

**Victor's Lavender Farm**  
**Phytophthora Disease Control and Management**  
**Information for the Lavender Industry**

*Phytophthora* (Fy-TOFF-thor-uh) root rot is the number-one disease of nursery crops in the U.S. and Canada, and is found in the soil and in plants throughout the world. It has been identified as a problem with lavender farms that have particular water and soil problems. *Phytophthora* organisms are often referred to as water molds because they do need water to complete their life cycle.

We have gathered scientific research on the disease so everyone can understand the disease and the research that is being conducted at university agriculture programs. As one of the top lavender growers in the country we are concerned about this issue but also very knowledgeable in the disease and how to manage it. We are consulting with Washington State University plant pathologist, Gary Chastagner, Ph.D and other national experts. We have additional information so you can directly review what plant pathologists are saying about *Phytophthora*.

To put the particular issue of *Phytophthora* (*root rot*) in perspective, you will find the disease nearly everywhere in the soil throughout North America and throughout the world. Plant pathologists call this a “cosmopolitan” pathogen. The issue is how it infects plants, how to keep it from infecting plants, and managing the disease when it occurs.

We do random tests on our plants to look for the presence of *Phytophthora* as part of our “Best Practices” in greenhouse and nursery management. However, it is important to understand that random tests do not guarantee that all of the plants are disease free. Since *Phytophthora* exists everywhere it is impossible for any nursery to guarantee a disease free plant (of any type of disease). In fact, you will not find a nursery that provides a guarantee of perfection because it is impossible. Whenever you order plants of any kind, there are some that do not meet the customers standards or deteriorate in the process of delivery. That is why all quality nurseries provide for refund or replacement of any plants that are damaged in shipping or are unacceptable to the customer.

The most important thing to understand is the “disease triangle.” A **susceptible host**, a **virulent pathogen**, and a **conducive environment** are all required for disease to occur. *Phytophthora* is likely to be present in your soil and it may also come in from nurseries, so if you are growing susceptible plants, your best option for managing disease is manipulating the environment to be unfavorable to disease. *Phytophthora* species generally require free flowing water to infect plants. These organisms are not active until the soil is at or above field capacity. The zoospores have a very long life span; they can lay dormant in the soil for many years and when the conditions are right (high soil moisture) they “come alive” and spread, infecting roots and causing infected plants to die. It might take up to 3 years for an infected plant to die as the disease may kill only sections of the plant in the first year or two.

Plants that show disease cannot be saved and the basic protocol with diseased plants is to remove those plants and the immediate surrounding plants. If there are water related problems, especially if water is flowing, this problem must be resolved or the problem will continue to take more plants. Diseased plants should be tested as there are a wide variety of possible diseases, although the remedies are basically the same. Do not plant lavender in the same area, as the disease will reappear. Cold weather generally will kill the pathogen (as will heat, but there are a number of unresolved issues here). Since moisture is the major problem, farms in the southeast or other areas with an excessive moist climate and warm winters are most susceptible, but again, it can be found anywhere.

Farmers need to do the research on their land, understand the different types of soils, the slope of the land, drainage, and other issues before lavender is planted. This is the best way to keep the disease away from the farm.

More research needs to be done with lavender plants and several initiatives are underway, but hopefully we have provided the basic information that you need to understand *Phytophthora*.

# Selections from the Phytophthora Literature

Compiled by Victor's Lavender Farm

The following excerpts from the literature compiled by the staff of Victor's Lavender provides some quick snapshots of information that may help farmers and growers understand and manage Phytophthora diseases. Please spend some time on the source material to get a full picture of this disease which affects many types of agricultural plants throughout North America.

