



“Seminario 20 años de Cultivos Transgénicos en Uruguay”

Cultivos transgénicos: promesas, incertidumbres y certezas

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¿ Cuales son las mayores
innovaciones de la
humanidad?

Espigeta de teosinto selvagem com uma fileira de cariopses revestidas por uma rígida cápsula



Espiga do milho domesticado atual com muitas fileiras de cariopses maiores e sem proteção





La planta del teocintle. A. Vista general de la planta. B. Inflorescencia femenina “mazorca” inmadura descubierta. C. Inflorescencia femenina “mazorca” madura. D. Cápsulas de fruto “granos” dispersos. (Proyecto Global de Maíces Nativos)



Espiga femenina de teocintle con “frutos” en arreglo dístico (A-B) (*Zea mays* subsp. mexicana raza Mesa Central) e híbridos de teocintle y maíz (C-F) (Material colectado por el Dr. Ariel Álvarez, en Erongarícuaro, Michoacán; Foto: J. M. Hernández).





“No hay país en el mundo que haya presentado tanta resistencia a la siembra de maíz transgénico como México.”

Wall Street Journal, 9 dic 2010

<http://online.wsj.com/article/>

Velada por el maíz
Zócalo de la Cd de México

Campaña nacional
Sin maíz no hay país









Cultivos predominantes



4700Mt ZONA GLACIAL 0°C



PARAMO
3000Mt

< 10°C



FRIO

> 10°C

2000 Mt



TEMPLADO

> 17°C

1000 Mt



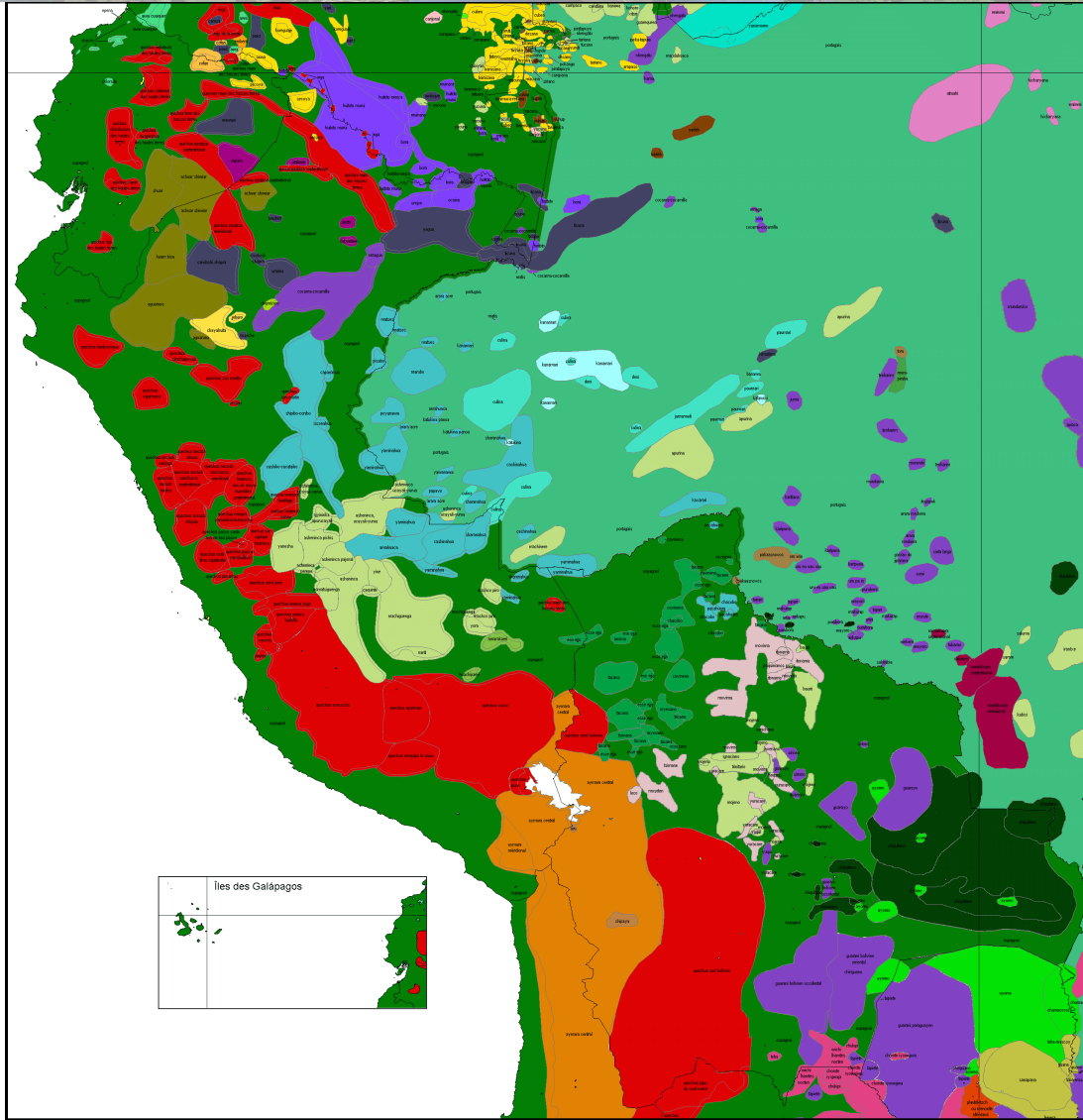
CALIDO

> 24°C

0Mt



DIVERSIDAD CULTURAL





Agrobiodiversidad

La diversidad en los centros de diversidad genética es resultado de factores de naturaleza histórica, ecológica, genética y cultural.





Promesa: la tecnología
es precisa!



La transgenia puede ser llamada de una....

1. ***”..precisa, modificación genética que racionalmente fue diseñada para alcanzar un objetivo específico de ingeniería.***
2. *.” (Roger Beachy et al. Nat. Biotechnol. 20,1195, 2002)*
3. *Mutagénesis Insercional*
4. *Transferencia genética horizontal forzada.*

Pieter Windels · Isabel Taverniers · Ann Depicker
Erik Van Bockstaele · Marc De Loose

Characterisation of the Roundup Ready soybean insert

Eur Food Res Technol (2001) 213:107–112
DOI 10.1007/s002170100336

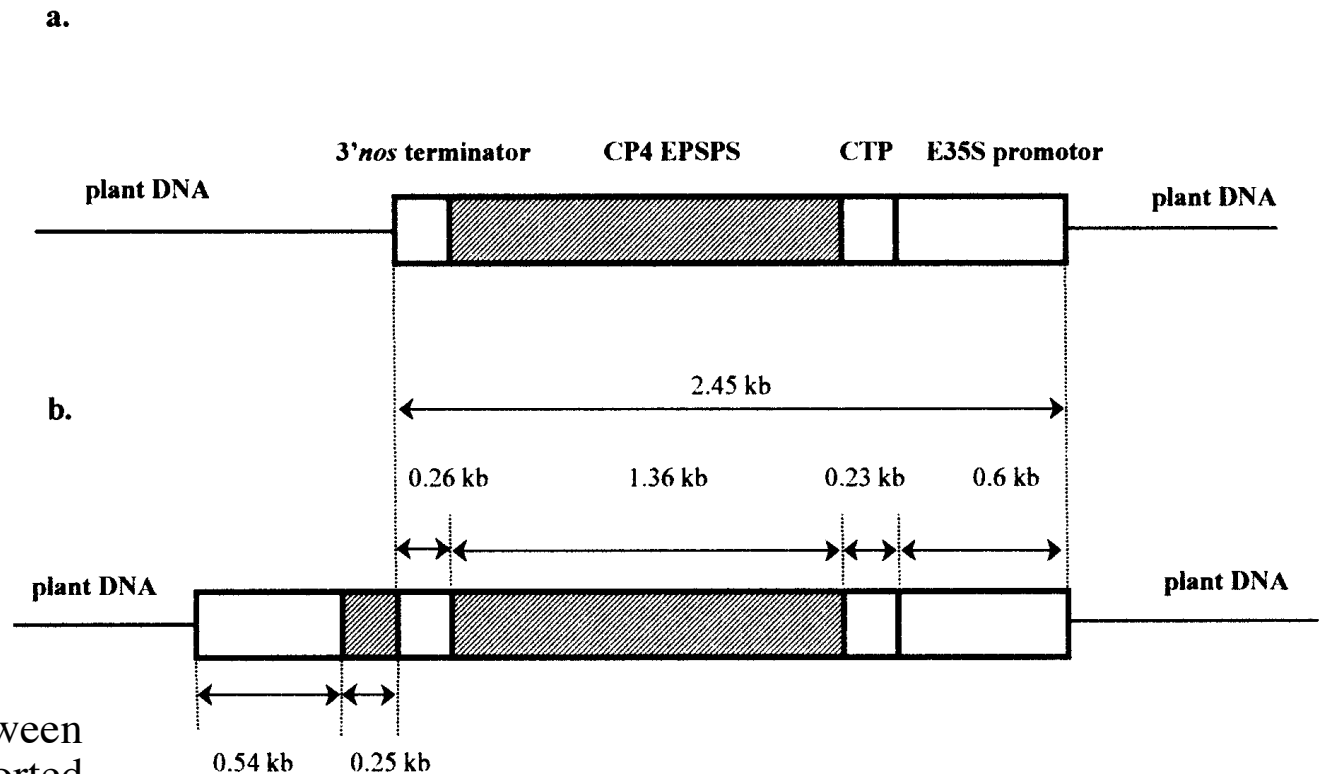
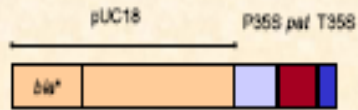


Fig. 3 A comparison between the insert structure as reported by **a** Padgett et al. [10] and **b** the structure of the insert deduced from the results described in this article

Transgene esperado vs observado

Colonier *et al.*, 2003

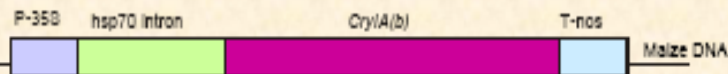


DNA transgênico esperado

Milho transgênico (T-25)



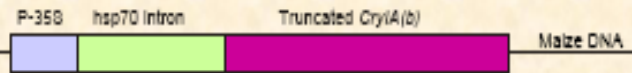
DNA transgênico observado



DNA transgênico esperado

Milho Bt transgênico (Mon810)

