

# Getting the Most out of the Plant Diagnostic Clinic

Professional Development Training  
March 17, 2011

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New Mexico State University



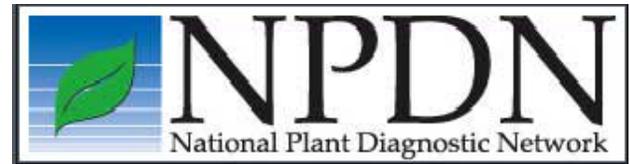
# NMSU Plant Diagnostic Clinic

- <http://plantclinic.nmsu.edu>
- Link to NMSU Distance Diagnostic System
  - On-line submission system for diagnostics
- Submission Forms
- Information on how to submit samples (do's and don'ts)
- Publications
- PowerPoint Presentations
- Links to useful websites
- Other resources



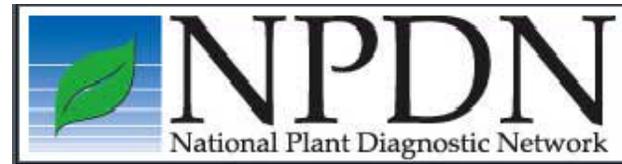
# NMSU Plant Diagnostic Clinic

- Support lab for the National Plant Diagnostic Network
- Participate in National Plant Disease Surveys



# NMSU Plant Diagnostic Clinic

- Support lab for the National Plant Diagnostic Network
- Participate in National
- \* Services provided free of charge when samples are submitted through the county extension offices



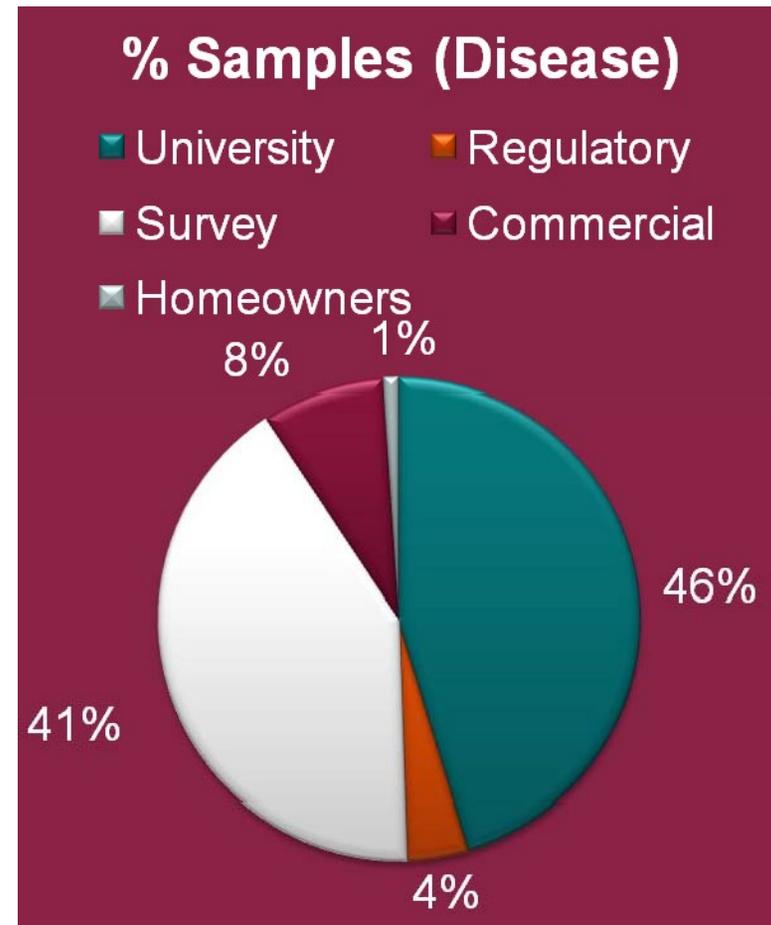
# NMSU – Plant Diagnostic Clinic

	1993	1999	2004	2010
Funding	University (Salary)	University & USDA	University & NPDN	Univ., NPDN & grants
Personnel	Director	Director Students	Director Clinician ADS*	Director Clinician ADS*
Lab Space	No	Yes	Yes	Yes
Integrated Lab	No	No	Yes	Yes
Total Samples	350	1,300	6,300	9,000 (2,450 Disease)

\*Additional Diagnostic Specialists – Entomology and Weed/Plant ID

# Plant Clinic Clientele

- University:
  - County Agents
  - Researchers
  - Extension Specialists
- Regulatory Agency:
  - USDA
  - NMDA
- National Surveys
- Commercial:
  - Crop Producers
  - Crop Consultants
  - Landscape Professionals (Ornamental and Turf )
- Homeowners



# How many of you have submitted a sample to the diagnostic clinic and received one of these responses?

1. The sample submitted is insufficient for diagnosis
2. No plant pathogenic microorganisms were found associated with the sample submitted

# How many of you have submitted a sample to the diagnostic clinic and received one of these responses?

1. The sample submitted is insufficient for diagnosis\*
2. No plant pathogenic microorganisms were found associated with the sample submitted\*\*

\*Unsatisfactory response

\*\*Often means, sample insufficient

# Training Goals

- Improve sample submissions to reduce unsatisfactory responses
  - Emphasize the key ingredients needed for an accurate diagnosis
- Increase knowledge and use of the online submission system (NMSU DDS)



