



Sudden Death Syndrome in Minnesota Soybean Fields in 2006, an Expanding Problem

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In early August 2006 sudden death syndrome (SDS) was confirmed in two southern Minnesota soybean fields, one in Steele County near Owatonna and the other in Brown County near New Ulm. Little did anyone know at that time that this was to be the “tip of the iceberg”, and that SDS would be reported in more locations in Minnesota than ever before. In fact, SDS had been confirmed in 18 counties by the end of the 2006 growing season. SDS can cause significant yield reductions, but the overall impact of this disease on soybean production in Minnesota was probably relatively low in 2006 because the total number of acres infected still appear to be limited.

Now let's step back a bit. SDS was first confirmed in Minnesota in 2002. However, this disease has been known in Illinois since 1985 and in Iowa since 1993. Dr. Jim Kurle from the University of Minnesota and the Minnesota Pest Survey team from the Minnesota Department of Agriculture surveyed the distribution of SDS in 2003 – 2005. Their results indicated that SDS occurred most frequently in the south central part of Minnesota (<http://www.mda.state.mn.us/pestsurvey/pestreports/default.htm>), but the distribution of this disease in Minnesota was uncertain.

Symptoms of SDS are found on roots, lower stems, and leaves of soybean. This disease typically begins as a root infection in a patchy distribution in fields. As the infection develops in a plant, the SDS pathogen (*Fusarium solani* f.sp. *glycines*) produces a toxin that moves up to the leaves to cause chlorotic (yellow), diffuse spots on leaves. The leaves may become cupped, wilt, and fall off as the disease progresses. Plants infected with SDS typically develop a brown-gray discoloration just under the outer surface and into the vascular tissues of the lower stem. SDS also causes root rot, and in moist soil conditions a blue fungal growth may develop on infected roots. The foliar symptoms are similar to symptoms of brown stem rot (BSR), however, the pith remains white in plants infected with SDS while the pith becomes brown in plants infected with BSR. SDS often occurs in fields where the soybean cyst nematode (SCN) is present.

In response to many reports of SDS in August, we conducted a study to determine the prevalence and distribution of SDS in Minnesota. We received nearly 50 samples from farmers, crop consultants, and Extension Service personnel in response to a request for samples of soybean plants with SDS symptoms. These samples were examined for visible symptoms of SDS, and tissue from the samples were cultured in order to isolate pathogens present in the plants. Because the symptoms and cultures alone are not enough to confirm the presence of this disease in new areas, we performed a very specific DNA-based diagnostic test that is used to confirm if the SDS pathogen is present in the “sick” plants. We thank all who contributed plants to this survey.

In summary, here is what we found.

- SDS was confirmed to be present in 18 counties. *See map below with counties highlighted from the 2006 survey.* However, this probably does not indicate the complete distribution of SDS in Minnesota. SDS likely also occurs in other areas.
- SDS was most frequently found in areas less than 1 acre in size. However, the diseased areas had increased in size in fields where SDS had been confirmed before 2006.
- The presence of the SDS pathogen was confirmed in 37 of the samples submitted. About 20% of the samples thought to have SDS were not infected with the SDS pathogen; instead, they were infected with BSR or other diseases. Several samples were infected with both SDS and BSR.
- The widespread occurrence of SDS in Minnesota was likely associated with weather conditions favorable for the disease. In Illinois, the occurrence of SDS has been associated with wet and cool soil conditions occurring early in the season followed by heavy rainfalls in June and July. A similar pattern occurred in areas of southern Minnesota in 2006.
- If the behavior of SDS in Minnesota is similar to that in Iowa and Illinois, the prevalence and severity of SDS infestations will likely increase in Minnesota.
- Our results confirm that the SDS pathogen is more widely distributed in southern Minnesota than was previously recognized and that steps should be taken to manage SDS.

Given this information, what can be done to manage SDS? Several things should be considered. First and foremost, farmers and consultants should learn to recognize the symptoms of SDS. In fields where SDS is identified, soybean cultivars should be planted that have the highest levels of tolerance or partial resistance to SDS available. Because SCN may increase the severity of SDS, SCN-resistant varieties should be planted and the affected fields should be managed to reduce populations of SCN. Farmers should also consider delaying planting or planting on staggered planting dates in fields where SDS has been a problem. Research in Illinois has shown that SDS losses can be reduced in some areas by reducing soil compaction. Crop rotation has provided no clear benefit in other states where SDS is a problem.

Figure 1. Confirmed distribution of sudden death syndrome (SDS) on soybeans in Minnesota (2006). This map represents locations where positively identified samples were collected.

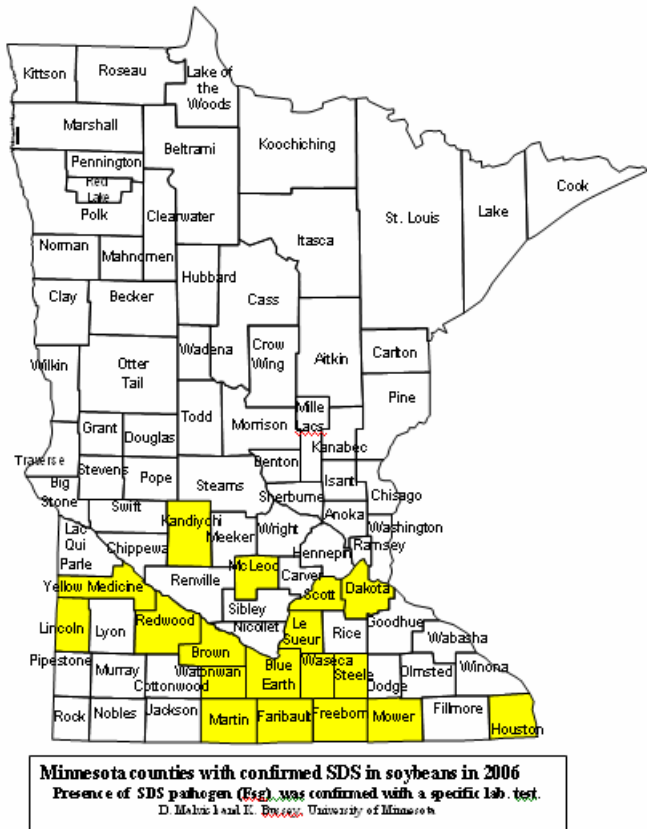


Figure 2. SDS (discolored plants) in a southern Minnesota soybean field in 2006.



Figure 3. SDS symptoms at different stages of development on soybean leaflets.

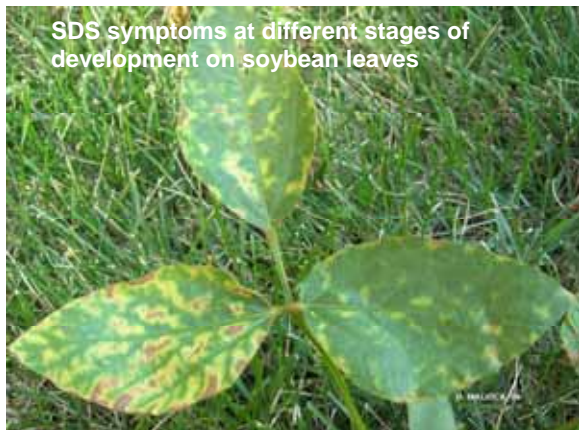


Figure 4. SDS symptoms on leaflets and in lower stem of infected soybean plant.



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