'A-maize-ing' discovery could lead to higher corn yields for food, feed and fuel

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Scientists may have made an "a-maize-ing" discovery that could lead to higher corn yields in the United States. In a new research report published in the March 2010 issue of the journal *Genetics*, scientists used tropical maize from Mexico and Thailand to discover chromosome regions responsible for detecting seasonal changes in flowering time (called the "photoperiod response"). This discovery may lead to higher crop yields, improved disease resistance, and heartier plants able to withstand severe weather. As one of the United States' largest crops, corn is used for food, feed, sweetener, fuel, plastics, and more.

"Photoperiod response is the major barrier to using tropical maize for the improvement of temperate maize varieties," said James B. Holland, Ph.D, a researcher involved in the work from the U.S. Department of Agriculture, Agricultural Research Service, Plant Science Research Unit at North Carolina State University. "By understanding the genetics of this barrier, we hope to be able to overcome it more quickly to broaden the genetic diversity of temperate maize."

To discover these important regions of the plant's genome, researchers interbred two tropical, photoperiod-sensitive corn lines (one from Mexico; one from Thailand) with two photoperiod-insensitive corn lines from the United States, and grew out hundreds of progeny lines in North Carolina (long day-length summers) and in Florida (short day-length winters). Lines with strong photoperiod response were identified as those flowering much later in North Carolina, compared to Florida. Researchers then genetically mapped all of the lines and identified DNA

markers associated with the photoperiod response. The genomic regions carrying the major photoperiod response genes were then identified.

In addition to allowing for improved strains of domestic corn, the research also is important because it suggests that the genes controlling the photoperiod response in corn are at least partly distinct than those believed to control photoperiod response in model plant species such as Arabidopsis (Mustard Weed) and rice. Future studies to pinpoint specific genes involved in the photoperiod response, however, will be necessary to draw definitive conclusions. The results of these future studies should lead to a better understanding of the extent of shared genetic pathways among distinct plant species and provide insights into how such pathways evolve. Ultimately this knowledge could have significant implications for agricultural species around the world.

"Corn is obviously an important crop, and geneticists and plant breeders are always looking for ways to improve it," said Mark Johnston, Editor-in-Chief of the journal *Genetics*. "This research may help us coax even more production out of this 'a-maize-ing' plant."

More information: Nathan D. Coles, Michael D. McMullen, Peter J. Balint-Kurti, Richard C. Pratt, and James B. Holland. Genetic Control of Photoperiod Sensitivity in Maize Revealed by Joint Multiple Population Analysis. Genetics 2010 184: 799-812. http://www.genetics.org

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