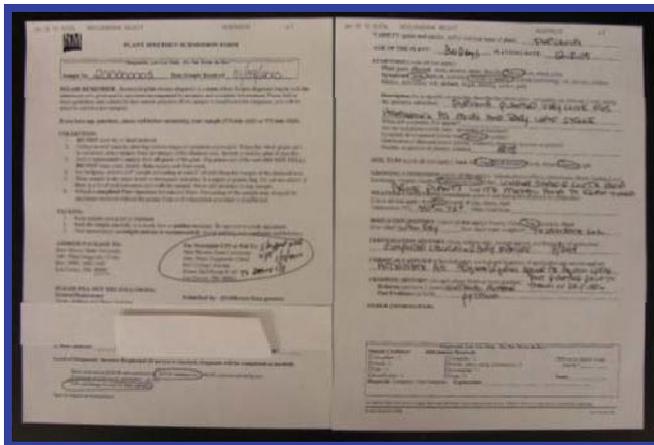
# Diagnosing Plant Disorders

- The process of determining the cause of an abnormality
- Diagnosis is a *team* effort
  - Grower
  - Submitting agent
  - Diagnostic clinic
- Conclusions are derived from critical evaluation of
- Requires a blend of good observational skills, science, and experience

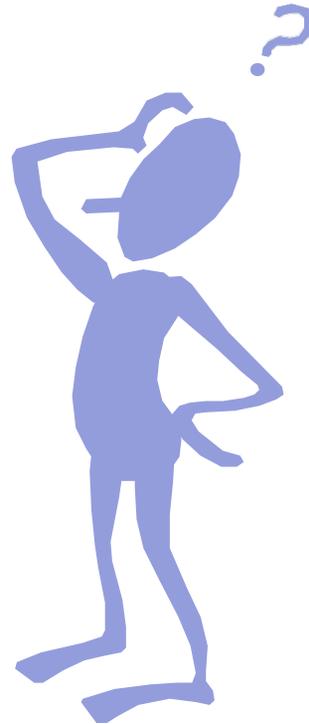


# The Diagnostic Process

- An accurate diagnosis depends on:
  - Early detection of plant problem – routine examination of the plant.
  - Accurate sample information
  - Examination of good quality specimens and/or photos



# Why is early detection important for an accurate diagnosis?



Early diagnosis is important  
because....

Dead plants tell no tales  
and

Plant diagnosticians are not plant coroners!

# Organisms Associated with Plants

- **Saprophytes** – a non-pathogenic microorganism residing on the plant and feeding on decaying organic matter
- **Primary organism** – the organism (pathogen) that is directly responsible for the disease
- **Secondary organisms** – organisms that are taking advantage of weakened plant tissue
  - Weak pathogens or saprophytes
- ***The longer you wait to conduct laboratory tests, the harder it gets to find the pathogen***

Why is accurate and complete information important for an accurate diagnosis?

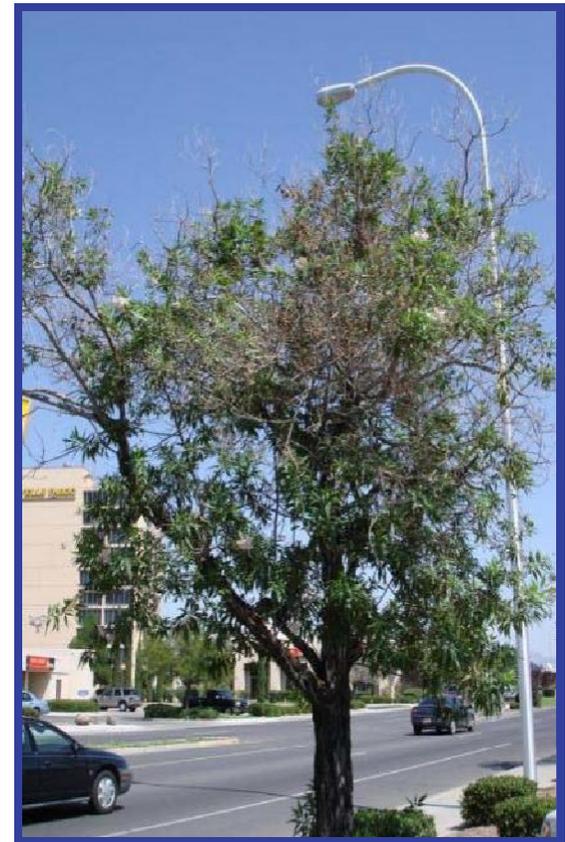


# Accurate and complete information is important because....

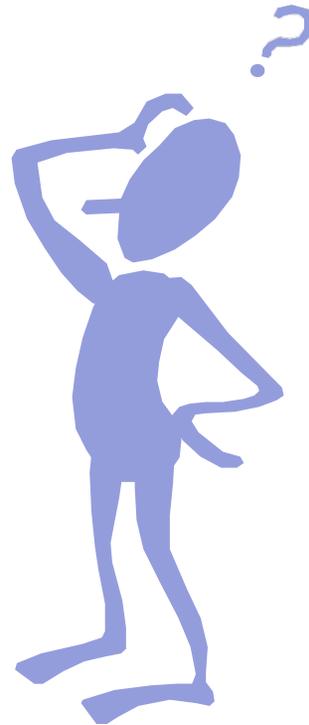
- The only information provided by the sample are the symptoms that are evident on that sample
  - Samples are usually a small piece of the plant
  - Samples show symptoms at only a moment in time (no information on symptom progression or spread)
  - Samples provide no information on how much of the plant or how many plants are affected
  - Samples don't tell when the problem began

