

Diagnosis of Philippine downy mildew caused by *Peronosclerospora philippinensis*.

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Introduction

Philippine downy mildew is not found in the United States. The disease causes significant crop losses in Asia and the Philippines. Disease impact is most significant on corn. Yield losses of 100% on corn and 36% on sugarcane have been documented.

Disease spreads locally via wind and rain. *P. philippinensis* can be seed transmitted, there are no external symptoms on the seed. Transmission does not occur when seed moisture content is less than 14%. Movement of infected plant tissue could introduce Philippine downy mildew to new locations. Regulatory protocols are in place to prevent the introduction of this pathogen to the U.S.

Differentiation of *P. philippinensis* and other closely related Oomycetes is difficult. NPDN diagnosticians should be familiar with the signs and symptoms of Philippine downy mildew to accurately and quickly detect and diagnose this disease.

Symptoms



Infection produces chlorotic streaks on foliage; plants in the two-leaf stage and older may be infected. Sporulation is present on the under surface of infected foliage. Infection may cause stunting and plant death of young plants. Systemic infections can cause deformation of tassels, reduced pollen production and the abortion of ears.

Host Range

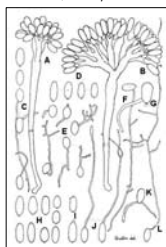
Corn	Sorghum
Oats	Johnson grass
Sugarcane	Teosinte
Wild sugarcane	

Diagnostic Features*

Conidiophores: Hyaline, 150 – 400 μ m long, dichotomously branched two to four times.

Conidia: Hyaline, elongate ovoid to round cylindrical, slightly rounded at apex, 17-21 x 27-39 μ m in size.

Oospores: Rare, 22.6 μ m in diameter.



Peronosclerospora philippinensis conidiophores with conidia.

A-B, Conidiophores with conidia; C-L, conidia and conidial germination. (A and C from sorghum; B and D-G from teosinte; H-L from maize; all after Weston).

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Similar Fungi

Eight downy mildew pathogens are reported to be pathogenic on corn, three of these have been reported in the U.S.

Peronosclerospora sorghi

Sorghum downy mildew

Conidiophores: Hyaline, dichotomously branched two to three times, 180 – 300 μ m long.

Conidia: Hyaline, oval to spherical, 14 – 27 x 15 – 29 μ m in size.



A. Streaking caused by Sorghum downy mildew.



B. Sporulation evident on the underside of infected corn foliage.

Images from CIMMYT

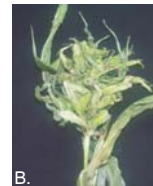
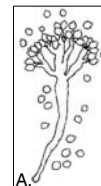
Sclerophthora macrospora

Crazy top

Disease symptoms include excessive tillering and twisting of the foliage. Infected plants may be stunted and have chlorotic stripes on the foliage. This pathogen is widespread in the U.S.

Sporangiophores: Hyaline, 14 μ m long, determinate.

Sporangia: Hyaline, lemon shaped, 30 - 65 x 60 - 100 μ m in size.



A. Sporangiohores of *S. macrospora*. Note sporangia are lemon shaped. B. Crazy top symptoms on corn.

Sclerophthora graminicola

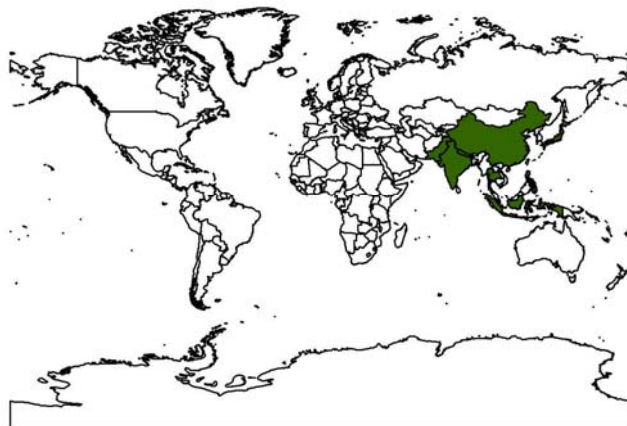
Green ear downy mildew or Graminicola downy mildew

Disease symptoms include grayish blotches and mottling of the foliage. Leaves may be thickened and puckered. This disease is rare in the U.S.

Sporangiophore: Hyaline, 268 μ m long, irregularly dichotomously branched.

Sporangia: Hyaline, elliptical 12-21 x 14-31 μ m in size with a papillate operculum.

Current Distribution of Philippine Downy Mildew



References

CABI (2002) Crop Protection Compendium, 2002 Edition. Wallingford, UK: CAB International, www.cabicompendium.org.

*Morphological descriptions taken from: Compendium of Corn Diseases (1999) ed. Donald G. White. APS Press.

CIMMYT, Center for International Maize and Wheat Improvement Center, www.cimmyt.org.