Occurrence of Asian Soybean Rust Caused by *Phakopsora pachyrhizi* in Mississippi

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Asian soybean rust (ASR) caused by *Phakopsora pachyrhizi* Sydow is one of the most destructive diseases of soybean [*Glycine max* (L.) Merr.]. It has been known in Asia since at least 1902 (2), and was first observed in the continental United States on 6 November 2004 in a field near Baton Rouge, LA (3). The first detection of ASR in Mississippi on soybean was in Adams Co. on 16 November 2004. At that time, soybeans were at the growth stages from R6 to R7. Typical rust lesions with erumpent and globose uredinia on lower leaf surface were observed. Identification of *P. pachyrhizi* was confirmed by the USDA/APHIS in Beltsville, MD on 17 November 2004. Later that month, ASR also was found in Holmes, Jefferson, Warren, and Washington counties. In July 2005, ASR was found in Pearl River and George counties through monitoring of sentinel plots. In 2006, ASR in Mississippi was first observed in one soybean field and one kudzu (*Pueraria* sp.) site in Jefferson Co. on August 1. At that time, soybeans in this area of southwestern Mississippi were mostly in reproductive growth stage R5. Fungicide application was recommended. However, in the major soybean growing areas in northeastern Mississippi and the Delta, the extremely hot and dry conditions were unfavorable for rust development until late in the season. As of November 2006, ASR was found in Claiborne, George, Issaquena, Jackson, Jefferson, Lee, Warren, Washington, and Yazoo counties in 20 locations.

Asian soybean rust was usually identified with a hand lens or dissecting microscope at the survey site and confirmed by microscopy, enzyme-linked immunosorbent assay (ELISA), and polymerase chain reactions (PCR) in laboratory. For observation using environmental scanning electron microscope (XL30 ESEM-FEG; FEI Company, Hillsboro, OR), fresh leaf samples were fixed with 2% paraformaldehyde and 2.5% glutaraldehyde in 0.1 M Na-Cacodylate buffer (pH 7.4), post-fixed with 1.0% osmium tetroxide, and critical point dried after dehydration with 37, 67, 95, and 100% ethanol. Asian soybean rust pustules were light brown, reddish brown or dark brown, and were irregularly shaped on soybean and kudzu samples (Fig. 1). On the abaxial surface of infected leaves, uredinia were erumpent. Urediniospores were hyaline to pale yellow-brown, and obvoid to ellipsoid with finely echinulate walls (Fig. 2). The sizes of urediniospores were 18 to 34 × 15 to 24 µm. Paraphyses were cylindric to clavate, surrounding the margin of a sorus (Fig. 2). Besides microscopic observations, ELISA assay using the QuickStix kit (EnviroLogix, Poland, ME) for soybean rust was also used to identify *P. pachyrhizi*. In addition, DNA was extracted from symptomatic soybean and kudzu leaves using the Qiagen Dneasy Plant Mini kit (Qiagen Inc., Valencia, CA). DNA of *P. pachyrhizi* was detected and confirmed by PCR using specific primer set (Ppm1/Ppa2) for *P. pachyrhizi* (1). None of the samples were amplified with the primers (Ppm1/Pme2) for *P. meibomiae* (1). Asian soybean rust specimens have been placed in USDA-APHIS PPQ approved Stoneville Research Quarantine Facility. Purification of ASR...
isolates using soybean seedlings and detached leaves are underway for characterization of isolates, and for preparing inocula for evaluation of soybean resistance.

Fig. 1. Asian soybean rust lesions: (A) Affected soybean leaf that was collected from Stoneville, Mississippi in October 2006; (B) Affected kudzu leaf that was collected from Jefferson County in August, 2006.

Fig. 2. Scanning electron micrograph of urediniospores of *Phakopsora pachyrhizi* from soybean.

**Literature Cited**