A HANDBOOK OF COMMON PLANT DISEASE SYMPTOMS

MARK ANGELO BALENDRES

2025

A Handbook of Common Plant Disease Symptoms

1st Edition, May 5, 2025

Mark Angelo Balendres

No changes or edits were made to the images, but they appear zoomed in when displayed within the frame.

The information in the handbook is intended to serve as a general guide to common plant disease symptoms. While every effort has been made to ensure the accuracy and reliability of the content, the author and publisher do not guarantee the completeness or applicability of the information for all situations.

Readers are advised not to rely solely on the material presented in this handbook and to consult additional resources, including peer-reviewed research, expert advice, and other relevant resources. The author and publisher are not responsible for any outcomes or consequences of using the information in this handbook.

How to Cite this Handbook:

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About the Main Cover Image

The main image depicts mango fruits exhibiting symptoms of anthracnose, a fungal disease that causes dark, necrotic, sunken lesions on host's tissue. These affected mangoes are being sold at a local market at a discounted price, primarily due to their diminished visual appeal caused by the disease. Despite their aesthetic imperfections, these fruits remain safe to consume and are often sold as a more affordable option for buyers. Some buyers use them to prepare mango shakes, and, during celebrations, as ingredient for mango float.

Photo by Mark Balendres

Preface

Understanding plant health is crucial for successful crop cultivation and sustainable practices. The *Handbook of Common Plant Disease Symptoms* is designed to serve as a resource for lecturers, students, gardeners, farmers, and researchers, offering practical insights into the first step of identifying plant diseases caused by biotic agents: *symptom recognition*.

This handbook provides visual aids to help readers recognize common symptoms of plant diseases. Understanding these common symptoms can help in the early detection and management of plant diseases, thereby reducing crop losses and improving agricultural productivity.

The content is drawn from a wealth of resources provided by plant pathologists and plant health specialists, consolidating information on the most common plant diseases affecting various crops.

I thank and acknowledge all the owners/photographers (and their organizations and source databases) of the images used in this handbook.

Mark Angelo Balendres
May 5, 2025

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About the Author

Mark Angelo Balendres is a Plant Pathologist and Full Professor at the Department of Biology, De La Salle University (DLSU), Manila, Philippines. He holds a PhD in Agricultural Science (Plant Pathology) from the University of Tasmania, Australia. With over 16 years of research experience, he specializes in plant disease diagnostics and plant disease management in tropical agriculture. Mark has authored numerous scientific publications and leads the DLSU Plant and Soil Health Research Unit, mentoring future scientists and collaborating nationally and globally to advance sustainable plant health solutions. In addition to his academic pursuits, he supports institutions in building expertise in plant pathology, scholarly publication, and research leadership.

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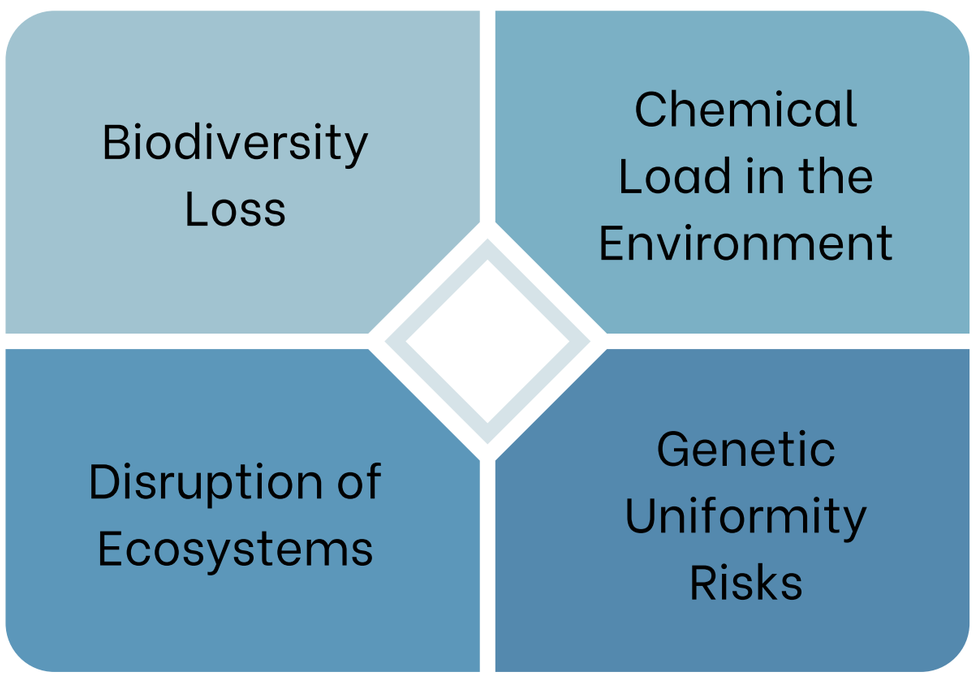
What is a Plant Disease?

- The abnormal functioning of a plant (organism) (American Phytopathological Society).
- Abnormal condition that alters the appearance or function of the plant (www.ipm.iastate.edu).
- It occurs over time (www.ipm.iastate.edu).

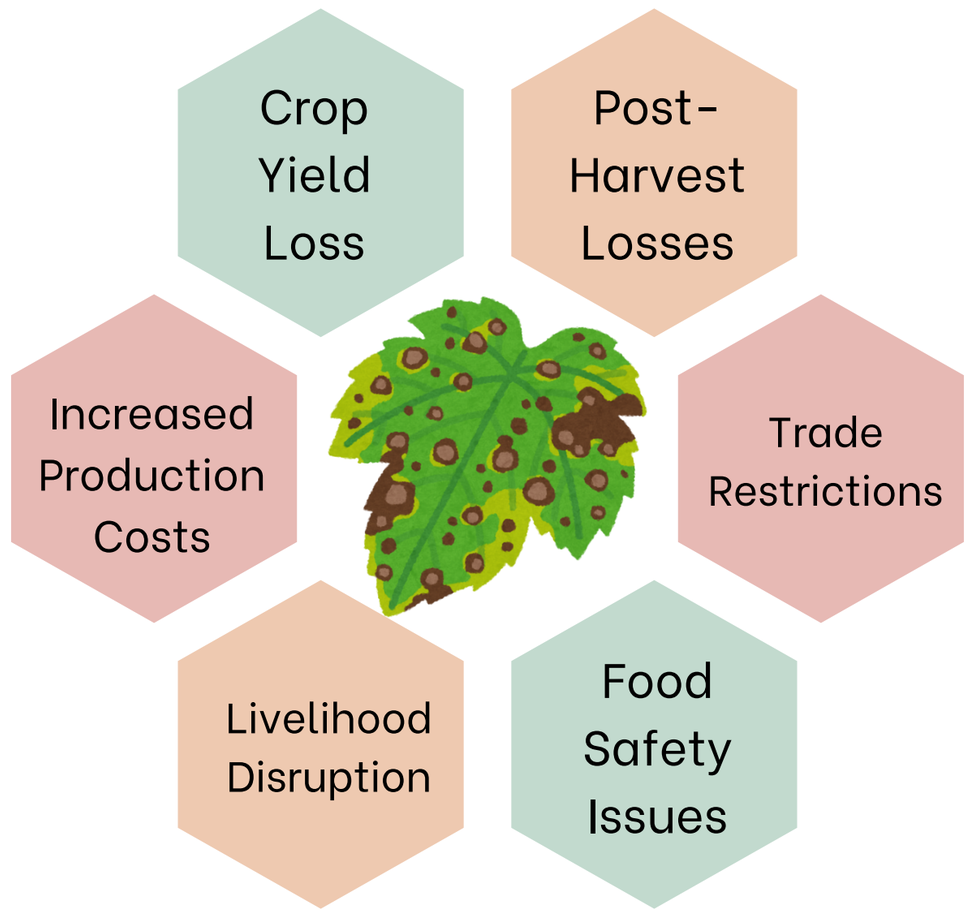
Ecological Impact of Plant Diseases



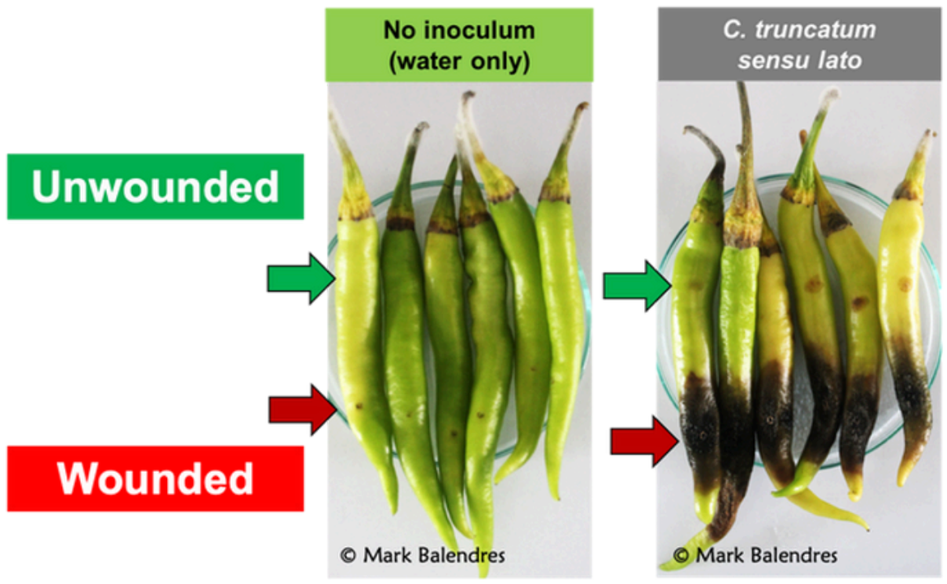
Effective disease diagnosis and management are critical for:

- Ensuring food security
- Supporting sustainable agriculture
- Protecting the environment
- Building resilient farming systems in the face of climate change

Economic Impact of Plant Diseases



Affects fruit quality and marketability



Affects plant growth and productivity

What Causes Plant Diseases?

True Fungi Composition

Balendres (2022)

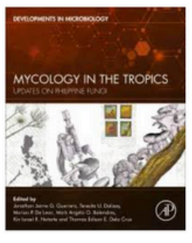
Ascomycota *77.66 %*
Basidiomycota *18.62 %*
Blastocladiomycota *0.53%*
Chytridiomycota *1.60 %*
Mucoromycota *1.60 %*

CHAPTER
7

Plant diseases caused by fungi in the Philippines

Mark Angelo O. Balendres

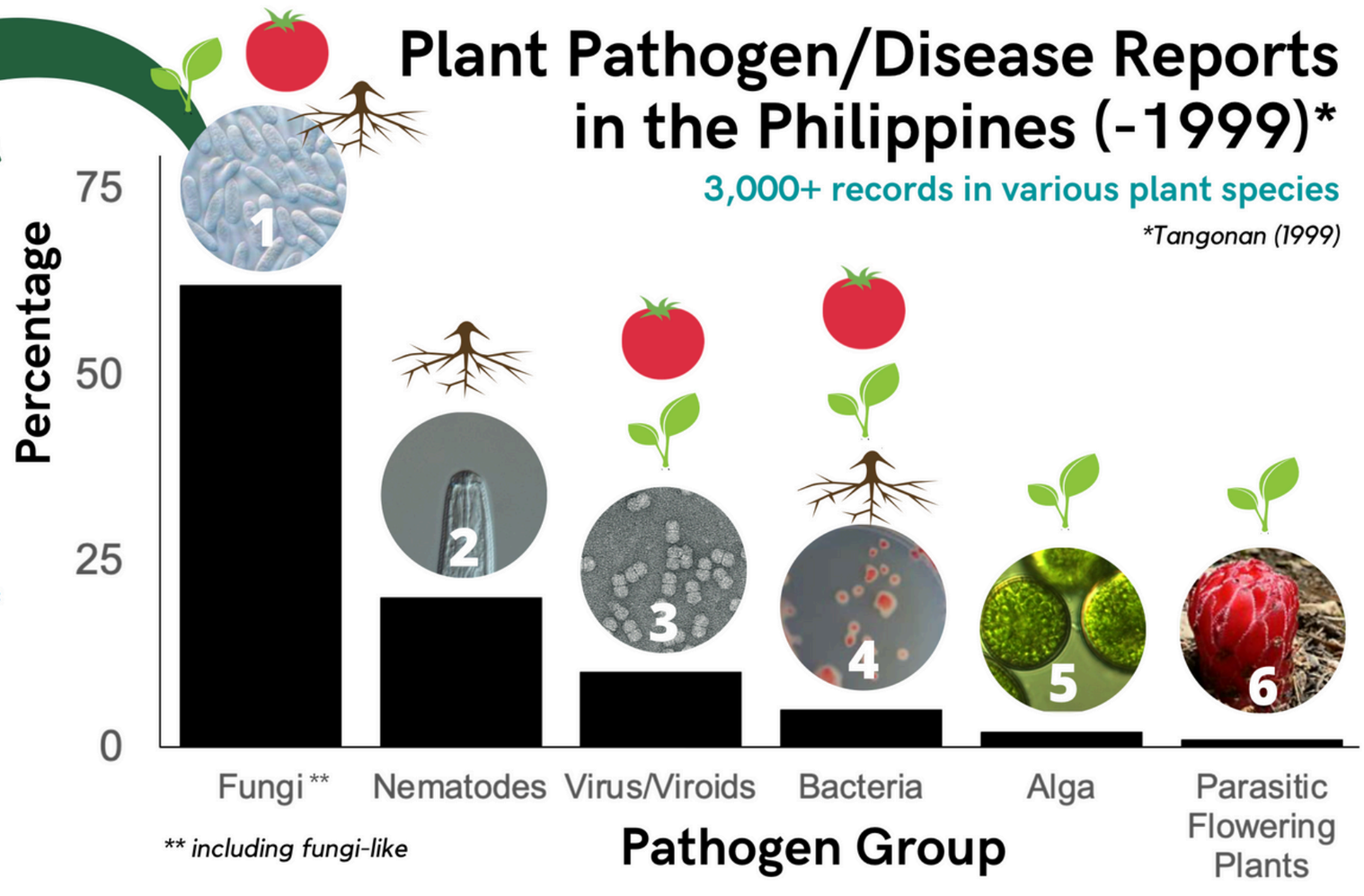
Plant Pathology Laboratory, Institute of Plant Breeding, College of Agriculture and Food Science, University of the Philippines Los Baños, Laguna, Philippines