# Symptoms are important...

- Visual evidence that there is a problem with the plant
- Starting point for investigating the cause of the problem
- Help us understand what plant processes are affected
- But, symptoms alone are not sufficient for diagnosis



# Why aren't symptoms sufficient for diagnosis?



# Symptoms

- Often develop away from the site of infection or pathogen activity
- Change over time
- Vary with severity (virulence) of the pathogen
- Vary due to age of plant at time of infection
- Vary due to environmental conditions during and after infection



# Why aren't symptoms sufficient for diagnosis?

- **Symptoms are not specific to the causal agent!**



# Symptoms Develop Because....

- The pathogen interferes with the host plants cellular functions

and/or

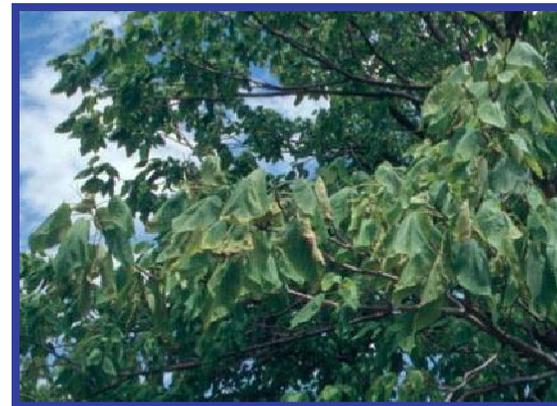
- The pathogen produces enzymes, toxins, or growth regulators which cause adverse conditions in the host plant

# Plant Processes Affected by Pathogens

- Disruption of growth (impaired cell development, impaired hormone production)
- Disruption of absorption or transport of water, minerals, and carbohydrates (impaired roots or vascular tissue)
- Disruption in reproduction (impaired flowering or seed development)
- Disruption in storage (loss of stored carbohydrates)
- Disruption of secondary metabolism (impaired pigment development)

# Disruption in Absorption and Transport

- Impaired absorption of water and minerals - (root dysfunction)
- Impaired transport of water and minerals - (xylem)
- Impaired translocation of carbohydrates - (phloem)



# Disruption in Absorption or Transport

- Types of Symptoms
  - Wilting
  - Yellowing or other nutrient deficiency symptoms
  - Necrosis
  - Loss of vigor (progressive)
  - Defoliation (over time)
- Potential Causal Agents
  - Infectious diseases
  - Soil insects and animals
  - Moisture stress (too much and not enough)
  - Nutrient deficiency
  - Chemical or salt injury
  - Mechanical injury
  - Soil problems
  - Temperature extremes (high and low)



# Bottom line...

- Symptoms are complex
  - Symptoms are non-specific to causal agents
  - Symptoms develop based on whatever plant process(es) are affected
  - Pathogens (and abiotic disorders) often affect more than one plant process at a time leading to complex symptomology
  - Plants may be affected by more than one causal agent (abiotic and biotic) at a time - adds to complex symptomology



# Critical Information Needs

- When the problem began
- Specific description of symptoms (including symptom development)
  - Keep in mind what we won't see on the samples
- Indication of whether or not the symptoms are spreading (on plant or to other plants)
- Indication of distribution or pattern (field situations)
- Cultural practices (particularly irrigation)
- Environmental conditions (prior to and during symptom development)
- Chemical use history (including fertilizer)

# Accurate and Complete Information

- Helps to:
  - Determine if the plant is suffering from an infectious disease or an abiotic disorder
  - Develop a list of potential causal agents
    - Helps to narrow down the diagnostic tests that will be needed (saves time and money)

# Plant Specimen Submission Form

- Found online (<http://plantclinic.nmsu.edu>)
- Print and keep blank forms in the office
- Helps to remind you of the information needed
- Use to help you fill in the information for online submission

VARIETY (genus and species, and/or common name of plant) \_\_\_\_\_

AGE OF THE PLANT: \_\_\_\_\_ PLANTING DATE: \_\_\_\_\_

**SYMPTOMS (circle all that apply):**  
Plant parts affected: roots, crowns, stems, branches, leaves, fruit, whole plant.  
Symptoms: spots, tipburn, distortion, mosaic or mottle, chlorosis (yellowing), rot, necrosis, mildew, blister, defoliation, wilt, dieback, blight, stunting, canker, galls

Description (be as specific as possible, describe the whole plant - remember the clinician is only seeing the specimen submitted). \_\_\_\_\_

When did symptoms first appear? \_\_\_\_\_  
Are the symptoms (circle one): spreading or localized? \_\_\_\_\_  
Symptom development (circle one): gradual or sudden? \_\_\_\_\_  
Distribution of diseased plants (circle): scattered, clustered, in a row or pattern? \_\_\_\_\_  
Number or percent of plant(s) infected: \_\_\_\_\_

**SOIL TYPE (circle all that apply):** Sand, Silt, Clay, Well drained, Poorly drained, Heavy, Light.

**GROWING CONDITIONS (circle all that apply):** Indoors (home/office), Greenhouse, Home Garden, Lawn, Landscape, Organic Garden, Commercial Field, Other \_\_\_\_\_

**WEATHER CONDITIONS (immediately prior to and during development of symptoms):**  
(Circle all that apply) Wet, Dry, Humid, Windy, Dury, Hail  
Temperature (°F) \_\_\_\_\_ Other Conditions \_\_\_\_\_

**IRRIGATION HISTORY: (circle all that apply):** Furrow, Flood, Drip, Sprinkler, Hand  
How often? \_\_\_\_\_ How much water is applied? \_\_\_\_\_