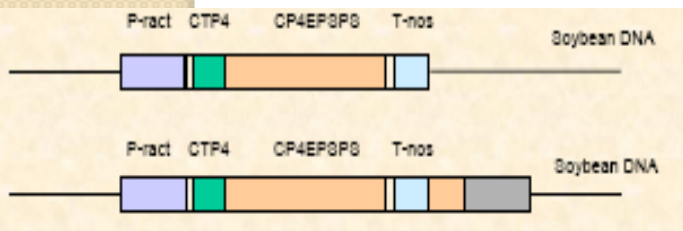
DNA transgênico observado



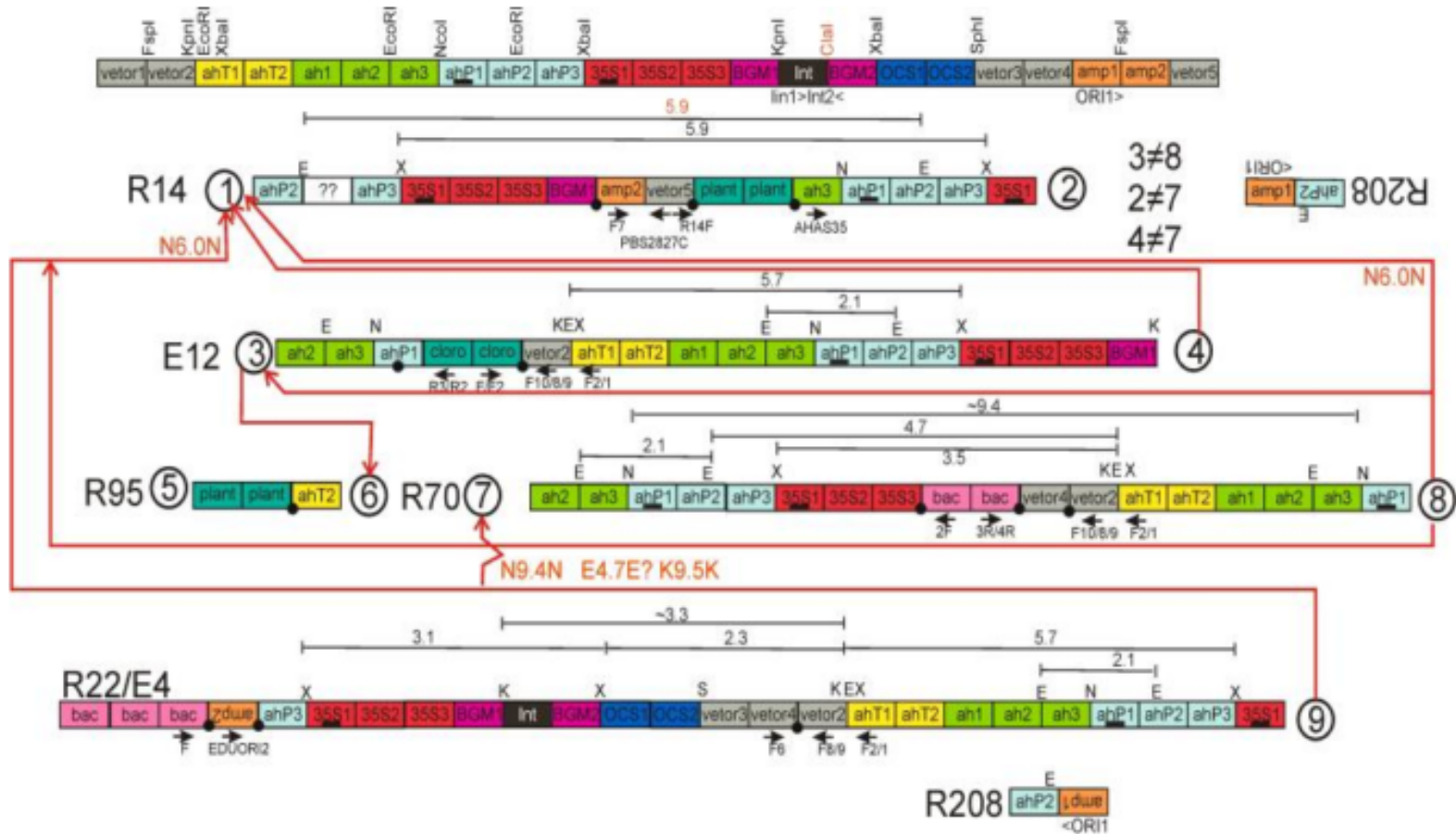
DNA transgênico esperado

Soja transgênica (Soja RR)

DNA transgênico observado



Como ficaram os transgenes dentro do genoma do feijão?





Promesa: los OGMs
son los organismos
mas estudiados!



RESEARCH ARTICLE

Laboratory Rodent Diets Contain Toxic Levels of Environmental Contaminants: Implications for Regulatory Tests

Robin Mesnage^{1,2☉✉}, Nicolas Defarge^{1,2☉}, Louis-Marie Rocque², Joël Spiroux de Vendômois², Gilles-Eric Séralini^{1,2*}

1 University of Caen, Institute of Biology, EA2608 and Network on Risks, Quality and Sustainable Environment MRSH, Esplanade de la Paix, 14032 Caen Cedex, France, **2** CRIIGEN, 40 rue Monceau, 75008, Paris, France

☉ These authors contributed equally to this work.

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* gilles-eric.seralini@unicaen.fr

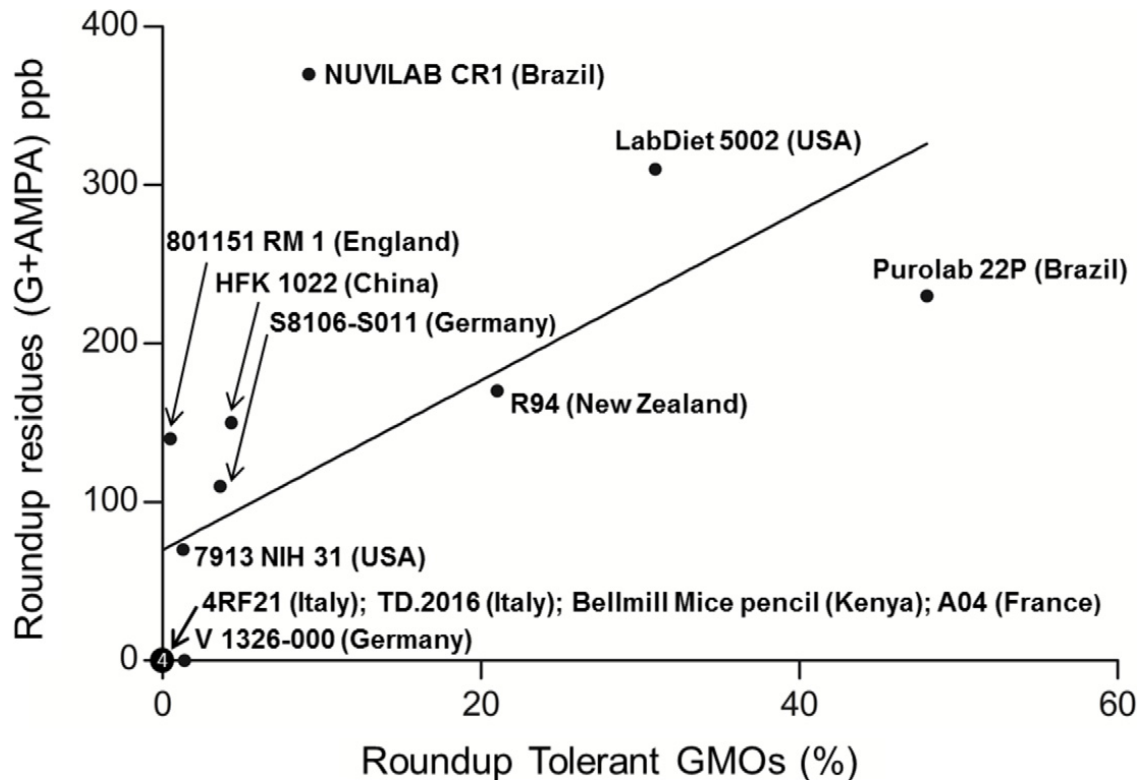


Fig 3. Roundup residues (glyphosate + AMPA, ppb or $\mu\text{g/kg}$) as a function of Roundup-tolerant GMOs quantities (%) in 13 rodent diets used worldwide. The linear regression was calculated in Stata ($y = 5.34x + 69.97$), the Pearson's r indicates a significant correlation ($r = 0.64$, $p = 0.019$). The y-axis is labelled as such because while other glyphosate-based herbicides do exist, legally only Roundup should be used on glyphosate-tolerant plants due to commercial agreements. However, other glyphosate-based herbicides may be used in some countries.



Promesa: resolver
problemas da
agricultura!



AMERICAN
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ADVANCEMENT OF
SCIENCE

SCIENCE

18 OCTOBER 1991
VOL. 254 ■ PAGES 345-488

\$6.00

1994 – primera
planta
transgénica
comercial

CA 95616-5146
DAVIS
ORCHARD PK
M 1
RUBENS ONOFRE NODARI
66 00003166962AS 01/10/92S9142
***** 5-DIGIT 95616





¿Cuanto tiempo el Tomato Flavr Savr se quedo en mercado? 2 años

¿ Cuales son las razones del fracaso?

1. Problemas no previstos: rechazo de los consumidores y maior costo industrial.
2. Efectos no intencionales: peor gusto, menor resiliencia a distintos ambientes, cultivo más costoso.
3. Otras



Eficiência del evento Embrapa 5.1



todas as plantas foram submetidas à inoculação durante sete dias com alta população de moscas brancas virulífera.

Tabela V.17. Segregação do transgene e da resistência ao mosaico dourado na geração F_1

Cruzamento ^a	GM	Resistentes	Suscetíveis	% Suscetíveis
Olathe 5.1 X Jalo Precoce	20	13	7	35,0
Olathe 5.1 X Olathe Pinto	20	17	3	15
Olathe 5.1 X Dark Red Kidney 18	20	13	7	35,0
Olathe 5.1 X BRS Supremo	20	18	2	10,0
Olathe 5.1 X BRS Pontal	58	37	21	36,2
Olathe 5.1 X Pérola	36	29	7	19,4
Parental Olathe 5.1	16	16	0	0,0

^aJalo Precoce (grão jalo, origem Andina), Olathe Pinto (grão pinto, origem Mesoamericana), Dark Red Kidney 18 (grão “red kidney” origem Andina), BRS Supremo (grão preto, origem Mesoamericano), BRS Pontal (grão carioca, origem Mesoamericana), Pérola (grão carioca, origem Mesoamericana)

Soja – Biotecnologia e Proteção contra Lagartas

[#cropstaremação](#), [#lagartas](#), [#Sementes](#), [#Soja](#), [#Tecnologia de aplicação](#)

