

University of California, Davis

# The National Grapevine Importation Program at Foundation Plant Services



**FPS**  
**National Grapevine Importation**  
**& Clean Stock Facility**



This informational brochure was produced by Foundation Plant Services (FPS), a service department of the College of Agricultural and Environmental Sciences at the University of California, Davis.

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United States Department of Agriculture  
Animal and Plant Health Inspection Service  
4700 River Road, Unit 133, Riverdale, MD 20737  
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Anti-smuggling Hotline: 1-800-877-3835  
Web: [http://www.aphis.usda.gov/plant\\_health](http://www.aphis.usda.gov/plant_health)  
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# FPS NATIONAL GRAPEVINE IMPORTATION PROGRAM

## Introduction and History

The National Grapevine Importation Program is based at Foundation Plant Services (FPS) at the Davis campus of the University of California (UC). It is the largest nationally-recognized program for importing grape selections into the United States. It serves as both an importation and quarantine facility, with a state-of-the-art laboratory for disease detection and elimination as well as field plantings. The elements of this program are detailed in this brochure.

A cooperative effort by UC, the United States Department of Agriculture (USDA), the California Department of Food and Agriculture (CDFA) and the grape industry initiated the National Grapevine Importation Program. This self-supporting program enables grape growers, nurseries, researchers and wineries to bring valuable new selections into the United States without the threat of importing foreign exotic pests and diseases that could cause serious damage to the industry. From 1995 through 2006, over 640 new selections have been imported including new varieties, clones and rootstocks, plus germplasm intended for research.

There is a long history of grape importation work at UC Davis. Since 1948, strict federal quarantine laws have prohibited the introduction of foreign grape materials into the U.S. except via a rigorous USDA-sanctioned quarantine program to exclude damaging pests and diseases. Viticulture and enology researchers on campus realized that they needed access to foreign materials for their work. They approached the USDA, and were issued a special departmental permit for grapes that allowed the first grape quarantine facilities to be built at UC Davis in 1952. Thousands of grape varieties and clones have subsequently been collected from throughout the world and evaluated for diseases of quarantine concern and horticultural merit by UC and USDA researchers. Many of these introductions have been released to grape nurseries and growers to become the backbone of the U.S. wine, raisin and table grape industries.

Grape quarantine staff and facilities were first provided by the Viticulture and Enology (VEN) Department at UC Davis. Dr. Harold Olmo proposed the initial program to APHIS and held the import permit for the first few years. Dr. William Hewitt of the UC Davis Plant Pathology Department then took over responsibilities for the permit, importation and disease testing. He was

joined in this work in 1956 by Dr. Austin Goheen, a USDA Agricultural Research Service (ARS) scientist with an assignment to work on the improvement of grapevines through the control of grapevine virus diseases. The APHIS permit passed to Goheen in 1969 when Hewitt left Davis for a new position.

In July 1958, Foundation Plant Materials Service (FPMS) was created and given increasing responsibility for the importation work. The permit issued to Dr. Goheen in 1969 listed FPMS as the administrative unit where the work was to be conducted. His retirement in 1988 precipitated a grape quarantine crisis, as all of his facilities and staff were reallocated to other projects. No further USDA-ARS funds were available for grape quarantine work.

Reports of grapevine smuggling, emboldened by the lack of legal means to import grape materials into the U.S., became commonplace in the late 1980s. Many responsible industry members became concerned about the risk of dangerous foreign pathogens being introduced along with the smuggled materials. This concern, coupled with a growing demand for legitimate access to European wine grape clones, galvanized industry support for creating new grape importation facilities.

By 1989, FPMS was chosen as the home for a dedicated grape importation program. FPMS was already the source of foundation stock for the California Registration and Certification Program for Grapevines, which requires many of the same disease testing and elimination procedures as the federal importation program. Most species of grapevines thrive in the California Central Valley climate at UC Davis, and with proper care, grapevines readily survive the post-entry quarantine period so that vigorous propagation materials are available upon their release. Disease testing using grapevine indicator plants is more reliable when conducted in this climate than in many other parts of the country. In addition, technical advisors from the UC Davis Plant Pathology and Viticulture and Enology departments enable FPMS to implement the latest methods for grape variety identification, disease detection and elimination.

It was also clear that simply replacing the old USDA facilities would not be adequate to house a modern

world-class program. Many lab-based technologies for grape disease detection were emerging, including ELISA and PCR. The new program needed room for trained staff and facilities to utilize new testing methods as they became available for quarantine purposes.