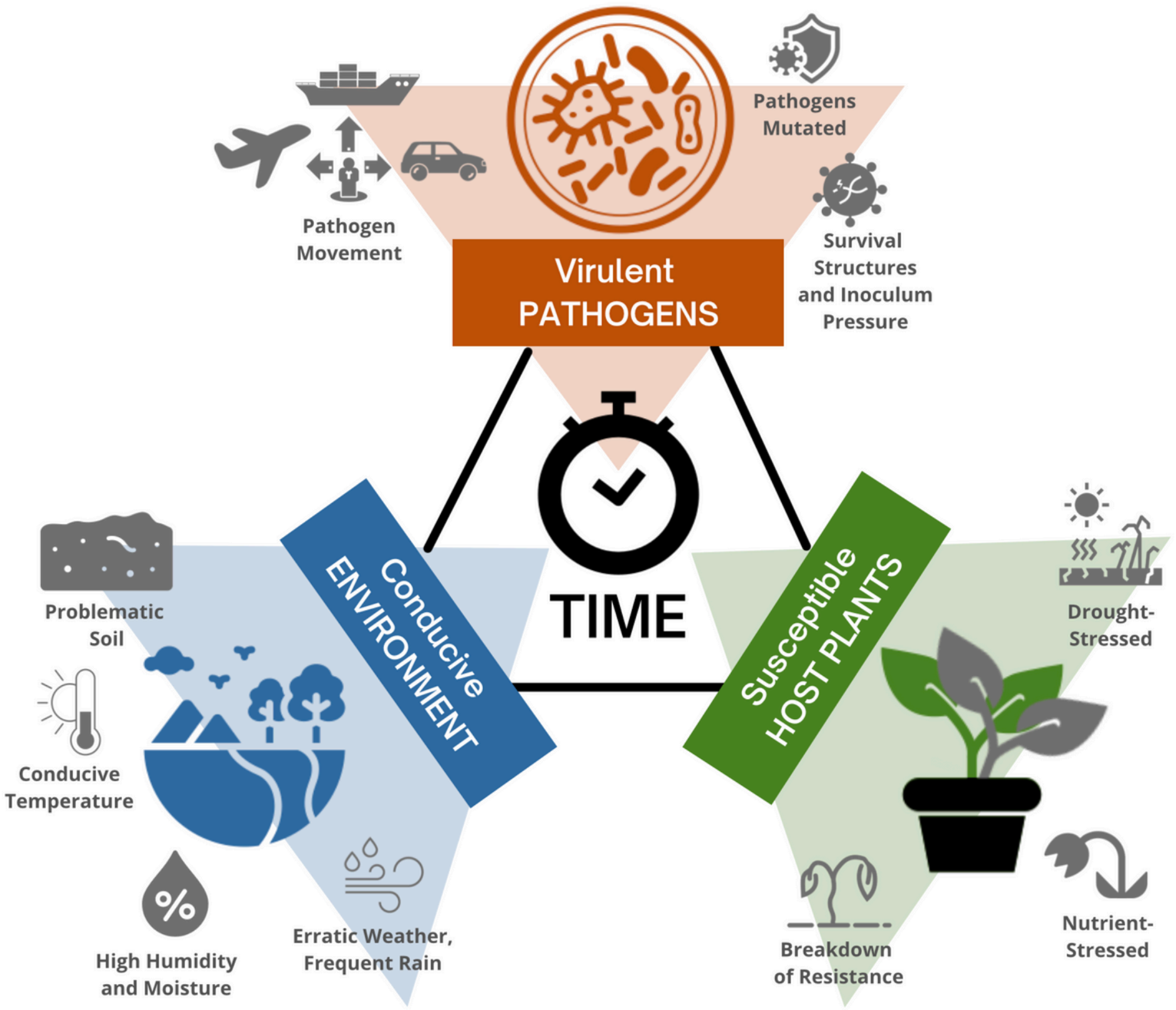
Plant Pathogen/Disease Reports in the Philippines (-1999)*

3,000+ records in various plant species

*Tangonan (1999)



How and Why Plant Diseases Occur?

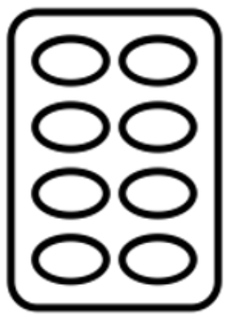


How plant diseases are being managed?

Use certified seed and pathogen-free transplants

Seed/hot water-treatment

Wash hands with soap before and after working



Clean and Disinfect Trays

Soil Solarization

Deep Plowing

Disinfect Garden /Farming Tools

Sterilize seedling media

Avoid over-watering and make sure hose end is above ground

Add organic matter in the soil

Avoid planting in (known) infested fields/areas.

Avoid overhead irrigation and use drip irrigation

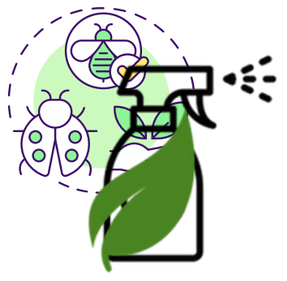
Control weeds in the field.

Biofumigation can reduce bacterial wilt soil inoculum

Plant in raised beds to improve drainage

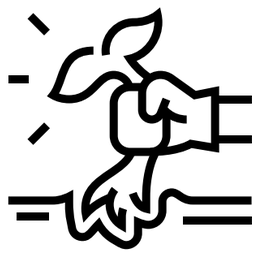
Control insects that vectors viruses

Crop rotation with non-host crops



Use biological control agents if available

Responsible use of pesticides

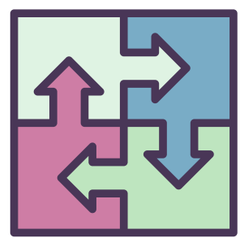


Remove severely infected plants to avoid infection

Plant relatively resistant or less susceptible cultivars

Regular surveying and disease monitoring

Accurate plant disease identification



Integrated Disease Management

The goal of plant disease management is to reduce the economic and aesthetic damage caused by plant diseases (O. Maloy 2005).

Exclusion Measures

Cultural Practices

Biological Control

Host Resistance

Common Plant Disease Symptoms

and Selected Bibliography

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Algal Spot

Pathogen: Algae

Possible Causative Agent: *Cephaleuros* sp.

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Pathogen: Algae

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Anthracnose

Pathogen: Fungi

Possible Causative Agent: *Colletotrichum* spp.

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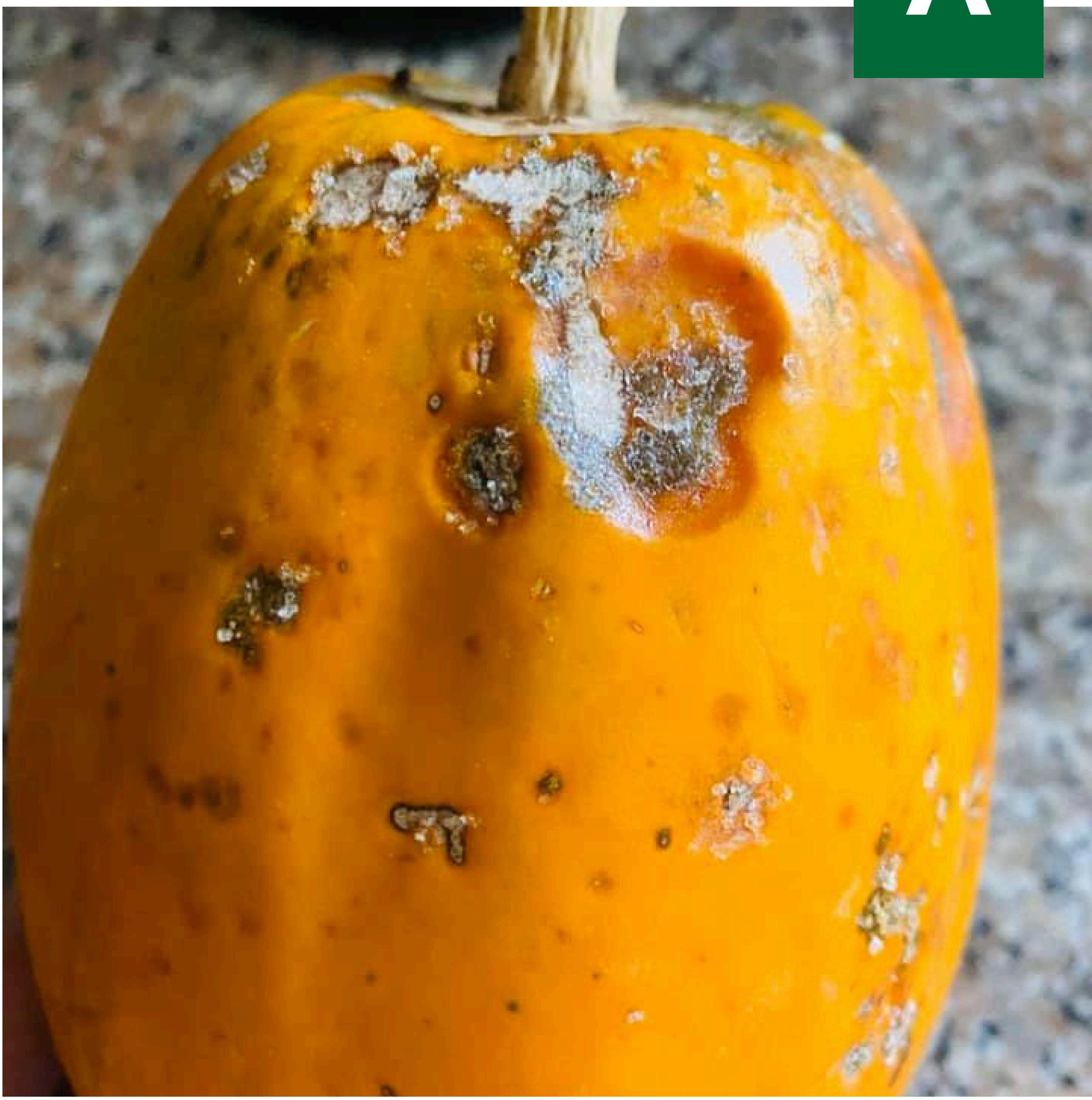

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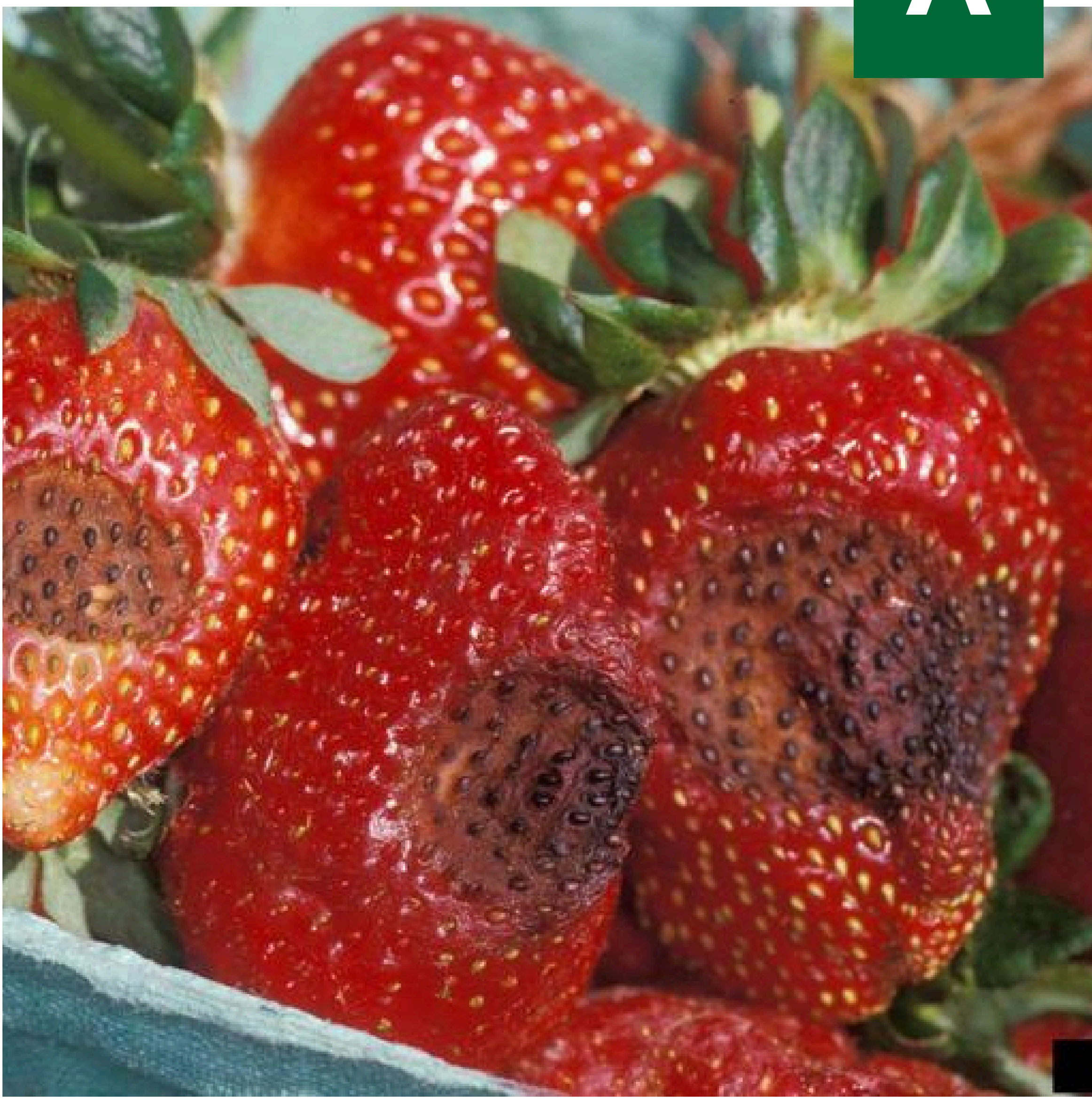