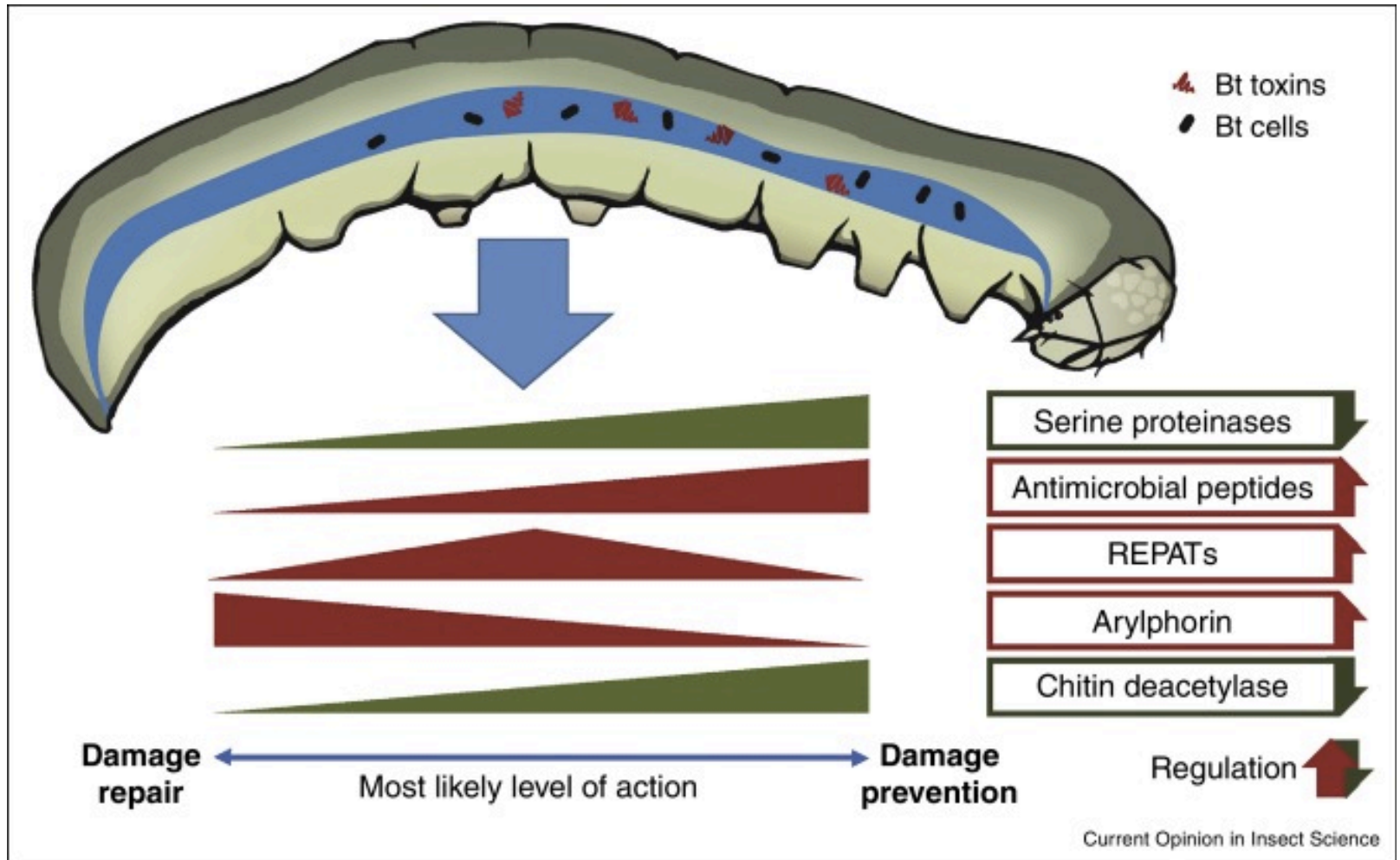


Os produtores de soja, ao longo das últimas safras, ganharam um importante aliada no combate às lagartas que atacam à lavoura: a Biotecnologia. A biotecnologia utilizada para o controle de lagartas vem mudando o jeito de se produzir soja no país. São incorporados nas

plantas alguns genes que produzem proteínas letais a algumas espécies de lagartas, fazendo com que a planta fique resistente a estes insetos. Essa tecnologia é conhecida como Tecnologia Bt, pois os genes utilizados têm sua origem na bactéria *Bacillus thuringiensis*.

A utilização de variedades de soja Bt é uma excelente ferramenta no controle de lagartas, facilitando assim o manejo, diminuindo a população de lagartas na lavoura e consequentemente protegendo as folhas e a produtividade.

<http://www.grupocultivar.com.br/artigos/soja-n-biotecnologia-e-protecao-contralagartas>



General overview of the main groups of genes/proteins regulated in the midgut of *Spodoptera* after ingestion of *B. thuringiensis* or Cry toxins. Doi: 10.1016/j.cois.2016.04.006



Promesa:
coexistencia sin
causar daños!



RESEARCH ARTICLE

Laboratory Rodent Diets Contain Toxic Levels of Environmental Contaminants: Implications for Regulatory Tests

Robin Mesnage^{1,2☉✉}, Nicolas Defarge^{1,2☉}, Louis-Marie Rocque², Joël Spiroux de Vendômois², Gilles-Eric Séralini^{1,2*}

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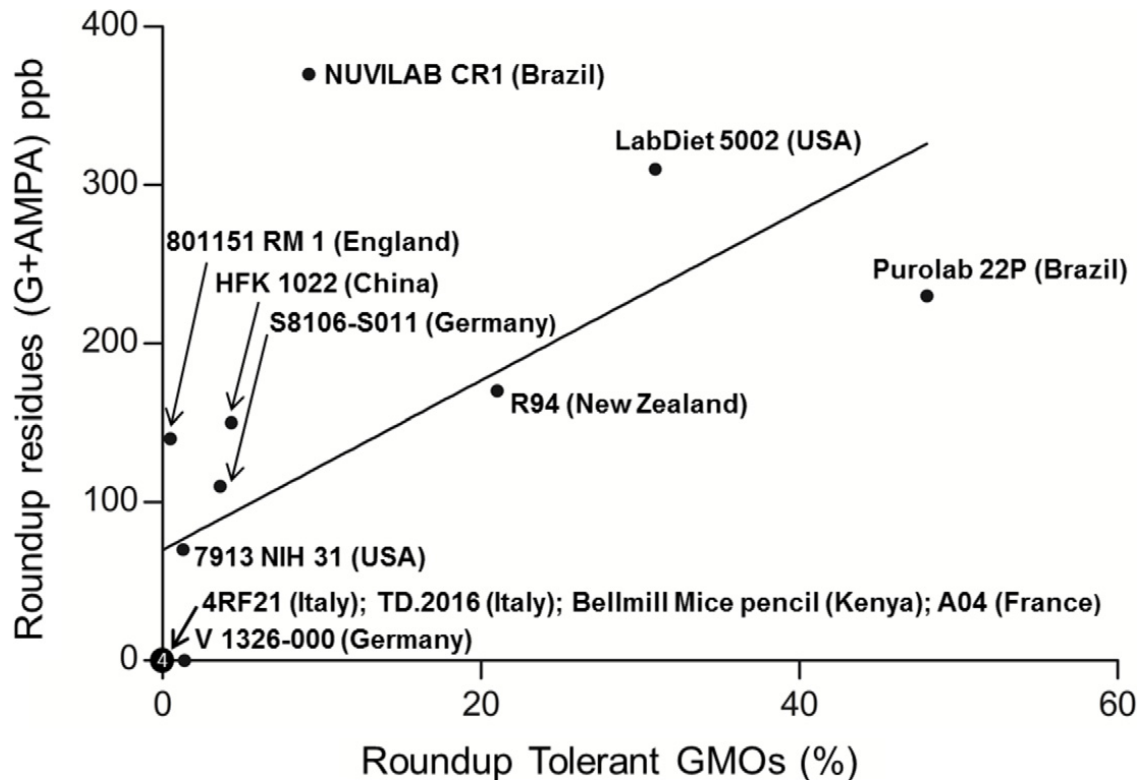


Fig 3. Roundup residues (glyphosate + AMPA, ppb or $\mu\text{g/kg}$) as a function of Roundup-tolerant GMOs quantities (%) in 13 rodent diets used worldwide. The linear regression was calculated in Stata ($y = 5.34x + 69.97$), the Pearson's r indicates a significant correlation ($r = 0.64$, $p = 0.019$). The y-axis is labelled as such because while other glyphosate-based herbicides do exist, legally only Roundup should be used on glyphosate-tolerant plants due to commercial agreements. However, other glyphosate-based herbicides may be used in some countries.

THE IMPOSSIBLE COEXISTENCE – CASE STUDY IN SPAIN –

Reducing of the cultivated area Organic Corn

by 75% in Aragon (2004-2007)

by 95% in Catalonia (2002-2008)

Binimelis, 2008. Coexistence of plants, coexistence of farmers: Is an individual choice possible? *Journal of Agricultural and Environmental Ethics*, 21: 437–457





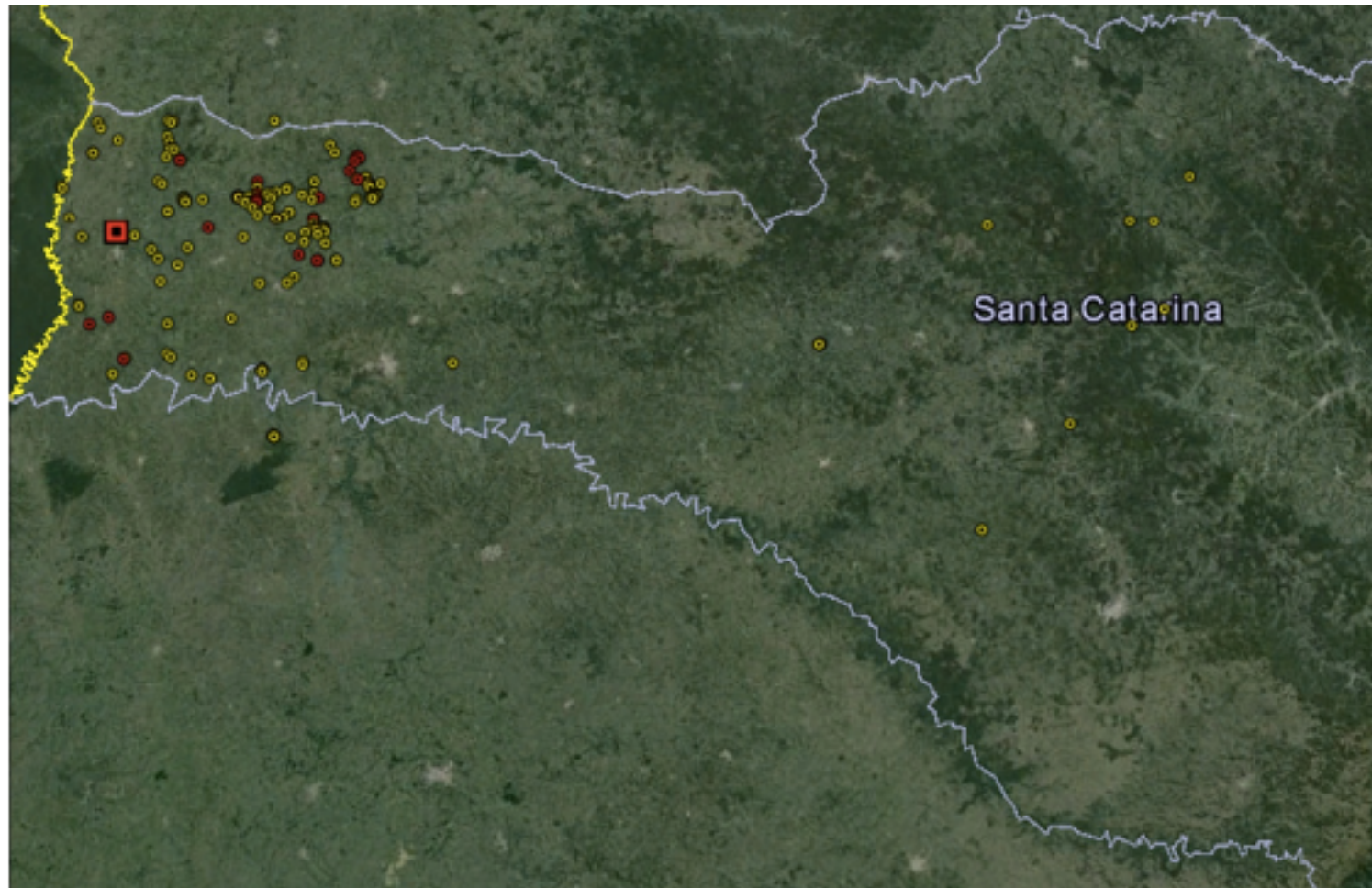
Brasil não tem controle sobre milho transgênico



O agricultor Ademir Ferronato em sua plantação de milho convencional no Paraná; ele teme contaminação por lavoura transgênica



Courtesy: Gabriel Fernandes, ASPTA





Promesa: no causa
danos a organismos
branco o benéficos!