Grape industry members nationwide supported the effort to develop a state-of-the-art facility for the U.S. They were successful in obtaining over \$3,000,000 in federal grant funds from USDA to help build the facilities needed at FPMS for national grape importation and clean stock work. The federal funds, in combination with a match of more than \$3,300,000 in cash and in-kind contributions from the California grape nursery industry and the University of California were used to build the FPMS National Grapevine Importation and Clean Stock Facility in phases over a five-year period (1990–95). A plan was developed to create operating funds for quarantine work by adapting the fee-for-service system used to successfully fund other FPMS programs. The first grape introductions were received and processed at the new facility in 1993.

In June 2003 the name Foundation Plant Materials Service was changed to Foundation Plant Services (FPS) to better reflect the increasing variety of services added to the program since its inception. FPS currently provides a broad range of plant-related services (i.e. importation, disease testing, virus elimination, DNA identification and shoot tip culture) in addition to the plant materials that have always been a part of the program.

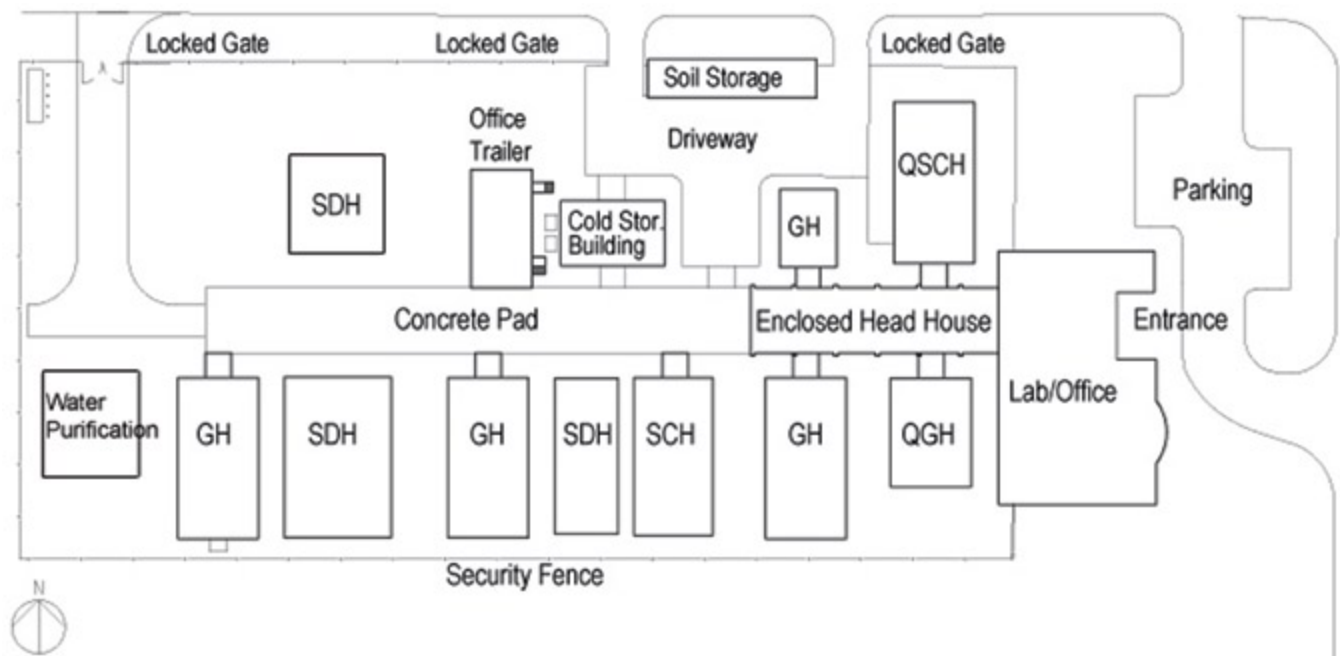
## Facility Design

The physical layout and phytosanitary features of the FPS National Grapevine Importation and Clean Stock Facility were developed after surveying the designs of existing grape quarantine facilities around the world. Specifications were incorporated that met or exceeded the standards set by these international programs.

The main building houses the administrative and laboratory functions. The laboratory section has a sophisticated plant pathology laboratory with two sterile culture growth rooms and eight plant growth chambers, plus equipment such as ultra freezers, centrifuges and a lab autoclave. The lab connects to three greenhouses and a screenhouse by a 25' X 100' headhouse that provides protection and containment when quarantine materials are moved between the greenhouses, lab, refrigerator, and growth chambers. A 73 ft<sup>3</sup> capacity soil autoclave, to treat quarantine materials before they are discarded, is located inside the headhouse.