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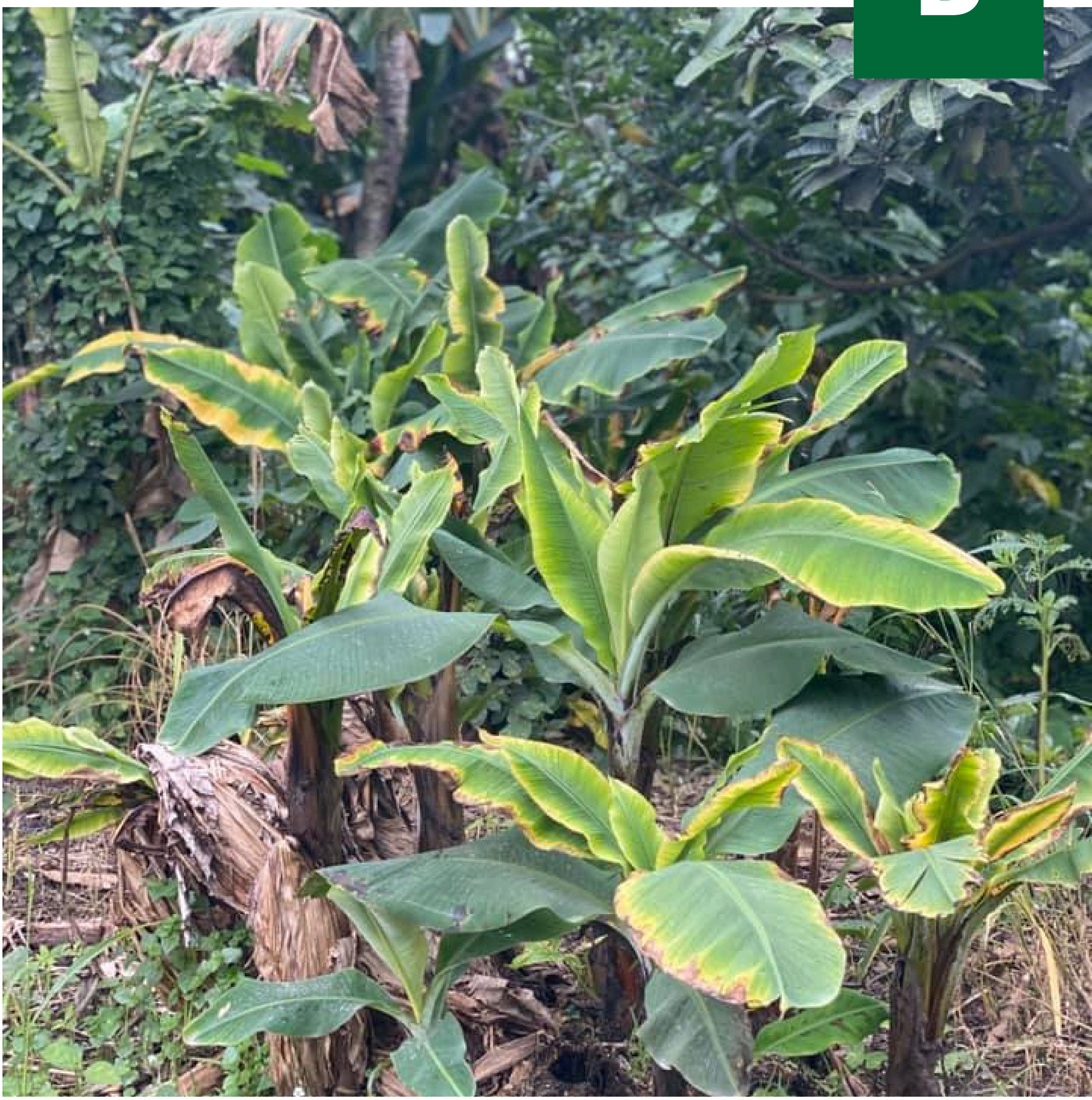

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Bunchy Top

Pathogen: Virus

Possible Causative Agent: *Banana bunchy top virus*

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Blight

Pathogen: Oomycete

Possible Causative Agent: *Phytophthora* sp.

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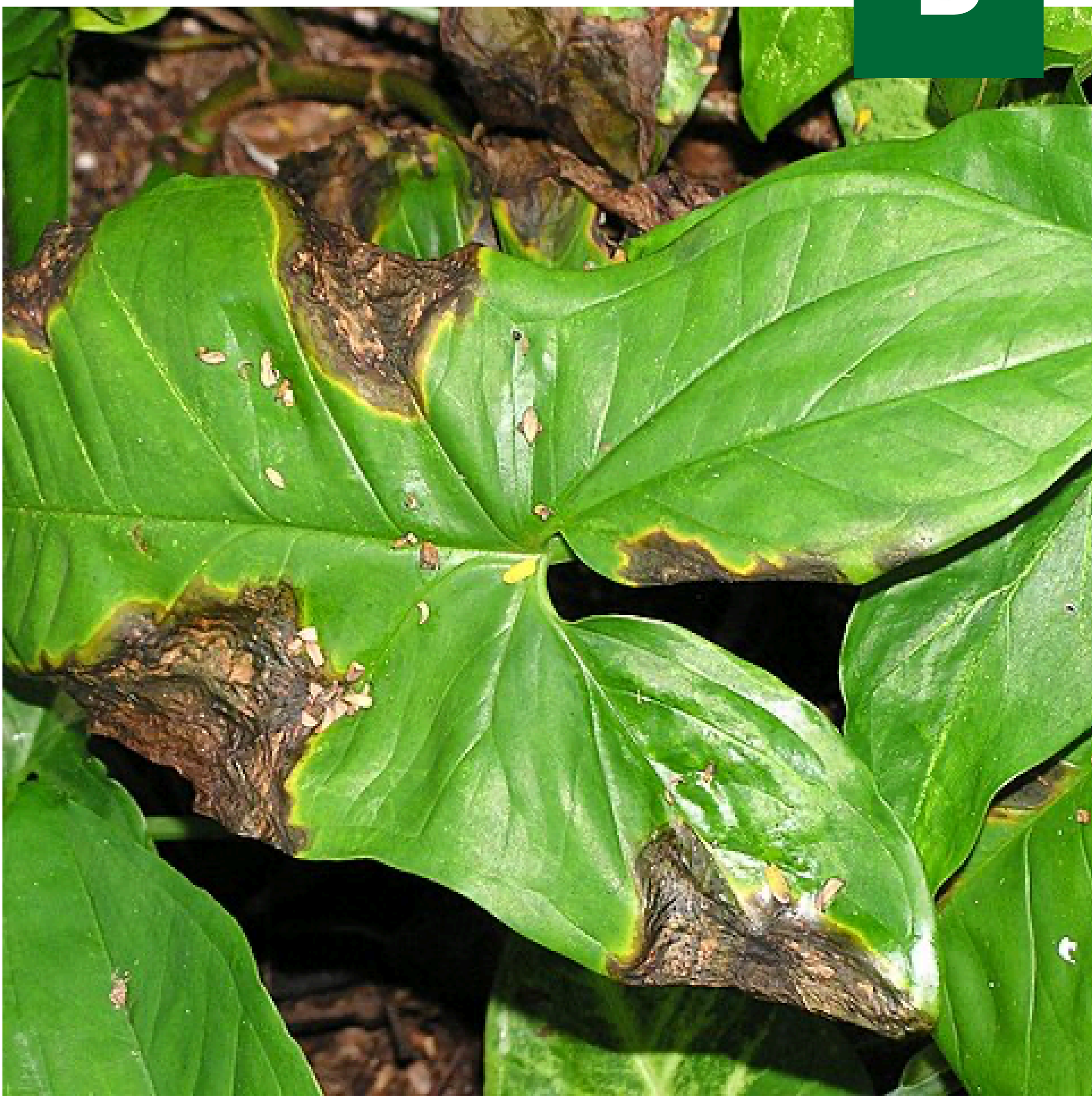

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Blight

Pathogen: Bacteria

Possible Causative Agent: *Xanthomonas* sp.

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Blight

Pathogen: Fungi

Possible Causative Agent: Unknown

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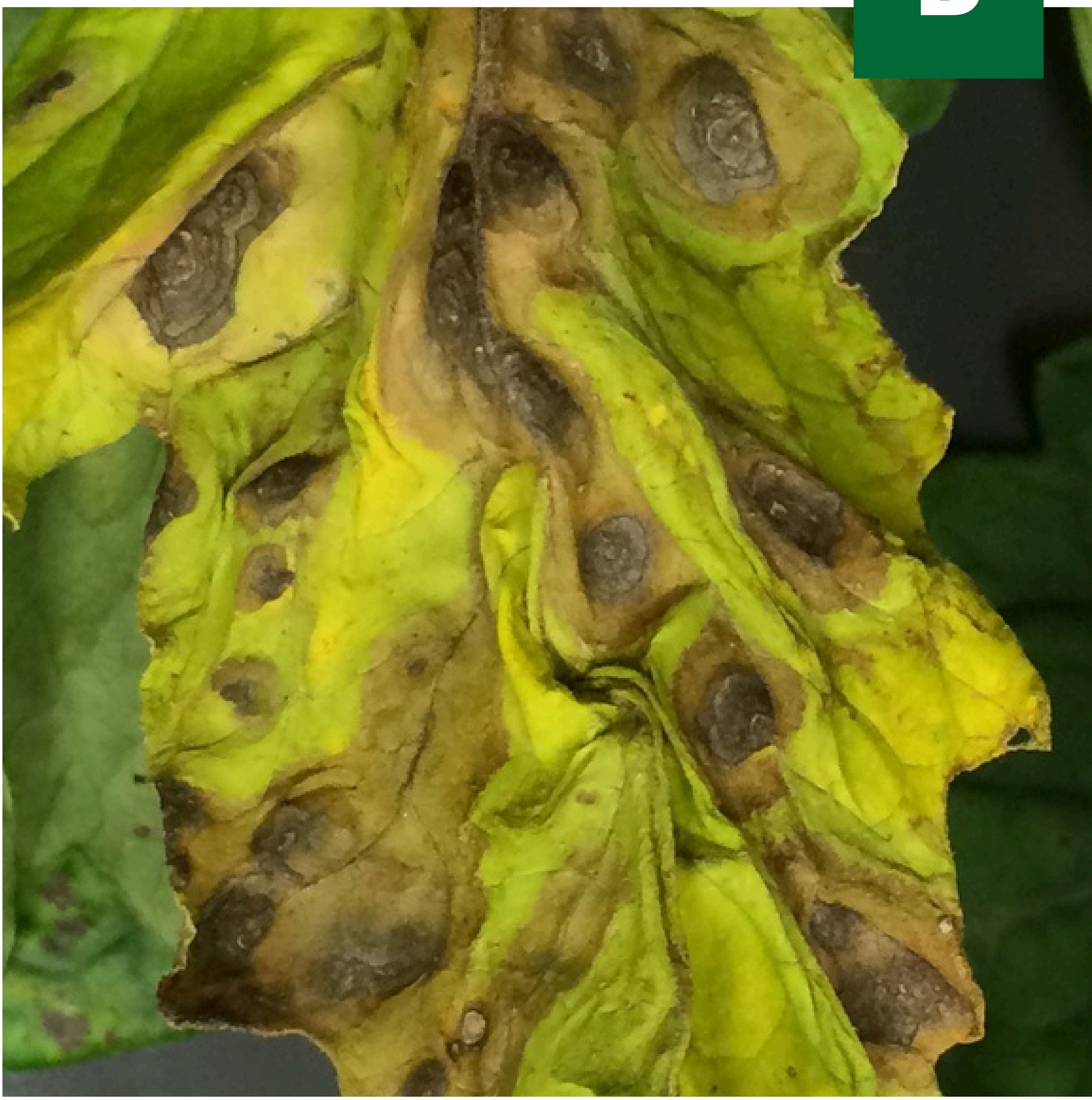

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Blight (Early)

Pathogen: Fungi

Possible Causative Agent: *Alternaria* sp.

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Blight (Late)

Pathogen: Oomycete

Possible Causative Agent: *Phytophthora* sp.

Photo Credit: Thirunarayanan Perumal, Banaras Hindu University, Bugwood.org

Blight (Late)

Pathogen: Oomycete

Possible Causative Agent: *Phytophthora infestans*

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Blight (Late)

Pathogen: Oomycete

Possible Causative Agent: *Phytophthora* sp.

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Blight (Early)

Pathogen: Fungi

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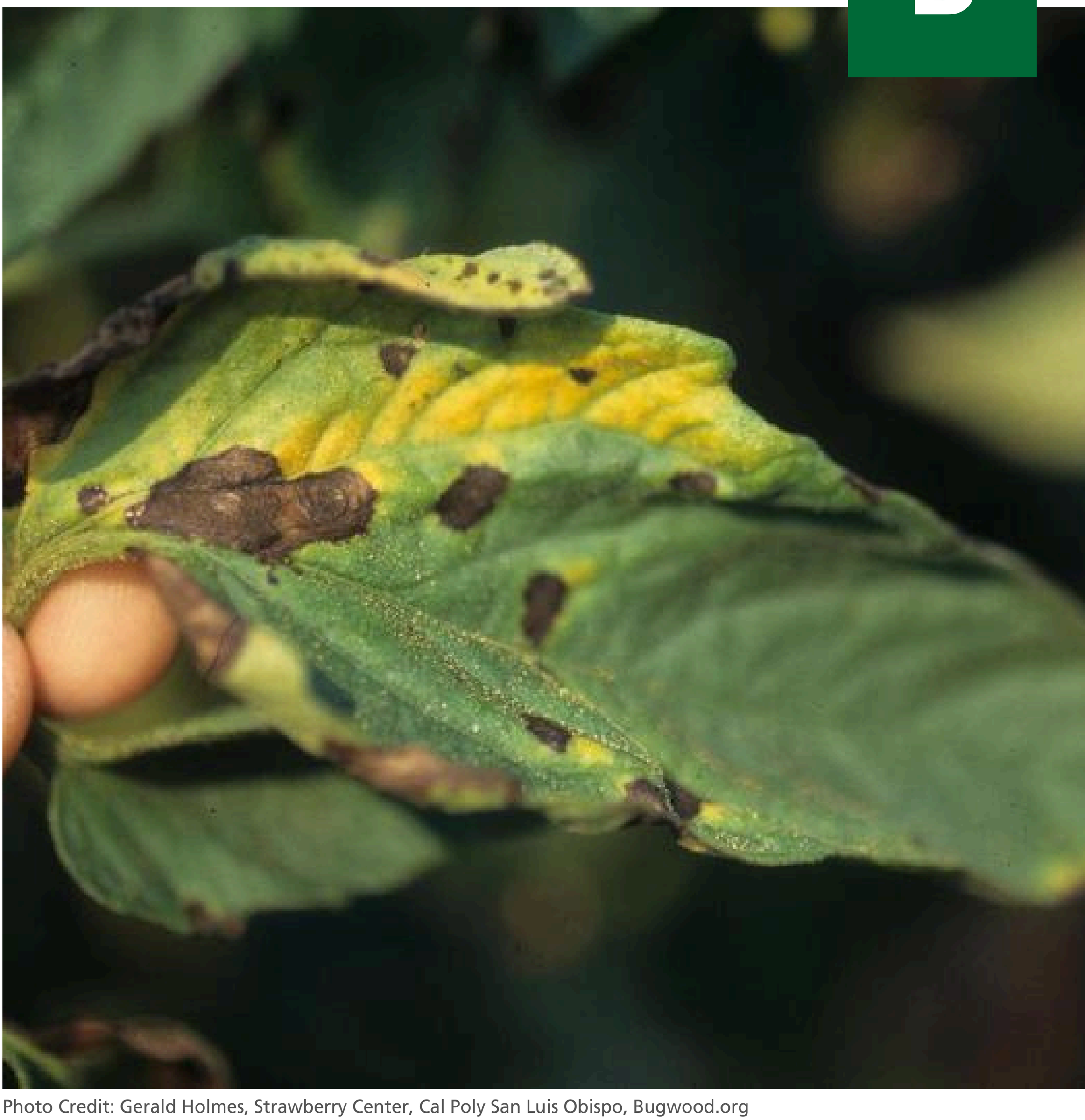

