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GM gene crosses species

Landscape sampling finds plant transgene flow into related species in same genus 14 km away | By Cathy Holding

A genetically modified crop has passed its transgene on to a closely related species growing 14 kilometers away and to wild-growing plants of the same species 21 kilometers away, according to an article published this week in PNAS.

Authors from the US Environmental Protection Agency (EPA) report that a novel sampling method found evidence of gene flow from transgenic *Agrostis stolonifera*—commonly known as bentgrass—into the related species, *A. gigantea*. There was no evidence that the gene crossed into a grass in a different genus, *Polypogon monspeliensis*.

Bentgrass is an amenity grass usually grown on golf courses and as a forage crop, but it is also listed as a weed in parts of the world, including in some parts of the United States. The transgenic strain was engineered to contain the RoundUp (glyphosate) resistance gene CP4 EPSPS.

But researchers Anne Fairbrother and Lidia S. Watrud were not primarily trying to assess the ecological and agronomical significance of interspecies gene transfer. They were mainly concerned with the actual sampling methods, which work at the landscape scale.

"We were looking at a larger scale system—both the crop system and the way we did our sampling," said Fairbrother, from Oregon's Western Ecology Division of the EPA. "We were also looking at naturally occurring plants outside of agronomic systems."

The authors set up their initial hypothesis on distance and direction of pollen travel assuming that pollen from the bentgrass can live for about 3 hours, Fairbrother told The Scientist. They devised sampling grids and set up sentinel plants placed at different locations to act as biological monitors.

The authors proved that resident and sentinel nontransgenic plants set seed that had captured the transgene by testing the resistance of the seedlings to spraying, by monoclonal antibody detection of the resistance-conferring protein, and by sequencing of polymerase chain reaction products in surviving plants.

The paper shows that this perennial species can "cross with its

relatives in the same area and produce glyphosate-resistant individuals outside of where it's supposed to be," said Charles F. Chilcutt, who authored a recent paper showing windborne gene flow from genetically modified corn into neighboring refuges, but who was not involved in the present study.

The results are reassuring because they mean there is no risk of crossing with other species when growing corn or cotton in the mainland United States, said Chilcutt, because there aren't any other species available there.

However, the new method of sampling still may not go far enough to accurately predict gene flow from future commercially grown transgenic crops into the wild, commented Michael Wilkinson, at the University of Reading's School of Plant Sciences in the United Kingdom. For governments to make legislative decisions, the scale of predictive modeling will have to be "even at the national level," he said.

"We have to start moving towards this kind of scale of experiments if we're going to be predictive at all," said Wilkinson, who wasn't involved in the study. He believes that the current article will help the EPA and others to assemble spatially explicit models on much larger scales in the future.

"But it's not hugely predictive at this stage because they're not really in a situation yet where they're able to model gene flow from the kind of patterns of distribution you'll expect once these plants are actually commercialized—if they will be," Wilkinson added.

Links for this article

L.S. Watrud et al., "Evidence for landscape-level, pollen-mediated gene flow from genetically modified creeping bentgrass with CP4 EPSPS as a marker," PNAS, DOI:10.1073/pnas.0405154101, September 20, 2004.
<http://www.pnas.org>

US Environmental Protection Agency
<http://www.epa.gov/>

Anne Fairbrother
<http://www.epa.gov/wed/pages/staff/fairbrot.htm>

Lidia S. Watrud
<http://www.epa.gov/wed/pages/staff/watrud.htm>

Charles F. Chilcutt
http://beaumont.tamu.edu/Personnel/emeritus_page/Charles_Chilcutt.htm

C. Holding, "Resistance found in GM refuges," The Scientist, May 11 2004.
<http://www.biomedcentral.com/news/20040511/01/>

Michael Wilkinson
[http://www.lifesci.rdg.ac.uk/cgi-
bin/WebObjects/Directory.woa/2/wa/staffDetails?staffID=400](http://www.lifesci.rdg.ac.uk/cgi-bin/WebObjects/Directory.woa/2/wa/staffDetails?staffID=400)