The overriding issue is best stated by the University of Massachusetts in its Greenhouse Crops & Floriculture Program. "Sources of Root Disease Fungi & Fungus-like Organisms"

"Fungi that attack root systems are natural inhabitants of the soil and thus, have the ability to survive there indefinitely"

Phytophthora (Fy-TOFF-thor-uh) species make up a group of microorganisms that are important plant pathogens. The name *Phytophthora* derives from Greek and literally means "plant destroyer." *Phytophthora* species resemble fungi but are not. While they are most closely related to aquatic organisms, such as brown algae and diatoms, they can also exist on land. However, *Phytophthora* organisms are often referred to as water molds because they do need water to complete their life cycle. Certain species of *Phytophthora* cause important diseases in vegetable crops, fruit and nut trees, and forest trees as well as in nursery crops. *Phytophthora* disease is the number-one disease of nursery crops nationwide.

<https://pace.oregonstate.edu/catalog/phytophthora-training-nursery-growers>

## Root Diseases of Greenhouse Crops, University of Massachusetts Center for Agriculture, Food, & the Environment

*Phytophthora*, a related organism, is generally more pathogenic than *Pythium* but is encountered less frequently. The pathogen causes root and crown rot as well as foliar blighting. *Phytophthora* like *Pythium* is favored by excess moisture and excess nitrogen fertility. Unlike *Pythium*, species of *Phytophthora* are more aggressive, more likely to be host specific, and less frequently found in greenhouses. The most likely source of origin is plant material. *Phytophthora* species are soil-borne where they can survive many years in the soil. Optimum conditions for disease development are saturated soil and high nitrogen fertility. The pathogen is not likely to be seed-borne in commercial seed, and it does not travel easily through the air for long distances. It is possible that contaminated irrigation water can introduce the fungus to new sites. Prevention is the key to managing *Phytophthora* because the pathogen is difficult to suppress with fungicides once it develops.

<https://aq.umass.edu/fact-sheets/root-diseases-of-greenhouse-crops>

## Pacific NW Plant Disease Handbook

Regulating water is an important way to control Phytophthora diseases. This includes both the amount and duration of water coming to the plants and the way water is conducted away from plants. Phytophthora species generally require free water for a long duration to infect plants. These organisms are not active until the soil is at or above field capacity. In other words, when water does not move down through the soil with the force of gravity.

<http://pnwhandbooks.org/plantdisease/pathogen-articles/pathogens-common-many-plants/oomyctes/diagnosis-and-control-phytophthora-diseas-1>

## Phytophthora isolated from lavender plants from 11 states in 2015

A study by Margaret Williamson, Suzette R. Sharper, and Steven N. Jeffers, Dept of Plant Industry, Clemson University conclusions:

- *Phytophthora nicotianae* is a cosmopolitan pathogen with a wide host range-including English lavender.
- *Phytophthora* root and crown rots (PRCRs) were a problem on field grown lavender plants in 2015 all across the country.
- Some of those infections may have come from the nursery
- *P. Nicotianae* was the most frequently isolated species

[http://www.clemson.edu/public/regulatory/plant\\_industry/](http://www.clemson.edu/public/regulatory/plant_industry/)

### **Dr Jennifer Park, Plant Pathologist, Oregon State University.**

Remember the disease triangle? A **susceptible host**, a **virulent pathogen**, and a **conducive environment** are all required for disease to occur. *Phytophthora* is likely to be present in your soil, so if you are growing susceptible plants, your best option for managing disease is manipulating the environment to be unfavorable to disease. *Phytophthora* spp. release swimming spores in water and waterlogged soil. To prevent disease, do whatever you can to prevent standing water.

<http://www.oregon.gov/ODA/shared/Documents/Publications/NurseryChristmasTree/ManagingPhytophthora.pdf>

### **A recent meeting in Sequim, Washington regarding Phytophthora**

On April 11, 2016 there was a meeting of five lavender farms, county extension (current and retired), Washington Dept of Agriculture (WDA) and Washington State University (WSU) held at B&B Lavender in Sequim, WA. WDA and WSU presented general information on Phytophthora, including its life cycle, occurrence, detection, management options, ongoing research and available assistance for lavender farms and nurseries. This was followed by a question & answer discussion. The featured speaker was Dr. Gary A. Chastagner, Ph.D., Plant Pathologist & Extension Specialist from Washington State University.

