

# Genetic changes have affected maize's tolerance to moderate and severe heat stress

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Although current corn hybrids are more resilient to moderate heat stress than older hybrids, they exhibit less tolerance to severe heat stress that is expected to become more common due to climate change. Credit: Taylor Siebert, Unsplash (CC0, [creativecommons.org/publicdomain/zero/1.0/](https://creativecommons.org/publicdomain/zero/1.0/))

The ability of crops to withstand heat is critical to our food system's resilience to climate change. A study published in the open access journal *PLOS Genetics* by Aaron Kusmec at Iowa State University; Ames, Iowa, United States and colleagues suggests that trait selection through plant breeding has increased maize's tolerance to moderate heat stress over time; however, its tolerance to severe heat stress has decreased.

Maize is vulnerable to heat stress and high temperatures can diminish [crop yields](#). However, the genetic adaptation of maize to heat over time is not well understood. In order to better understand how maize's heat tolerance has changed over time, researchers collected 81 years of public yield trial records, including 4,730 maize hybrids. They paired maize yield data with historical weather records from the same time period. Using this data, they built a model estimating [genetic variation](#) for temperature responses among maize hybrids.

The researchers found that maize tolerance to moderate heat stress has increased, but has reduced tolerance to severe heat stress. The study was limited by potential confounding factors such as environmental conditions other than temperature and precipitation. Future studies are needed to better understand the potential for plant breeders to select for temperature adaptation.

According to the authors, "Because climate change is expected to increase the incidence of severe heat stress in particular, these findings indicate the need for more detailed genetic and physiological studies of heat tolerance and their incorporation into [plant breeding](#) efforts. They also highlight the past successes of plant breeders at adapting maize to moderate heat stress."

The authors add, "Using 80+ years of corn yield data stored by research libraries in hard-copy format, we discovered that plant breeders have

increased the tolerance of hybrid corn to moderate heat stress, while inadvertently decreasing its tolerance to severe heat stress.

Unfortunately, the frequency of severe [heat stress](#) is expected to increase due to [climate change](#)."

**More information:** Kusmec A, Attigala L, Dai X, Srinivasan S, Yeh C-T, Schnable PS, A genetic tradeoff for tolerance to moderate and severe heat stress in US hybrid maize, *PLoS Genetics* (2023). [DOI: 10.1371/journal.pgen.1010799](#)

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