**FERTILIZATION HISTORY: (type, nutrient ratio, amount applied, and frequency of application)** \_\_\_\_\_

**CHEMICALS APPLIED (Chemical name, method and frequency of application and amount applied)** \_\_\_\_\_

**CROPPING HISTORY (for agricultural fields or home gardens):**  
Rotation (previous 3 years) \_\_\_\_\_  
Past Problems (in field) \_\_\_\_\_

**OTHER INFORMATION:** \_\_\_\_\_

\*\*\*\*\*Diagnostic Lab Use Only - Do Not Write In Box\*\*\*\*\*

<b>Sample Condition:</b> <input type="checkbox"/> Excellent / 1 <input type="checkbox"/> Good / 2 <input type="checkbox"/> Fair / 3 <input type="checkbox"/> Insufficient / 4 Diagnosis: Complete / Not Complete	<b>Information Received:</b> <input type="checkbox"/> Complete / 1 <input type="checkbox"/> Partial, some useful information / 2 <input type="checkbox"/> Incomplete / 3 <input type="checkbox"/> None / 4 Explanation: _____	<input type="checkbox"/> Photo or digital image Quality? _____ Total: _____
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Revised December 2005. Las Cruces, NM

Why are good quality samples important for an accurate diagnosis?



# Good Quality Samples

- Are in the early to middle stages of disease
  - Dead plant tell no tales
- Are fresh and in good condition
  - Send or deliver to the Plant Diagnostic Clinic as quickly as possible after collection
- Are representative of the problem – range of symptoms and a range of severity
- Contain the margin of disease

# Good Quality Samples

- Are in the early to middle stages of disease
    - Dead plant tell no tales
  - Are fresh and in good condition
    - Send or deliver to the Plant Diagnostic Clinic as quickly as possible after collection
  - Are representative of the problem – range of symptoms and a range of severity
  - Contain the margin of disease
- \* If we get samples that meet these criteria, we will make an accurate diagnosis!

# Sample Collection

- Representative samples
  - Select material that shows the symptoms you are concerned about
  - Include all symptomatic plant parts – this may include roots if necessary
- \* Remember, symptoms may occur away from the site of infection (inspect the whole plant)



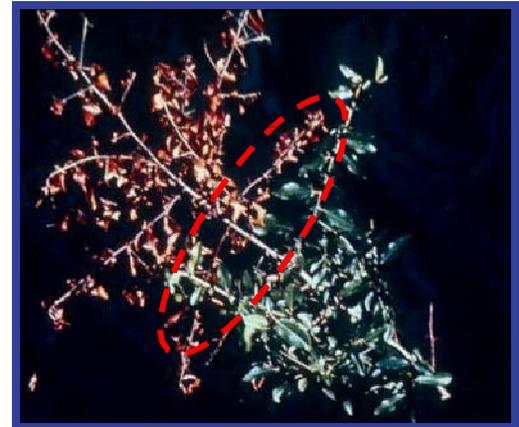
# Sample Collection

- Select several samples that show a range of symptoms (in varying stages of infection)



# Sample Collection

- Whenever possible, the sample should contain the margin of disease



# Sample Submission (Photos or Digital Images)

- Photos or digital images can be *extremely* useful for diagnosis
- Think about what you see that the diagnostician may not be able to see
- Good pictures include:
  - Wide angle view of field, landscape or site
  - Mid-range images of damaged areas, whole plants, branches, leaves, etc.
  - Top, bottom and side views
- **Be sure photos are in focus.**



Remember: Diagnosis is a team effort. The diagnosis received is only as good as the *sample submitted* and the *information* provided.



# New Mexico State University Distance Diagnostics System



# NMSU Distance Diagnostics System

[plantclinic.nmsu.edu](http://plantclinic.nmsu.edu)



**NM STATE** New Mexico State University

**PLANT DIAGNOSTIC CLINIC**  
College of Agricultural, Consumer and Environmental Sciences

You are here: » [NMSU](#) » » [College of Agricultural, Consumer and Environmental Sciences](#) » [CES](#)

The Plant Diagnostic Clinic is designed to provide plant diagnostic services for the state of New Mexico. Our services include analysis of plant material for plant pathogens and environmental stresses as well as suggesting appropriate control measures when available. The clinic also facilitates insect and weed identification through referrals to other specialists. Our clients include Extension Personnel, Crop Consultants, Growers, Retailers, Landscape Professionals, Golf Courses, Researchers, Government Agencies, and Homeowners.

The Plant Diagnostic Clinic works very closely with the **New Mexico Cooperative Extension county offices**. For initial assistance with plant problems contact the county extension office near you. The County Extension staff will assist you with sample submission to the clinic if needed. No diagnostic service fees will be applied to samples submitted through extension offices. If you would like to use our services directly, please review the pages of this document for information on fees, how to collect and send a sample and the required sample submission form. A sample that was improperly collected, packed, and/or shipped and arrives in poor condition may be insufficient for diagnosis.

The Plant Diagnostic Clinic is a facility of the **Extension Plant Sciences Department** at New Mexico State University. The clinic also serves as a support lab for the **Western Plant Diagnostic Network**. The clinic provides accurate plant disease diagnosis, quick turn around time, professional services, and up-to-date control recommendations.

When contacting clinic personnel for assistance with plant related problems, it would be helpful if you would let us know where you are from – this will facilitate our ability to provide you with good information for your geographic area. Thank you.

