# New Lab Test Can Detect SDS In Soybean Seedlings

**CARBONDALE, ILL.**

A simple, cheap lab test developed at Southern Illinois University Carbondale can unerringly detect Sudden Death Syndrome, a costly fungal disease, in soybean seedlings. Once commercialized, its use will help breeders produce SDS-resistant soybean varieties much faster than they can now.

"You can do a reliable assay in the greenhouse in a plastic cup and four weeks later, you'll see the result," said David A. Lightfoot, a biotechnologist in SIUC's College of Agricultural Sciences who developed the procedure.

"The seedlings develop the leaf symptoms and the root rot or they don't. It works every time, and the labor cost is very low – about $1 per assay."

Lightfoot received a patent for the assay Oct. 31, which will allow the University to negotiate with private companies to license it.

"Now that the important things about the assay are protected, we can use it without fear of infringement by others," Lightfoot said.

"When you don't patent your discoveries, companies can do so, and it really kills research if what you have been working with now belongs to someone else. It's very difficult to get grant money, for one thing.

"When we license the assay for use by commercial groups, SIU can recoup some of the money it invested, and we can keep the method open for use by other researchers."

Not so long ago, breeding SDS-resistant soybean varieties was pretty much hit or miss. Breeders would plant a bunch of beans in a flock of fields and hope the disease would show up somewhere by the end of the growing season. If it did, they could make breeding crosses with the survivors and repeat the process during the next season.

But sometimes the disease didn't appear, and sometimes when it did, it didn't behave normally, disappearing mid-season. In addition, SDS resistance is not the only part of the equation. Breeders also must incorporate other traits, such as yield and adaptability, when developing new lines. Lightfoot and colleagues Khalid Meksem and Paul Gibson (now retired) figured starting out with disease-resistant breeding lines would cut the time it took breeders to produce marketable new varieties. In 1994, they began working on an assay that could quickly pinpoint seedlings that could withstand SDS.

"We tried all sorts of things before we hit the 'Eureka!'" Lightfoot said.

"People had done two things wrong in the past (in attempts to develop an assay). They'd grown the fungus on rich media, so it wasn't hungry (which could lead to false negatives). The other mistake was to just jab the plant with the fungus or put it in humongous quantities in the ground, making the disease inevitable (leading to false positives). The amount of fungus and its aggressiveness are critical parameters in SDS – much more so than in other diseases."

Lightfoot grows his fungus on a mix of cornmeal, sand, mineral salts and agar, a jelly-like substance made from algae. That's enough to keep it alive but not "fat, lazy or happy," Lightfoot said. Graduate students, armed with spades and pails of the mix, then dig that mix into piles of soil, turning it until the fungus-laden growing medium is distributed evenly throughout. Vulner-able seedlings planted in that infected soil will contract the disease; seedlings with resistance potential won't.

Lightfoot began the patent application process in 1966 but ran into an unexpected barrier because the assay was only a part of the resistance package he was trying to protect.

"They said it was so big and novel, we would have to break it up into four areas," he said.

A patent for the first area, which involved using molecular markers to pinpoint resistance genes not just for SDS but for soybean cyst nematode as well, came through in 2001.

The assay comprises the second area.

"It's a quick way of backing up the genetics to see if you have the right line or not," Lightfoot said. "It can also be used to weed out the bad ones."

The third area, presently undergoing the patent application process, will involve positional cloning, a way of finding the resistance genes based on where they lie on a chromosome.

"I'm hoping it will go a little more quickly this time," Lightfoot said with a grin. Δ