus produce smaller clusters with shot berries (bottom) compared to normal clusters from a healthy vine (top) (Chardonnay pictured).

Photo by Naidu Rayapati, WSU

Grapevine leafroll associated viruses



Chardonnay leaf showing symptoms of grapevine leafroll disease. Slight yellowing and downward rolling of leaves are commonly observed during and after véraison.

Photo by Naidu Rayapati, WSU

Grapevine leafroll associated viruses



Cabernet Franc showing symptoms of grapevine leafroll disease. 'Green veins' and reddish-purple areas between veins are commonly observed in September and October.

Photo by Naidu Rayapati, WSU

Grapevine leafroll associated viruses



Grapevine leafroll disease can result in smaller clusters, uneven ripening, poor color development in red varieties, decreased sugars and reduced yield (Chardonnay pictured).

Photo by Naidu Rayapati, WSU

Grapevine leafroll associated viruses



Grapevine leafroll disease can result in smaller clusters, uneven ripening, poor color development in red varieties, decreased sugars and reduced yield (Cabernet Sauvignon pictured).

Photo by Naidu Rayapati, WSU

Grapevine virus A, Grapevine virus B



Grapevines affected by Grapevine virus A (GVA) and Grapevine virus B (GVB), may display symptoms related to the various components that make up Rugose wood complex. This typically includes pitting and grooving in the woody tissue under vine bark. These viruses are generally transmitted by propagation of infected material. Symptoms associated with GVA include reddening of leaf margins and petioles, poor vigor, and rolling of leaf edges. The plant may exhibit swelling at the graft union and stem cracking.

Rugose Wood Complex (Kober stem grooving)



Kober stem grooving disorder is associated with Grapevine virus A. Grooving symptoms can be seen after the bark was peeled off where phloem tissue died in the trunk of the rootstock Kober 5BB. These trunk symptoms are only seen on the Kober 5BB rootstock, but this rootstock serves as an indicator of potential GVA infection when other foliar symptoms are seen as described on page 21.

Photo by S.T. Sim, UC-Davis

Rugose Wood Complex (LN 33 stem grooving)



LN33 stem grooving disorder is associated with Grapevine virus B. Grooving/pitting symptoms can be seen after the bark was peeled off where phloem tissue died in the trunk of the sensitive indicator variety LN33. This rootstock serves as an indicator of potential GVB infection when other foliar symptoms are seen as described on page 21.

Photo by S.T. Sim, UC-Davis

Xylella fastidiosa (Pierce's disease)



Common symptom of Pierce's Disease are matchstick petioles and leaves remaining attached to canes after leaf fall.

Photo by Jack Kelly Clark, courtesy UC - Statewide IPM Program

Xylella fastidiosa (Pierce's disease)



Brown canes with random "green islands" is a common symptom of Pierce's Disease.

Photo by Jack Kelly Clark, courtesy UC - Statewide IPM Program

Daktulosphaira vitifoliae (Grapevine phylloxera)



*Top: Phylloxera female and eggs shown in the circle.
Bottom: Root galls (nodosities) form at the end of
young roots due to phylloxera feeding.*

Top Photo by Mike Klaus, WSDA

Planococcus ficus (Vine mealybug)



Vine mealybug adult female. Distinction between grape and vine mealybugs can be challenging. Contact your local WSU Extension office for help in identifying mealybugs.

Photo by Jack Kelly Clark, courtesy UC - Statewide IPM Program

Planococcus ficus (Vine mealybug)



Mealybugs hide under bark.

Photo by Cindy Cooper, WSDA

Other Regulated Pests



Arabis mosaic virus



Grape leaf with yellow mottling due to Arabis mosaic nepovirus.

Photo by Marc Fuchs, Cornell University



Tomato ringspot virus



Poor fruit set and berry development is a common symptom of Tomato ringspot virus and other viruses.

Photo by S.T. Sim, UC-Davis

Tobacco ringspot virus



Like Tomato ringspot virus, Tobacco ringspot virus causes reduced fruit set and uneven ripening. These two viruses diseases are hard to distinguish in the field, and must be identified using molecular tests.