**Plant Diagnostic Clinic**  
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**NMSU Distance Diagnostic System**  
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NMSU Home

# New Mexico State University Distance Diagnostics System

**NM STATE** New Mexico State University

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**Plant Diagnostic Clinic**

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Search  
NMSU Home

Please sign in to access your account.

Login

Username:  Password:

Login

[Request an Account](#)

[Forgot password?](#)

# New Mexico State University Distance Diagnostics System

The screenshot displays the NMSU Distance Diagnostics System interface. At the top left is the New Mexico State University logo and name. Below this is a blue header bar with the text "NMSU Distance Diagnostics System". On the left side, there is a sidebar menu with the following sections:

- Submit a Sample**
  - Entomology
  - Plant Pathology
  - Plant/Weed ID
- Find Samples**
  - Go To
  - Search Samples
  - Submitted by Jason French
  - Samples to which you have access
- Your Account**
  - Manage Your Account
  - Change Your Password
- Help and Support**
  - Contact System Administrator
- Welcome**
- Logout**

The main content area on the right features a message box titled "Samples you submitted within the past week" with the text "There are no samples to display". A red bracket on the left side of the interface points to the sidebar menu, with a callout box containing the text: "After a successfully login the NMSU Distance Diagnostics System menu bar is displayed."

# New Mexico State University Distance Diagnostics System

**Submit a Sample**

Entomology  
Plant Pathology  
Plant/Weed ID

**Find Samples**

Go To

Search Samples  
Submitted by Jason French  
Samples to which you have access

**Your Account**

Manage Your Account  
Change Your Password

**Help and Support**

Contact System Administrator

**Welcome**

**Logout**

**NMSU Distance Diagnostics System**

**Samples you submitted within the past week**

There are no samples to display

**Submit a Sample**

Entomology  
Plant Pathology  
Plant/Weed ID

The “Submit a Sample” section allows you to :

1. Submit an insect for identification
2. Submit a plant sample for evaluation
3. Submit a plant for identification

# New Mexico State University Distance Diagnostics System

**Submit a Sample**

Entomology  
Plant Pathology  
Plant/Animal/ID

**Find Samples**

Go To

Search Samples

Submitted by Jason French

Samples to which you have access

**Your Account**

Manage Your Account  
Change Your Password

**Help and Support**

Contact System Administrator

**Welcome**

**Logout**

**NMSU Distance Diagnostics System**

**Samples you submitted within the past week**

There are no samples to display

**Find Samples**

Go To

Search Samples

Submitted by Jason French

Samples to which you have access

The “Find Samples ” section allows you to :

1. Search for a sample by sample number
2. Search for all samples you have submitted
3. Search for all sample you have access to (all samples from your county)

# New Mexico State University Distance Diagnostics System

**Submit a Sample**  
Entomology  
Plant Pathology  
Plant/Weed ID

**Find Samples**  
Go To   
Search Samples  
Submitted by Jason French  
Samples to which you have access

**Your Account**  
Manage Your Account  
Change Your Password

**Help and Support**  
Contact System Administrator

**Welcome**  
**Logout**

**NMSU Distance Diagnostics System**

**Samples you submitted within the past week**  
There are no samples to display

**Your Account**  
**Manage Your Account**  
**Change Your Password**

The “Your Account” section allows you to :

1. Update your contact information
2. Change your password

# New Mexico State University Distance Diagnostics System

**NMSU** New Mexico State University

## NMSU Distance Diagnostics System

**Submit a Sample**

- Entomology
- Plant Pathology
- Plant/Weed ID

**Find Samples**

Go To

- Search Samples
- Submitted by Jason French
- Samples to which you have access

**Your Account**

- Manage Your Account
- Change Your Password

**Help and Support**

- Contact System Administrator

**Welcome**

**Logout**

**Samples you submitted within the past week**

There are no samples to display

**Help and Support**

**Contact System Administrator**

The “Help and Support” section allows you to :

- Report technical problems to the system administrator

# New Mexico State University Distance Diagnostics System

New Mexico State University

## NMSU Distance Diagnostics System

**Submit a Sample**

- Entomology
- Plant Pathology
- Plant/Weed ID

**Find Samples**

Go To

Search Samples

Submitted by Jason French

Samples to which you have access

**Your Account**

- Manage Your Account
- Change Your Password

**Help and Support**

- Contact System Administrator

**Welcome**

**Logout**

**Submit a Sample**

Entomology

Plant Pathology

Plant/Weed ID

Samples you submitted within the past week

There are no samples to display

To submit a sample click on the type of sample you would like to submit.