FPS has five greenhouses—one 20' X 30', one 30' X 40' and three 30' X 60.' The greenhouses all feature sturdy metal framing, glass glazing, and locking double door entryways so that the outside doors can be closed before the inside doors are opened. The floors are solid concrete, with drains that empty into the campus waste system so that insects and rodents cannot move in and out of the houses through the floor or drain system. All

**THE FPS NATIONAL GRAPEVINE IMPORTATION AND CLEAN STOCK FACILITY** includes a main building (5000 ft<sup>2</sup> of office/laboratory), plus 2500 ft<sup>2</sup> headhouse, 1200 ft<sup>2</sup> quarantine greenhouse (QGH), 6000 ft<sup>2</sup> domestic greenhouse (GH), 1800 ft<sup>2</sup> quarantine screenhouse (QSCH), 1800 ft<sup>2</sup> domestic screenhouse (SCH), 7200 ft<sup>2</sup> shadehouse (SDH), 720 ft<sup>2</sup> soil storage and 1000 ft<sup>2</sup> cold storage space.

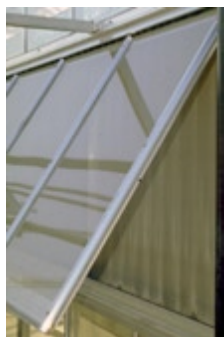


**DOMESTIC GREENHOUSE**

*with a double door entry and screens covering the exhaust fans and heater intake vents.*



vents to the outside are covered with 30 X 30 wires/inch mesh screen to prevent movement of insects that might carry disease. The greenhouses also have raised benches and separate water lines for domestic, fertilizer-injected, and purified water. Greenhouse temperatures are controlled and monitored by a central computer using information from temperature sensors in the greenhouses and from a weather station mounted on the roof of the headhouse.



Two 30' X 60' screenhouses contain plants while disease testing is in progress. The screenhouses have sturdy metal frames covered with 30 X 30 wires/inch mesh stainless steel screen and locking double door entryways. The screenhouses have raised benches; domestic, fertilizer-injected water and purified water lines; and solid concrete floors with drains that empty into the campus waste system.

Three 40' X 60' shadehouses are used to house domestic grape materials while tests are in progress. They have gravel floors and an open galvanized pipe frame with shade cloth stretched over the top.

Dormant propagation materials for several FPS clean stock programs are stored in a 1000-square-foot cold storage building before they are shipped to customers. The building has redundant refrigeration units that maintain a temperature of 35°F ± 1°F (4°C). A record of the temperature is data logged onto the greenhouse computer every 15 minutes. Soil and potting supplies for the greenhouse operations are stored in a 1000-square-foot soil storage building. Additional office space is provided by a 1000-square-foot temporary building, with plans to expand the main building and accommodate the staff under one roof.

Water is purified using two on-site reverse osmosis units and ion exchange tanks. The water produced has less than 0.06 PPM soluble solids. Some of the purified water is mixed with nutrients by a fertilizer injector system to make a fertilizer solution. High quality water and fertilizer are necessary to keep the vines alive and vigorous under greenhouse conditions for the 2+ years of quarantine containment.

Temperature alarms are installed in all of the greenhouses, growth chambers, refrigerators, and freezers in the facility to protect valuable plant and research materials. If the temperature moves out of a safe range in any of these areas, a signal is sent to UC Davis Facilities Services, and department staff is summoned immediately to correct the problem. These signals are monitored and addressed 24 hours a day 7 days a week by service personal. The intrusion alarm system for the buildings, greenhouses, and screenhouses is continuously monitored by the UC Davis Police Department. A six-foot-high cyclone fence enclosure surrounds the whole facility.



**TEMPERATURE, LIGHT AND HUMIDITY** are controlled in eight plant growth chambers.

## Importation Services

Grape importation services are provided to private industry and public researchers on a fee-for-service basis. Customers choose from several levels of service according to their goals and the reported health of the foreign source materials. Customers confident that the source material is healthy may choose to have the introduction tested without concurrent disease elimination treatment. If there are doubts about the health status of the source material, customers may choose to begin disease elimination treatment concurrently with the initial testing.

Although additional charges are assessed for disease elimination treatment and testing of treated materials, this is an important decision to make early on that can affect the release time for the selection. The treatment and testing processes each require one to two years. If the decision to treat is delayed two years until the disease tests have been completed, and the introduc-

tion is found to be diseased, the quarantine retention period will be extended by at least four years—two years of virus elimination treatment followed by two years of additional testing. Creating treated materials as backup upon receipt could reduce this period by half to approximately two years.

Customers are also asked to decide whether the plant material they import will be made public, or whether they wish to retain private control after quarantine release. Higher fees are charged for privately-controlled introductions.

