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Cooperative Extension & Outreach
Technical Report
TR 04-22

Foliar Pathogens in Guam: *Botrytis*

Diseases: Gray Mold, Tan Leaf Spot

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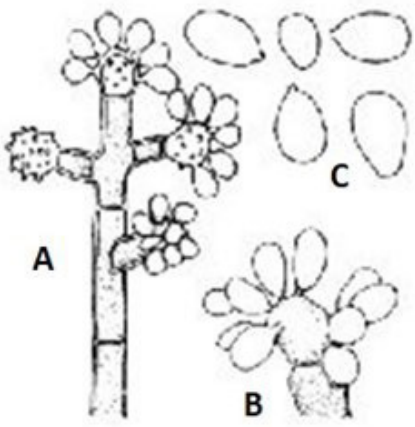

Figure 1. [A] Conidiophore bearing cluster of spores; [B] Sporulating tip of conidiophore; [C] Mature conidia
Illustration by L. Gray, University of Illinois Extension

Introduction

The name **Botrytis** is derived from the Greek work 'botrus,' meaning grapes. This fungal pathogen is named because its conidia (spores) look like a clump of grapes when attached to its conidiophore (spore bearing hypha) (Fig. 1, Fig. 4). The name **GRAY MOLD** refers to a phase in the development of the fungus, during which it acquires the appearance of a gray fuzz. This gray fuzz is due to the production of abundant gray mycelium and long, branched conidiophores that have ovoid and one-celled conidia with protuberances on the cell wall. Conidia (asexual spores) are mainly responsible for propagation and dispersal of the fungus. *Botrytis* can infect all aerial plant parts. Symptoms include fruit rots, blossom blight, and gray mold. Twenty species are responsible for gray mold on 200 hosts including beans, potatoes, tomatoes, peppers, leafy vegetables, soft fruits, and some shrubs, trees, and ornamentals. Historically, the sexual stage of the fungus is that of an ascomycete within the Sclerotiniaceae family. Members of the Sclerotiniaceae family form sclerotia (dark bodies of compact hyphae) and produce stalked apothecia, or open fruiting bodies which contain ascospores (sexual spores).

Hosts

The genus *Botrytis* was referenced to 7 times in the Index of Plant Diseases on Guam as causing foliar infections on cabbage, sweet potato, and on the weed *Euphorbia cyanthophora* (dwarf poinsettia). In the Diseases of Cultivated Crops in Pacific Island Countries, *Botrytis* was not mentioned; however, a species of *Sclerotinia* was mentioned causing wilt on lettuce.

Figure 2. Clusters of conidia on the end of thin black "hairs," typical of *B. cinerea* species
Photo: J. Williams-Woodward, UGA Extension Plant Pathology

Morphology of *Botrytis cinerea*

Botrytis cinerea produces a gray to whitish-gray layer of spores (conidia) and spore bearing hypha (conidiophores) over the affected tissue (Fig. 2, Fig. 7). Conidiophores are long (750 µm to over 2,000 µm), slender (18-23 µm), may be clear or pigmented (often darkly-colored when viewed through a microscope (Fig. 3)), and branch irregularly at the end; terminal cells are enlarged or rounded and bear clusters of conidia. Conidiophores are commonly clustered but may also be dispersed on the leaf surface. Conidia are 6-9 x 8-14 µm, single-celled, ovoid, and clear or grayish en mass (Fig. 3, Fig. 4). The fungus also produces black "survival" structures called sclerotia (Fig. 5). Sclerotia are

hardened masses of hyphae that allow the fungus to persist on crop debris or in soil. They are usually dark, often oval, firmly attached to the substrate, and roughly 2-4 x 1-3 mm. Rarely present is its sexual structure, a small apothecium (cup-shaped fruiting body) lined with asci (saclike structure containing spores) with a height of 7-12 mm and disk width of 3-4 mm.

