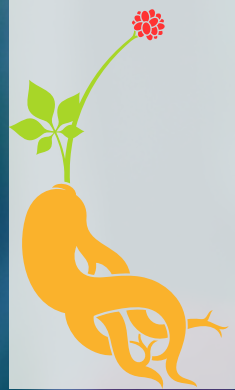




AMERICAN GINSENG
WORKSHOP 2021

Plant Pathogen Management in American Ginseng

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Dr. Eleanor Lopez, UTK Soil, Plant and Pest Center



PRESENTATION OVERVIEW

- Plant Pathogens - Disease Overview
- Fungal Pathogens of Ginseng
- Current Objectives
- Management Resources

DISEASE OVERVIEW



Disease Triangle

CONDUCTIVE
ENVIRONMENT



TIME



PATHOGEN



SUSCEPTIBLE
PLANT



- SUSCEPTIBLE PLANT
 - American ginseng,
Panax quinquefolius
 - Stage of growth
 - Plant structure

IMPLICATIONS FOR GINSENG



- ENVIRONMENT
 - Temperature - growth and infection
 - Movement
 - Rainfall
 - Wind
 - Forest wildlife
 - Soil - stress, dispersal

IMPLICATIONS FOR GINSENG



- FUNGAL PATHOGEN
 - Signs - fungal structures present?
 - Fruiting bodies
 - Mycelium
 - Symptoms - visible disease
 - Discoloration
 - Wilting
 - Rotting
 - Dieback
 - Leaf spots
 - 14 fungal and fungal-like organisms documented in the U.S.

IMPLICATIONS FOR GINSENG



FUNGAL PATHOGENS OF GINSENG



Fungal Pathogens - From US

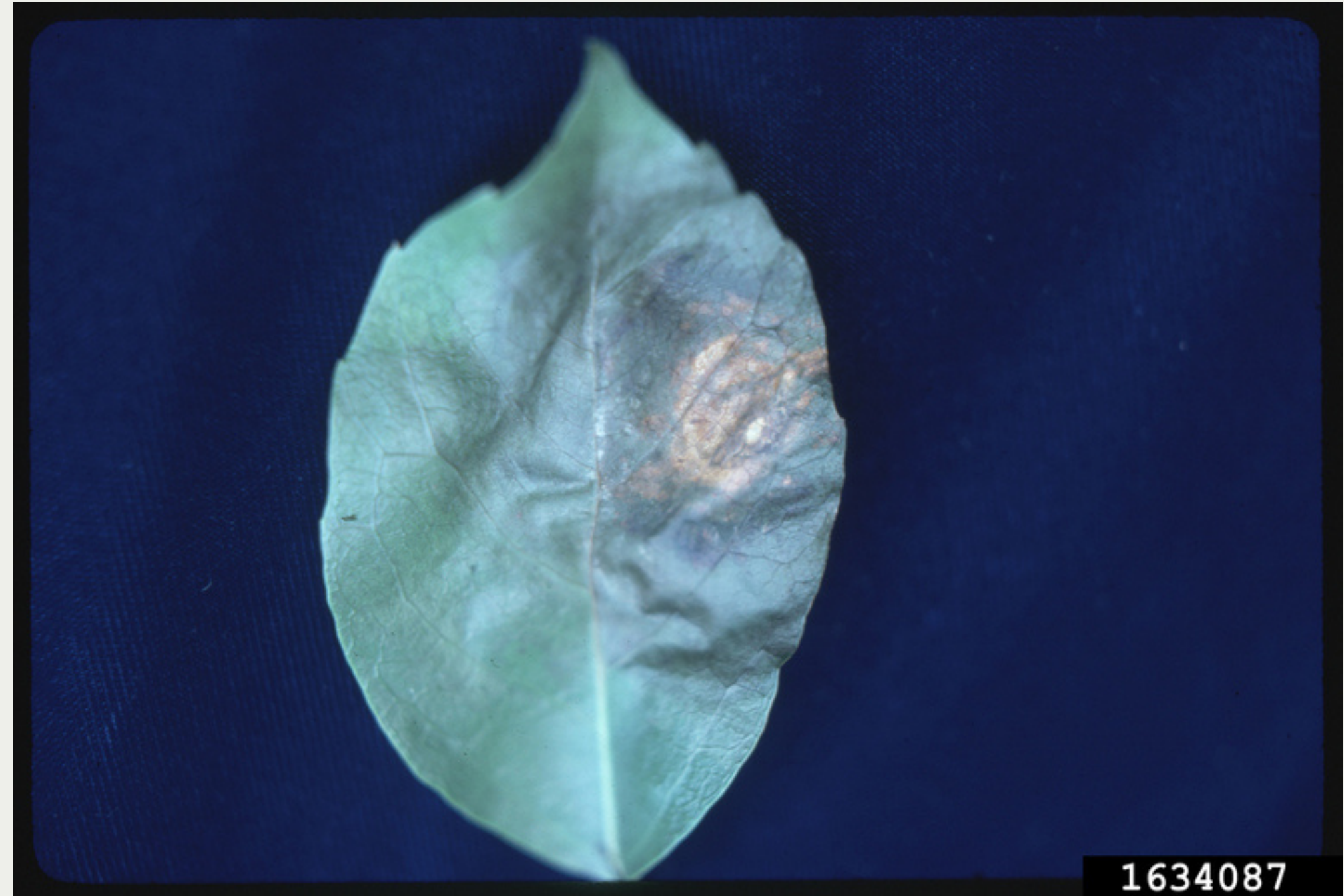
- Leaf Spot
 - Alternaria
 - Septoria
- Stalk rot
 - Alternaria
 - Colletotrichum (Anthracnose)
 - Fusarium
- Root rot
 - Calonectria
 - Cyindrocarpon
 - Fusarium
 - Rhizoctonia
 - Sclerotinia
 - Thielaviopsis - root rot
- Wilt
 - Verticillium