### Procedure for importing grapevine selections

It is important to note that each grapevine introduction must be made from a single vine. Mass selections are not accepted, and customers are cautioned to be certain that the foreign source vine is true to variety and clone. It is also important to choose a vine with the highest possible sanitary status. Obtaining documented materi-

## GRAPE QUARANTINE TIMELINE

Year 1	Jan–March	Hardwood cuttings for new introductions are received by FPS.
	Feb–March	Mother plants are propagated for each new introduction.
	March–May	Field indicators are budded to start field indexing tests.
Year 2	March–May	Leaf samples are collected from mother plants and used to conduct herbaceous indexing tests.
	April–May	Leaf samples collected from mother plants are used to conduct ELISA and PCR tests for nematode-transmitted viruses.
	May	Leaves on the St. George indicator plants are inspected for fleck and fanleaf disease symptoms.
	Sept–Oct	Leaf samples are collected from mother plants and used to conduct ELISA and PCR tests for leafroll-associated viruses.
	Oct–Nov	Leaves on Cabernet Franc indicator plants are inspected for leafroll disease symptoms. Kober 5BB, St. George and LN33 indicator plants are dug, the bark peeled off, and the woody cylinders inspected for Kober stem grooving, Rupestris stem pitting, and corky bark disease symptoms.
Nov–Dec	All test data is entered into a computer database for evaluation.	
Year 3	Jan–Feb	All test data for each introduction is reviewed, and quarantine release is requested for qualified selections.
	April–July	Diseased introductions are destroyed or treated to eliminate disease.
	Feb–June	Introductions released from quarantine are propagated and plants are provided to the customers who contracted for the importation services.
Year 4	Jan–Dec	Plants produced using disease elimination treatments(s) are grown to produce sufficient hardwood cuttings for field disease indexing tests.
Years 5 to 7		Treated materials are tested to determine whether disease was successfully eliminated. Qualified materials are released from quarantine.

als from a well-established research station is one of the best ways to ensure the identity of the variety/clone and to obtain accurate information about its sanitary status. Inspecting potential source vines at fruiting stage for varietal correctness and disease symptoms is also recommended.

Customers are responsible for reaching an agreement with foreign suppliers of grape materials about their ownership in the U.S. Sometimes it is possible to obtain permission to propagate materials without restriction. Other suppliers require a commitment to pay royalties. Obtaining a written statement from the supplier regarding ownership of grape materials in the U.S. is recommended.

The first step is completing a Service Request Form for FPS custom treatment, testing and/or quarantine services. After a supplier has been identified, customers provide the name, address, and phone number to FPS so an import permit, import sticker and instructions can be sent to the supplier. Suppliers are asked to send 25–30 dormant hardwood cuttings cut from a single vine for each selection. Cuttings that are 18"–20" (40–50 cm) long with a diameter of 3/8"–1/4" (6–9 mm) are best. The materials from each vine are to be labeled separately as to the variety name, clone number, sanitary status, source vineyard, and source vine location. If these sizes and quantities are not available, suppliers are asked to send all available dormant cuttings of all sizes from a single vine for each selection. The cuttings should be slightly moist but not wet, enclosed in a plastic bag, and packed in a rigid box or tube.

Material is sent by international express courier to the USDA-APHIS Plant Germplasm and Quarantine Center in Beltsville, Maryland, where it is inspected and, if everything is in order, forwarded to Foundation Plant Services. Freight can be prepaid or collect according to the preferences of the customer. Any freight charges incurred by FPS are billed to the customer in addition to the other service charges. January through March is the best time to send cuttings; however, cuttings from the Southern hemisphere may be sent at other times. Always check with FPS for up-to-date requirements.

Customers are notified of the initial test results for foreign introductions about two years after receipt by FPS. After an introduction is released from quarantine, customers are supplied a minimum of 10 own-rooted potted vines of the selection. FPS can produce additional plants for the customer at standard FPS plant material prices. Quarantine release can occur as early as 2 years or as long as 10 years or more after importation. The timeline on Page 4 details the quarantine process.

## Quarantine Disease Testing

Quarantine laws benefit the grape industry by providing access to international grape materials and shielding the industry from harmful diseases and other pests and pathogens that are not present in the United States. Quarantine tests are designed to identify disease(s) or pathogen(s) of concern according to federal quarantine laws before a new grape introduction is released for propagation. Entry of most pests and diseases is stopped by importing only dormant wood that is dipped in a broad-spectrum fungicide and insecticide immediately upon arrival.

Pathogens of quarantine concern that might escape these treatments include viruses and some bacteria. Both can cause reduced vigor, decreased fruit yield and loss of fruit quality. In severe cases, vine death can result. Some viruses and bacterial pathogens can spread in the field to healthy vineyards. In nurseries, virus-infected stock has resulted in reduced bud take, reduced rooting capacity, and has caused higher mortality rates. The severity of a viral disease will depend on virus type, the rootstock and scion varieties, and the vineyard environment. Infection by multiple viruses increases the disease risk factor. If virus-infected planting stock is used, no subsequent cultivation practices or treatments will eliminate the virus short of replacing the vines.