Photo by S.T. Sim, UC-Davis

Grapevine fleck virus



*Grapevine fleck virus causes diffuse, chlorotic leaf spots or flecks on *Vitis rupestris* rootstocks (St. George pictured). While it does not cause problems to the scion, it can reduce graft union take, and thus, is a problem in areas using grafted vines.*

Photo by S.T. Sim, UC-Davis

Red blotch associated virus



Merlot leaf showing red veins, interveinal red blotches and red blotches on leaf margins which is characteristic of red blotch disease.

Photo by Naidu Rayapati, WSU

Red blotch associated virus



In red-fruited varieties, interveinal red patches appear on the basal leaves in the fall and can easily be confused with leafroll disease symptoms.

Photo by S.T. Sim, UC-Davis

Grapevine vein clearing virus



Symptoms of grapevine vein clearing include translucent vein clearing on young leaves.

Photo by Wenping Qiu, MSU-Mountain Grove

Grapevine vein clearing virus



Another symptom of grapevine vein clearing is abnormal berry shape, light brown color and stone texture on fruit (Vidal blanc pictured).

Photo by Wenping Qiu, MSU-Mountain Grove

Peach rosette mosaic virus



Peach rosette mosaic virus, which is more often found in North American juice grapes (Concord pictured here), can cause poor fruit set, stunted canopy development with distorted shoot internodes, and general overall decline. It is often confused with grapevine fanleaf disease, and/or boron deficiency. It is vectored by the dagger nematode or spread by using infected plant material.

Photo by W.R. Allen, Agriculture and Agri-Food Canada, Bugwood.org

North American Grapevine Yellows



Symptoms of North American grapevine yellows (NAGY) include discolored, rolled leaves in Chardonnay. NAGY can be confused with leaf-roll disease. Additional characteristic symptoms include death of the shoot tip, brittle leaves, poor periderm formation, and cluster abortion.

Photo by Marc Fuchs, Cornell University

Agrobacterium vitis (Grapevine Crown Gall)



Gall development, or uncontrolled undifferentiated cell division, is characteristic of grapevine crown gall. Galls typically do not become visible until mid-summer, when canopy collapse due to water restriction is visible.

Photo by Michelle Moyer, WSU

Glossary

Cane: *A dormant shoot.*

Certified planting stock: *Vines, rooted cuttings, callused cuttings or grafted plants propagated directly from Registered Nursery Mother Blocks in accordance to an approved state Certification Program.*

Certified nursery: *A nursery licensed by the state department of agriculture and in compliance with state nursery standards for “Certified” status.*

Chlorosis: *Yellowing of plant tissue.*

Foundation Block: *A block of grapevines established from planting material meeting rigorous testing and management strategies outlined by the National Clean Plant Network. Foundation programs exist in California and Washington.*

Mottling: *Random discoloration of plant tissue, typically on leaves.*

Necrosis: *Death of plant tissue.*

Pest: *An unwanted insect, animal, pathogen, or weed.*

Petiole: *The “stem” connecting the leaf blade to the grapevine shoot.*

Glossary *(continued)*

Periderm: *The transition of shoot outer tissue into a brown, water-resistant structure for dormancy. Usually associated with the acclimation of cold hardiness.*

Quarantine: *A restriction on the movement of plant material across a specific boundary, such as county or state line. Designed to reduce the introduction or spread of unwanted pests.*

Registered Nursery Mother Block: *A nursery vineyard what was established using vines derived from a Foundation source. Used to propagate material that will be sold as “Certified.”*

Shoot: *The actively growing, green stem of a grapevine.*

Véraison: *Color change and berry softening that occurs during the ripening process.*

Photo credits and sources

W.R. Allen, Agriculture and Agri-Food
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Jack Kelly Clark, Principle Photographer,
ANR Communication Services,
UC-IPM, Davis, CA

Cindy Cooper, Plant Inspection Supervisor,
WSDA, Olympia, WA

Marc Fuchs, Plant Virologist,
Cornell University, Geneva, NY

Mike Klaus, Entomologist,
WSDA, Yakima, WA

Jim Marra, Pest Program Manager
WSDA, Olympia, WA

Michelle Moyer, Viticulture Extension Specialist,
Washington State University, Prosser, WA

Wenping Qiu, Co-Director
Center for Grapevine Biotechnology,
Missouri State University, Mountain Grove, MO

Naidu Rayapati, Plant Virologist,
Washington State University, Prosser, WA

Susan T. Sim, Research Associate,
Foundation Plant Services,
UC-Davis, Davis, CA

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