EVIDENCE Col Bob Jones
TOPIC GMO RC131 / RC18
SUB# 024
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post-2009 GMO references

Crossing the divide: gene flow produces intergeneric hybrid in feral transgenic creeping bentgrass population

Mol Ecol. 2012 May 24. Epub 2012 May 24. PMID: 22625177
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Abstract:
Gene flow is the most frequently expressed public concern related to the deregulation of transgenic events (Snow 2002; Ellstrand 2003). However, assessing the potential for transgene escape is complex because it depends on the opportunities for unintended gene flow, and establishment and persistence of the transgene in the environment (Warwick etal. 2008). Creeping bentgrass (Agrostis stolonifera L.), a turfgrass species widely used on golf courses, has been genetically engineered to be resistant to glyphosate, a nonselective herbicide. Outcrossing species, such as creeping bentgrass (CB), which have several compatible species, have greater chances for gene escape and spontaneous hybridization (i.e. natural, unassisted sexual reproduction between taxa in the field), which challenges transgene containment. Several authors have emphasized the need for evidence of spontaneous hybridization to infer the potential for gene flow (Armstrong etal. 2005). Here we report that a transgenic intergeneric hybrid has been produced as result of spontaneous hybridization of a feral-regulated transgenic pollen receptor (CB) and a nontransgenic pollen donor (rabbitfoot grass, RF, Polypogon monspeliensis (L.) Desf.). We identified an off-type transgenic seedling and confirmed it to be CB × RF intergeneric hybrid. This first report of a transgenic intergeneric hybrid produced in situ with a regulated transgenic event demonstrates the importance of considering all possible avenues for transgene spread at the landscape level before planting a regulated transgenic crop in the field. Spontaneous hybridization adds a level of complexity to transgene monitoring, containment, mitigation and remediation programmes.
24 May 2012

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Horizontal Gene Transfer by the Parasitic Plant Striga hermonthica

Horizontal gene transfer has been postulated to occur between crops to co-occurring parasitic plants, but empirical evidence has been lacking. We present evidence that an HGT event moved a nuclear monocot gene into the genome of the eudicot parasite witchweed (Striga hermonthica), which infects many grass species in Africa. Analysis of expressed sequence tags revealed that the genome of S. hermonthica contains a nuclear gene that is widely conserved among grass species but is not found in other eudicots. Phylogenetically, this gene clusters with sorghum genes, the monocot host of the parasitic weed, suggesting that nuclear genes can be captured by parasitic weeds in nature.

Satoko Yoshida, Shinichiro Maruyama, Hisayoshi Nozaki, Ken Shirasu
Science 28 May 2010:
Vol. 328, Issue 5982, pp. 1128
DOI: 10.1126/science.1187145

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Worst-case scenarios for horizontal gene transfer from Lactococcus lactis carrying heterologous genes to Enterococcus faecalis in the digestive tract of gnotobiotic mice.

Environ Biosafety Res. 2003 Jul-Sep;2(3):173-80. PMID: 15612415
Carl-Alfred Alpert, Denis D G Mater, Marie-Claude Muller, Marie-France Ouriet, Yvonne Duval-Iflah, Gérard Corthier
Unité d'Ecologie et de Physiologie du Système digestif, INRA, 78352 Jouy-en-Josas, France.

Abstract:
Since genetically modified (GM) lactic acid bacteria (LAB) might be released in open environments for future nutritional and medical applications, the purpose of this study was to determine an upper limit for the horizontal gene transfer (HGT) in the digestive tract (DT) from Lactococcus lactis carrying heterologous genes (lux genes encoding a bacterial luciferase) to Enterococcus faecalis. Two enterococcal wide host-range conjugative model systems were used: (i) a system composed of a mobilizable plasmid containing the heterologous lux genes and a native conjugative helper plasmid; and (ii) a Tn916-lux transposon. Both systems were tested under the most transfer-prone conditions, i.e. germfree mice mono-associated with the recipient E. faecalis. No transfer was observed with the transposon system. Transfers of the mobilizable plasmid carrying heterologous genes were below 10(2) transconjugants per g of faeces for a single donor dose and reached between 10(3) and 10(4) transconjugants per g of faeces when continuous inoculation of the donor strain was used. Once established in mice, transconjugants persisted at low levels in the mouse DT.
1 July 2003

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The relevance of gene transfer to the safety of food and feed derived from genetically modified (GM) plants

van den Eede G, Aarts H, Buhk HJ, Corthier G, Flint HJ, Hammes W, Jacobsen B, Midtvedt T, van der Vossen J, von Wright A,Wackernagel W, Wilcks A.
Abstract
In 2000, the thematic network ENTRANSFOOD was launched to assess four different topics that are all related to the testing or assessment of food containing or produced from genetically modified organisms (GMOs). Each of the topics was linked to a European Commission (EC)-funded large shared cost action (see http://www.entransfood.com). Since the exchange of genetic information through horizontal (lateral) gene transfer (HGT) might play a more important role, in quantity and quality, than hitherto imagined, a working group dealing with HGT in the context of food and feed safety was established. This working group was linked to the GMOBILITY project (GMOBILITY, 2003) and the results of the deliberations are laid down in this review paper. HGT is reviewed in relation to the potential risks of consuming food or feed derived from transgenic crops. First, the mechanisms for obtaining transgenic crops are described. Next, HGT mechanisms and its possible evolutionary role are described. The use of marker genes is presented in detail as a special case for genes that may pose a risk. Furthermore, the exposure to GMOs and in particular to genetically modified (GM) deoxyribonucleic acid (DNA) is discussed as part of the total risk assessment. The review finishes off with a number of conclusions related to GM food and feed safety. The aim of this paper is to provide a comprehensive overview to assist risk assessors as well as regulators and the general public in understanding the safety issues related to these mechanisms.
Food Chem. Toxicol. 2004 Jul;42(7):1127-56.

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Visual Evidence of Horizontal Gene Transfer between Plants and Bacteria in the Phytosphere of Transplastomic Tobacco

Alessandra Pontiroli, Aurora Rizzi, Pascal Simonet, Daniele Daffonchio, Timothy M. Vogel, Jean-Michel Monier

Applied and Environmental Microbiology, May 2009 vol. 75 no. 10 3314-3322

Plant surfaces, colonized by numerous and diverse bacterial species, are often considered hot spots for horizontal gene transfer (HGT) between plants and bacteria. Plant DNA released during the degradation of plant tissues can persist and remain biologically active for significant periods of time, suggesting that soil or plant-associated bacteria could be in direct contact with plant DNA. In addition, nutrients released during the decaying process may provide a copiotrophic environment conducive for opportunistic microbial growth. Using*Acinetobacter baylyi*strain BD413 and transplastomic tobacco plants harboring the*aadA*gene as models, the objective of this study was to determine whether specific niches could be shown to foster bacterial growth on intact or decaying plant tissues, to develop a competence state, and to possibly acquire exogenous plant DNA by natural transformation. Visualization of HGT in situ was performed using*A. baylyi* strain BD413(*rbcL*-Δ*P aadA*::*gfp*) carrying a promoterless*aadA*::*gfp*fusion. Both antibiotic resistance and green fluorescence phenotypes were restored in recombinant bacterial cells after homologous recombination with transgenic plant DNA. Opportunistic growth occurred on decaying plant tissues, and a significant proportion of the bacteria developed a competence state. Quantification of transformants clearly supported the idea that the phytosphere constitutes a hot spot for HGT between plants and bacteria. The nondisruptive approach used to visualize transformants in situ provides new insights into environmental factors influencing HGT for plant tissues.

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