It is preferred that propagation materials for quarantine processing be dormant hardwood cuttings sent to FPS in January through March. Sending other types of materials, or at other times of the year, usually extends the quarantine retention period. Upon receipt, cuttings are inspected by the County Agricultural Commissioners office. FPS staff then dips the cuttings into a solution of bactericide, fungicide and insecticide to kill any surface pathogens, and then immerses them in an 82°F water bath for 72 hours to eliminate phytoplasmas that may be present in the wood. Mother vines are propagated from these cuttings and kept in a quarantine greenhouse or screenhouse for the duration of quarantine testing.

Four different types of tests are used to check foreign grape introductions for disease. A list of all the tests used is shown on Page 6. Note that the USDA Animal and Plant Health Inspection Service (APHIS) requires only four of the tests used by FPS. More than one technique is used to check for many of the viruses and other diseases. This duplication makes it possible to reach more accurate conclusions about the health of an introduction than a single test can provide.

The time required to complete all the tests is determined by the longest test—the field index. Field indexing requires two years and must be started in the Spring. Testing of foreign introductions that arrive at another time of year is delayed until the following Spring, adding up to nine months to the total disease testing time.

### FPS Test Procedures for Detecting Viruses and Target Diseases in Foreign Grape Introductions

*\* tests required by the United States Department of Agriculture, Animal and Plant Health Inspection Service for foreign grape introductions*

#### FIELD INDEXING TESTS

Cabernet Franc leaf symptoms for grapevine leafroll disease \*

LN33 stem symptoms for corky bark disease \*

St. George leaf symptoms for grapevine fanleaf disease and other NEPO viruses, grapevine fleck disease and asteroid mosaic disease\*

St. George stem symptoms for grapevine rupestris stem pitting disease

Kober 5BB stem symptoms for Kober stem grooving disease

#### HERBACEOUS INDEXING TESTS

*Chenopodium quinoa* for detection of NEPO viruses and other mechanically-transmitted agents \*

*Chenopodium amaranticolor* for detection of NEPO viruses and other mechanically-transmitted agents

*Cucumis sativa* 'National Pickling' for detection of NEPO viruses and other mechanically-transmitted agents

*Nicotiana glauca* for detection of NEPO viruses and other mechanically-transmitted agents

#### ELISA TESTS TO DETECT:

Arabis mosaic virus

Grapevine fanleaf virus

Grapevine fleck virus

Grapevine leafroll-associated virus Type 1, 2, 3, 6, and 7

Tomato ringspot virus

#### PCR TESTS TO DETECT:

Arabis mosaic virus

Grapevine fanleaf virus

Grapevine fleck virus

Grapevine leafroll-associated virus Type 1, 2, 2RG, 3, 4, 5, 7, and 9

Grapevine virus A, B, D

Grapevine rupestris stem pitting-associated virus

Tomato ringspot virus

Phytoplasmas

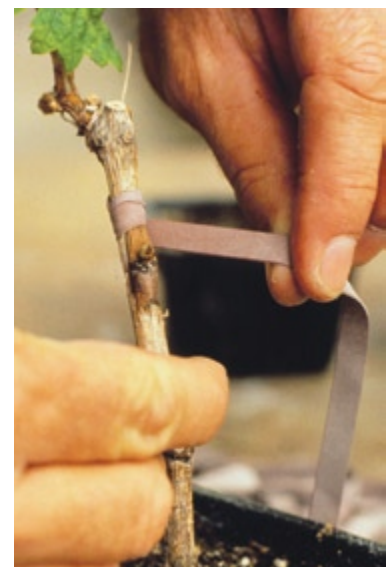
Pierce's Disease (*Xylella fastidiosa*)

### FIELD INDEXING

Field testing or “field indexing” is one of the oldest methods used to detect graft-transmissible viral disease. The method is based on visual symptoms that can be seen on specific grape varieties (indicator varieties) infected with virus disease. For instance, the variety Cabernet Franc is highly sensitive to grapevine leafroll disease. Infected vines have red curled leaves with green veins that are easy to distinguish from the leaves on healthy control vines. Another example is that the woody cylinder of the variety LN33 shows pitting and grooving symptoms when infected with corky bark. Field indexing is one of the definitive tests because it can detect many different known and unknown strains of virus. The main disadvantages of field indexing are 1) the two-year period required; 2) field indexing cannot be used to determine the specific types of virus present; and 3) good symptom expression in a field index is climate dependent.

