

Sweet corn yield gain over 80 years leaves room for improvement, according to study

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New research from the University of Illinois shows sweet corn, when

planted at high densities, has steadily increased in yield since the 1930s. The historical view underscores the importance of planting modern density-tolerant hybrids at their optimal densities, and suggests an opportunity to improve density tolerance even more.

"Over time, steady improvement in plant density tolerance has contributed greatly to genetic yield gain in field corn. While our recent research indicates plant density tolerance in modern sweet corn hybrids could be exploited to improve yield, historical changes in plant [density](#) tolerance in sweet corn were unknown," says Daljeet Dhaliwal, doctoral student in the Department of Crop Sciences at Illinois and lead author on a new *Frontiers in Plant Science* article.

Dhaliwal and Marty Williams, a USDA-ARS ecologist and adjunct professor in the department, tested sweet corn crowding tolerance in hybrids dating from 1934 to 2014. They found marketable ear mass increased by a total of 2.85 tons per acre over the 80-year time period, or 0.36 tons per acre per decade, when grown at high densities.

To quantify these historical changes, Williams worked his connections in the sweet corn seed industry. Many of the early hybrids are no longer available, so companies offered to recreate the hybrids from scratch.

"The seed industry was willing to go through a lot of effort to create these hybrids at no cost to us. It took about five years to get the germplasm together," Williams says. "This project would not have been possible without broad industry support. I think it's a reflection of the value our research program provides."

Williams and Dhaliwal grew one or more hybrids representing each decade at low (4,000 [plants](#) per acre) and high (32,000 plants per acre) densities over three years. Then they measured characteristics important for growers and processors, including key harvest metrics like

marketable ear mass, crate yield, recovery, and more.

In addition to per-area marketable ear mass improvements in hybrids grown under high densities, crate yield also increased in modern hybrids. Fresh kernel mass and recovery—a measure of how much of an ear's mass is made up of marketable kernels—didn't change much over time.

"No improvement over 80 years suggests a potential breeding objective. What if we could improve recovery? Until the last decade, few sweet [corn](#) breeding programs were measuring recovery. Instead, breeders focused on other important traits, particularly eating quality and disease resistance. But now that we know how little recovery has improved, perhaps it's worth targeting," Williams says.

Modern hybrids appeared to be more suited for growth at high densities, with fewer tillers than older hybrids.

"Plant architecture has become more compact. Plants are putting fewer resources into vegetative tissue, so there's less fresh biomass and fewer tillers. That means modern plants are really suitable for growing at higher densities. There's less interference, right? But when you plant them at low densities where there is no competition, these plants are not out-yielding older hybrids," Dhaliwal says.

Williams adds, "I find it both exciting and humbling to conduct a study like this, which captures the long arc of [sweet corn](#) improvement. Where we go from here is made possible by incremental advances of many others before us."

More information: Daljeet S. Dhaliwal et al, Historical Trends in Sweet Corn Plant Density Tolerance Using Era Hybrids (1930–2010s), *Frontiers in Plant Science* (2021). [DOI: 10.3389/fpls.2021.707852](https://doi.org/10.3389/fpls.2021.707852)

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