

Managing Soybean Stands

Study Examining Soybean Plant Attrition Suggests Growers Should Consider Treating Seed With Fungicide And Insecticide

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Dr. Eric Walker, USDA-ARS, Soybean Research Agronomist, spoke recently at the Milan No-Till Field Day on managing full-season soybean stands. Walker explained, "Previous research conducted by scientists and Extension spe-

Walker. "During feeding, they girdle the plant slightly above the soil surface, weakening the stem. Later in the season, the plant will lodge and not contribute to the final yield." An insect that reduced stands last year, but has not been found in this study, is the grape colaspis, although Walker suspects the larvae are present and have contributed to stand loss, "by a



Dr. Eric Walker, USDA-ARS, Soybean Research Agronomist, discusses managing full-season soybean stands.

Photo by John LaRose, Jr.

cialists have shown that 100,000 plants per acre at harvest are needed for consistent optimum soybean yields. Several sources of literature also state that approximately one-fourth to one-third of the seed planted will not survive and develop into harvestable plants." Previous research conducted by Walker confirmed this surprising fact, "We conducted field studies to determine optimum seeding rates for maturity III, IV, and V soybeans. When we compared early-season stand counts with stand counts taken at harvest, we had essentially lost from one-fourth to one-third of the seed planted to in-season plant attrition."

Dr. Richard Joost, Associate Professor of Plant Sciences at the University of Tennessee at Martin, had also realized the significant loss of soybean producer investment in seed costs caused by plant attrition and designed a field study to quantify and then identify the causes of soybean plant attrition. Dr. Joost also used the study to teach his students about soybean production and stand dynamics. The Tennessee Soybean Promotion Board funded this research. After visiting with Dr. Joost about the study in January, Walker was eager to collaborate.

"We planted an early maturity group IV soybean variety on 15- and 30-inch row spacing at seeding rates of 50,000, 100,000, 150,000 and 200,000 seeds per acre." Walker started weekly stand counts when soybean plants had added their second to third trifoliolate. "We count the same rows every week, and will do so until harvest. The first stand count showed that regardless of seeding rate, one fourth of the seed did not emerge, possibly due to lack of germination, poor vigor, environment, insects, or disease.

Each week during the stand counts, dead plants are collected and taken to Dr. Alemu Mengistu, USDA-ARS Research Plant Pathologist, and Dr. Scott Stewart, University of Tennessee Extension Row Crops IPM Specialist, for determination of the cause of plant death. "Fortunately, during the six-week period from June 13 to July 18, we have only lost about two percent of our soybean stand. Diseases responsible for the plant attrition are charcoal rot, rhizoctonia and fusarium. Insect damage by the three-cornered alfalfa hopper has also reduced stand," added

combination of feeding on the roots and also facilitating the entry of plant pathogens where the roots are damaged by feeding."

In summary Walker encouraged producers with relatively sparse but uniform stands. "Soybean plants have the tremendous ability to compensate for thin stands with increased branching and branch pod numbers. As long as the stand was uniform, we have seen final soybean stands ranging from 80,000 to 160,000 produce comparable yields. However," he cautioned, "when choosing a seeding rate, don't choose a seeding rate that is too low and then rely on the compensatory ability of the soybean to consistently produce acceptable yields. Instead, base your seeding rate on your desired final stand. You want at least 100,000 plants per acre at harvest. Assume that you are going to lose one-fourth to one-third of the seed that you plant, so set your seeding rate to allow for this loss. Once you have a good initial soybean stand, then the compensatory ability of soybean should provide resiliency to in-season plant attrition."

"If you are planting maturity group IV or V varieties for non-irrigated, full-season production, and you assume that one-third of the seed planted will not be present as harvestable plants, then plant 150,000 seeds per acre. If you do lose one-third of the seeds that you planted, you will still have 100,000 plants per acre at harvest. Because maturity group III varieties mature sooner than MG IV and V varieties, plant about 180,000 seeds per acre. Then, if you lose a third of the seeds planted, you should still have 120,000 plants per acre at harvest."

Walker advised producers to choose proven, high-yielding varieties with high germination and vigor from reliable seed sources and to, "consider applying fungicide and insecticide seed treatments that will protect you from some of the diseases and insects mentioned earlier."

Walker also suggested that growers "consider the application of a strobilurin fungicide at the R3 soybean reproductive stage, which is the beginning pod stage, when growing conditions are good. Even if disease symptoms are not present, the resultant increase in yield is often enough that the application will at least pay for itself." Δ