Dormant buds from a candidate vine of unknown disease status are chip grafted into the trunks of several varieties of grape indicator plants growing in pots in a greenhouse.

If virus is present in the candidate bud, it is likely to be passed to the indicator plants through this graft. After the bud union heals, indicator plants are planted in a field indexing block. The candidate buds are carefully inspected in the field to determine if they are alive or dead, since disease transmission is lower if the buds die. Each variety of indicator plants is visually inspected several times a year



**CHIP GRAFTING** a bud from a candidate vine of unknown disease status onto a grape indicator plant for field indexing.

in the field at the optimum times for disease symptom expression. St. George indicators are inspected in the late spring for fleck and fanleaf symptoms. Cabernet Franc indicators are inspected in the fall for leafroll symptoms. The bark is peeled off of the trunk of Rupestris St. George, LN33, and Kober 5BB in the fall to check for the pitting and grooving symptoms of Rupestris stem pitting, corky bark, and Kober stem grooving, respectively.





**CABERNET FRANC** indicator plants in the FPS field index are examined in the fall of the second growing season for symptoms of grapevine leafroll disease. The red curled leaf at right is from a Cabernet Franc indicator plant displaying typical grapevine leafroll disease symptoms.



**ST. GEORGE, LN33 AND KOBER 5BB INDICATOR PLANTS** are dug up from the field index in the fall of the second growing season. The trunk of each plant is peeled to enable FPS staff pathologists to examine them for disease symptoms.

**CORKY BARK DISEASE SYMPTOMS** can vary from mild pittings to severe pittings and groovings on the indicator variety LN33 (shown below). It may develop split bark, trunk pitting and/or necrosis.



## HERBACEOUS INDEXING

Herbaceous indexing is used to detect mechanically-transmitted viruses in grapevines. Leaves from a candidate vine of unknown disease status are ground up in a buffer solution. Greenhouse-grown herbaceous indicator plants are inoculated by rubbing this preparation onto their leaves after dusting them with an abrasive powder. Mechanically-transmitted viruses enter the leaves through the resulting abrasions, multiply, and produce visual symptoms of infection after about 1-3 weeks. The advantages of this test are its sensitivity and ability to detect a broad range of viruses. The disadvantages include the length of time to conduct the test, the very specific greenhouse conditions necessary for an accurate test (usually more reliable in the spring), and the inability to distinguish specific viruses from one another.



**INOCULATION** of a tobacco indicator plant in an herbaceous index.



**VIRUS SYMPTOMS** are distinct on the tobacco herbaceous indicator (left) compared to the healthy plant being held.

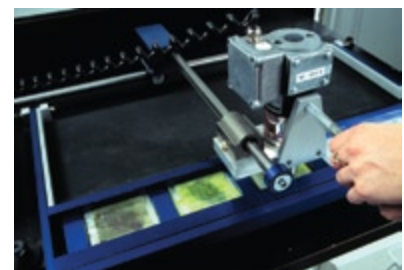
**CHLOROTIC LESIONS** on the herbaceous indicator *Chenopodium quinoa* are symptoms of grapevine fanleaf virus.



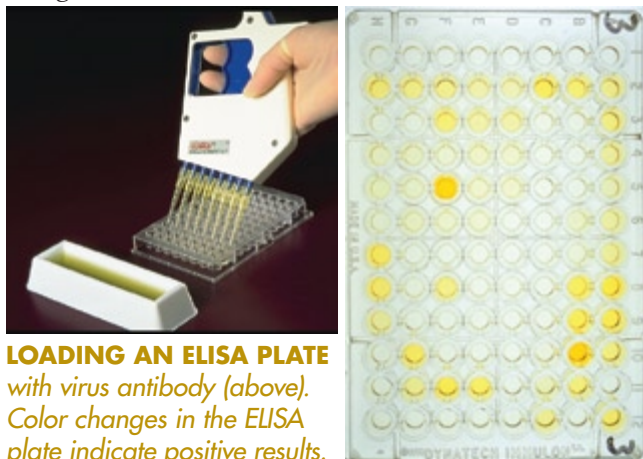
## ELISA

Enzyme-linked Immunosorbent Assay (ELISA) is a fast, inexpensive, and sensitive technique for detecting viruses based on specific recognition of viral antigens by antibodies. Antiserum is made from the blood of an animal injected with purified virus. Leaf or cambium tissue from a candidate vine is ground in buffer solution and incubated with antiserum to specific viruses in a plastic microtiter plate.