Cuanto de la toxina produce un cultivo *Bt* comparado con los niveles naturales del suelo?



Natural <i>Bt</i> Soil Microorganisms	<i>Bt</i> Cotton	<i>Bt</i> Corn
0.25 g	400 – 1000 g/ha	2,800 – 4,200 g/ha

Bt cotton produces up to **4,000 times** more *Bt* than soil microorganisms, while *Bt* corn produces up to **16,800 times** more.

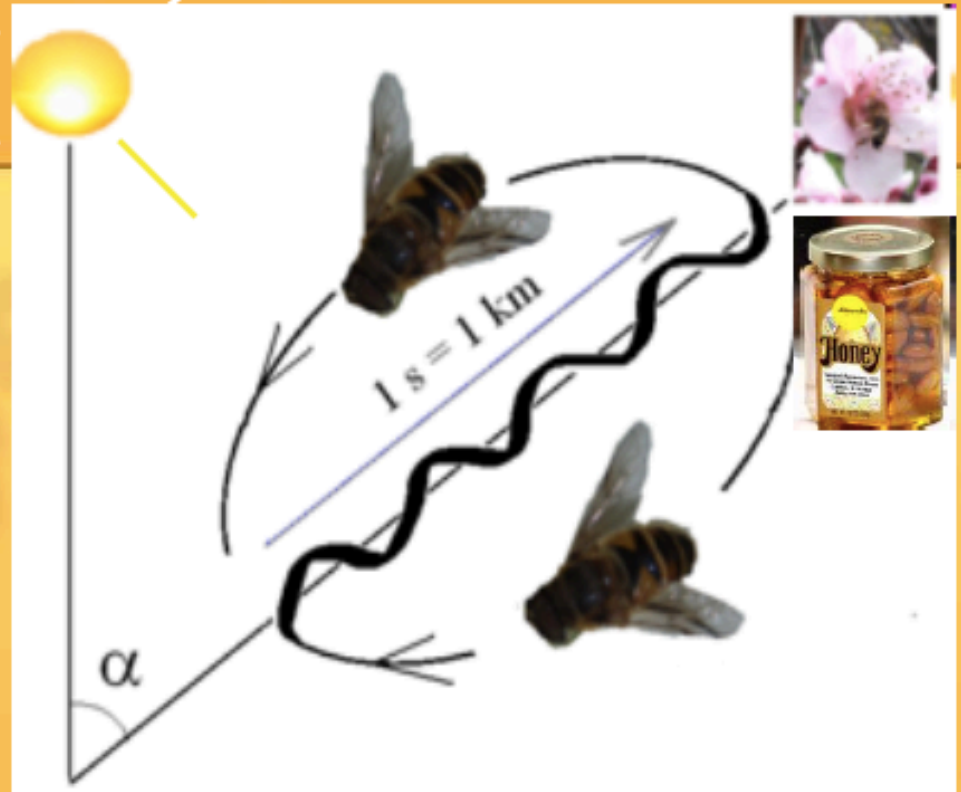
Blackwood, C.B., J.S. Buyer, 2004. “Soil Microbial Communities Associated with *Bt* and Non-*Bt* Corn in Three soils,” *J. Environmental Quality*, Vol. 33, pages 832-836

Bees dancing



The Sun

Sweet Target

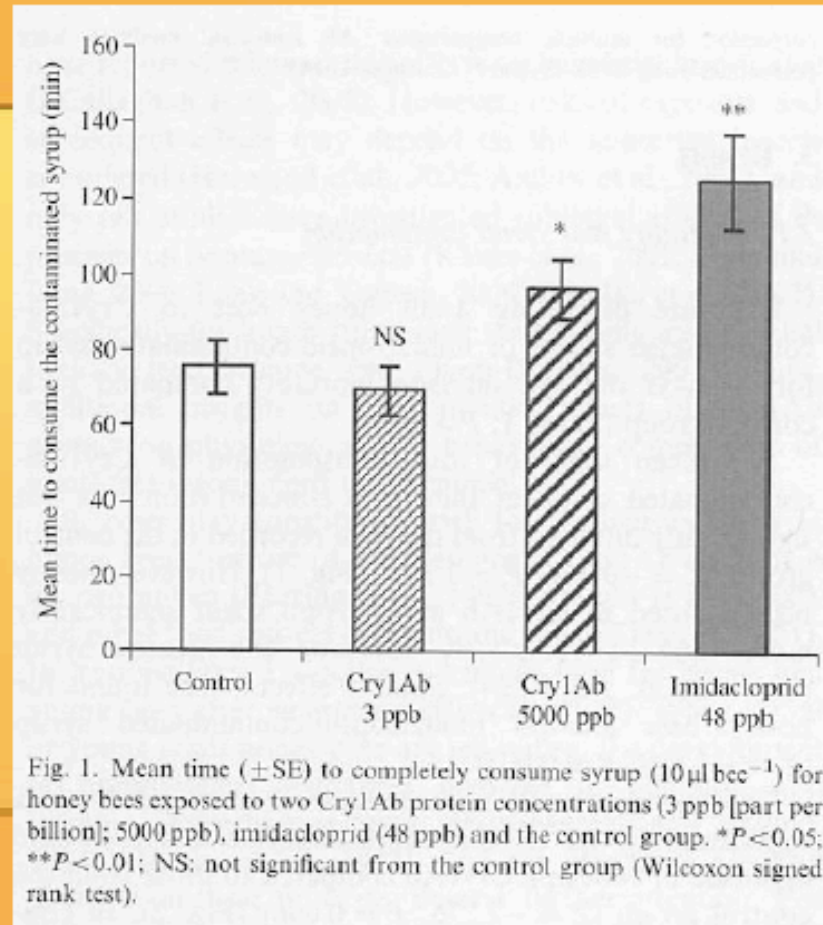


- Indicates direction...
- and distance to food
- Dialects!

Cry1Ab pollen slows down feeding



Time for syrup consumption

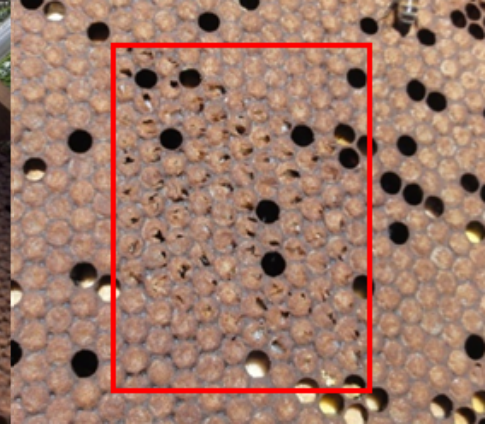


From Ramirez-Romero et al. 2008



Comportamiento higiénico

(Leon Bizzochi)



Decreció con polen
transgénico



Promesa: diminuir
la incidencia de
plagas!



Dominant Inheritance of Field-Evolved Resistance to *Bt* Corn in *Busseola fusca*

Pascal Campagne^{1,2,4,5*}, Marlene Kruger³, Rémy Pasquet^{1,2,4}, Bruno Le Ru^{1,2,4}, Johnnie Van den Berg³

1 Unité de Recherche IRD 072, CNRS UPR9034, Laboratoire Evolution, Génome et Spéciation, Gif-sur-yvette, France, **2** Université Paris-Sud 11, Orsay, France, **3** Unit of Environmental Sciences and Management, North-West University, Potchefstroom, South Africa, **4** Noctuid Stem Borers Biodiversity in Africa Project, Environmental Health Division, *icipe* (International Centre of Insect Physiology and Ecology, Nairobi, Kenya, **5** Department of Ecology, Evolution and Natural Resources, Rutgers University, New Brunswick, New Jersey, United States of America

Abstract

Transgenic crops expressing *Bacillus thuringiensis* (*Bt*) toxins have been adopted worldwide, notably in developing countries. In spite of their success in controlling target pests while allowing a substantial reduction of insecticide use, the sustainable control of these pest populations is threatened by the evolution of resistance. The implementation of the “high dose/refuge” strategy for managing insect resistance in transgenic crops aims at delaying the evolution of resistance to *Bt* crops in pest populations by promoting survival of susceptible insects. However, a crucial condition for the “high dose/refuge” strategy to be efficient is that the inheritance of resistance should be functionally recessive. *Busseola fusca* developed high levels of resistance to the *Bt* toxin *Cry 1Ab* expressed in *Bt* corn in South Africa. To test whether the inheritance of *B. fusca* resistance to the *Bt* toxin could be considered recessive we performed controlled crosses with this pest and evaluated its survival on *Bt* and non-*Bt* corn. Results show that resistance of *B. fusca* to *Bt* corn is dominant, which refutes the hypothesis of recessive inheritance. Survival on *Bt* corn was not lower than on non-*Bt* corn for both resistant larvae and the F_1 progeny from resistant \times susceptible parents. Hence, resistance management strategies of *B. fusca* to *Bt* corn must address non-recessive resistance.





Field-Evolved Resistance to Bt Maize by Western Corn Rootworm

Aaron J. Gassmann*, Jennifer L. Petzold-Maxwell, Ryan S. Keweshan, Mike W. Dunbar

Department of Entomology, Iowa State University, Ames, Iowa, United States of America

Abstract

Background: Crops engineered to produce insecticidal toxins derived from the bacterium *Bacillus thuringiensis* (Bt) are planted on millions of hectares annually, reducing the use of conventional insecticides and suppressing pests. However, the evolution of resistance could cut short these benefits. A primary pest targeted by Bt maize in the United States is the western corn rootworm *Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae).

Methodology/Principal Findings: We report that fields identified by farmers as having severe rootworm feeding injury to Bt maize contained populations of western corn rootworm that displayed significantly higher survival on Cry3Bb1 maize in laboratory bioassays than did western corn rootworm from fields not associated with such feeding injury. In all cases, fields experiencing severe rootworm feeding contained Cry3Bb1 maize. Interviews with farmers indicated that Cry3Bb1 maize had been grown in those fields for at least three consecutive years. There was a significant positive correlation between the number of years Cry3Bb1 maize had been grown in a field and the survival of rootworm populations on Cry3Bb1 maize in bioassays. However, there was no significant correlation among populations for survival on Cry34/35Ab1 maize and Cry3Bb1 maize, suggesting a lack of cross resistance between these Bt toxins.

