

Identification of the sudden death syndrome pathogen of soybean in Argentina

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Objectives

Recently, concerns have grown about the spread of and damage caused by soil-borne diseases. One of such diseases is sudden death syndrome (SDS), which has been associated with continuous cropping of soybean plants on untilled land in MERCOSUR countries. In order to bring SDS under control, identification of the pathogen that causes the disease is critical. Toward this objective, JIRCAS has conducted cooperative studies with the National Institute of Agricultural and Farming Technology (INTA) in Marcos Juarez, Argentina, entitled the “Ecology and control of major diseases of soybeans” since 1999.

Results

In Argentina, severe outbreaks of SDS have occurred in the Cordoba and Santa Fe Provinces. Infected plants were collected from the fields and the symptoms of SDS were observed and recorded. The symptoms of SDS are characterized by yellow spots on the leaves in the early stage of the disease, by the browning interveins of the leaves in the later stage, and by a loss of leaves in the final stage (Fig. 1). SDS also causes red-brown discoloration at the upper part of the main and lateral roots, and root rot, making the plant easy to unearth (Fig. 2).

While researchers are aware of the symptoms of SDS, identification of the pathogen that causes the disease has proven more difficult. Using PCR, a detection method was created that would identify the pathogen in both artificially inoculated and naturally infested plants. Tissue samples were taken from the infected plants and the isolated pathogen was observed under a microscope for its morphological characteristics.

A strain of the pathogen was cultured on a grain of sorghum, then dried and macerated to inoculate into soil. Soybean plants were grown for 40 days in a greenhouse for evaluation of the symptoms of SDS. The pathogen displayed a very slow growth rate on the potato dextrose agar (PDA) with one half to a third of the saprophytic *Fusarium* producing more than 50 μ m of macroconidia, while the rest produced none. Sporodochya of the pathogen were frequently observed on the surface of the lesion of the roots. *Fusarium* was more frequently isolated from the red-brown colored tissues of the upper main roots and the lower hypocotyls than from the lateral roots (Table 1). The symptoms of the leaves and roots tested in greenhouse conditions were similar to those observed in fields. Yellow spots formed on the leaves two weeks after inoculation and the interveins subsequently began to brown.

Based on the observations and the application of Koch's Postulates, it was concluded that the SDS pathogen in Argentina could be identified as *Fusarium solani* f. sp. *glycines*. The identification of the SDS pathogen is expected to help in the process of cultivating SDS-resistant soybean plants in Argentina. Recently, these strains of SDS from Argentina were reported as a new species *Fusarium tucumanae* by Aoki et al. (2003).



Fig. 1. Leaves and roots displaying symptoms of sudden death syndrome in the field.



Fig. 2. Leaves displaying symptoms of sudden death syndrome in greenhouse test.

Table 1. Re-isolation of the MJ161 strain of *Fusarium solani* f. sp. *glycines* from roots infected in a greenhouse test.

Roots	Pieces tested	*Re-isolated	%
Upper main root	25	19	76.0
Lower main root	25	4	16.0
Lateral root	25	12	48.0

*Confirmation of the characteristics of the MJ161 strain on test tube culture of PDA.

References

Aoki, T., O'Donnell, K., Homma, Y. and Lattanzi, A. (2003): Sudden-death syndrome of soybean is caused by two morphologically and phylogenetically distinct species within the *Fusarium solani* species complex-*F. virguliforme* in North America and *F. tucumaniae* in South America. *Mycologia*, 95(4), 660–684.

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