# New Mexico State University Distance Diagnostics System

**NMSU Distance Diagnostics System**

**Sample Submission**

**Select a Contact**  
NOTE: Form elements indicated with a "\*" are required.

\*Select a Contact

**Submit a Sample**  
Entomology  
Plant Pathology  
Plant/Weed ID

**Find Samples**  
Go To   
Search Samples  
Submitted by Jason French  
Samples to which you have access

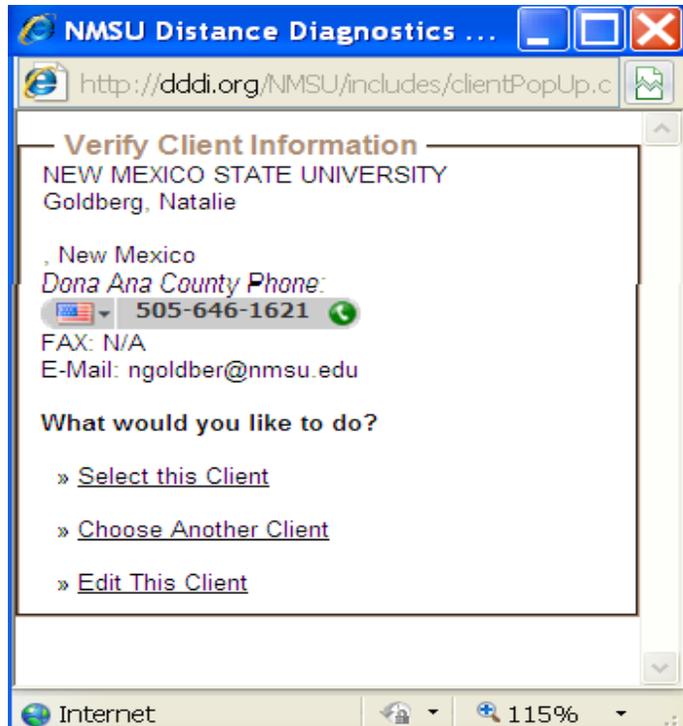
**Your Account**  
Manage Your Account  
Change Your Password

**Help and Support**  
Contact System Administrator

Welcome  
Logout

Select a contact from the drop down list or select "Enter A New Contact"

# New Mexico State University Distance Diagnostics System



Create New Client

NOTE: An \* by the form element indicates the field is required.

Company Name

Client First Name

\*Client Last Name

Address 1

Address 2

City

\*State and County  Choose State/District and Country

Email

Phone

FAX

After selecting a client you will be prompted to:

1. Select a client with out modifying any information
2. Choose a different client
3. Modify information for this client

If you chose to enter a new client:

1. Fill out all appropriate contact information
2. Click "Continue" when completed

# New Mexico State University Distance Diagnostics System

## Sample Submission

### Client Information

NEW MEXICO STATE UNIVERSITY Phone:  505-...   
Goldberg, Natalie FAX: N/A  
, New Mexico [Dona Ana County] E-Mail: ngoldber@nmsu.edu

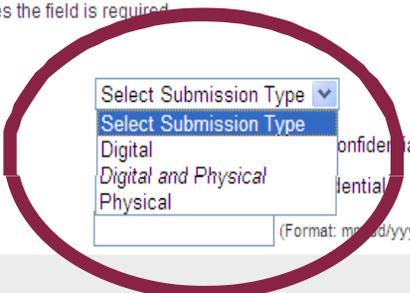
### Sample Information

NOTE: An "\*" by the form element indicates the field is required.

\*Submission Type

\*Is this sample confidential?

\*Date Sample Collected



Select Submission Type  
Select Submission Type  
Digital  
Digital and Physical  
Physical  
(Format: mm/dd/yyyy)

#### Sample Location

Problem Location Address 1

Problem Location Address 2

Problem Location City

Problem Location Zipcode

\*Problem Location [County and State]

Dona Ana:New Mexico

Choose State and County

#### Problem Information

\*Describe the problem

NOTE: You have 256 characters left.

Suggested Problem

## Submitting Sample information:

### 1. Choose Sample Type

- **Digital** — Photos will be uploaded but no physical sample will be sent
- **Digital and Physical** — Photos will be uploaded and a physical sample will be sent
- **Physical** — No photos physical sample only

# New Mexico State University Distance Diagnostics System

**Sample Information**

NOTE: An "\*" by the form element indicates the field is required.

\*Submission Type

\*Is this sample confidential?  No, this sample is NOT confidential  
 Yes, this sample is confidential

\*Date Sample Collected  (Format: mm/dd/yyyy)

**Sample Location**

Problem Location Address 1

Problem Location Address 2

Problem Location City

Problem Location Zipcode

\*Problem Location [County and State]

**Choose State and County**

**Problem Information**

\*Describe the problem

NOTE: You have 256 characters left.

Suspected Problem

Field/Reference ID

Sample Material Submitted

NOTE: Use CTRL Key to select multiple list items

Plant or crop

Plant or crop (if not found in database)

## Required Fields for Sample Submission:

- Submission Type
  - Is the sample confidential: Select Yes or No
- Date Sample Collected:
- Sample Location:
  - County and state
  - Click on “Choose State and County”
- Description of the Problem
- Images if you selected “Digital” or “Digital and Physical” Submission types

# New Mexico State University Distance Diagnostics System

Effectiveness

Comments on pest controls used

NOTE: You have 256 characters left.

**Additional comments on the sample**

Additional Comments

NOTE: You have 256 characters left.

**Images of the Problem (not required for "Physical Only" samples)**

If you have more than 5 images to upload, you may use the batch upload feature displayed on the next screen.

