Unique gene combinations control tropical maize response to day lengths

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Tropical maize proves to be a valuable genetic resource, containing genetics not found in USA Corn Belt maize. Most tropical maize varieties respond to the long summer day lengths that occur in U.S. growing regions by flowering late. This delayed flowering response results in poor yields, effectively trapping the useful genes and hindering their incorporation into maize hybrids adapted to the most productive corn growing regions.

Scientists from the United States Department of Agriculture – Agricultural Research Service and North Carolina State University identified four regions of the maize genome that control much of the photoperiod response in maize. A diverse sample of maize lines bred in Mexico and Thailand were crossed into a standard Corn Belt maize line. Results of this study were reported in the May – June issue of *Crop Science,* the scientific journal published by the Crop Science Society of America.

For each key day length response region, the researchers compared the effects of moving the genes from a tropical variety into a Corn Belt variety. Even at a single genome region, the effects of tropical genes differed, depending on which tropical variety they were bred from. In the most extreme case, the scientists discovered that genes from tropical varieties did not have uniform effects on delayed flowering at the genome region. One of the tropical varieties carried genes that made plants flower earlier than the standard Corn Belt variety.

James Holland, who conducted the study, stated: "We were pleased to validate the effects of these four day length response gene regions that we had identified in previous independent studies. However, we were surprised to discover that some tropical lines carry early flowering genes at our most important day length genome region. Our results highlight the amazing genetic variation that exists in both tropical and temperate maize."

This research supports findings of other scientists about the genomic position of key day length response genes and reveals unexpected diversity in their effects on flowering. Ongoing research is focused on identifying the specific genes controlling day length response that exist in these regions.

More information: The full article is available for no charge for 30 days following the date of this summary. View the abstract at www.crops.org/publications/cs/articles/51/3/1036

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