Early-Season Soybeans

The old saying "the early bird catches the worm" has a new twist for southern soybean farmers. Agricultural Research Service agronomist Larry G. Heatherly has developed an early soybean production system (ESPS) for farmers in the Midsouth. He says planting early-maturing soybean varieties in early April boosts farmers' yields and profits.

Heatherly's work is part of ongoing ARS research to develop more efficient ways to grow soybeans—including new varieties and germplasm to increase yields.

Growers in Mississippi, Arkansas, Louisiana, west Tennessee, and northwest Texas usually plant their soybeans in May and June. But Heatherly has convinced farmers like John G. Gourlay, Jr., to plant earlier—and it's paid off. He farms in northwest Mississippi, near Benoit.

Gourlay, whose family has been farming since 1933, took a detour from farming to pursue degrees in agriculture and law. Then, he says, "One day I decided to get back into farming, and I thought why not try soybeans. Someone recommended I call Larry. He sent me literature on his early planting system."

Gourlay was sold on the idea. "I got out there and planted 2,400 acres of soybeans beginning on April 9, 1997, on no-till land, planting through cocklebur thickets," he says with a laugh. "From there it was wait-and-see. I wasn't sure I would get any return on my investment."

KEN HAMMOND (K8529-13)

Agronomist Larry Heatherly (left) and Dariel Crafton, manager of Gourlay Joint Ventures, inspect soybean plants sown in a no-till seedbed.

To his surprise, not only did his soybeans mature earlier—August 30—but he harvested 41 bushels per acre. "I thought this was fantastic," says Gourlay. " I got a $1.50 premium, for about $8 a bushel."

Growers are sometimes given a premium to cover shortages in the market, usually from August 15 to September 15. Gourlay says last year he planted even earlier and got comparable yields, despite extremely low rainfall.

Will he plant early again? "You bet. I'm harvesting my soybeans when everyone is scrambling to cover the shortage. My crop fills a small niche," he says.

Why is the early-planting system so successful? "Because it brings crops into sync with the weather," explains Heatherly, who is in the ARS Crop Genetics and Production Research Unit at Stoneville, Mississippi. "Plants require more water during their reproductive stage. Early planting means they'll be going through that developmental phase during the season of higher rainfall, from April through June."

Drought is common in the midsouth region later in the growing season, from July through early September. That means plants sown on the conventional timetable develop pods and seeds and fill these seeds during the hot, dry months when water is scarce. Heatherly says, "ESPS allows midsouth farmers to avoid drought, harvest earlier, and increase yields and profit."

Since 1992, Heatherly has been comparing yields and net returns from ESPS plantings to those from conventional plantings. Data from the 1992 through 1998 growing seasons show that ESPS soybeans outperformed conventional soybean plantings. ESPS soybeans averaged 33 bushels per acre, compared with 27.3 bushels per acre in traditional plantings. Net returns were $69 an acre for early planting, versus $29 per acre from later plantings.

"Average state yields during the 1970s and 1980s were only 21.5 to 22 bushels an acre," says Heatherly. "As ESPS has gained in popularity, average yields have risen to about 28 bushels per acre."

But planting early won't help farmers as much if their soybeans are attacked by diseases. Geneticist Jeffrey M. Tyler is studying one of these diseases—stem canker, a serious fungal disease in soybeans. He is trying to categorize early-maturing soybean lines as either resistant or susceptible to stem canker.

"Although stem canker infects plants early in the growing season, symptoms—brown lesions on the stems—appear much later," says Tyler, who is also in the Stoneville unit. "Early maturing varieties often ripen before symptoms appear, so they may appear genetically resistant to stem canker.

"The problem is that breeders may inadvertently cross early non-genetically resistant lines with later susceptible ones, leading to many late-maturing lines that lack genetic resistance. They really don't have any protection against the disease."

To help breeders avoid this problem, Tyler modified a field screening technique for greenhouse use. He exposes greenhouse plants infected with stem canker fungus to extended light for 18 hours a day for 2 to 3 months. This exposure to longer days fools the plants, delaying their maturity and allowing time for stem canker to develop.

"I discovered in the long-day environment that many early lines previously considered resistant were actually genetically susceptible to stem canker," says Tyler. "By properly categorizing early varieties, breeders can be sure that at least one parent has genetic resistance to stem canker."—By **Tara Weaver-Missick,** ARS.

This research is part of Crop Production, Product Value, and Safety, an ARS National Program described on the World Wide Web at http://www.nps.ars.usda.gov/programs/cppvs.htm.

Larry G. Heatherly and Jeffrey M. Tyler are in the USDA-ARS Crop Genetics and Production Research Unit, P.O. Box 345, Stoneville, MS 38776; phone (662) 686-5241, fax (662) 686-5218, e-mail lheather@ag.gov jtyler@ag.gov. ◆

KEN HAMMOND (K8530-16)

In a greenhouse, geneticist Jeffrey Tyler checks early-maturing soybeans for signs of stem canker.

Geneticist Thomas Kilen inspects seeds of the newly released D95-5246 soybean that is resistant to both Phytophthora rot and soybean cyst nematode races 3 and 14.

Fighting Phytophthora

The best offense is a good defense when it comes to fighting soybean diseases and pests. That's geneticist Thomas C. Kilen's approach.

Based in the ARS Crop Genetics and Production Research Unit at Stoneville, Mississippi, Kilen has developed and released a new soybean germplasm line that's resistant to Phytophthora rot and two races of soybean cyst nematodes. Last year, combined losses from both were estimated at 20 million bushels in 16 southern states.

The *Phytophthora sojae* fungus causes Phytophthora rot, a major soybean disease that ruins millions of bushels each year. Soybean cyst nematodes are tiny worms that feed on soybean roots, causing more losses than all other soybean pathogens combined. They cut soybean yields by nearly 16.4 million bushels last year.

"This high-yielding new line, D95-5246, should give farmers another defense against these two major soybean crop killers," says Kilen.

To date, Stoneville scientists have developed 29 high-yielding soybean varieties and 24 new germplasm lines with improved pest resistance.—By **Tara Weaver-Missick,** ARS.

Thomas C. Kilen is in the USDA-ARS Crop Genetics and Production Research Unit, P.O. Box 196, Stoneville, MS 38776; phone (662) 686-3125, fax (662) 686-5218, e-mail tkilen@ag.gov.