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Blight (Early)

Pathogen: Fungi

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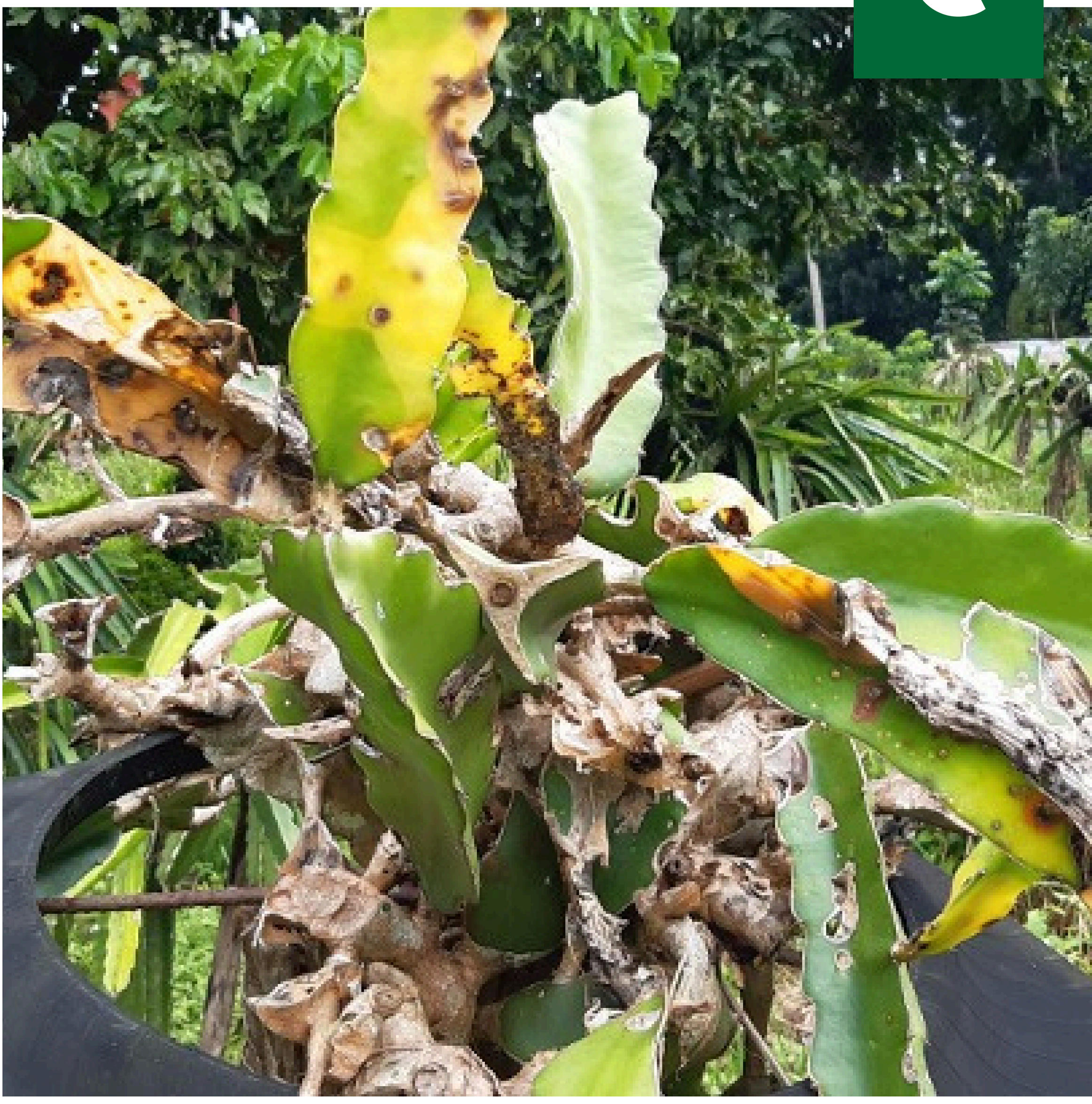

Photo Credit: Mark Balendres, De La Salle University

Canker

Pathogen: Fungi

Possible Causative Agent: *Neoscytalidium dimidiatum*

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Photo Credit: Timothy Schubert, Florida Department of Agriculture and Consumer Services, Bugwood.org

Canker (fruit)

Pathogen: Bacteria

Possible Causative Agent: *Xanthomonas citri*

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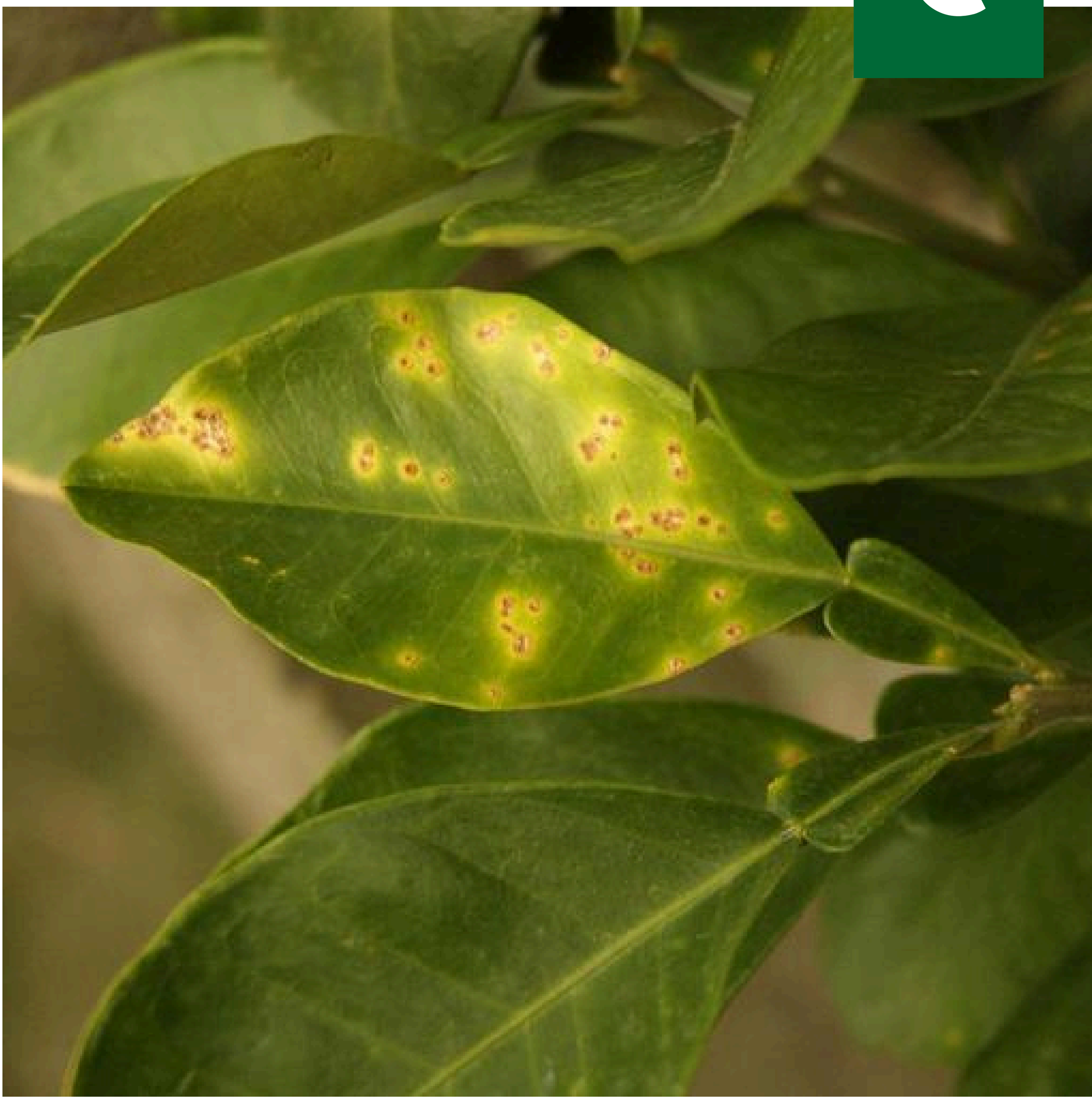

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Canker (leaf)

Pathogen: Bacteria

Possible Causative Agent: *Xanthomonas citri*

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Photo Credit: Rupert Anand Yumlembam, Central Agricultural University, Imphal, Manipur, India, Bugwood.org

Canker (stem)

Pathogen: Bacteria

Possible Causative Agent: *Xanthomonas citri*

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Photo Credit: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

Club Root

Pathogen: Plasmodiophorid

Possible Causative Agent: *Plasmodiophora brassicae*

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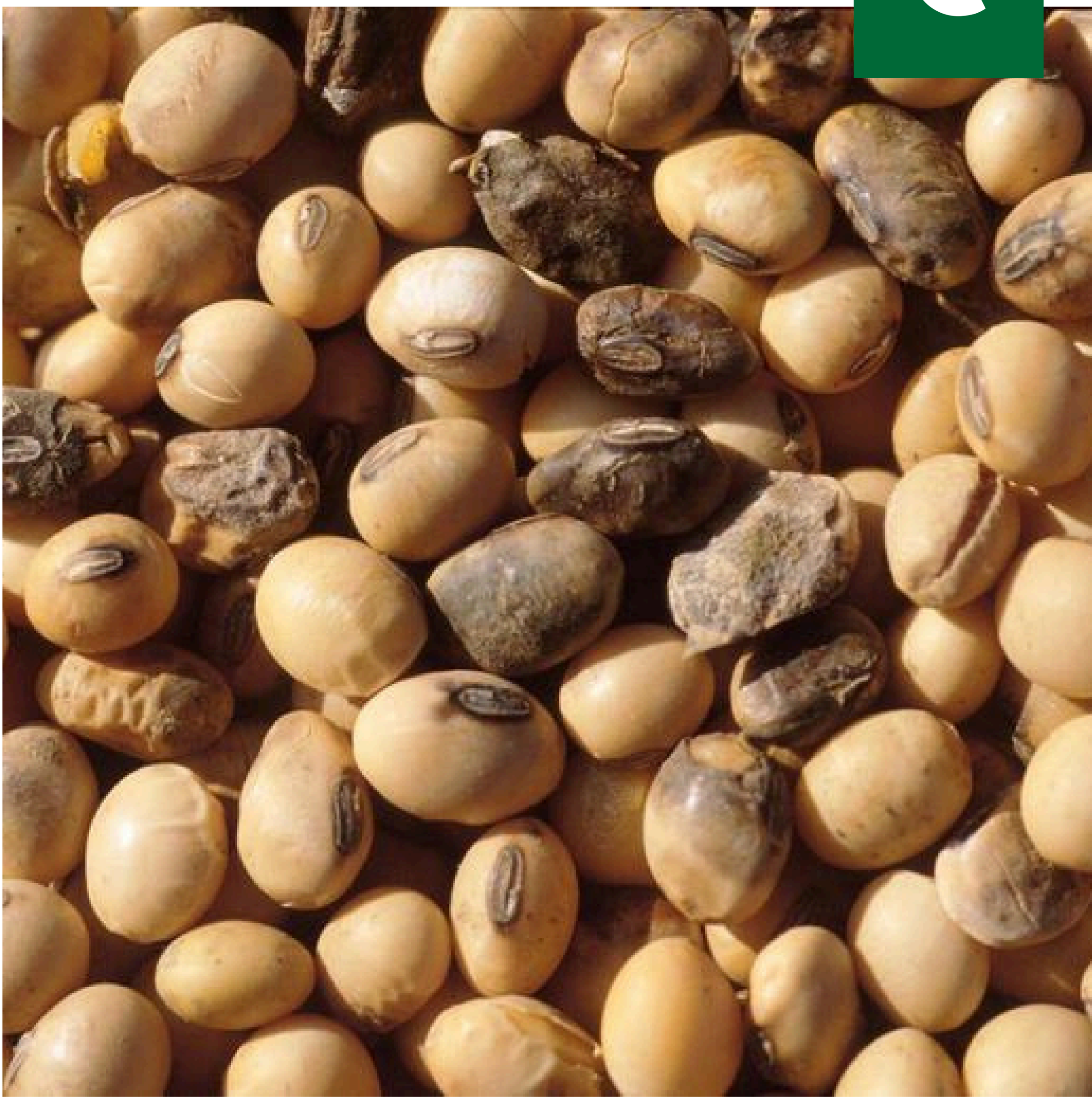

