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DISEASE NOTES

First Report of *Erysiphe quercicola* Causing Powdery Mildew on Cashew in Brazil

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Cashewnut (*Anacardium occidentale* L.) is a very important crop plant native to northern Brazil. In 2010 and following years, a powdery mildew outbreak was observed in over 60% of cashew growing areas in coastal and highland fields in Ceará and Piauí states, which account for over 70% of Brazilian cashewnut production. Disease symptoms commonly appeared as white to gray powder on young shoots, inflorescences, young fruits, and leaves, reducing fruit onset and severely damaging apple and kernels. Highest level of infection was observed by the time of flowering and fruiting plant stages, which occurs from June to September in those particular states. Today, powdery mildew is the main pathological constraint of cashew production in Brazil, as it affects mature trees, nursery stocks, and new plantings. Although there is great variability within cashew genotypes, most growing varieties are susceptible. From 2012 until 2014, field surveys were conducted to collect samples from different environments and host genotypes. Severely infected flushing leaves of BRS 189 cashew clone were collected in Pacajus county, Ceará State, and introduced into the Laboratory of Plant Pathology, Embrapa, for further studies. Due to conspicuous differences between these and commonly known symptoms from early described powdery mildew (Noack 1898), morphological and sequence data molecular studies were then conducted in order to determine the causal fungus. Conidiophores were erect with cylindrical foot cells, average size 100.2 µm. Chasmothecia were absent. Primary conidia were ellipsoid, with a rounded apex and truncate base. Mature conidia were mainly dolioform and formed singly (no catenescence), measuring 26.9 to 31.7 µm long × 14.3 to 20.4 µm wide (avg. 29.9 × 14.8 µm), with length/width ratio of 1.8 on average. The internal transcribed spacer (ITS) region, including 5.8S and partial 28S from genomic DNA extracted, was amplified with ITS1F (5'-TCCGTAGGTGAACCTGCGG-3') and P3 (5'-GCCGCTTCACTCGCCGTTAC-3') primers. The amplicon was sequenced by external service (Macrogen, Seoul, South Korea). BLASTn analysis of the ITS sequence (661 pb)

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showed a high homology (identity: 100%, e-values: 0.0, coverage: 100%) with *Erysiphe quercicola* (GenBank accession no. KY172852). Five young 75-day-old grafted plants of cv BRS 189 were artificially inoculated and five noninoculated plants served as control, all grown under glasshouse conditions at 26 ± 2°C. Inoculations were made by brushing conidia from naturally disease leaves onto flushing young leaves. All inoculated plants developed powdery mildew symptoms after 10 days, whereas the control plants remained symptomless. Therefore, on the basis of morphological features and sequence data analysis, the causal fungus causing powdery mildew on young organs of cashew plants was determined to be *E. quercicola*. This fungus has been reported to cause powdery mildew on several tropical plant species including cashew reported in Tanzania (Voucher MUMH781, Mie University, Mycological Herbarium, Japan) (Limkaisang et al. 2006) under the anamorphic name of *Pseudoidium anacardii*, which is presently assigned as *E. quercicola* (Braun and Cook 2012). This is the first report of powdery mildew on young organs of cashewnut plants caused by *E. quercicola* in Brazil.

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Section:

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