Summary of key issues discussed at the meeting (thanks to Bruce McCloskey for the notes, with additional comments from Victor Gonzalez)

- Phytophthora is wide spread in the US, with over 100 different species of the disease identified.
- It most likely exists in more locations than we know of; if we look for it, we often find it.
- The zoospores have a very long life span; they can lay dormant in the soil for many years and when the conditions are right (high soil moisture) they “come alive” and spread, infecting roots and causing infected plants to die. It might take up to 3 years for an infected plant to die as the disease may kill only sections of the plant in the first year or two.
- Most likely “wet farms” are more susceptible than “dry” farms.
- The zoospores can swim through the moisture in wet soil, and are not so mobile in dry soil.
- Greenhouses and nurseries can manage their operations to minimize risk of Phytophthora by following best practices regarding watering; sanitizing tools, pots, floors, tables, etc.; taking leaf or stem cuttings;
- There is a commercial test kit available to purchase for us to test for Phytophthora ourselves. It is only a positive or negative test. To determine the specific species of Phytophthora (if a test result is positive), the WSU Plant Pest Diagnostic Clinic needs to do a culture from the plant.
- WSU will also do the positive or negative test for \$40. See this site for more information: <http://plantpath.wsu.edu/diagnostics/> (Many agricultural universities will do these tests)
- The most important factor in defending against Phytophthora is managing soil moisture; standing water encourages it to spread; saturated soil is also a problem.
- Different species of Phytophthora have different temperature tolerances. Heat and cold can kill the disease. Heat as a method can be difficult, but cold temperatures can kill the disease.
- There is not really any treatment for an infected plant.

## **Articles and References Related to Phytophthora**

**Compiled by the Victor Gonzalez and the staff of Victor's Lavender Farm**

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**The following are resources we have reviewed for more detailed research to assist lavender growers and farmers with the problem of Phytophthora:**

**One of the best resources we have found:**

**Pacific Northwest Plant Disease Handbook**

<http://pnwhandbooks.org/plantdisease/pathogen-articles/pathogens-common-many-plants/oomyces/diagnosis-and-control-phytophthora-diseases-1>

**A free online course from Oregon State University – Easy to access, great information:**

<https://pace.oregonstate.edu/catalog/phytophthora-training-nursery-growers>

**Root Diseases of Greenhouse Crops, University of Massachusetts Center for Agriculture, Food, & the Environment**

<https://aq.umass.edu/fact-sheets/root-diseases-of-greenhouse-crops>

**[Be on the Lookout for Phytophthora on Lavender](#)**

**Ontario Canada Specialty Crops**

**[Sean Westerveld](#)**

<https://onspecialtycrops.wordpress.com/2015/08/28/be-on-the-lookout-for-phytophthora-on-lavender/>

**Managing Phytophthora, Dr Jennifer Park, Plant Pathologist, Oregon State University.**

<http://www.oregon.gov/ODA/shared/Documents/Publications/NurseryChristmasTree/ManagingPhytophthora.pdf>

**Safe Procurement and Production Manual - A Systems Approach for the Production of Healthy Nursery Stock**

**By John A. Griesbach, Jennifer L. Parke, Gary A. Chastagner,**

**Niklaus J. Grünwald and John Aguirre, Oregon Association of Nurseries**

<http://c.ymcdn.com/sites/www.oan.org/resource/resmgr/imported/pdf/SafeProduction.pdf>

**Lavender: History, Taxonomy, and Production**

[http://www.ces.ncsu.edu/fletcher/programs/herbs/crops/culinary/lavender\\_mccoy.html](http://www.ces.ncsu.edu/fletcher/programs/herbs/crops/culinary/lavender_mccoy.html)

**Phytophthora root rot of lavender identified in Ontario**

<http://www.omafr.gov.on.ca/english/crops/hort/news/hortmatt/>

**United States Lavender Growers Association**

**Member Section – [www.uslavender.org/](http://www.uslavender.org/)**

The USLGA members section includes additional references and a PowerPpoint presentation and Webinar from Dr. Stecven Jeffers, Clemson University

<http://uslavender.org/>

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