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Issue Article

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MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF ALTERNARIA ALTERNATA

Abstract: *Alternaria alternata diseases, it is important to improve the current techniques to identify this species. Alternaria is a dictyosporic genus of the family Dematiaceae, order Hyphomycetes, Fungi Imperfecti. The genus was established in 1817 by Nees, with A. alternata (originally A. tenuis) as the type species. Initial events in the infection process caused by fungi in general, as well as by A. alternata, are spore adhesion to the cuticle and directed growth of the germ tube on the plant surface. Although it is known that there is a quiescent phase in the life cycle of Alternaria, it is not entirely clear whether the ungerminated or the germinated appressorium represents the quiescent stage.*

Key words: *Molecular, Morphological, Alternaria alternata Characterization, diseases, fruits.*

Language: *English*

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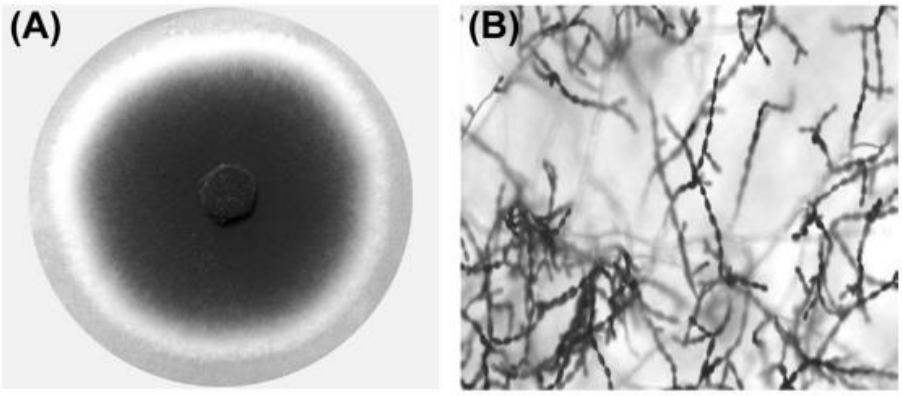
Introduction

Black spot is caused by Alternaria alternata in numerous fruits and vegetables around the world. It is a dormant fungus that develops during fruit cold storage and becomes evident during the marketing period, resulting in significant postharvest losses. To manage Alternaria alternata infections, present approaches for identifying this species must be improved. Alternaria is a dictyosporic genus in the Dematiaceae family, Hyphomycetes order, and Fungi Imperfecti. Nees created the genus in 1817, with A. alternata (formerly A. tenuis) as the type species. Several attempts have been made to identify and discriminate this species utilizing morphology, physiology, metabolic profile, coding area DNA sequences, DNA molecular markers, and a combination of two or more of the aforementioned approaches.

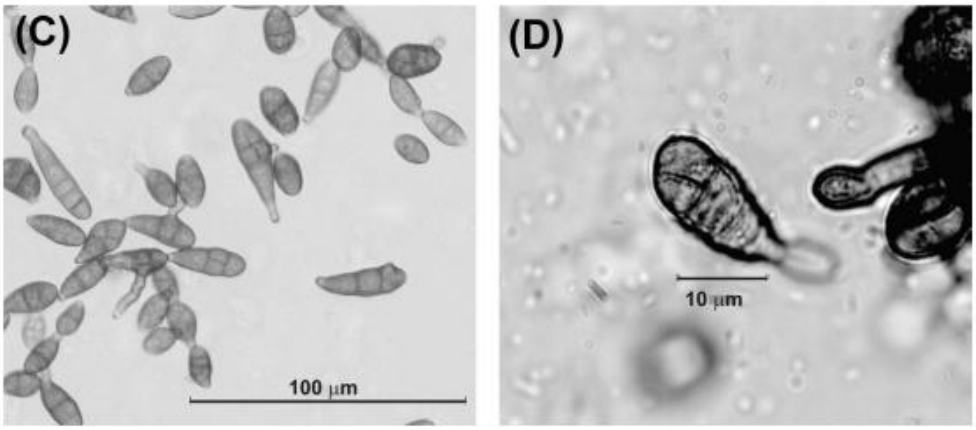
Most isolates produce colonies larger than 70mm in diameter after 7-10 days.A. alternata is identified by the creation of conidial chains six to 14 conidia in length and the growth of multiple secondary, and occasionally tertiary, chains two to eight conidia in length based on the sporulation habit of single-spored colonies. Chain branching occurs in a sympodial manner via secondary conidiophore extension from distal terminal conidial cells and subsequent conidium production. Small conidia (20-50 um long) are a distinguishing feature of this species. Unambiguous identification and classification of A. alternata has always been difficult, which is why some authors concluded that all plant pathogenic Alternaria species are in fact A. alternata and proposed differentiating them by using the term pathotype based on host specificity.



Pic.1 Alternaria alternata morphology. (A) Colonies of A. alternata growing on potato dextrose agar. (B) Conidial chains and chain branching of A. alternata

Spore adherence to the cuticle and directed growth of the germ tube on the plant surface are the first events in the infection process produced by fungus in general, as well as A. alternata. Apical deposition of wall glycoproteins and carbohydrates such as chitin and glucans cause germ tubes and hyphae to elongate. These components are formed into microfibrils during fungal apical expansion as a result of hydrogen bonding and cross-linking of neighboring polysaccharide chains. Melanin is another small component of Alternaria hyphae.

These fungal sheaths, which are associated with the germ tube of many fungi, are thought to mediate adhesion and infection court preparation. Conidia germinate on the surface of the host tissue, forming a germ tube and an appressorium. The germ tube is a specialized structure that differs from fungal mycelium in that it often grows just a short distance before differentiating into an appressorium. A specific narrow hyphal strand termed the penetration peg emerges from the appressorium and advances into and through the cuticle and cell wall. Plant penetration occurs only when melanin (dark pigment) accumulates in the appressorial cell wall. It appears that melanin forms a hard structural layer and causes water absorption by trapping solutes inside the appressorium.



Pic.2 Alternaria alternata (C) Conidia at ×40. (D) Conidia at ×100. (Photographs (B) and (C) are a kind gift from Professor Barry Pryor, Plant Pathology, University of Arizona, Tucson, Arizona, USA.)

Although it is known that Alternaria has a quiescent stage in its life cycle, it is not totally apparent whether the quiescent stage is represented by the ungerminated or germinated appressorium. Appressoria germinate to create infection hyphae prior to the commencement of quiescence, according to experimental findings. In any case, the fungus stops growing soon after appressorium development and remains dormant until the fruit ripens.

Each year, postharvest illnesses vary, and a variety of preharvest conditions influence their development. Weather (rainfall, temperature, humidity, and so on), production region, cultivar, cultural methods (pesticide application, fertilizer, irrigation, planting density, pruning, mulching, fruit bagging, and so on), and planting material are examples of these. These factors may have a direct impact on disease development by limiting inoculum

sources or discouraging infection. Alternatively, they may alter the physiology of the crop in such a way that disease development occurs after harvest.

Alternaria species is a robust fungus that can survive in harsh environments. A. alternata can spend the winter as mycelia and/or conidia in soil, seed, diseased agricultural debris, or perennial host tissue such as bark, nodes, and scaly leaves. Some strains can develop survival structures in order to withstand unfavorable environments. While some Alternaria species require stimulation to induce conidiophore development and sporulation, A. alternata can sporulate on its own. A. alternata spores can be propelled into the air by a change from moist to dry conditions, a fast increase in humidity, or exposure to red light.

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