Corn hybrids that better tolerate crowding—allowing them to be sown at higher populations than their predecessors—have been a driver of rising yields of field corn in recent decades. Now, large differences in crowding stress tolerance (CST) have been reported among sweet corn hybrids, leading growers and processors to wonder if these emerging hybrids may offer similar yield benefits.

Martin Williams, a University of Illinois crop scientist and ecologist with USDA-ARS, says the question is fundamental to improving the sustainability of sweet corn production in the United States and maintaining dominance in sweet corn production globally.

The trick is finding an efficient way to test sweet corn for crowding tolerance. To identify field corn hybrids with improved CST, researchers usually grow and compare hybrids across a range of plant populations. Unlike mechanically harvested field corn, however, sweet corn is harvested by hand and during a very narrow window of time. Sweet corn is then husked and fresh kernels are cut—processing that also often takes place by hand.

So, “Because of time and labor constraints in processing sweet corn, comparing more than a few hybrids with the ‘field corn approach’ is impractical,” Williams says.

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The Stress Test

In a study in the September-October issue of Agronomy Journal (see http://bit.ly/1isHYV1), Williams identified a more efficient method for comparing processing sweet corn hybrids for CST. Instead of testing sweet corn at many different population levels, his “stress test” approach grows all hybrids at a single, high population that he identified based on previous research.

“We had a good sense of the optimum population of previous top-performing hybrids,” he explains. “So we went just beyond that level.”

More specifically, sweet corn for processing is grown in the Midwest at approximately 23,000 plants/ac. Williams’s previous research showed that profitability of hybrids with improved CST was maximized at approximately 27,000 plants/ac. In his most recent “stress test” trial, all hybrids were grown at 29,000 plants/ac.

Following this approach, William’s team was able to compare, in replicated field trials across various environments, CST among every “super sweet” processing hybrid provided by the seed industry. This included 26 hybrids from eight companies. The findings of the study then allowed the researchers to rank the entire list of processing sweet corn hybrids for CST.

Higher Yields and Profits

The highest-yielding hybrid produced 50% more green ear mass than the lowest-yielding hybrid. In addition, recovery—the fraction of ear mass represented by recoverable kernel mass—ranged from 36 to 42% for most hybrids, with the highest exceeding 46%.

Moreover, the top-ranked hybrid for “case production” produced 61% more cases of corn kernels per acre than the lowest. Based on an economic analysis, the highest CST hybrid was also 71% more profitable than the lowest hybrid.

Williams adds that the stress test will aid in testing future germplasm. And he thinks his study should challenge seed companies to work on improving sweet corn CST.

“There’s a quantifiable benefit to having plants that can tolerate more neighbors,” he says. “That has been a large driver to yield gains in field corn, and it’s a logical route to increasing sweet corn yield.”

The Midwest Food Processors Association provided support for the study.

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