Conclusions/Significance: This is the first report of field-evolved resistance to a Bt toxin by the western corn rootworm and by any species of Coleoptera. Insufficient planting of refuges and non-recessive inheritance of resistance may have contributed to resistance. These results suggest that improvements in resistance management and a more integrated approach to the use of Bt crops may be necessary.



Gusano de la raíz del maíz



Diabrotica virgifera, the Western Corn Rootworm
www.ent.iastate.edu/rootworm.

Lavoura furada

O Brasil enfrenta infestação sem precedentes de lagartas em lavouras de milho GM. Agricultores, técnicos e empresas difusoras de tecnologia divergem sobre a causa do ataque.

Ariosto Mesquita

Agro DBO, March, 2013

Ponto de vista

Goleada no campo

Uso generalizado de OGMs traz contratempos aos agricultores em termos econômicos, em pragas e ervas daninhas resistentes.

Rogério Arioli Silva *



Nesse caso o prejuízo fica apenas no bolso do produtor que investiu numa nova opção biotecnológica e, mesmo assim, precisou pulverizar sua lavoura com inseticidas, além de perder produtividade com o ataque das lagartas. Primeiro, a culpa dessa ineficiência foi debitada aos produtores que não teriam utilizado a tecnologia de maneira correta, deixando de implantar as áreas de refúgio. Posteriormente, observou-se que não foi bem isso que aconteceu e sim a quebra de resistência das pragas, abreviando a vida útil do evento biotecnológico.



02/07/2014 07h13 - Atualizado em 02/07/2014 07h22

Milho que deveria resistir às pragas traz problemas para produtores de MS

Lavouras com variedades transgênicas têm grande infestações.
Saída foi aumentar o número de aplicações de defensivos.

Do Globo Rural

Comente agora

Tweetar 42

Recomendar 16



<http://g1.globo.com/economia/agronegocios/noticia/2014/07/milho-que-deveria-resistir-pragas-traz-problemas-para-produtores-de-ms.html>



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Research



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Cite this article: Hagenbucher S, Wäckers FL, Wettstein FE, Olson DM, Ruberson JR, Romeis J. 2013 Pest trade-offs in technology: reduced damage by caterpillars in Bt cotton benefits aphids. *Proc R Soc B* 280: 20130042. <http://dx.doi.org/10.1098/rspb.2013.0042>

Received: 7 January 2013

Accepted: 18 February 2013



Pest trade-offs in technology: reduced damage by caterpillars in Bt cotton benefits aphids

Steffen Hagenbucher¹, Felix L. Wäckers², Felix E. Wettstein¹, Dawn M. Olson³, John R. Ruberson⁴ and Jörg Romeis¹

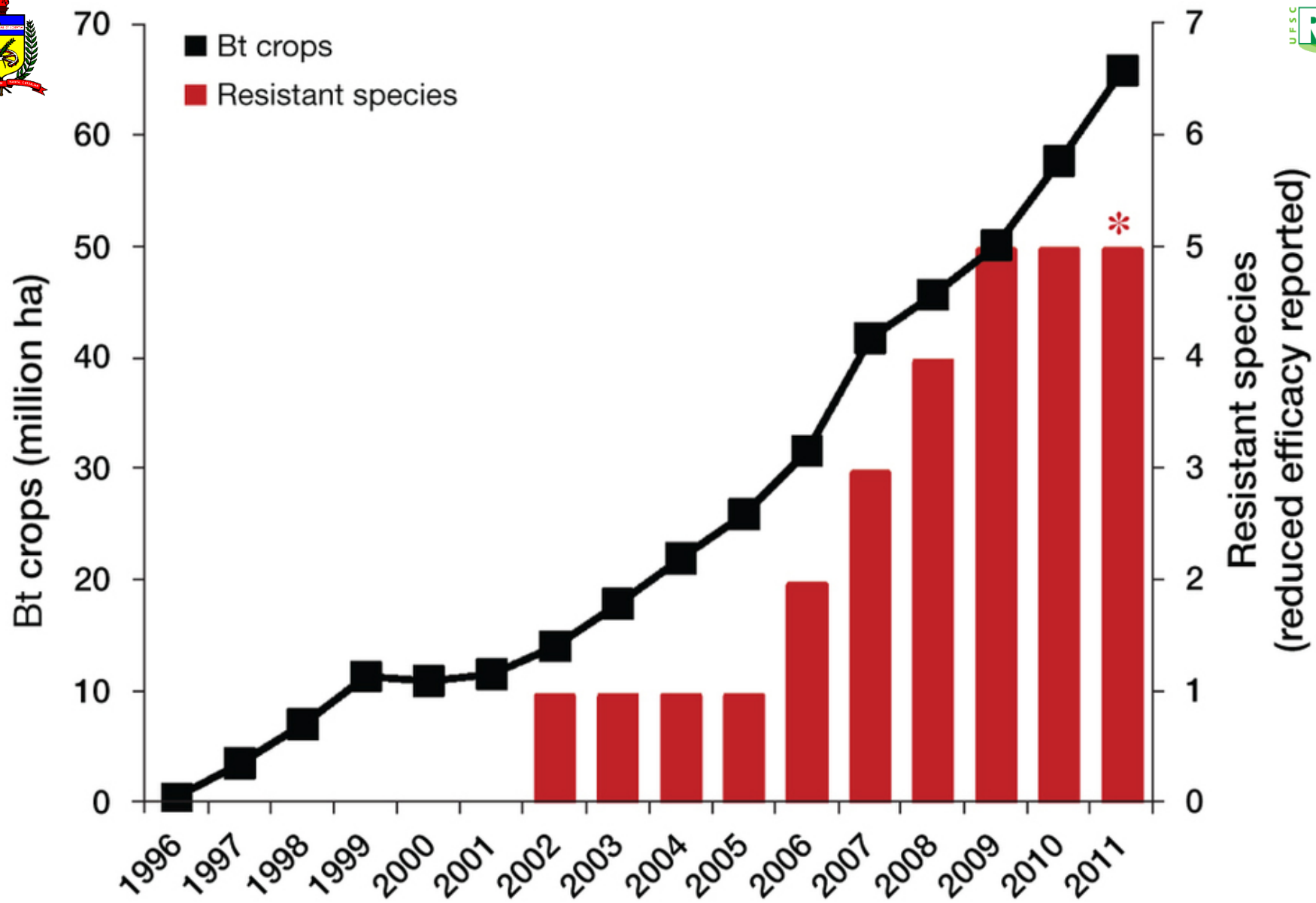
¹Agroscope Reckenholz-Tänikon Research Station ART, Reckenholzstrasse 191, 8046 Zurich, Switzerland

²Lancaster Environment Centre, Lancaster University, Lancaster LA14YQ, UK

³Crop Protection and Management Research Unit, USDA-ARS, Tifton, GA, USA

⁴Department of Entomology, University of Georgia, Tifton, GA, USA

The rapid adoption of genetically engineered (GE) plants that express insecticidal Cry proteins derived from *Bacillus thuringiensis* (Bt) has raised concerns about their potential impact on non-target organisms. This includes the possibility that non-target herbivores develop into pests. Although studies have now reported increased populations of non-target herbivores in Bt cotton, the underlying mechanisms are not fully understood. We propose that lack of herbivore-induced secondary metabolites in Bt cotton represents a mechanism that benefits non-target herbivores. We show that, because of effective suppression of Bt-sensitive lepidopteran herbivores, Bt cotton contains reduced levels of induced terpenoids. We also show that changes in the overall level of these defensive secondary metabolites are associated with improved performance of a Bt-insensitive herbivore, the cotton aphid, under glasshouse





Review article

The impact of secondary pests on *Bacillus thuringiensis* (Bt) crops

Rui Catarino^{1,*}, Graziano Ceddia², Francisco J. Areal¹ and Julian Park¹

¹School of Agriculture, Policy and Development, University of Reading, Reading, UK

²Department of Public Governance and Sustainable Development, MODUL University, Vienna, Austria

- En el espacio de aproximadamente **10 años**, la ventaja inicial de los cultivos Bt se había ido;
- Hoy en día esos insectos que antes se consideraban de menor relevancia son en realidad la **principal preocupación** de los agricultores;
- La caída en el uso de insecticidas y la **ineficacia de algodón Bt** contra estas plagas secundarias ha dado lugar a una inversión de la función ecológica de algodón.



Nueva plaga en soya RR y algodón GM: *Helicoverpa armigera*





Promesa: sin
problemas con la
malezas!

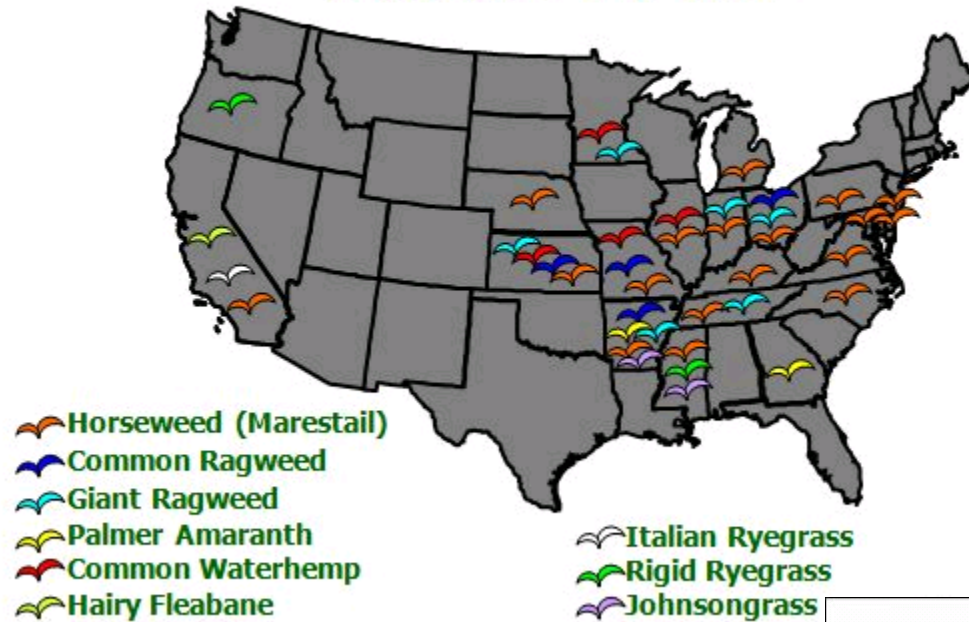
Dossie de la Monsanto para la aprobacion de la soya RR presentado para USDA en 1994

D. The Likelihood of the Appearance of Glyphosate-resistant Weeds

Several decades ago, herbicide resistant weeds were virtually unknown. Today there are some 109 herbicide resistant weed biotypes with over half of them resistant to triazines (Le Baron, 1991). Major factors which can contribute to the development of resistant weeds include: a single target site and a specific mode of action, broad spectrum of activity, long residual activity and the capacity to control weeds year-long, and frequent applications without rotation to other herbicides or cultural control practices. Using these criteria and based on current use data, glyphosate is considered to be a herbicide with low risk for weed resistance (Benbrook, 1991).