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Charcoal Rot

Pathogen: Fungi

Possible Causative Agent: *Macrophomina phaseolina*

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Charcoal Rot

Pathogen: Fungi

Possible Causative Agent: *Macrophomina phaseolina*

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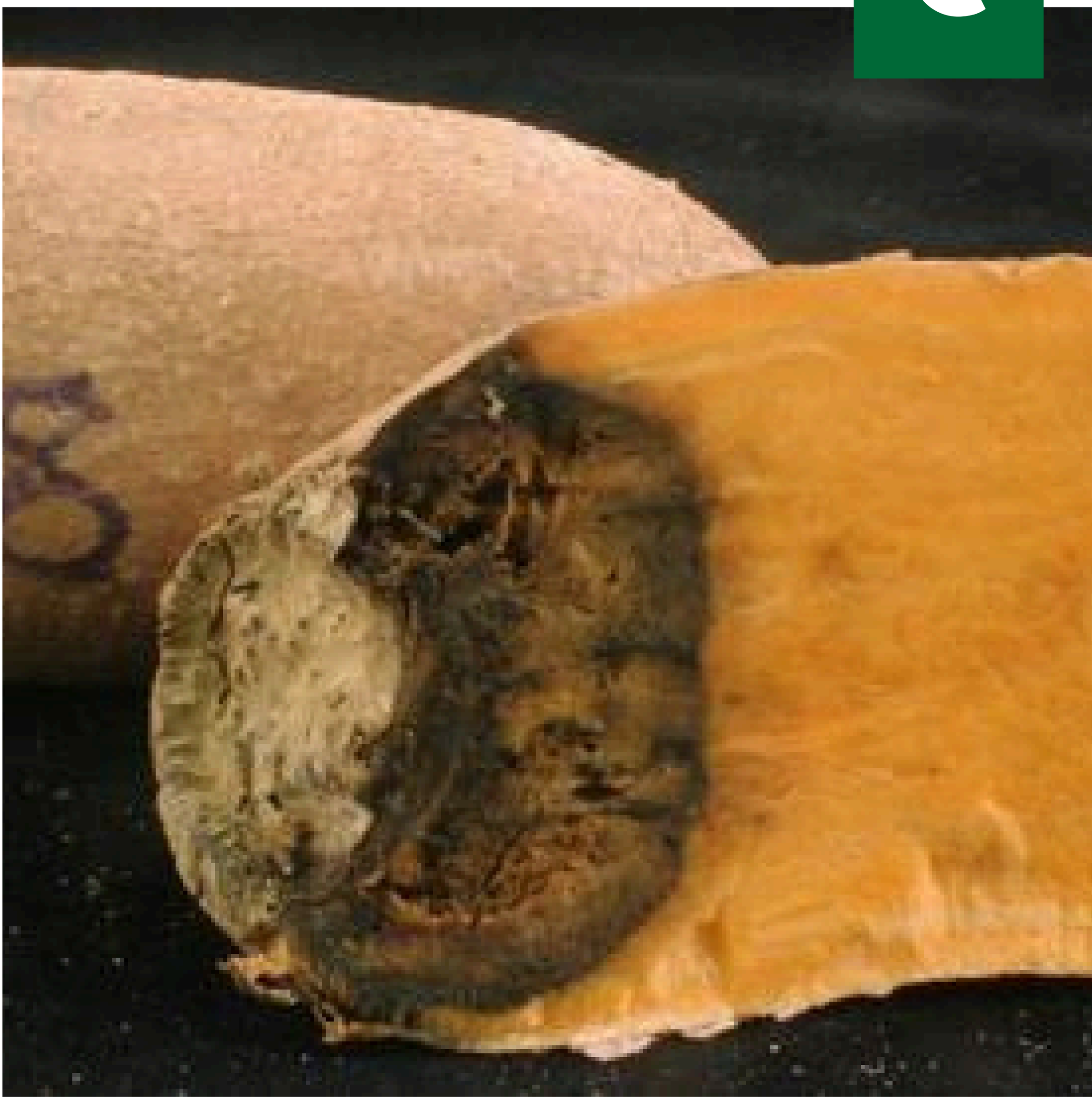

Photo Credit: Alan Henn, Mississippi State University, Bugwood.org

Charcoal Rot

Pathogen: Fungi

Possible Causative Agent: *Macrophomina phaseolina*

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Photo Credit: Tristan Mueller, Bugwood.org

Damping Off

Pathogen: Fungi

Possible Causative Agent: *Rhizoctonia* sp.

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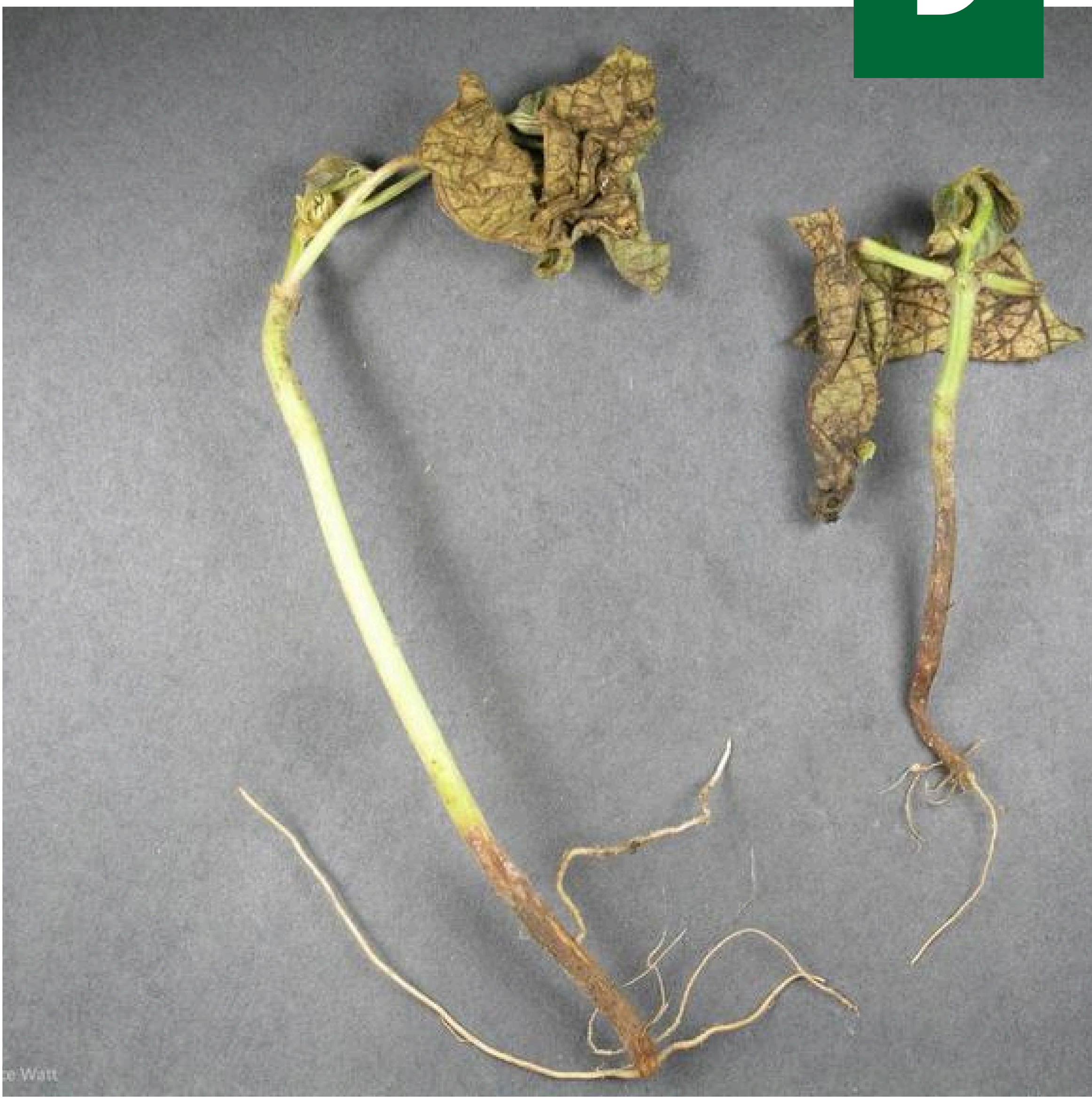

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Damping Off

Pathogen: Fungi

Possible Causative Agent: *Fusarium* spp.

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Damping Off

Pathogen: Fungi

Possible Causative Agent: *Fusarium* spp.

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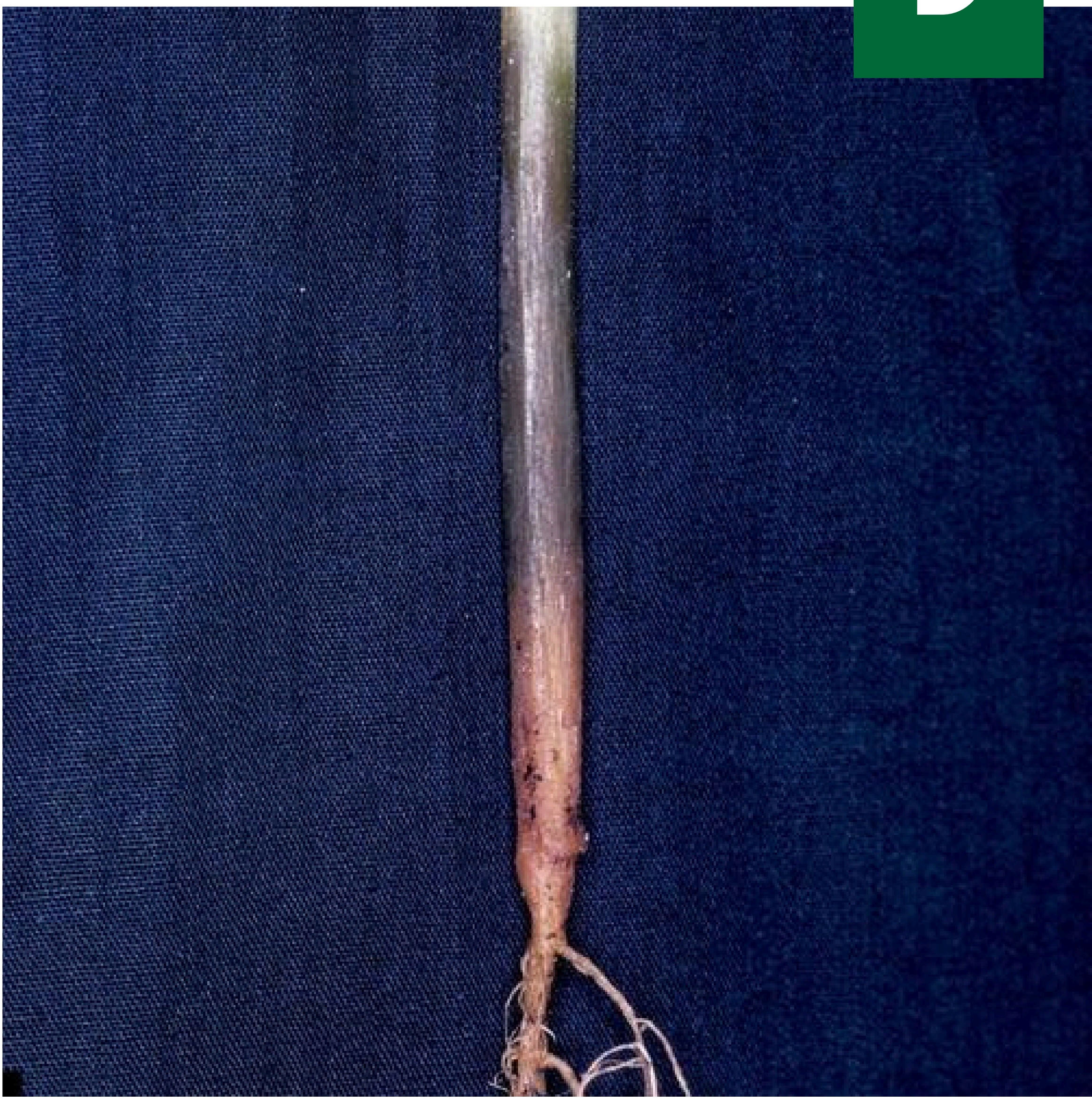

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Damping Off

Pathogen: Fungi

Possible Causative Agent: *Pythium* spp.

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Damping Off

Pathogen: Fungi

Possible Causative Agent: *Pythium* spp.

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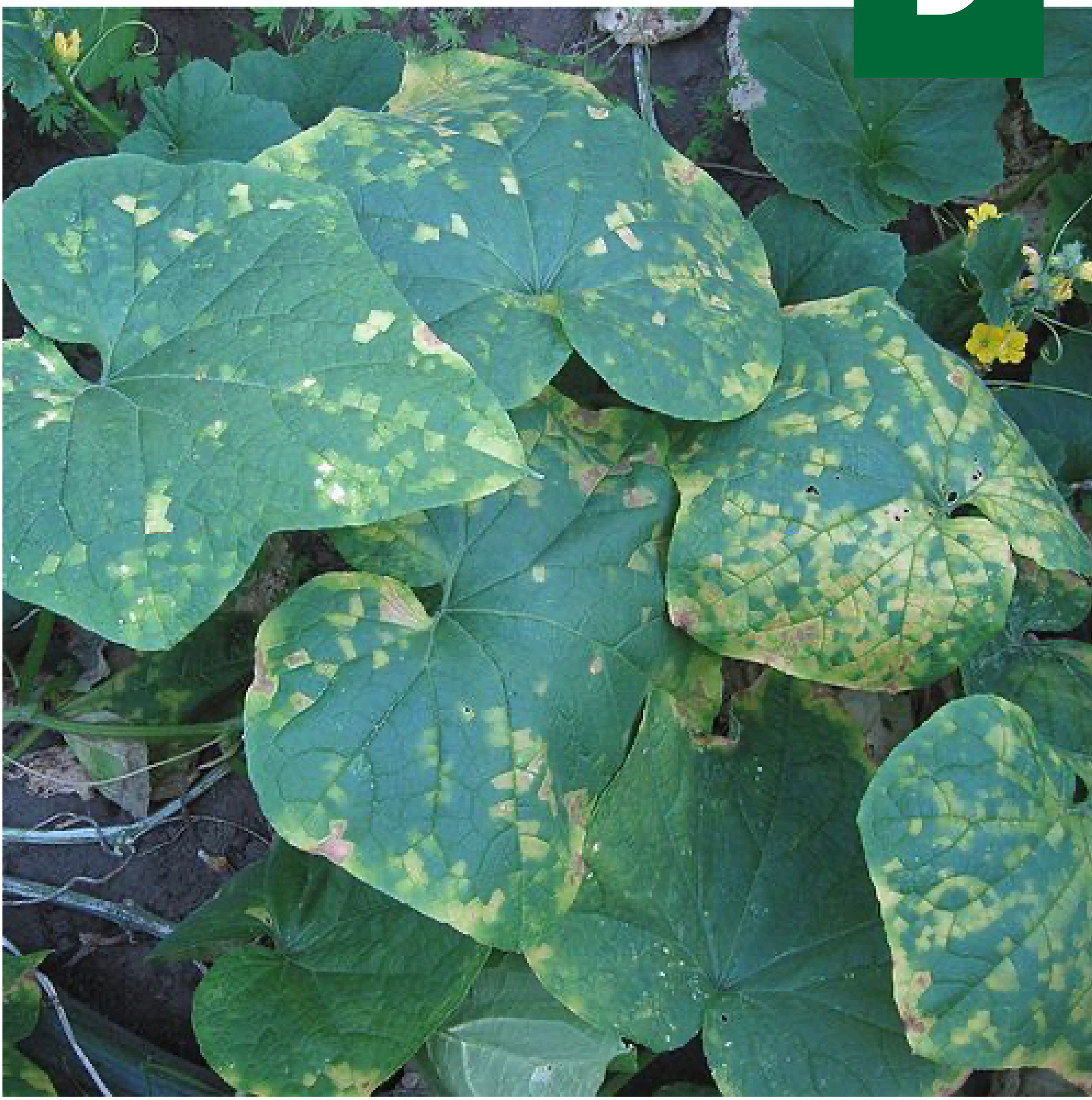

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Downy Mildew

Pathogen: Oomycete

Possible Causative Agent: *Pseudoperonospora cubensis*

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Downy Mildew

Pathogen: Oomycete

Possible Causative Agent: *Pseudoperonospora cubensis*

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Downy Mildew

Pathogen: Oomycete

Possible Causative Agent: *Peronosclerospora* sp.