Yes, use batch upload

\*Image 1

Description of Image 1

Image 2

Description of Image 2

Image 3

Description of Image 3

Image 4

Description of Image 4

Image 5

Description of Image 5

## Uploading Images:

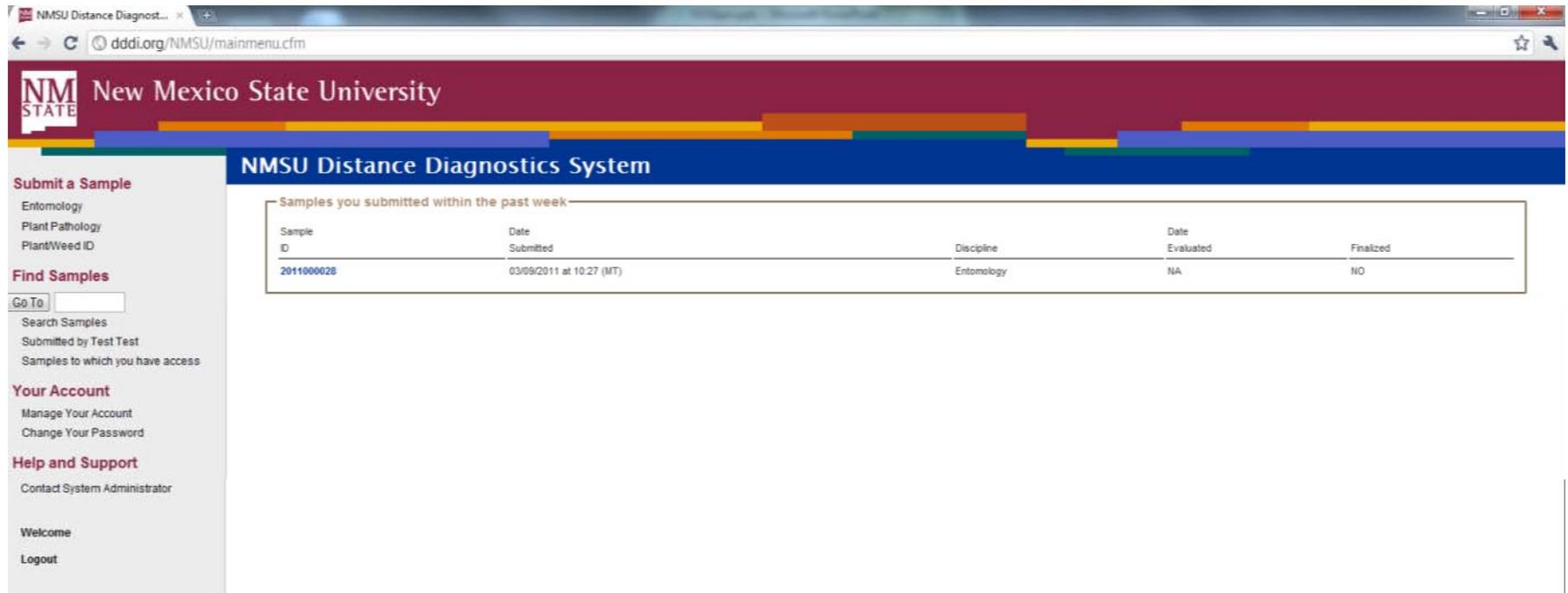
### Five images or less

1. Select "Browse" and select each image.
2. After all images have been selected click on "Submit Sample"

### Six to Twenty images

1. Check the Box "Yes, use batch upload"
2. Click "Submit Sample"
3. Select "Browse" and select each image
4. After all images have been selected click on "Submit Sample"

# Tracking Samples



The screenshot shows a web browser window with the URL [dddi.org/NMSU/mainmenu.cfm](http://dddi.org/NMSU/mainmenu.cfm). The page header includes the New Mexico State University logo and the text "New Mexico State University". Below the header is a blue banner with the text "NMSU Distance Diagnostics System".

On the left side, there is a navigation menu with the following sections:

- Submit a Sample**
  - Entomology
  - Plant Pathology
  - Plant/Weed ID
- Find Samples**
  - Go To:
  - Search Samples
  - Submitted by Test Test
  - Samples to which you have access
- Your Account**
  - Manage Your Account
  - Change Your Password
- Help and Support**
  - Contact System Administrator
- Welcome
- Logout

The main content area displays a table titled "Samples you submitted within the past week". The table has the following columns: Sample ID, Date Submitted, Discipline, Date Evaluated, and Finalized. A single row of data is shown:

Sample ID	Date Submitted	Discipline	Date Evaluated	Finalized
2011000028	03/09/2011 at 10:27 (MT)	Entomology	NA	NO

# Tracking Samples

**NM STATE** New Mexico State University

**NMSU Distance Diagnostics System**

**Submit a Sample**  
Entomology  
Plant Pathology  
PlantWeed ID

**Find Samples**  
Go To:   
Search Samples  
Submitted by Test Test  
Samples to which you have access

**Your Account**  
Manage Your Account  
Change Your Password

**Help and Support**  
Contact System Administrator

Welcome  
Logout

Entomology Sample Information 2011000028

[Click Here to upload additional images](#)  
[Click Here For Printable Sample Submission Form](#)

Email PDF Report to:

Optional  
Send Client Comments:

Optional: To send to multiple e-mail addresses, separate addresses with a comma.

**General Sample Information**

Sample Number	2011000028
Submission Type	Physical
Submitted By	Test, Test [Tester] jfrench@nmsu.edu
Assigned Evaluator	Not Defined
Is this sample confidential?	No
Date Sample Submitted	March 9, 2011 at 10:27 (MT)
Date Sample Collected	March 9, 2011
Date Physical Sample Arrived	March 9, 2011
Suspected Problem	--
Field/Reference ID	--

**Sample Contact**

Contact	test New Mexico Bernalillo County
---------	---

**Sample Location**

Problem Location	--
------------------	----

**Host/Plant and Site Information**

Describe the problem	identification
Host or Plant	Unspecified [Mixed Plant Material]

Optional: To send to multiple e-mail addresses, separate addresses with a comma.

