'Psychedelic' maize may help increase crop and biofuel yields

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Research published in the journal *Genetics* suggests that mutant maize have multiple independent pathways used to regulate and export sugars throughout its various organs

More than 40 years have passed since Woodstock, but psychedelics still have people seeing colors — this time, in maize, and the significance is no hallucination. That's because scientists from Pennsylvania State University have identified new genes in maize which promote carbohydrate export from leaves. These genes are called psychedelic because of the yellow and green streaks they cause in the plant's leaves. Manipulating these genes may increase crop yields and the amount of biofuel that can be derived from each plant. This research discovery was published in the May 2010 issue of *Genetics*.

"This study shows that there is still a lot to learn about genes that control carbohydrate distribution in plants," said David Braun, Ph.D, a researcher involved in the work conducted at Penn State's Department of Biology. "By learning how these genes work, I hope we'll be able to improve plant growth and crop yield to solve some of the serious challenges concerning sustainable food and fuel production."

The movement of carbohydrates from leaves to roots, stems, flowers, and seeds is fundamental to plant growth and crop yields. Although the process has been studied for many years, relatively little is known about the genes that control it. This research shows that two previously unknown genes function together to help move carbon from leaves to

other parts of the plant, ultimately resulting in the allocation of carbohydrates that are essential for growth. To make this discovery, scientists examined maize with yellow- and green-streaked leaves, a sign of mutation in genes responsible for the transport of carbohydrates within the plant. Once they identified the specific genes responsible for this coloring, they determined exactly which biological pathway they affected. Not only did the scientists find two new genes that work together in this process, but they also discovered that these genes affected a pathway different from anything previously known. This finding raises hope that by manipulating this pathway, corn or other crops could yield more grain for food or feed, more biomass for fuel, or plants better able to withstand environmental stresses, such as drought. This research was funded by the USDA Agriculture and Food Research Initiative.

"Woodstock was a trip," said Mark Johnston, Editor-in-Chief of the journal *Genetics*, "but the potential of this and similar research is a journey. Increasing corn yields will impact multiple generations. It would allow farmers to produce more food, feed, and fuel from the same amount of land, and as the human population increases, society will need to get the most out of each plant as possible. This work promises to contribute to a continuation of the Green Revolution."

More information: http://www.genetics.org

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