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Photo Source: Ghosh D, Kokane S, Savita BK, Kumar P, Sharma AK, Ozcan A, Kokane A, Santra S. Huanglongbing Pandemic: Current Challenges and Emerging Management Strategies. *Plants*. 2023; 12(1):160.

Greening

Pathogen: Bacteria

Possible Causative Agent: *Candidatus* Liberibacter asiaticus, Candidatus Liberibacter americanus

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Leaf Curl

Pathogen: Virus

Possible Causative Agent: *Tomato leaf curl virus*

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Leaf Spot

Pathogen: Bacteria

Possible Causative Agent: *Pseudomonas* sp.

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Leaf Spot

Pathogen: Bacteria

Possible Causative Agent: *Xanthomonas* spp.

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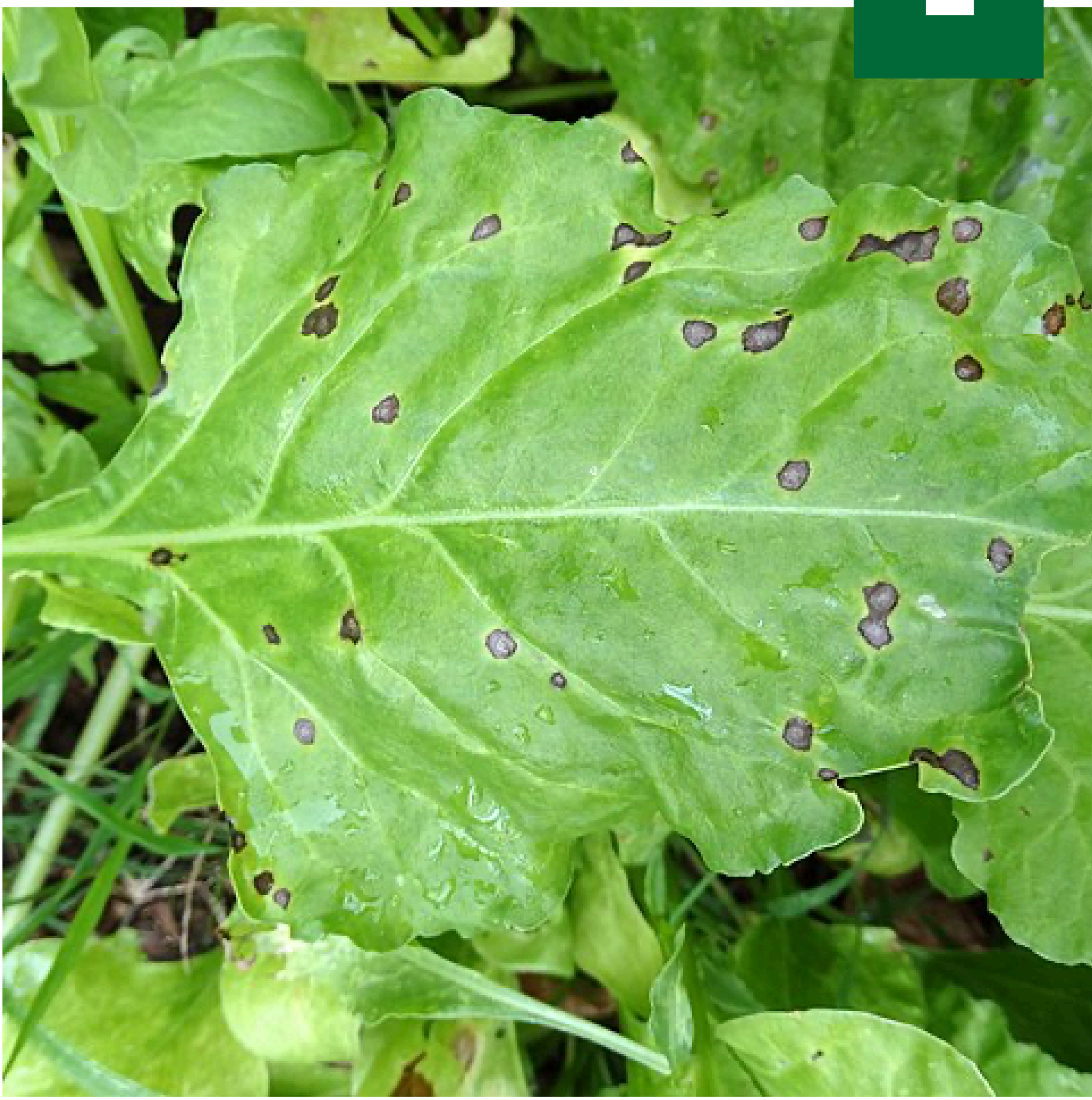
Leaf Spot

Pathogen: Fungi

Possible Causative Agent: *Curvularia* sp.



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Leaf Spot

Pathogen: Fungi

Possible Causative Agent: *Cercospora* sp.

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Leaf Spot

Pathogen: Fungi

Possible Causative Agent: *Cercospora* sp.

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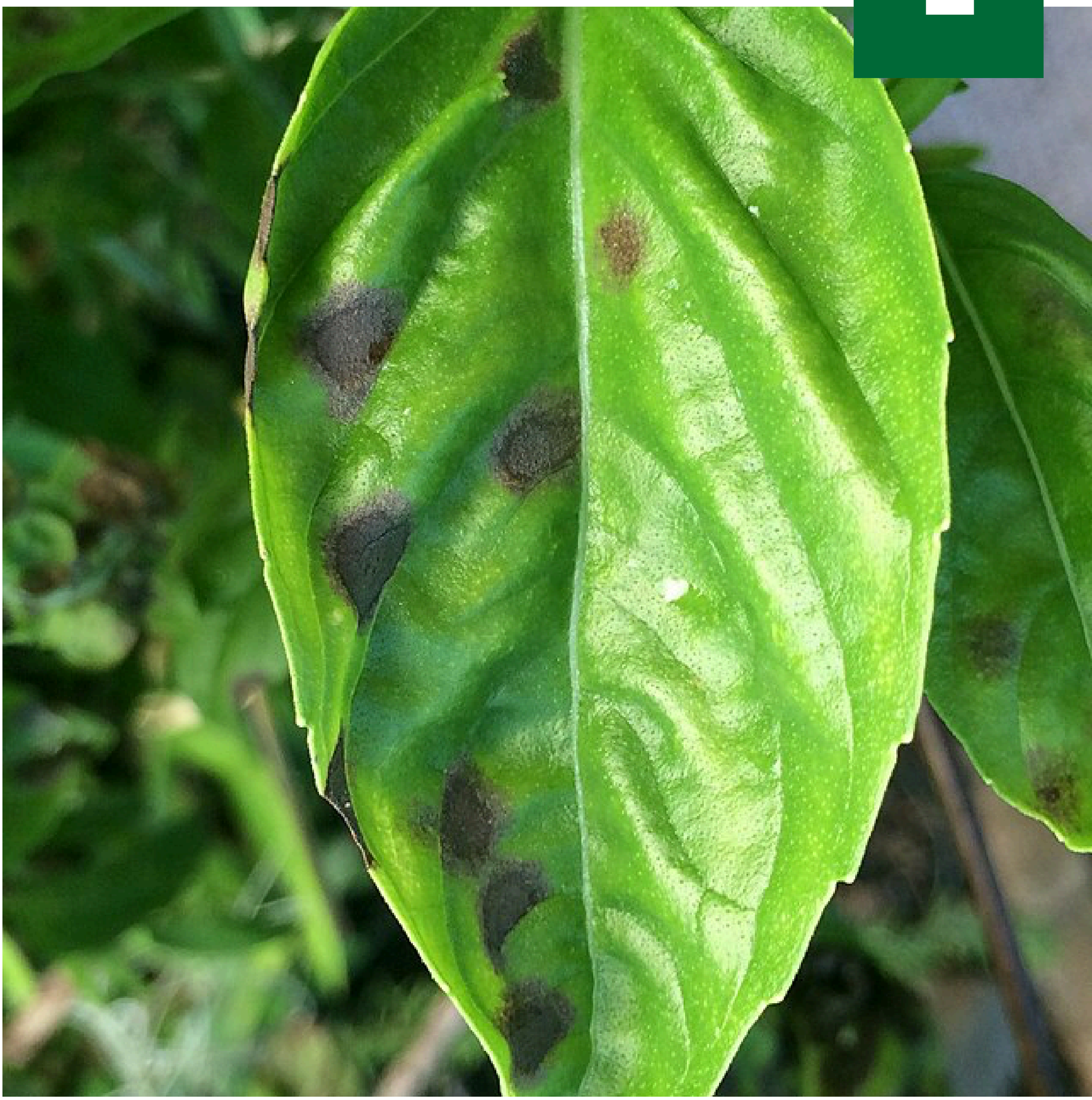

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Leaf Spot

Pathogen: Fungi

Possible Causative Agent: *Pseudocercospora* sp.

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Leaf Spot

Pathogen: Fungi

Possible Causative Agent: *Cordana muse*

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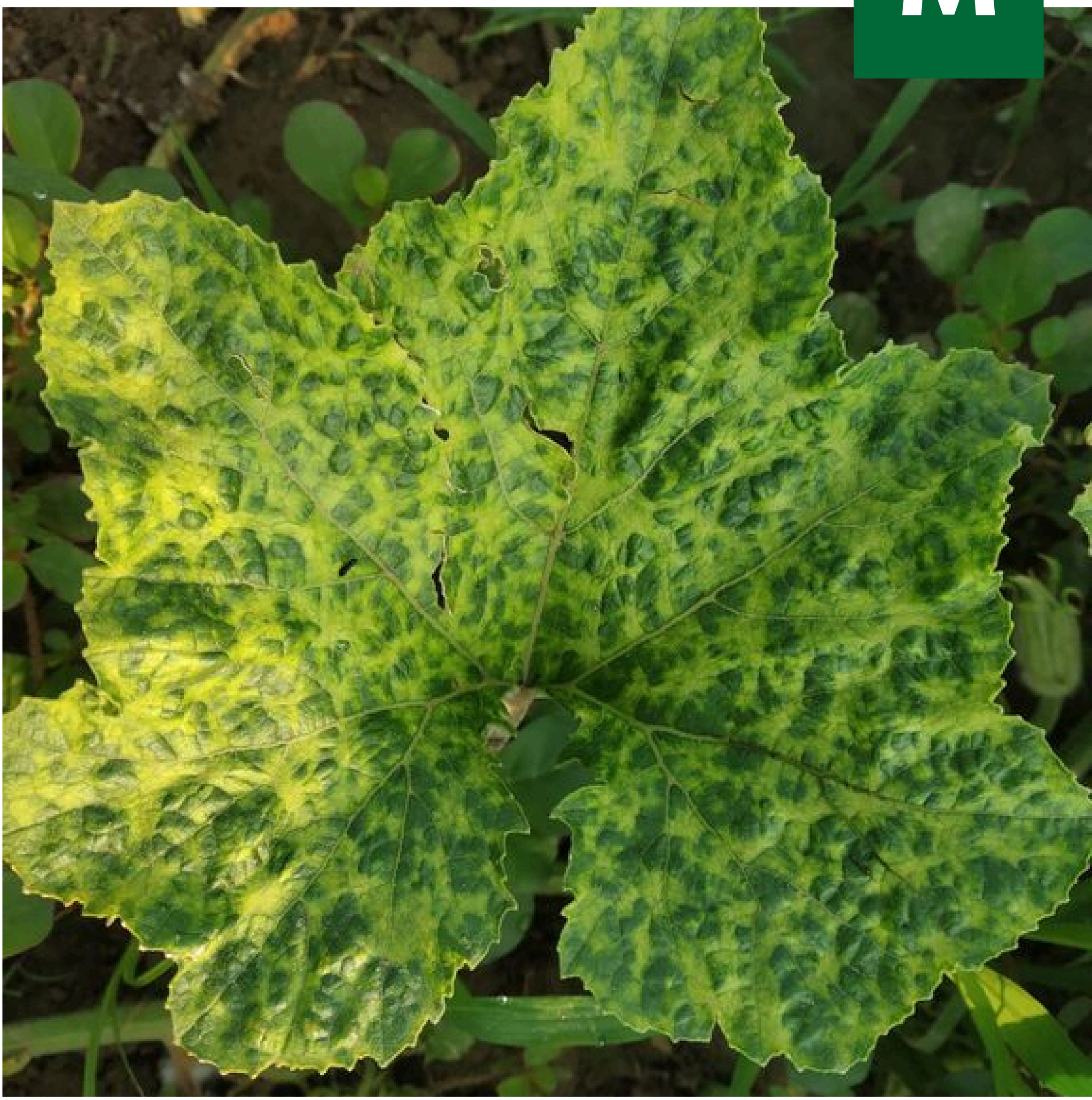

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Mosaic

Pathogen: Virus

Possible Causative Agent: *Cucumber mosaic virus*

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Mosaic

Pathogen: Virus

Possible Causative Agent: Unknown

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Mosaic

Pathogen: Virus

Possible Causative Agent: *Cucumber mosaic virus*

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Powdery Mildew

Pathogen: Fungi

Possible Causative Agent: Various (e.g., *Erysiphe* spp., *Podosphaera* spp.)