Attached in Appendix V are opinions from several academists located across the soybean growing belt regarding the likelihood of the development of glyphosate-resistant weeds, shifts in weed populations, and overwintering of soybeans. These experts are in agreement that it is highly unlikely that weed resistance to glyphosate will become a problem as a result of the commercialization of glyphosate-tolerant soybeans. Glyphosate has been used for over 20 years in various preplant, directed, spot or post harvest weed management systems with no known reports of weed resistance. This is most likely due to biological and chemical properties demonstrated by glyphosate and the use patterns of the herbicide. Glyphosate essentially has no residual

Confirmed Glyphosate Resistant Weeds in the U.S.



**Herbicide resistant weeds
costing farmers millions in
lost yield, increased expense
Delta Farm Press, 25 Feb 2011**

<http://deltafarmpress.com/soybeans/herbicide-resistant-weeds-costing-farmers-millions-lost-yield-increased-expense>

Norwest (Las Lajitas, Salta)



Argentina

Sorghum halepense resistant to glyphosate.



Ejemplos de impactos ya detectados



El cultivo sucesivo de Soya RR acelera el aparecimiento de plantas resistentes a herbicidas



Foto:
Robinson Osipe



XXX Congresso Brasileiro da Ciência das Plantas Daninhas

22 a 26 de agosto de 2016, Curitiba – PR

Tema: Conhecimento e Tecnologia a Serviço do Agricultor



Foto: Fernando Adegas



A University of California extension agent stands behind a patch of herbicide-resistant marestail (also known as horseweed) and talks about its effect on farmers. This aggressive weed, which can grow to be six feet tall, has emerged in many parts of the country but is particularly problematic in the Midwest and eastern United States.

Union of Concerned Scientists. The Rise of Superweeds—and What to Do About It. 2014, 8p.



Eleusine indica – A mais recente prova de resistência



Common Name: Goosegrass

Species: *Eleusine indica*

Group: EPSP synthase inhibitors (G/9)

Herbicides glyphosate

Location: Brazil, Paraná (PR)

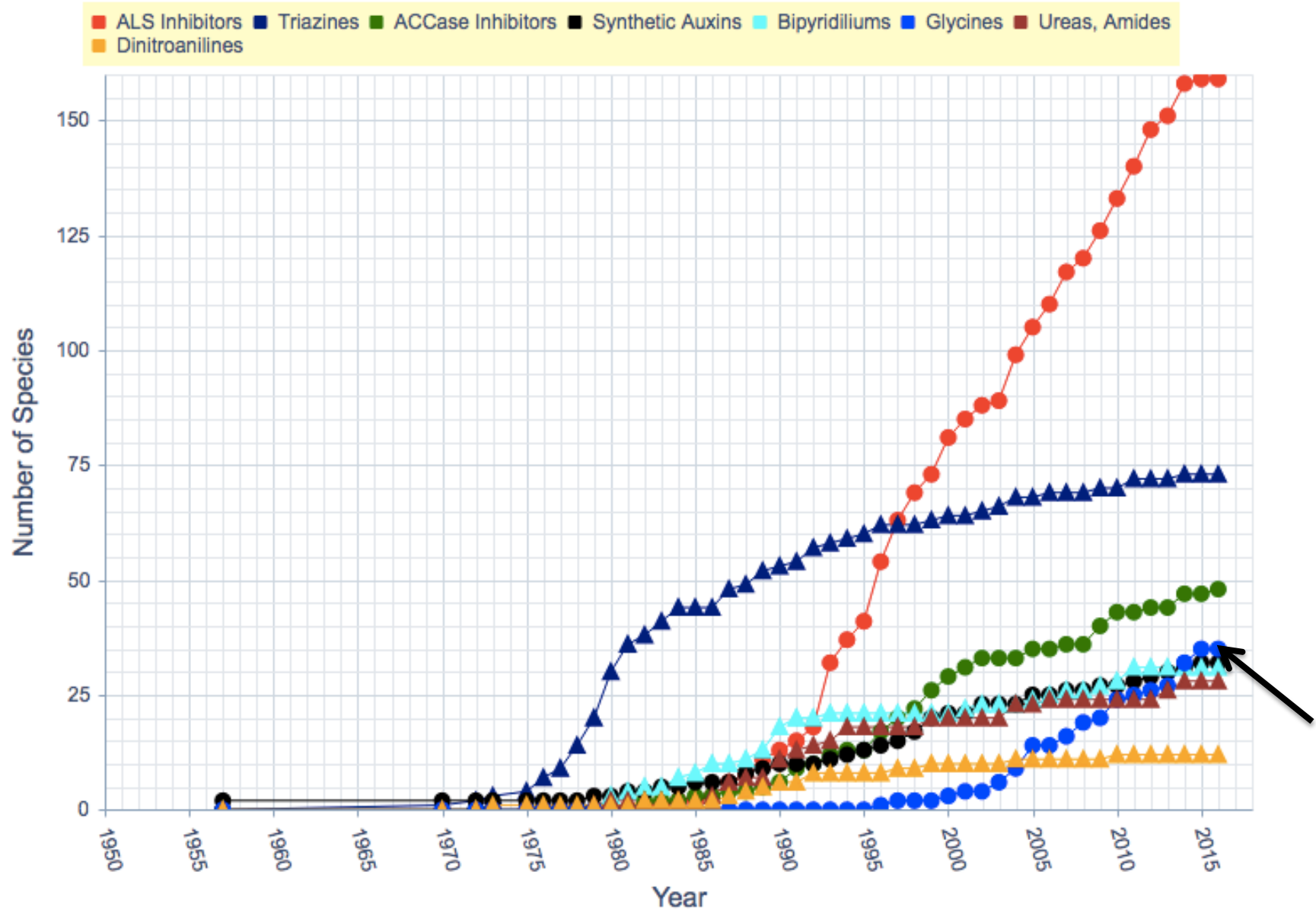
Year 2016

Situation(s): Corn (maize), Soybean, and
Wheat

Contributors: Jamil Constantin, Rubem
Oliveira, and Hudson Takano



Chronological increase in Resistant weeds Globally



Cultivo de frijol despues de maiz transgénico – Dois Vizinhos, PR



Foto: Joel Donazzolo, UTFPr, fev/2014



Embrapa alerta al posibilidad de que el maíz RR convertirse en una maleza!



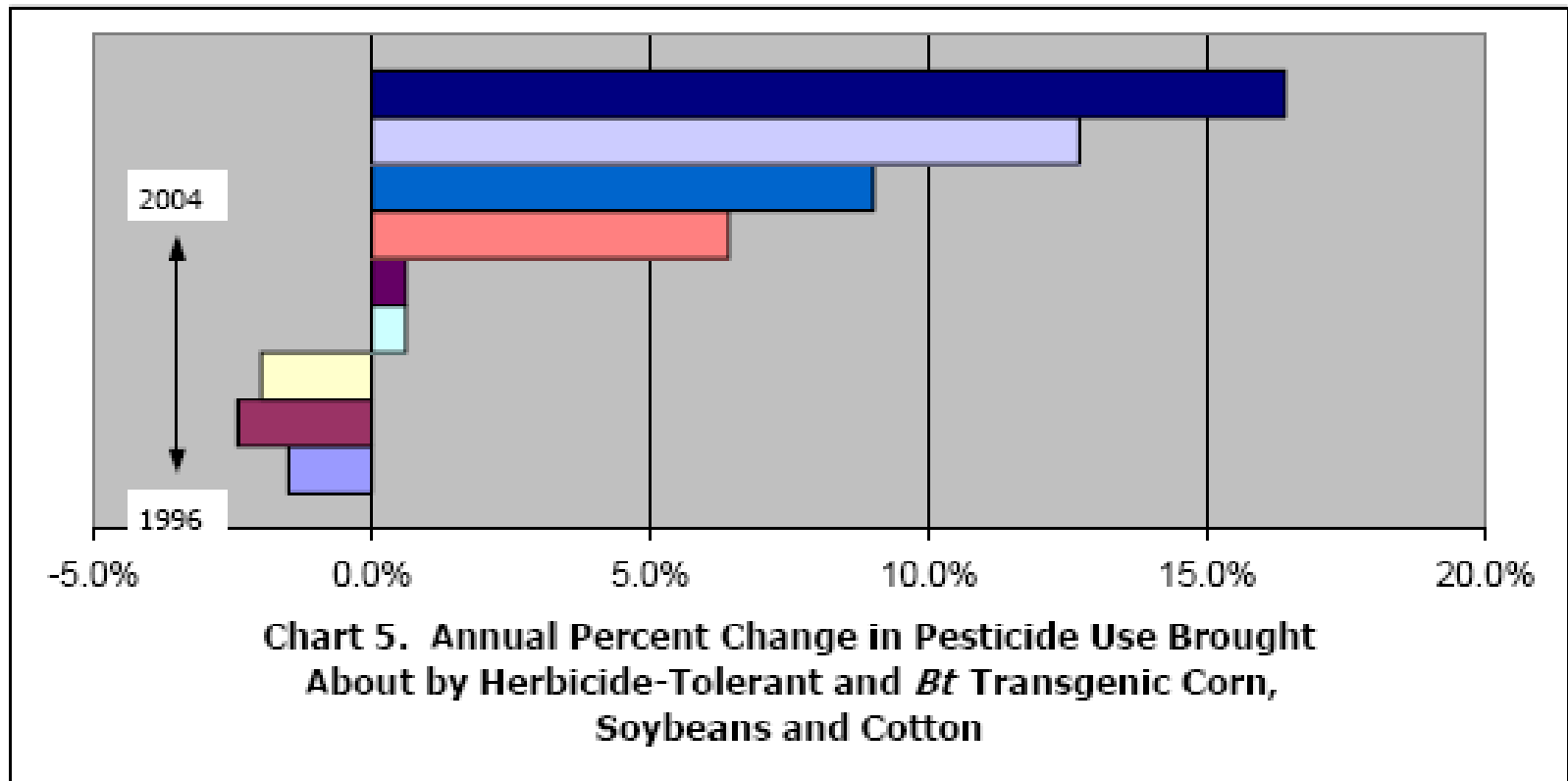
<http://www.valor.com.br/agro/3630820/embrapa-alerta-que-milho-rr-pode-virar-planta-daninha-na-soja#> 29/07/2014 - 15:54



Promesa: diminuir
la incidencia de
plagas!

