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A Breakthrough in Genetic Modification of Grains

Genetic modification of plants might be controversial in commercial applications, but it is undeniably useful for research purposes. Despite years of effort, it has been remarkably difficult to develop efficient methods for transformation of grain crops. Work published in *The Plant Cell* reports a new method to genetically modify maize and other grains.

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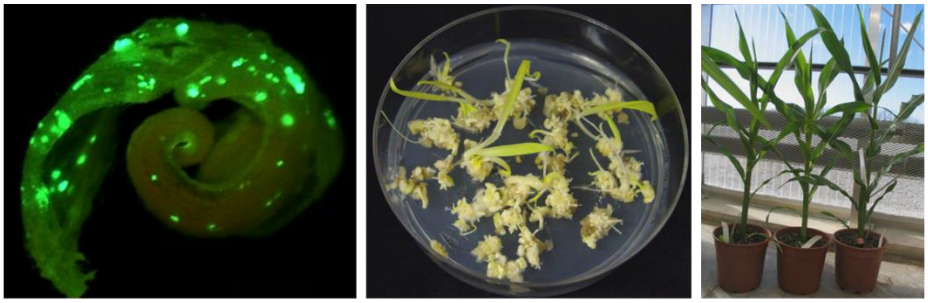
Scientists develop a new approach to genetic modification of maize and other grains

Although the commercialization of transgenic, or "genetically modified", plants has stirred widespread controversy, much research remains focused on improving techniques to create such plants. As people familiar with the controversy likely know, transgenic technology allows breeders to add genes for desirable traits to valuable breeding materials. However, transgenic plants are also widely used in basic scientific research. The ability to add a single gene to a plant allows researchers to explore what that gene does, for instance.

Despite years of effort, it has been remarkably difficult to develop efficient methods for transformation (i.e., genetic modification) of grain crops. The preferred methods generally involve infecting tissue with *Agrobacterium* – a bacterium that naturally transfers DNA to its host genome – and then stimulating that tissue to regenerate into whole plants. However, *Agrobacterium* infects only a narrow range of grain cultivars, and many cultivars are recalcitrant to regeneration. A paper published in *The Plant Cell* reports a breakthrough in transformation technology that greatly expands the range of cultivars and species that can be transformed.



Transformation of a maize leaf segment. Left: green fluorescent tissue on leaf segments from maize seedlings. Middle: plants begin to regenerate from transformed tissue. Right: leaf-derived plants (right). (Photo credit: Ning Wang).

A team of researchers from DuPont added so-called morphogenic genes – known from basic research to promote the production of embryonic tissue – to the other genes being transformed (in this case to express green fluorescent protein as a marker of transformation). When they did so, transformation rates increased for a large number of maize cultivars – in many cases going from essentially no transformation to rates high enough for efficient use in commercial and research applications. The technique also worked in sorghum, rice and sugarcane. This work extends the range of species, cultivars and tissues that can be used for efficient transformation and is a beautiful example of what can be accomplished by combining basic research, technical expertise, and knowledge of practical problems facing mainstream applications.

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In Brief Article describing the work: Hofmann, N.R. (2016) A Breakthrough in Monocot Transformation Methods. Plant Cell. doi:10.1105/tpc.16.00696.

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About the researchers: To arrange an interview with Dr. William Gordon-Kamm of DuPont Pioneer in Johnston, IA, USA, please contact Susan Mantey, DuPont Pioneer media relations manager, at susan.mantey@pioneer.com or 614-902-0836.

About *The Plant Cell*: Published monthly by ASPB, *The Plant Cell* (http://www.plantcell.org/) is the highest-ranking primary research journal in plant biology. *The Plant Cell* publishes novel research in plant biology, especially in the areas of cellular biology, molecular biology, genetics, development, and evolution. The primary criteria for publication are that the article provides *new insight that is of broad interest* to plant biologists, not only to specialists, and that the presentation of results is appropriate for a wide audience. Follow The Plant Cell on Facebook and on Twitter @ThePlantCell.

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Photo credit: Ning Wang.

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