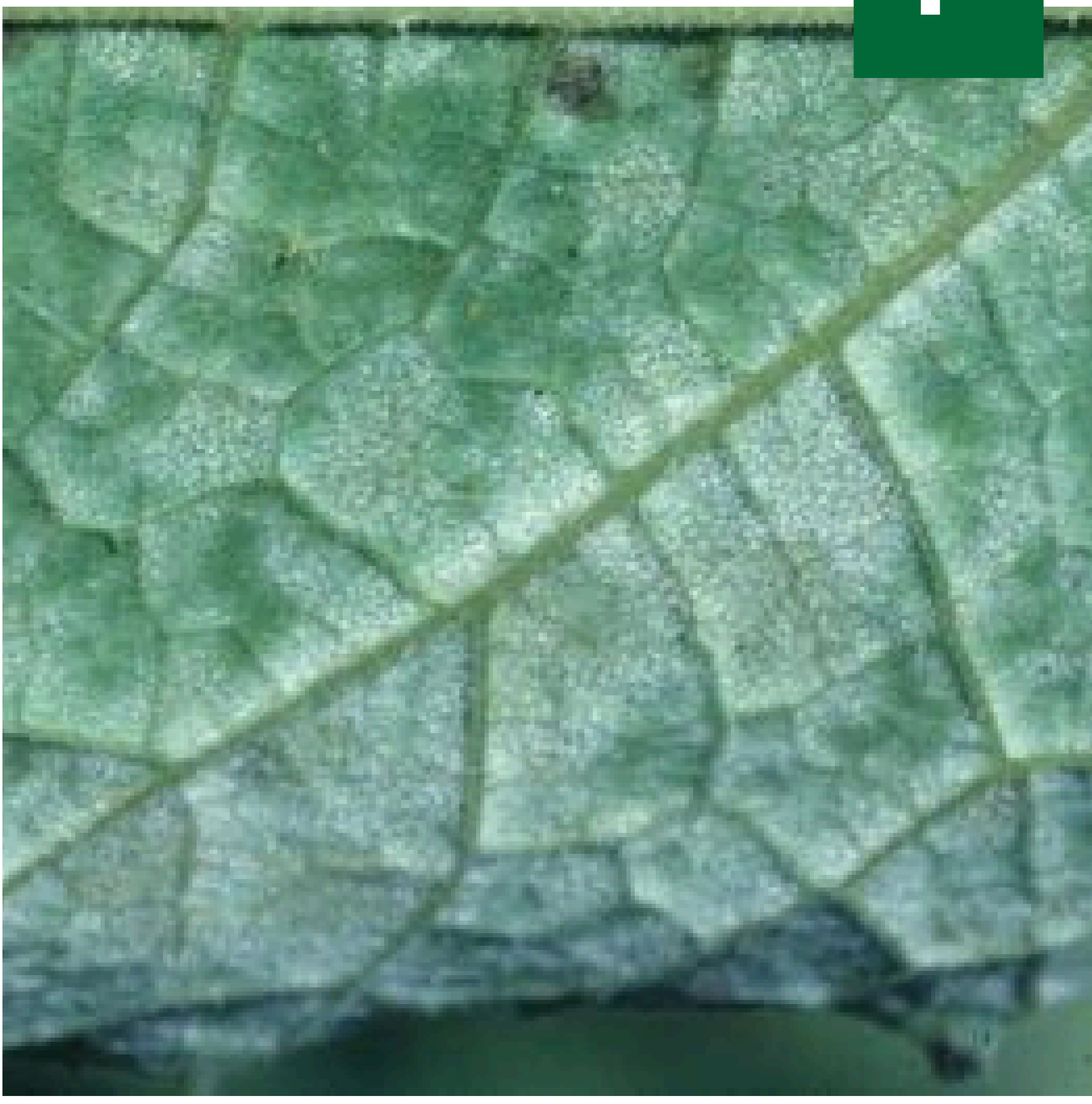

Photo Credit: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

Powdery Mildew

Pathogen: Fungi

Possible Causative Agent: Various (e.g., *Erysiphe* spp., *Podosphaera* spp.)

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Red Rot

Pathogen: Fungi

Possible Causative Agent: *Colletotrichum falcatum*

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Ringspot

Pathogen: Virus

Possible Causative Agent: *Papaya ringspot virus*

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Root Knot

Pathogen: Nematode

Possible Causative Agent: *Meloidogyne incognita*

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Rust

Pathogen: Fungi

Possible Causative Agent: *Hemileia vastatrix*

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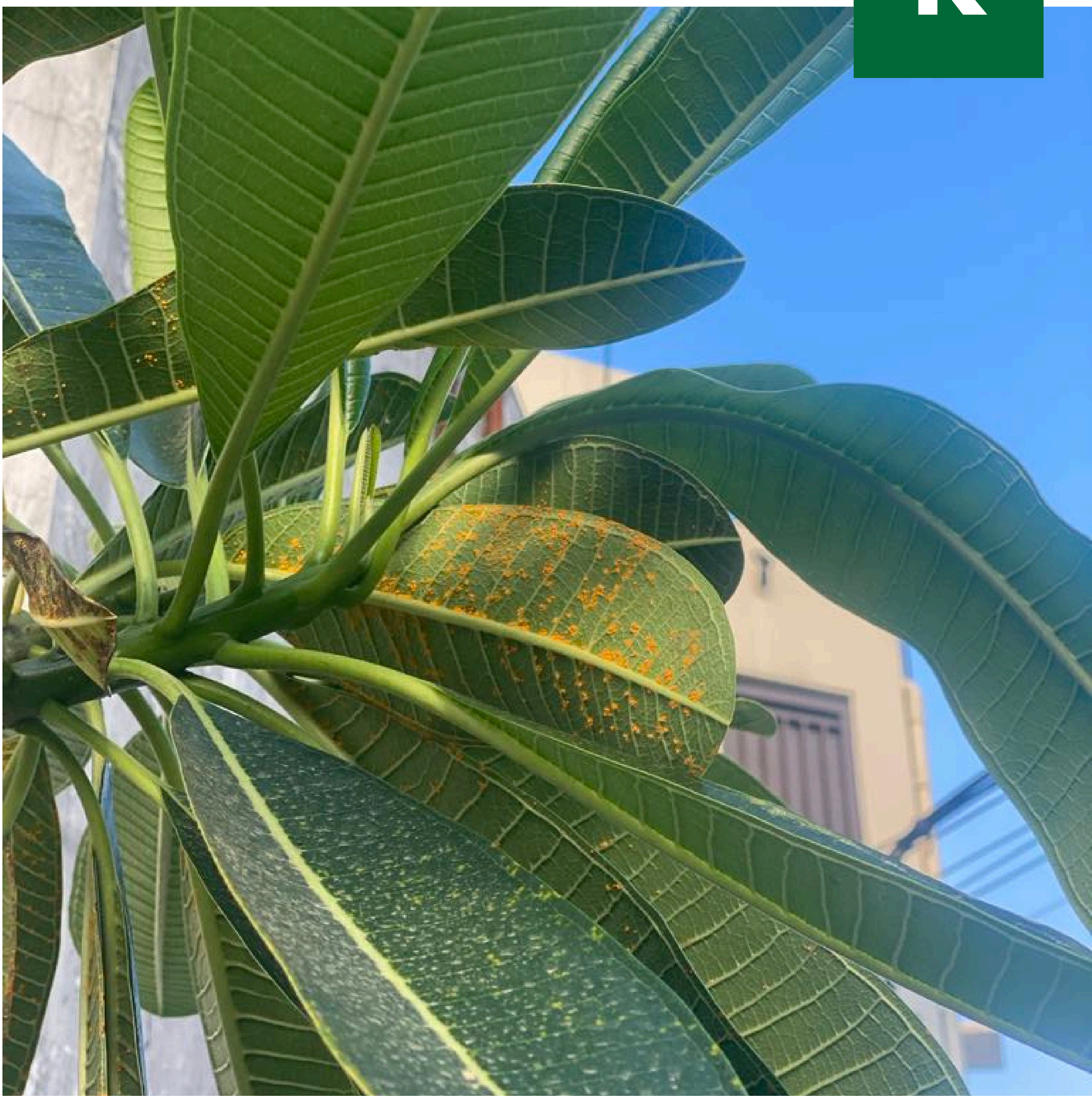

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Rust

Pathogen: Fungi

Possible Causative Agent: *Coleosporium* sp.

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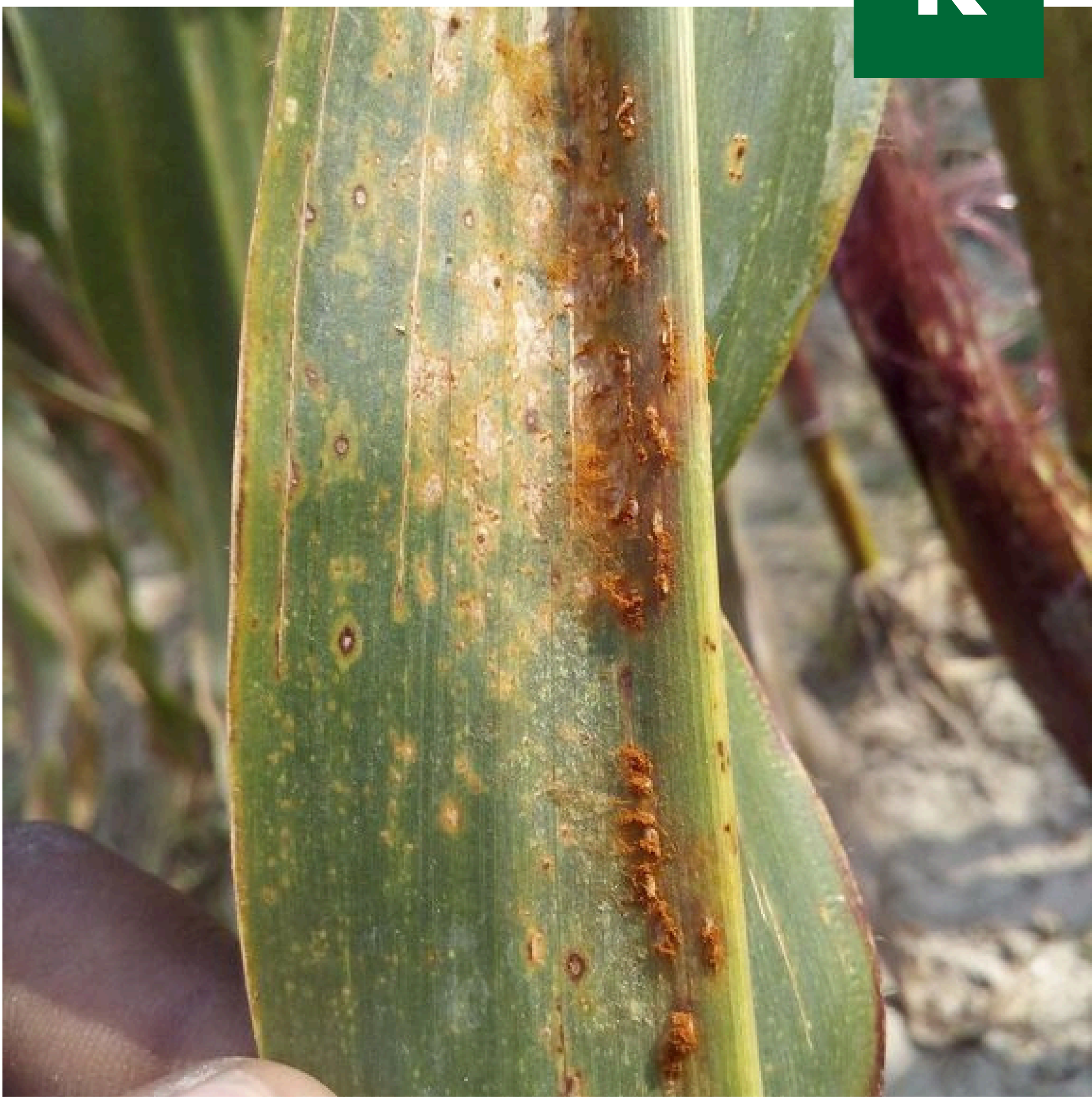

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Rust

Pathogen: Fungi

Possible Causative Agent: *Puccinia* sp.

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Scab (Common)

Pathogen: Bacteria

Possible Causative Agent: *Streptomyces* spp.

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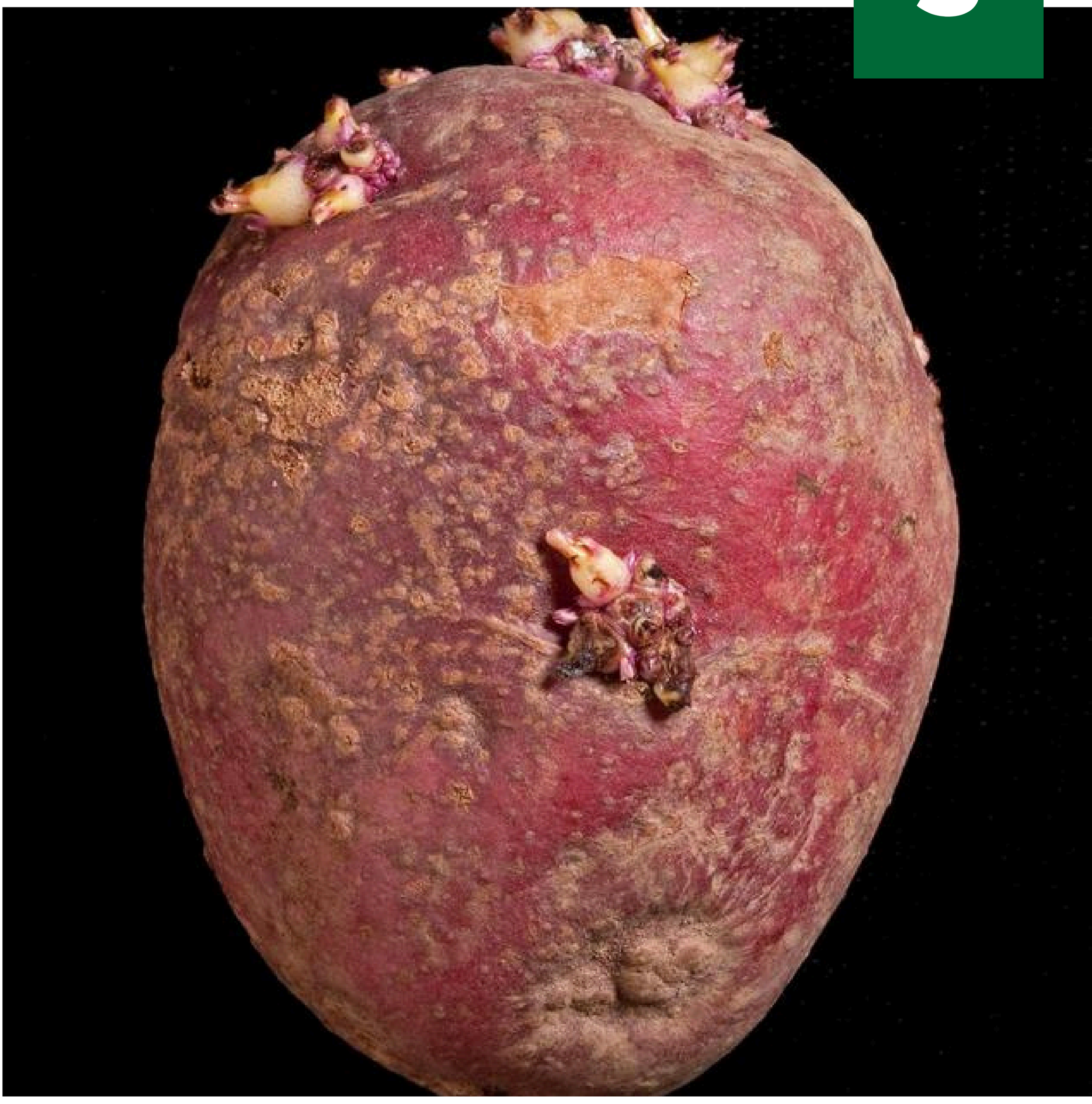