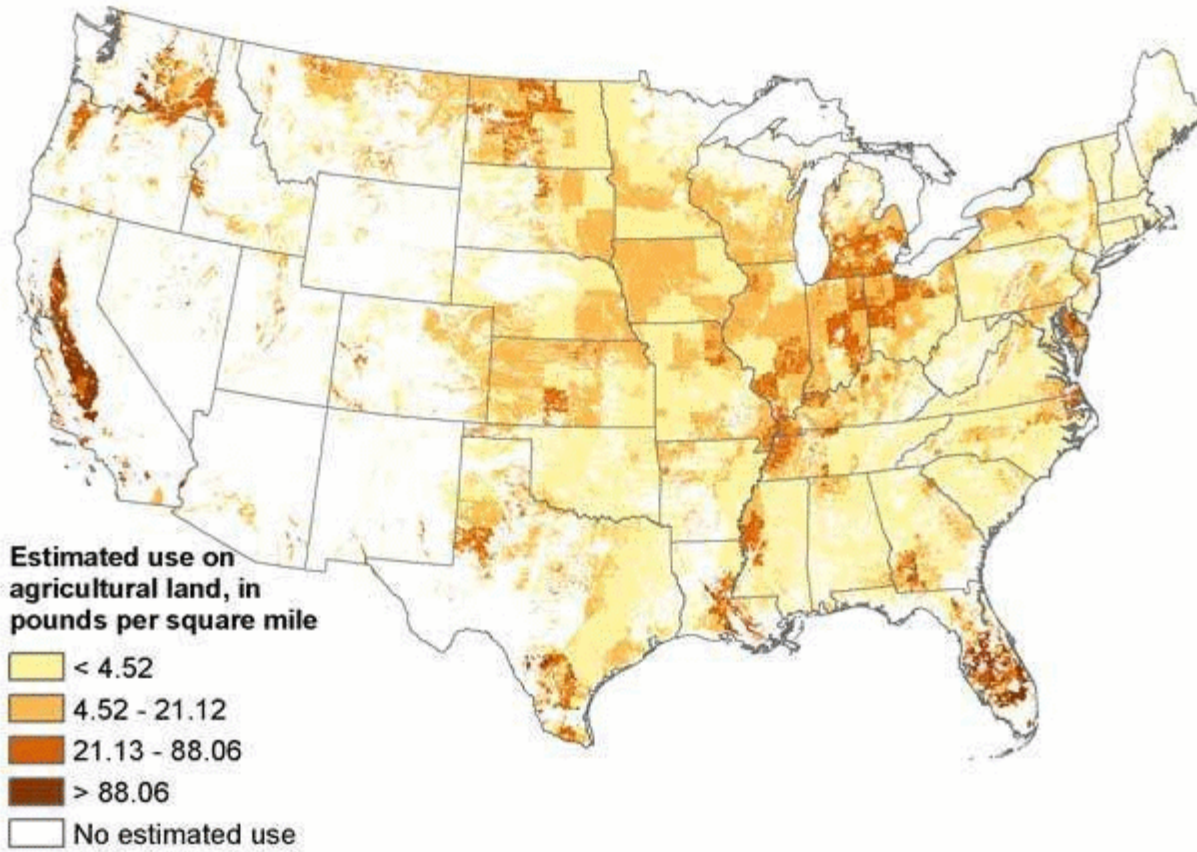


Consumo de plaguicidas (venenos ?) aumentó !



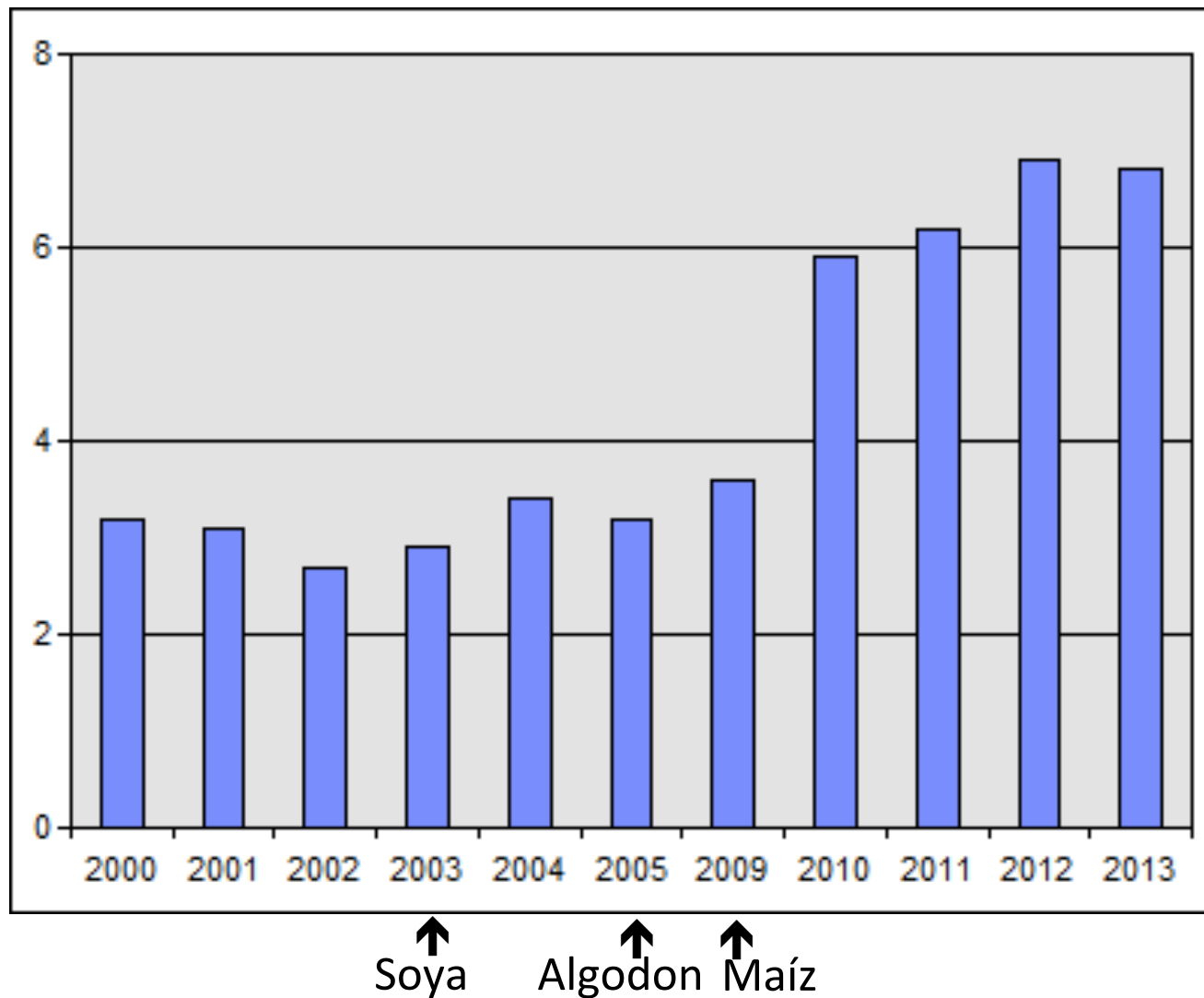
Human exposures to Roundup residues in steadily increasing

Estimated Agricultural Use for Glyphosate, 1992





k/ha



Consumo de plaguicidas en Brasil. (kg por ha de ingredientes activos)

Source: <http://www.sidra.ibge.gov.br/bda/tabela/protabl2.asp?c=771>



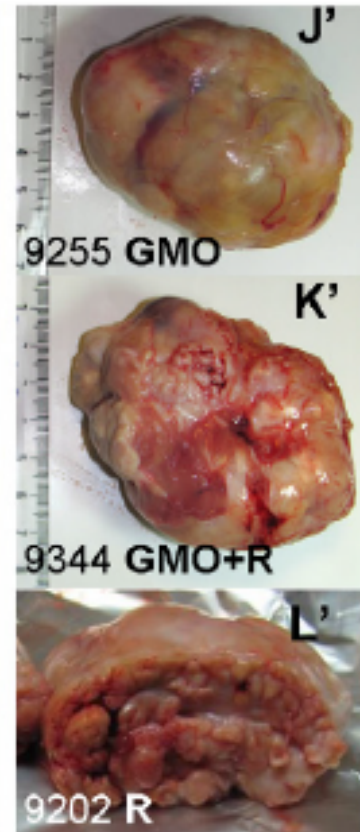
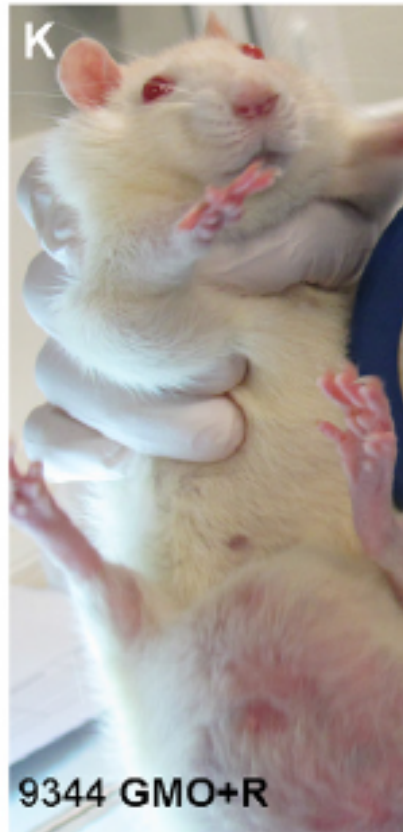
Promesa: no causa danos
a salud humana o animal



El primer estudio de larga duración – efectos crónicos –

1. Por primera vez se evalúa, por dois años, el efecto del maíz NK 603, en **54 parametros** de **34 organos** (características bioquímicas y fisiológicas) de 200 ratas;
2. Las alteraciones bioquímicas y las fallas fisiológicas son **más graves** en ratas alimentadas con **maíz transgénico NK603** con o sin fumagacion de **Roundup** y con **Roundup** que cuando alimentadas con maíz convencional;
3. Se comprobó al efecto non-linear de **desrelugador endocrino** del Roundup;

Mammary glands (F)



Séralini, G.-E., et al. Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize. Food Chem. Toxicol. (2012), <http://dx.doi.org/10.1016/j.fct.2012.08.005>



El primer estudio de larga duración – efectos crónicos –

4. Las alteraciones bioquímicas y las fallas fisiológicas **elevarán la probabilidad** de desarrollo de tumores en las ratas.

5. Los tumores cancerígenos aparecen a los **4 meses** en ratas macho y a los **7 meses** en ratas hembras.

Todavía las agencias exigen estudios de apenas 3 meses !!! Porque???



