Four years on, no transgenes found in Mexican maize

Four years ago, the discovery of transgenes from genetically modified (GM) crops in traditional maize varieties in Oaxaca, Mexico, triggered an almighty row. A new survey suggests that measures taken since then to purge the crops of transgenes have been effective.

In the original paper, David Quist and Ignacio Chapela of the University of California, Berkeley, used the polymerase chain reaction (PCR) to detect two genetic sequences from GM maize in harvests from 2000 (D. Quist and I. H. Chapela *Nature* 414, 541–543; 2001). Using a variant of the technique called inverse PCR, they also argued that the transgenes had integrated throughout the genomes of Mexico's maize varieties.

This was a shocking result, as it suggested that the 'contaminated' plants were not sporadic hybrids. Instead, it seemed that the transgenes were entrenched in the traditional varieties at the centre of natural genetic diversity for maize. "It was as if someone had gone to the United Kingdom and started replacing the stained-glass windows in the cathedrals with plastic," says Jorge Soberón, a former Mexican government scientist now at the University of Kansas in Lawrence and a co-author of the new study.

The inverse-PCR methodology used by Quist and Chapela soon came under fire, however, and *Nature* stated that it would not have published the paper if the criticisms had cropped up while the paper was under review. But even so, few experts questioned the basic finding that some transgenes had flowed into Mexican maize.

"The authors speculate that the fields were cleared of transgenes through education of local farmers and a reduction in GM imports."

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IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

Maize unmodified: Mexican farmer Lorenzo Rebollo holds some of a recently harvested crop.

Despite an official moratorium on GM planting, this could have resulted from local farmers planting GM maize intended for food use that was imported from the United States. Unpublished work by Mexican government scientists also found transgenes, but a thorough and systematic confirmation was lacking.

That survey has now been done — and to the surprise of the authors, they found no transgenes at all. The sample of more than 150,000 seeds from 2003 and 2004 was negative for the same two transgenic sequences (S. Ortiz-García *et al. Proc. Natl Acad. Sci. USA* doi10.1073/pnas.0503356102; 2005). "I was convinced we were going to verify Quist and Chapela's results," says co-author Exequiel Ezcurra, head of the Biodiversity Research Center of the Californias at the San Diego Natural History Museum and former president of the National Institute of Ecology in Mexico City.

The authors speculate that transgenes were present in the fields in 2000, but dropped out of local maize varieties thanks to a programme of education for farmers and a reduction in GM maize imports. The researchers, led by Allison Snow of Ohio State University in Columbus, did not directly replicate Quist and Chapela's inverse-PCR methods. But Snow says that the apparent failure of the transgenes to persist down the generations contradicts the idea that they were entrenched in the genomes of the traditional maize varieties.

Brian Johnson, who follows developments in agricultural biotechnology for the government conservation agency English Nature, is unsurprised by this finding: "If there are transgenes in Mexico, or anywhere else, I would expect that they would be difficult to find — they would be rather sporadic." Johnson says he never believed they were permanently incorporated into the genes of traditional maize varieties.

Chapela stands by his findings, saying it is "naive" to believe an education programme could have such a dramatic effect. He claims that the commercial labs used by the research team to do the screening used conservative thresholds for declaring a match with the transgene sequences. But Bernd Schoel, director of research at one of those labs — Genetic ID of Fairfield, Iowa — says the screen was as sensitive as possible, given the sample size. ■

Emma Marris