Photo Credit: Blair Janson, The Ohio State University, Bugwood.org

Scab (Powdery)

Pathogen: Plasmodiophorid

Possible Causative Agent: *Spongospora subterranea*

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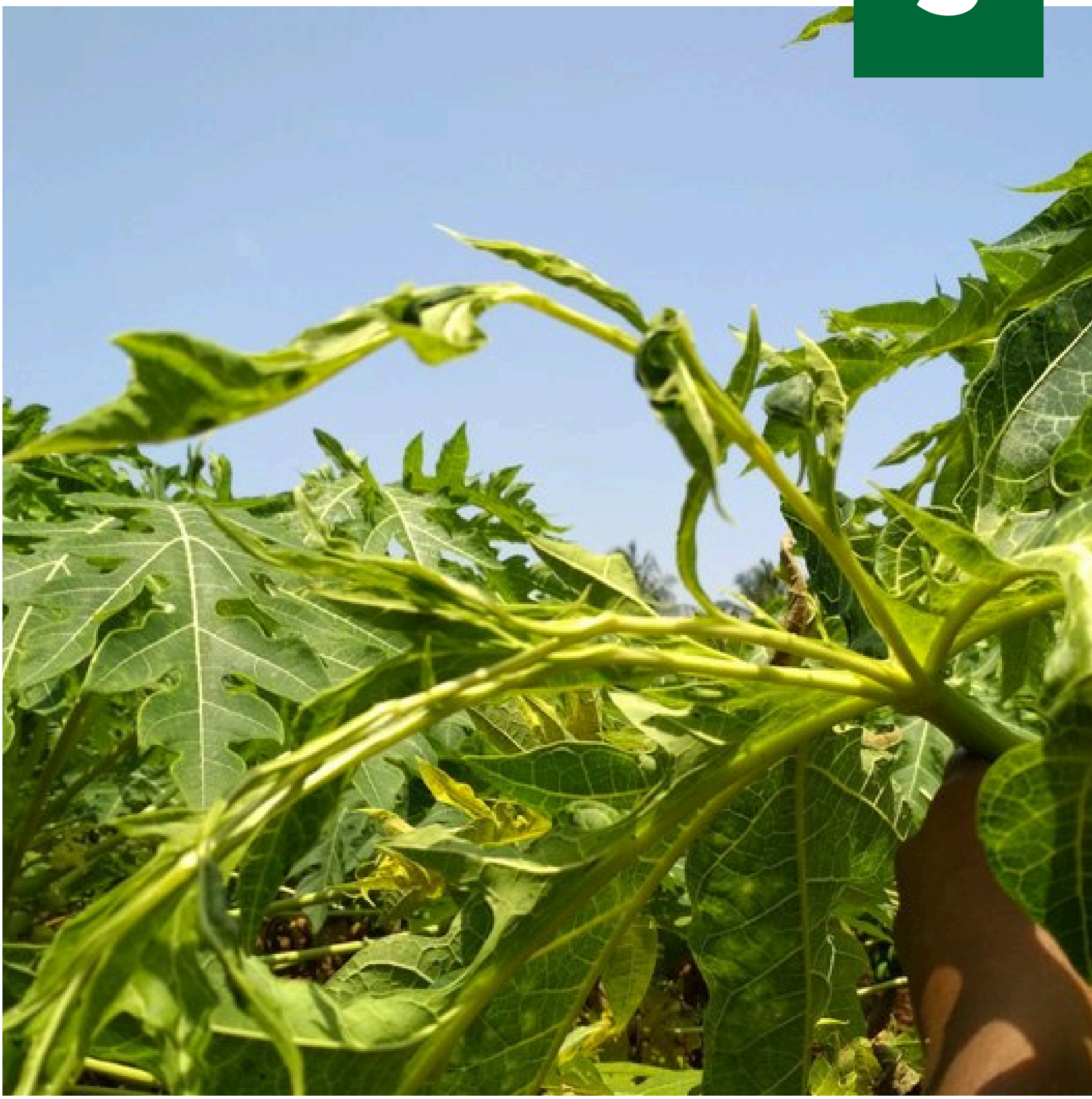

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Shoestring

Pathogen: Virus

Possible Causative Agent: various

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Smut

Pathogen: Fungi

Possible Causative Agent: *Ustilago maydis*

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Photo Credit: Yuan-Min Shen, National Taiwan University, Bugwood.org

Soft Rot

Pathogen: Fungi

Possible Causative Agent: *Rhizopus* sp.

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Photo Credit: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org

Soft Rot (Bacterial)

Pathogen: Bacteria

Possible Causative Agent: various

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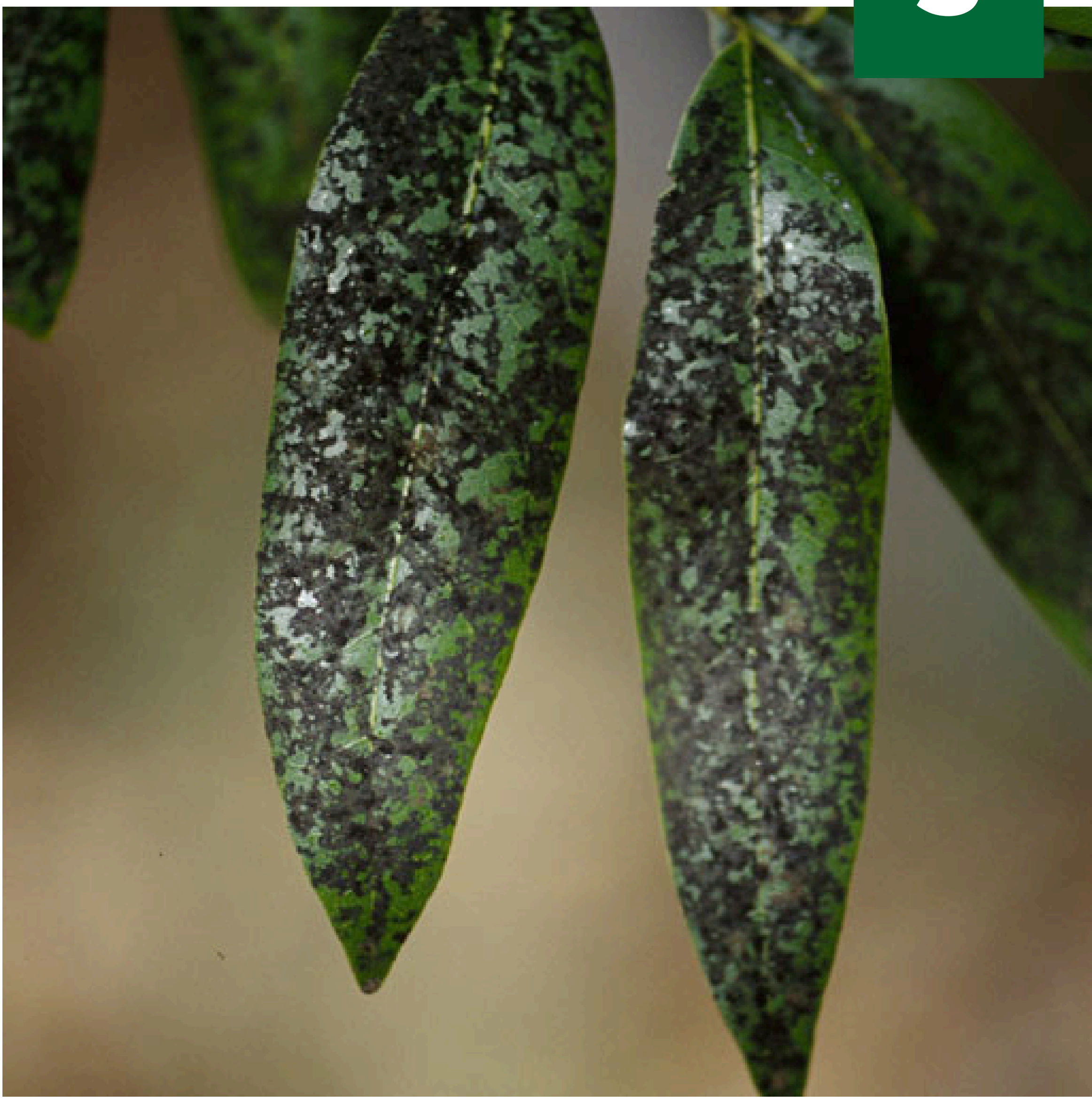

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Sooty Mold

Pathogen: Fungi

Possible Causative Agent: *Capnodium* sp., *Cladosporium* sp.

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Sooty Mold

Pathogen: Fungi

Possible Causative Agent: *Capnodium* sp., *Cladosporium* sp.

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Stem-end Rot

Pathogen: Fungi

Possible Causative Agent: *Lasiodiplodia theobromae*

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Tar Spot

Pathogen: Fungi

Possible Causative Agent: *Phyllachora* sp.

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Photo Credit: Thirunarayanan Perumal, Banaras Hindu University, Bugwood.org

Wilt (Fungal)

Pathogen: Fungi

Possible Causative Agent: *Fusarium* spp.

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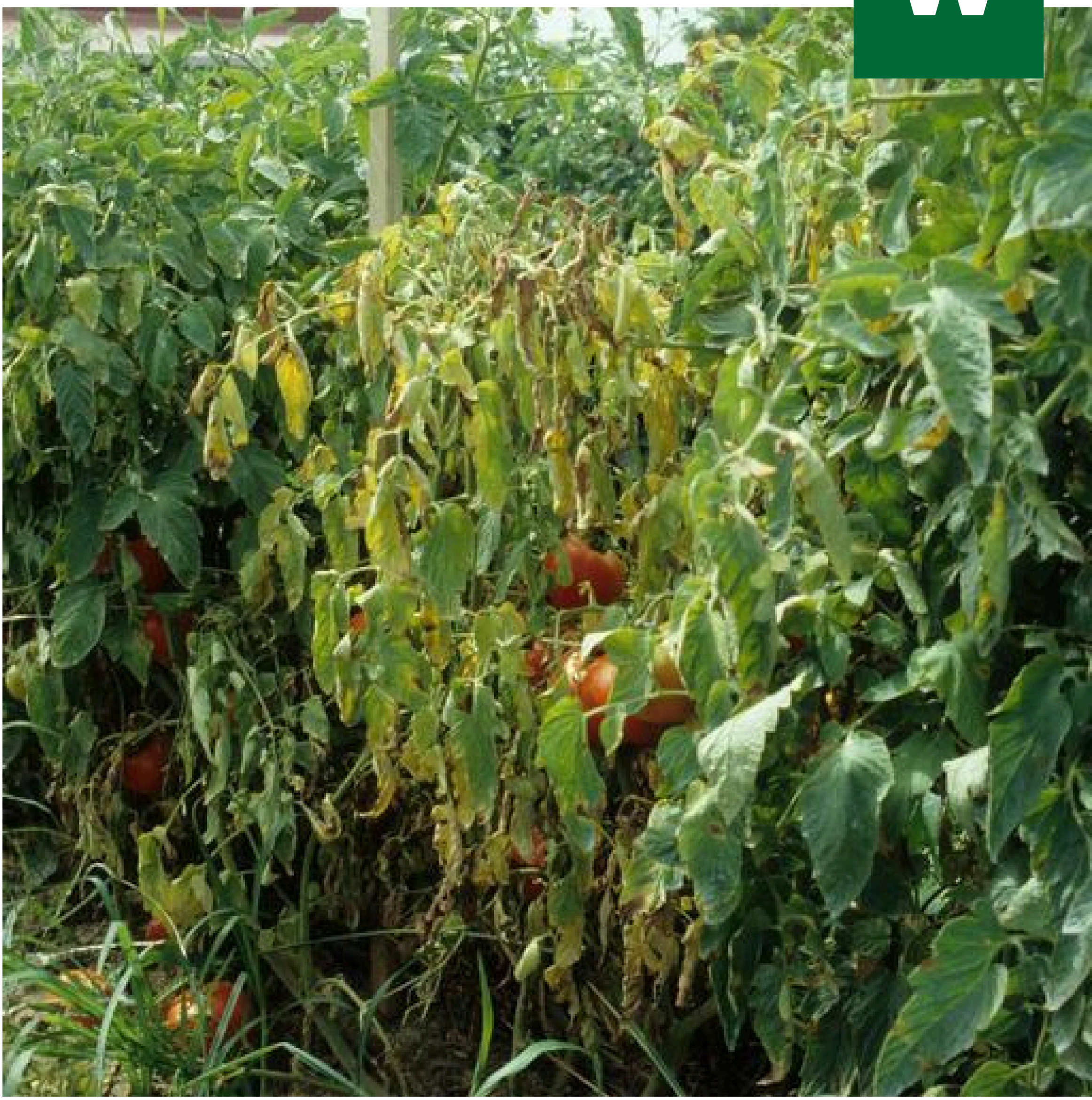

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Wilt (Fungal)

Pathogen: Fungi

Possible Causative Agent: *Fusarium* spp.

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Photo Credit: Rebecca A. Melanson, Mississippi State University Extension, Bugwood.org

Wilt (Bacterial)

Pathogen: Bacteria

Possible Causative Agent: *Ralstonia solanacearum* species complex

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- Balendres, M. A., Oraye, C., Maghirang, R., & Dela Cueva, F. (2021). Resistance of roselle to bacterial wilt caused by *Ralstonia pseudosolanacearum* and *R. solanacearum*. International Journal of Vegetable Science, 27(3), 231-237.

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