Oomycete Pathogens

- Root Rot
 - Phytophthora
 - Pythium



LEAF SPOT



Alternaria leaf spot

Photo from Penn State Department of Plant Pathology & Environmental Microbiology Archives , Penn State University, Bugwood.org



ROOT ROT



Phytophthora Root and Crown Rot

Department of Plant Pathology , North Carolina State University, Bugwood.org



CURRENT OBJECTIVES



Current Objectives

- **Identify Pathogens**
Soil, Plant and Pest Center
- **Describe seasonality**
Calendar for monitoring
- **Evaluate Management Options**
Efficacy data on organic fungicides





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- Pathogen Identification
- Management recommendations

Entire plants will rule out root rot. Send plants in mail in a plastic bag (wrap roots in aluminum foil), or bring to lab.





SAMPLE SUBMISSION

- Location - County-level, growing area description
- Symptoms of plant - leaves, stem, fruit, flowers, roots
- % symptomatic - growing area level
- Age of plant
- Fungicides applied and date of application



MANAGEMENT OPTIONS



TYPES OF FUNGICIDES

- Organic
 - Inorganic found in the environment
- Conventional
 - Synthesized or made in a laboratory





INTEGRATED PEST MANAGEMENT (IPM)



STEP 1: PREVENTION

- Site selection
 - Shade
 - Deep-rooted trees
- Seed treatments
- Monitoring
- Irrigation



INTEGRATED PEST MANAGEMENT (IPM)

STEP 2: MECHANICAL

- Environmental enhancement
 - Water drainage
 - Mulch
- Weed management
- Remove symptomatic plant structures when observed



INTEGRATED PEST MANAGEMENT (IPM)



STEP 3: CULTURAL

- Improve air circulation
 - Planting density
- Monitor soil fertility
- Increase biodiversity
- Use of suppressive plants

INTEGRATED PEST MANAGEMENT (IPM)

STEP 4: BIOLOGICAL

- Use of biological pesticides
 - Fungi, bacteria
- Use of natural enemies
 - Leafhoppers, aphids

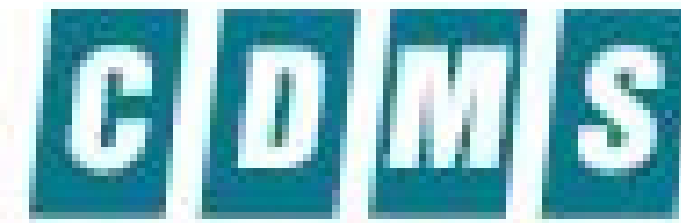


INTEGRATED PEST MANAGEMENT (IPM)

STEP 5: CHEMICAL

- Last resort!
- Protective, not curative
- Remove symptomatic plants
- Identify pest before spraying

CROP DATA MANAGEMENT SYSTEMS



Applied
Intelligence

Can search for:

Product Type →

Crop →

Pest →

Manufacturer →

State →

Organic Products Only ✓

Can search for:

Fungicide

Ginseng

Alternaria

We do not recommend by manufacturer

Tennessee

Check box for OMRI certified products only

TABLE OF LABELED PRODUCTS FOR TENNESSEE

Available online with University of
Tennessee Extension

TABLE CONTAINS

- OMRI-listed organic
- Active ingredient
- Trade names
- Mode of action
- Fungal pathogens on label



A photograph of a lush green field of plants, likely a garden or field study site. In the center, a single plant with large, serrated green leaves and a tall, thin stem topped with a cluster of small green buds is in sharp focus. The background is filled with other similar plants, slightly out of focus, creating a sense of depth. The lighting is bright and natural, suggesting a sunny day.

QUESTIONS?

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