

Acidovorax citrulli in watermelon and other cucurbits

Dr. Norman Schaad

Karpuz ve Diğer Kabakgillerde *Acidovorax citrulli*

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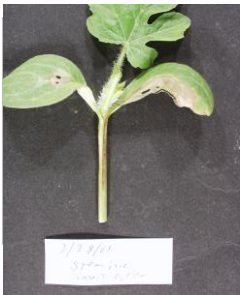
Symptoms caused by *A. citrulli* on watermelon and other cucurbits

- Symptoms on foliage
- Symptoms on fruits

Origin of Watermelon Fruit Blotch

- 1965 - Seedling blight of watermelon reported in USDA PI lines 174103 and 104 in Georgia by Webb and Goth caused by unidentified bacterium
- 1978 - The disease was described by Schaad et al. and the causal organism identified as *Pseudomonas pseudoalcaligenes* subsp. *citrulli* in same PI lines used by Webb and Goth
- 1989- The first outbreak in the US occurred in Florida
- 2008- Pathogen renamed *Acidovorax avenae* subsp. *citrulli* and more recently *A. citrulli* by Schaad et al.

Acidovorax citrulli



Water soaking caused by *A.citrulli* infection on watermelon cotyledon
Reddish brown lesion on watermelon leaves

Economic Importance of Watermelon

- Watermelon grown on more than 250,000 acres in US

Crop losses and legal liabilities from watermelon fruit blotch threaten the existence of the industry



Reddish brown foliar lesion associated with fruit blotch in melon plant

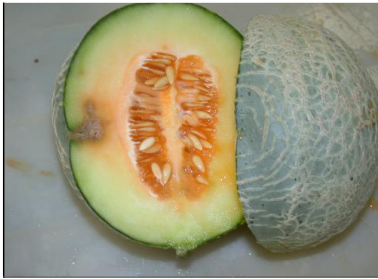




Cracks developed in the rind of watermelon fruit



Internal watermelon fruit rot associated with advanced stage of infection



Lesion on fruit



Rotten cavities in the flesh of melon fruit infected with *A. citrulli*





Hosts of WFB

- Watermelon
- Melon
- Pumpkin
- Squash
- Cucumber
- Gourds

Global Distribution of WFB

- Australia
- Brazil
- Canada
- China
- Costa Rica
- Greece
- Honduras
- Hungary
- Israel
- Iran
- Japan
- Mexico
- Nicaragua
- Taiwan
- Thailand
- Turkey
- USA

Distribution of WFB in the US

- Alabama
- Florida
- Georgia
- Illinois
- Indiana
- Iowa
- Missouri
- North Carolina
- Oklahoma
- South Carolina
- Texas

Phenotypic Characteristics of *A. citrulli*

- Gram-negative
- Non-pigmented
- Polar-flagellated
- Aerobic
- Oxidase positive
- Non-fluorescent on KB medium

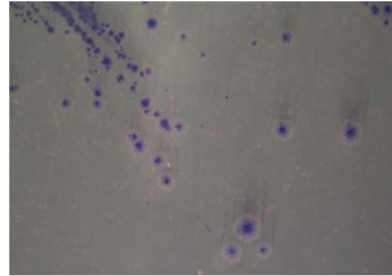
Key Characteristics for Identification

- **Growth at 41C**
- Tan to brown colonies on YDC
- Utilizes β -alanine, n-propanol, and ethanol but not sucrose or glucose
- Colonies have spreading margin

Characterization

Group I and II strains

- Based on DNA analysis of a global collection of strains *Acidovorax citrulli* strains can be typed into two groups:
- Group I strains are moderately aggressive on most cucurbits
- Group II strains are highly aggressive on watermelon but mild on other cucurbits
- Georgia has group I only



Acidovorax citrulli colonies growing on EBBA medium
After 5-7 days of growth at 28C colonies have a clear margin with blue-purple center

Epidemiology of WFB

- WFB is seed transmitted
- Symptomatic fruit generally contain infected seeds
- Infections of flowers at pollination stage can lead to seed infections with no obvious fruit symptoms (Walcott et al. 2002)
- Severe disease occurs under high temperatures and overhead watering in greenhouse transplant operations or under high rainfall in the field

Control Of WFB

- Use of disease free seeds:
 - Production of seeds in dry environment
- Seed treatments can reduce WFB but none will eradicate it.
- Seed assays:
 - Grow-out assay in greenhouse
 - Detection of the pathogen on agar plates
 - Immunomagnetic detection
 - BIO-PCR
 - Real-time PCR

Future Needs

- Reliable Seed Assay
- Resistant Cultivars
- Seed Treatment