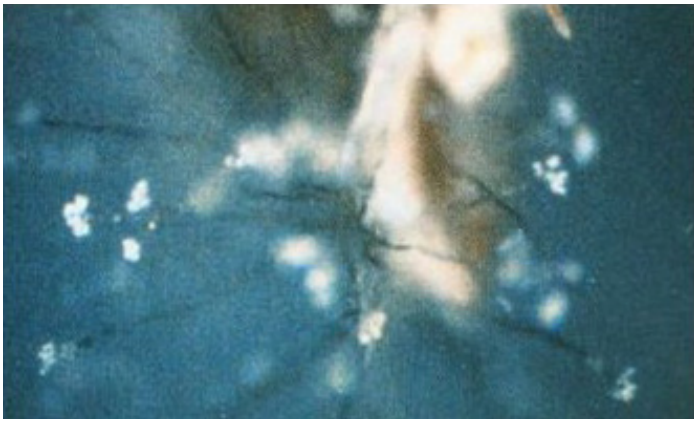

Figure 3. Tall and slender conidiophores with terminal clusters of conidia, typical of *B. cinerea* species
Photo: J. Williams-Woodward, UGA Extension Plant Pathology

Figure 4. Clumps of conidia on branched conidiophores, typical of *B. cinerea* species
Photo: J. Williams-Woodward, UGA Extension Plant Pathology

Visibility of *Botrytis cinerea*

- **With the unaided eye:** brown spots on leaves will have a fuzzy, moldy appearance (Fig. 5, 6, & 7).
- **With a 14X coddington hand lens:** clusters of light gray spores at the end of thin black hairs (conidiophores) are visible (Fig. 2).
- **With a dissecting microscope:** clusters of grayish conidia are more easily seen on the ends of tall conidiophores (Fig. 3).
- **With a compound microscope:** conidia and conidiophores are seen in detail (Fig. 4).

Disease Development of Gray Mold on Guam

Botrytis cinerea is a necrotrophic fungus, meaning it kills its host cells and uses their contents to support its growth. Gray mold disease is occasionally encountered on Guam even though conditions are not well suited for development. Ideal conditions for infection include at least 8 hours of leaf wetness and temperatures between 63-77°F; however, infection can occur as high as 86°F. Plants may be attacked at any stage but tender new growth, freshly injured tissues, and aging or senescent tissues are most vulnerable. *Botrytis* can affect both crops and weeds; therefore, weeds surrounding a field could be an important source of infectious spores. *B. cinerea* is difficult to control because it has a variety of modes of attack and inoculum from diverse hosts. It can survive for short periods both as mycelia and spores and extended periods in crop debris such as sclerotia (dark, compact hyphal masses).

Figure 5. *Sclerotinia sclerotiorum* causing white mold on soybean
Source: https://extension.umn.edu/pest-management/sclerotinia-stem-rot-white-mold-soybean

Figure 6. *B. cinerea* causing leaf symptoms on potato
Source: http://www.omafra.gov.on.ca/IPM/english/potatoes/diseases-and-disorders/botrytis.html

Figure 7. *B. cinerea* causing gray mold on stem of potato
Source: http://www.omafra.gov.on.ca/IPM/english/potatoes/diseases-and-disorders/botrytis.html#advanced

Foliar Symptoms

The development of *Botrytis's* typical gray fuzzed growth follows two to three weeks after infection. When it does occur, sporulation results in copious spores which are visible to the naked eye. Since the fungus can live in asymptomatic green tissue, leaf samples should be incubated in a moisture chamber for 24 to 48 hrs before judging a sample to be disease free. Once leaves begin dying in the field, the pathogen goes into an active stage, colonizing the leaf and producing sporulating tissue. Wedge-shaped, dark brown lesions with concentric rings usually develop on the tips or margins of leaflets (Fig. 6). Spots are initially limited by major veins, but may enlarge and coalesce to the point where they can envelop the entire leaf. Disease will continue to spread through petioles and stems, sometimes causing the entire stem to deteriorate. Under humid conditions a whitish mold develops, which will darken and give rise to a dense mass of brownish-grey spores, giving the disease its characteristic "gray mold" appearance (Fig. 5, Fig. 7).

For further information

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Acknowledgments

This material is based upon work that is supported by the University of Guam and the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2019-38640-29880 through the Western Sustainable Agriculture Research and Education program under project number WPDP20-001. USDA is an equal opportunity employer and service provider. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture or the University of Guam. The factsheet was prepared by UOG Extension Specialist Robert L. Schlub, Ph.D. and UOG Extension Associates Julia Hudson and Elizabeth Hahn on 10/19/2022. Reviewed by Drs. Marin T. Brewer and Leilani G. Sumabat.

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Published: 19 October 2022