**GRINDING** grape tissue samples in a buffer solution for ELISA and PCR tests.



It only takes two days to complete an ELISA test, but samples must be collected during specific seasons to obtain accurate results. Another limitation is that, in contrast to the field and herbaceous indicators that can detect multiple viruses at a time, ELISA only detects specific viruses for which antisera have been prepared. FPS currently tests for 9 different viruses in grapevines using ELISA.



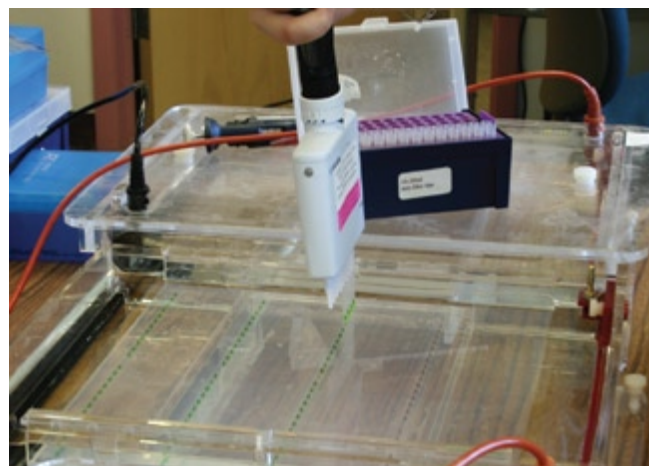
**LOADING AN ELISA PLATE** with virus antibody (above). Color changes in the ELISA plate indicate positive results.

### PCR

The most sensitive method currently used at FPS for pathogen detection is Polymerase Chain Reaction (PCR). PCR refers to the process of selective amplification of a small part of genetic code of a particular organism. PCR can be used for the detection of viral pathogens in grape because each virus has its own unique genetic code. In

the past decade, molecular scientists have been identifying the genetic code of various plant viruses. Once the genetic code of a virus is known, PCR detection of that virus in plant tissue is possible.

PCR tests can be completed in a lab in less than a day. Some viruses are more successfully detected only at certain times of the year. As with ELISA, PCR only detects specific viruses at a time, although it is more sensitive than ELISA. FPS currently uses PCR to test for 18 different viruses and other pathogens of grapevines.



**PCR PRODUCT FROM** grape samples is loaded onto an agarose gel. Electric current is used to move the PCR products across the gel, where they separate according to size. This creates banding patterns in the gel that can be used to identify grape pathogens.



**THE LAB AT FPS** is well-equipped to process and test a large number of samples.

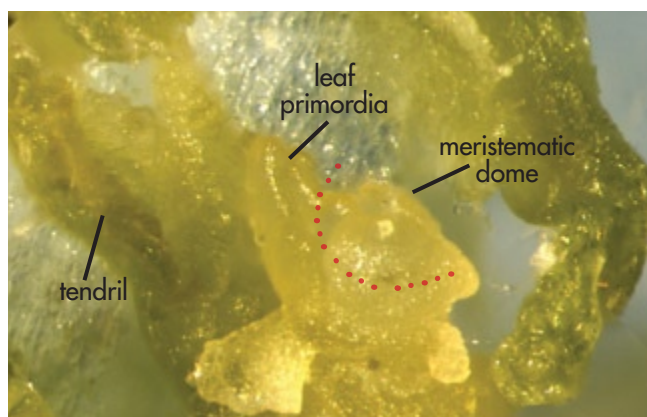
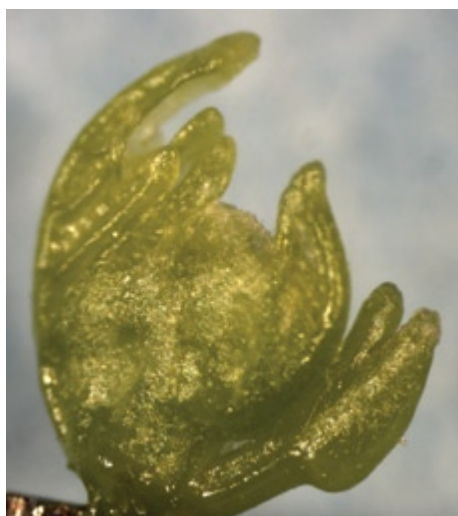
## Disease Elimination Treatment

If disease is detected in a foreign introduction, the customer can choose to contract with FPS to undertake disease elimination treatment or have the material destroyed. The preferred disease elimination method used at FPS is microshoot tip culture, which is very effective for eliminating most viral, bacterial and fungal contaminants. This technique involves regenerating a grape plant from a meristem tip less than 0.5 mm long in sterile tissue culture. When plants in sterile culture grow shoots and roots, which requires 4-12 months or more, they are transferred to sterile soil-less media and slowly adjusted to ambient humidity in a plant growth chamber over a 3-week period. Later, the plants are moved to a greenhouse and then finally to a screenhouse. In the screenhouse, plants are grown for one to two years until enough woody buds are available for the field index. Testing is repeated to determine whether the disease was successfully eliminated.



