



2011 file photo of PhD student/researcher Ryan Van Roekel in his Fayetteville test plot. Van Roekel's plot averaged 115-bushels per acre. Photo by Alejandro Bolton

Arkansas Soybean Yields Researcher Sees Room For Growth

FAYETTEVILLE, ARK.

Even though Arkansas' 2012 average soybean yield of 41 bushels per acre beat the national average of 39.3 bushels an acre, further yield improvements are possible, said Ryan Van Roekel, a doctoral student in the University of Arkansas.

His research, funded in part by the Arkansas Soybean Association, has applied various practices in Fayetteville and eastern Arkansas test fields in pursuit of the maximum yield of soybean.

"In the small plot trial in Fayetteville, we had 12 different varieties and the best one averaged 115 bushels per acre. Six of the 12 averaged over 100 bushels per acre and the lowest one averaged 86 bushels per acre," Van Roekel said. These results were noted in a hot, dry season that led to significant pod abortion and lower yields, despite irrigation.

One important source for Van Roekel has been Kip Cullers of southwest Missouri, who has won his state's Soybean Association Yield contest several times since 2006 with contest field yields exceeding 100 bushels per acre. Van Roekel and his Ph.D. adviser, Larry Purcell, have taken physiological measurements from Cullers' farm in an attempt to understand the inner workings of Cullers' top yielding crop. Purcell is a professor in the Crop, Soil and Environmental Sciences Department.

"Our research in Fayetteville is managed very similar to Mr. Cullers' contest field and we are taking the same measurements and have the same varieties plus some extras," Van Roekel said.

While smaller than Cullers' 2010 record soybean yield of 160.6 bushels per acre, Van Roekel's 115 bushels is likely the top yield in the nation for the challenging 2012 season.

Additional management practices applied this year included soil sampling and amending with fertilizer, Van Roekel said. Ten tons per acre of poultry litter was also incorporated into the soil, and deep tillage was used to try to break the plow pan to alleviate any rooting restrictions. Planting was done early – April 11 – in 18-inch narrow rows at 140,000 plants per acre.

Early planting may be the most important consideration in increasing yields, Van Roekel said. Indeterminate, maturity group IV soybeans planted in the first half of April start flowering in late May and early June. The plant's available resources guide the development of a soybean flower into a pod; insufficient resources

will cause the flower to abort. The plant's primary resource is carbohydrates from photosynthesis, and photosynthesis is generally at its highest around the summer solstice in late June.

"So if we can get a full canopy and start setting pods by that time, we stand the best chance of setting more pods and increasing yield," Van Roekel said. "Early planting does not directly cost anything extra and if podset can be timed with the longest days of summer we can increase yield for free."

Choosing the right soybean varieties can also make a big difference in yields. Beyond matching maturity with planting date, selecting a variety with the best package of traits to suit the growing environment, while maintaining top yield potential, is critical to realize these kinds of yields.

Weeds, insects, and diseases can cause significant yield declines, and must be carefully controlled, Van Roekel said.

"We had to spray for insects five times," Van Roekel said. "We also applied three preventative fungicides. You can't be giving up any yield to those pests when pursuing maximum yield. The trick for farmers is finding the most profitable balance between potential yield loss and the cost of controlling the pest. Previously established economic thresholds address this issue but may need to be lowered somewhat due to the current high value of the grain."

Nutrition and irrigation are also important factors. In the Fayetteville test field, researchers installed overhead sprinkler irrigation and applied 26 inches of water, which is much more than the average farmer. Nitrogen and potassium fertilizer were incorporated into the irrigation water during pod and seed development.

"Soybeans have high potassium needs and growers need to account for that, realizing that soil test recommendations are usually for a 50-bushel-per-acre crop and that their yields and goals may be higher," Van Roekel said.

While 100 bushels per acre may be attainable in Arkansas, that yield may not be profitable and is likely not sustainable, Van Roekel said.

"We have demonstrated with our strip trials that a good variety, planted early, with timely irrigation, adequate fertility, and good pest control can average over 80 bushels per acre and I believe that is a realistic, profitable, and sustainable yield goal for productive soils in Eastern Arkansas," Van Roekel said. Δ



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