**General Sample Information**

Sample Number	2011000028
Submission Type	Physical
Submitted By	Test, Test [Tester] jfrench@n
Assigned Evaluator	Not Defined
Is this sample confidential?	No
Date Sample Submitted	March 9, 2011 at 10:27 (MT)
Date Sample Collected	March 9, 2011
Date Physical Sample Arrived	March 9, 2011
Suspected Problem	--
Field/Reference ID	--

**Sample Contact**

# Final Report



### Diagnostic Report

NMSU Plant Diagnostic Clinic  
<http://plantclinic.nmsu.edu/>

P.O. Box 30003 MSC 3AE      Tel: (575) 646-1965  
Las Cruces, NM 88003      Fax: (575) 646-8085

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Sample Number:      Submission Date: 11/19/2010  
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Submitter:      Contact:      

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Host: Pecan *Carya illinoensis*

#### Diagnosis and Recommendations

Primary Diagnosis: Phymatotrichum Root Rot *Phymatotrichopsis (Phymatotrichum) omnivora (omnivorum)*  
Recommendation: Block 34 - 1 Tree

Phymatotrichopsis omnivorum, the causal agent of Phymatotrichum root rot (aka cotton root rot and Texas root rot), was found on the roots of the sample submitted.

The fungus has an extremely wide host range that affects more than 2,300 species of dicotyledonous (broad-leaved plants). Monocots are not affected, although the fungus has been found to grow and reproduce on some monocots without causing any disease. Observations in New Mexico indicate that many native plants such as mesquite, creosote and desert willow, do not succumb to the disease, however they are likely to harbor the pathogen.

The fungus is limited geographically to parts of the United States (parts of Arizona, New Mexico, and Texas) and Mexico. Even within its geographical boundaries, the fungus is spotty in occurrence. The pathogen may be so isolated that it is only found in small areas; areas small enough that only one or a few plants are affected. It may also be found in larger areas where many plants may be affected. It is found only at elevations below 5,000 feet. In New Mexico, the disease has been found only in the southern part of the state.

Symptoms first appear during the summer when air and soil temperatures are high. The first evidence of the disease is a slight yellowing of the leaves. The leaves quickly turn to a bronze color and begin to wilt. Permanent wilting can occur very rapidly - as little as two weeks from the first expression of disease. Plants infected with

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### Diagnostic Report

NMSU Plant Diagnostic Clinic  
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Phymatotrichopsis die rapidly with the leaves remaining firmly attached. In some cases, the tree wilts so quickly that there is little color change though the leaves become dry and brittle. The disease may progress more slowly in plants grown at higher elevations. The roots are brown and rotted. A reddish lesion develops around the trunk near the soil-line of trees killed by this fungus.

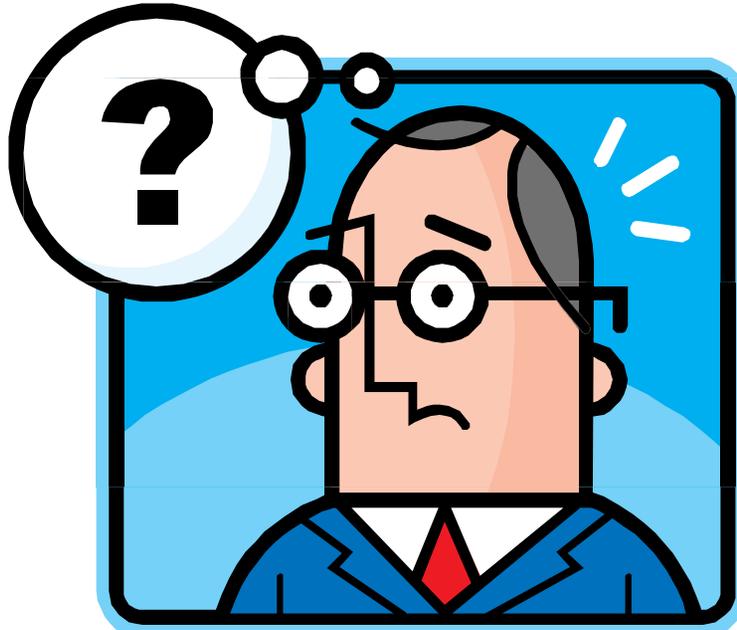
The fungus also produces signs on or near infected plants. Strands of fungal hyphae are produced on the surface of infected roots. These strands usually are visible with a good hand lens. When strands are viewed under a light microscope, cruciform (cross-shaped) hyphae unique to this fungus can be seen. Another sign is the formation of a white to tan colored spore mat on the soil surface around infected plants. Spore mats may develop during periods of high moisture. Spores produced in spore mats have never been germinated and are considered to have no function in survival or infection by this pathogen. Therefore, spore mats do not spread disease but are merely evidence of the fungus' presence.

The disease is associated with soils low in organic matter and high in alkalinity (pH). The fungus survives indefinitely deep (12 feet or more) in the soil as sclerotia (masses of hardened hyphae). Plants become infected when roots come in contact with sclerotia. It may take many years for plants to develop a root system deep enough to encounter the fungus. This explains why many plants will live for years before succumbing to the disease. Spread of the fungus is limited as it does not produce any viable spores. The only known spread is through root grafts between nearby plants.

This disease is very difficult, if not impossible, to control. If caught very early in the development of the disease, affected plants should be cut back immediately, leaving sufficient supporting branches for normal growth. Applying soil sulfur, ammonium sulfate, and steer manure out to the drip line of infected trees may help to delay the development of the disease. This treatment must be done on an annual basis and is no guarantee of control. Avoiding areas known to be infested with the pathogen or planting immune or resistant plants in these areas is the best control measure.

Date Finalized: 11/22/2010  
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# New Mexico State University Distance Diagnostics System



If you have any questions, comments or concerns please contact Jason French at 575 – 646 – 1965 or [jfrench@nmsu.edu](mailto:jfrench@nmsu.edu)