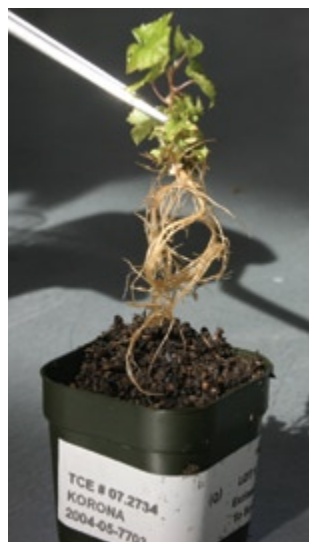
**MERISTEM TIPS ARE EXCISED ASEPTICALLY** using a dissection scope in a laminar airflow hood.

**GRAPE SHOOT TIP,** approximately 8.0 mm, before outer leaves were removed.



**GRAPE MERISTEM TIP** as seen through a dissection scope after leaves were removed. The red line indicates where it will be cut to place onto growth medium.

**READY TO BE TRANSFERRED TO POTS,** these grape plants have developed strong shoots and roots over the course of 6 to 12 months. Plants are removed from the test tube, the medium rinsed off the roots, and then potted into soilless media (right). Pots are put into clear plastic boxes (far right) to provide high humidity and reduce transplant stress.



## California Registration and Certification Program for Grapevines

Grape introductions that qualify for release from quarantine also qualify to be planted in the FPS Foundation vineyard for the California Registration and Certification (R&C) Program for Grapevines. Once Foundation vineyard plants have been professionally identified, they become registered mother vines for the California R&C Program. All propagation materials from registered mother vines have California Foundation stock status and can be increased by nursery participants in the R&C Program to produce California Certified Grape stock.



## Quarantine Enforcement

The direct importation of all foreign grape propagation materials without a permit has been strictly prohibited by Federal quarantine law since 1948. This law is enforced by USDA, Animal and Plant Health Inspection Service (APHIS) in cooperation with the Department of Homeland Security - Customs and Border Protection (CBP). APHIS seeks to prevent unlawful entry and distribution of prohibited products that may harbor harmful exotic plant and animal pests, diseases, or invasive species. CBP Agricultural quarantine inspectors are stationed at international airports, seaports, and border stations to inspect passengers and baggage for plant and animal products that could be harboring pests or disease organisms. These inspectors check millions of passengers and their baggage each year for plant or animal pests and diseases that might harm U.S. agriculture. They also inspect ship cargoes, rail and truck freight, and mail from foreign countries.

A federal Plant Protection Act, effective June 2000, increased civil penalties for violating the federal quarantine laws to as much as \$50,000 for the first offense, up to \$250,000 per violation for subsequent incidents, and a maximum of \$500,000 for all violations adjudicated in a single proceeding. There are also criminal penalties for knowingly violating the quarantine laws or for knowingly forging, counterfeiting, altering, defacing or destroying any certificate, permit or other quarantine documents. The criminal penalties include fines and/or up to a year in jail. For more information please visit [http://www.aphis.usda.gov/lpa/pubs/fsheet\\_faq\\_notice/fs\\_phcivilp.pdf](http://www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fs_phcivilp.pdf).

Civil penalties are enforced by APHIS Investigative and Enforcements Services (IES) <http://www.aphis.usda.gov/ies/index.shtml>. For current information on civil penalties and enforcement please contact your nearest IES at 301-734-4328 (Maryland) or 919-716-5626 (North Carolina) or 970-494-7487 (Colorado).

APHIS also conducts a Smuggling Interdiction and Trade Compliance (SITC) Program in cooperation with State departments of agriculture and other Federal agencies such as the U.S. Customs and Border Protection, U.S. Fish and Wildlife Service, U.S. Food and Drug Administration, and USDA Food Safety and Inspection Service. For more information visit [http://www.aphis.usda.gov/international\\_safeguarding/sitc/index.shtml](http://www.aphis.usda.gov/international_safeguarding/sitc/index.shtml).

To report smuggling, call the anti-smuggling hotline: 1-800-877-3835 or online at <http://www.aphis.usda.gov> and click 'report Agricultural smuggling.'

For help on regulations and prohibitions on nursery stock with respect to grapevines, visit [http://www.aphis.usda.gov/import\\_export/plants/manuals/online\\_manuals.shtml](http://www.aphis.usda.gov/import_export/plants/manuals/online_manuals.shtml) and click 'Nursery stock restrictions.'