Contents lists available at [SciVerse ScienceDirect](#)

Food and Chemical Toxicology

journal homepage: www.elsevier.com/locate/foodchemtox



Glyphosate induces human breast cancer cells growth via estrogen receptors



Siriporn Thongprakaisang^a, Apinya Thiantanawat^{b,c}, Nuchanart Rangkadilok^{a,c}, Tawit Suriyo^c, Jutamaad Satayavivad^{a,c,d,*}

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Contents lists available at [ScienceDirect](#)

Free Radical Biology and Medicine

journal homepage: www.elsevier.com/locate/freeradbiomed



Original Contribution

Roundup disrupts male reproductive functions by triggering calcium-mediated cell death in rat testis and Sertoli cells



Vera Lúcia de Liz Oliveira Cavalli^a, Daiane Cattani^a, Carla Elise Heinz Rieg^a, Paula Pierozan^b, Leila Zanatta^a, Eduardo Benedetti Parisotto^c, Danilo Wilhelm Filho^c, Fátima Regina Mena Barreto Silva^a, Regina Pessoa-Pureur^b, Ariane Zamoner^{a,*}

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^c Departamento de Ecologia e Zoologia, Centro de Ciências Biológicas, Universidade Federal de Santa Catarina, 88040-970 Florianópolis, Santa Catarina, Brazil



A long-term toxicology study on pigs fed a combined genetically modified (GM) soy and GM maize diet

Judy A. Carman^{1,2*}, Howard R. Vlieger³, Larry J. Ver Steeg⁴, Verlyn E. Sneller³, Garth W. Robinson^{5**}, Catherine A. Clinch-Jones¹, Julie I. Haynes⁶, John W. Edwards²

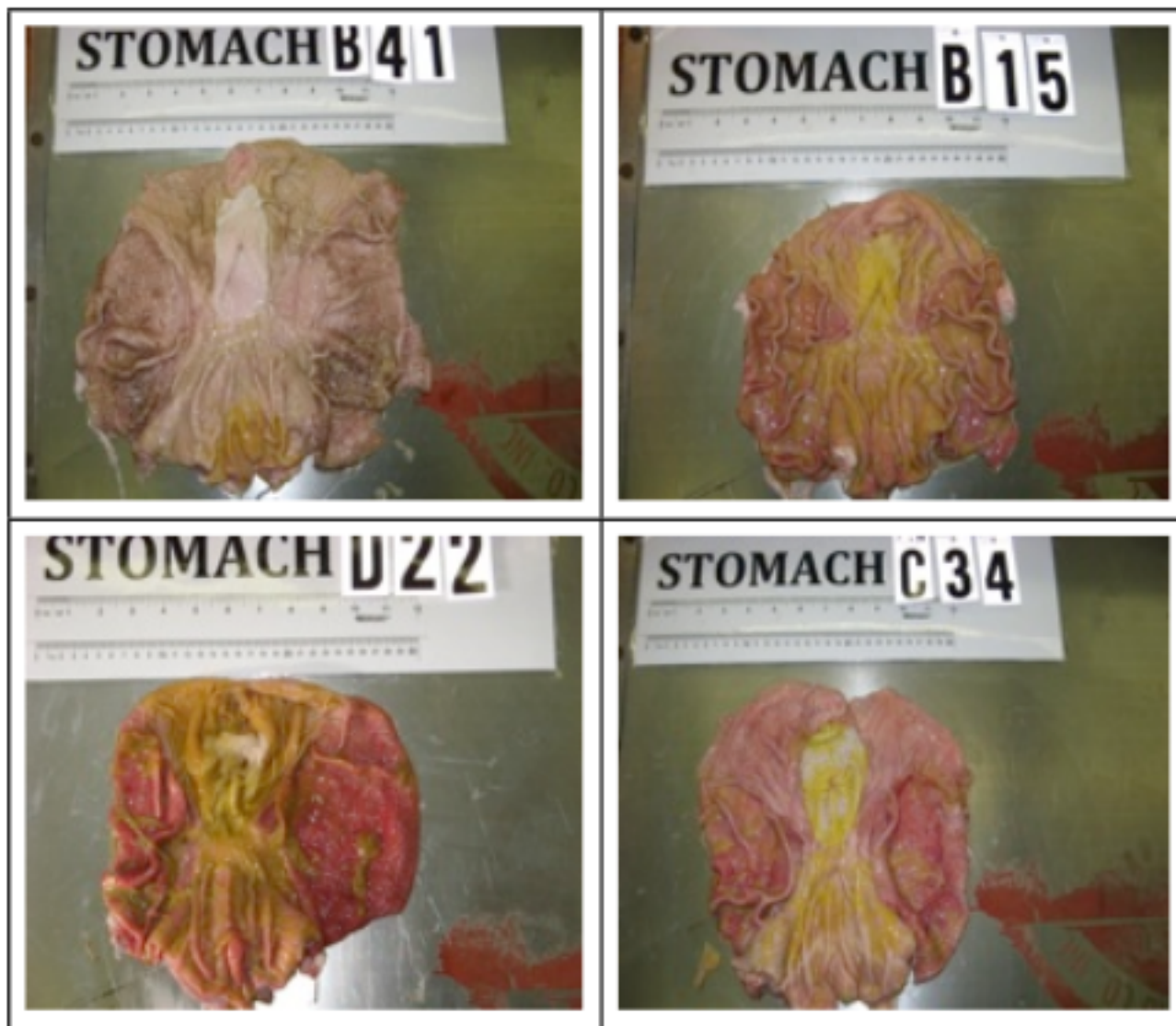


Figure 1. Different levels of stomach inflammation found (clockwise from top left): nil (from a non-GM-fed pig, number B41), mild (from a non-GM-fed pig, number B15), moderate (from a GM-fed pig, number C34) and severe (from a GM-fed pig, number D22).

Carman et al. 2013. A long-term toxicology study on pigs fed a combined genetically modified (GM) soy and GM maize diet. *Journal of Organic Systems*, 8(1), 2013. p.38-54.



Residuos metabólicos del glifosato y también de la toxina Cry1Ac fueron encontrados en sangre de mujeres embarazadas ó no y en fetos.

Reproductive Toxicology xxx (2011) xxx–xxx



Contents lists available at ScienceDirect

Reproductive Toxicology

journal homepage: www.elsevier.com/locate/reprotox



Maternal and fetal exposure to pesticides associated to genetically modified foods in Eastern Townships of Quebec, Canada

Aziz Aris^{a,b,c,*}, Samuel Leblanc^c

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ABSTRACT

Pesticides associated to genetically modified foods (PAGMF), are engineered to tolerate herbicides such as glyphosate (GLYP) and glufosinate (GLUF) or insecticides such as the bacterial toxin bacillus thuringiensis (Bt). The aim of this study was to evaluate the correlation between maternal and fetal exposure, and to determine exposure levels of GLYP and its metabolite aminomethyl phosphoric acid (AMPA), GLUF and its metabolite 3-methylphosphinopropionic acid (3-MPPA) and Cry1Ab protein (a Bt toxin) in Eastern Townships of Quebec, Canada. Blood of thirty pregnant women (PW) and thirty-nine nonpregnant



Unico estudio epidemiológico: La proteína Cry é transmitida para el feto en mamiferos (incluso humanos)

- Análisis de sangre de 30 mujeres embarazadas (MG) e 39 mujeres no embarazadas (MNG) (Canadá)
- Toxina Cry I Ab:
 - 93% MG
 - e 80% en los fetos.
 - 69% MNG

No hay otros estudios para comparar los resultados oitidos



Tabela 11 – Total de amostras detectadas e frequência de detecção de agrotóxicos analisados em leite humano em amostra (n=62) de nutrizes residentes em Lucas do Rio Verde-MT, 2010.

Substância	Total de amostras detectadas	Detectado abaixo do LQM	Detectado acima do LQM	% de Detecção (n=62)
p,p' - DDE	62	44	18	100%
β -endossulfam	27	25	2	44%
deltametrina	23	23	0	37%
aldrim	20	20	0	32%
α -endossulfam	20	20	0	32%
α -HCH	11	11	0	18%
p,p' - DDT	8	5	3	13%
trifluralina	7	7	0	11%
lindano	4	4	0	6%



Pesticidas: aplicase en un lugar, pero se va para otro...



**Glifosato e
Toxinas de Bt,
otras
moléculas**



Exposición de los non o recién
nacidos a plaguicidas por agua,
leche materno y comida !



Promesa: alimentar
la creciente
población mundial!



20 July 2009 www.nature.com/nature

THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

nature



CAN SCIENCE FEED THE WORLD?

PLANETARY SCIENCE

The first 400 years

THE NEW MADRID EARTHQUAKES

Spreading the risk

DIABETES

The circadian
dimension

NATURE JOBS

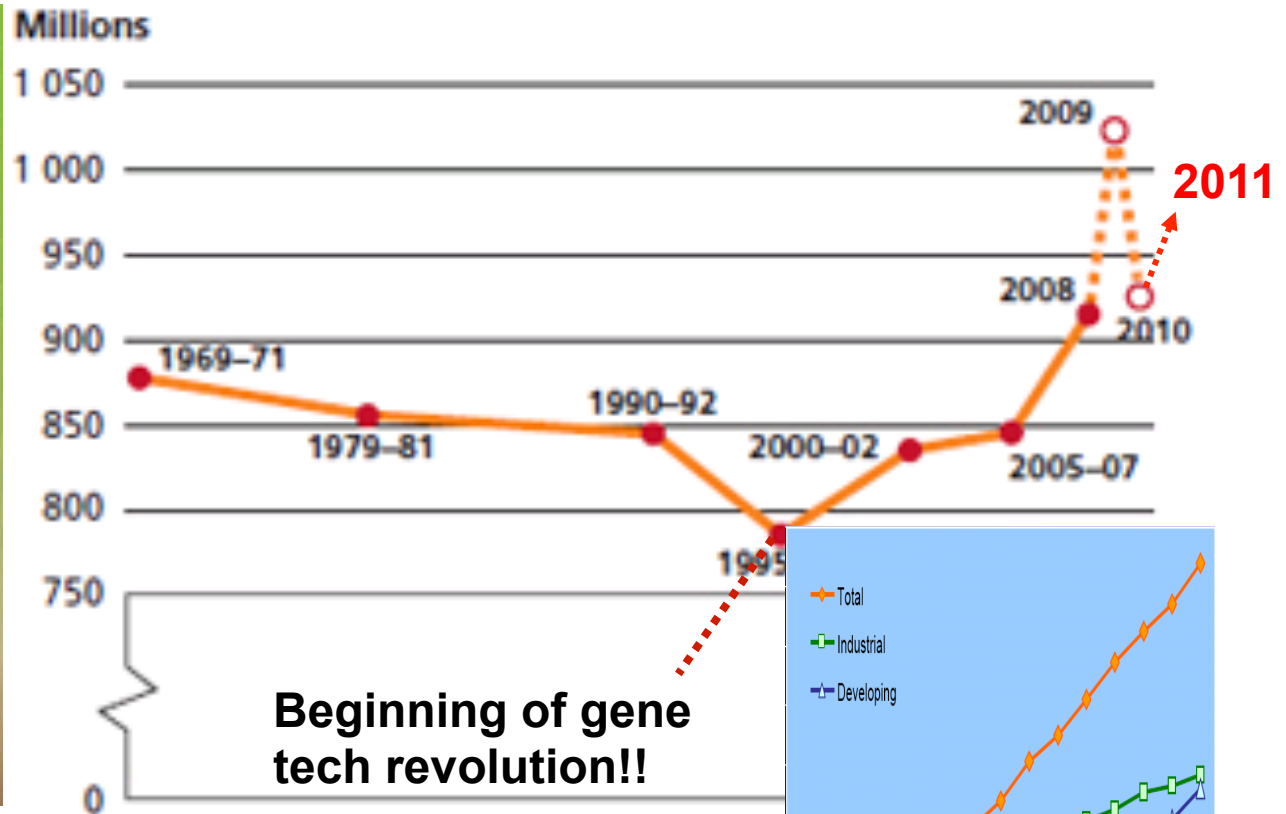
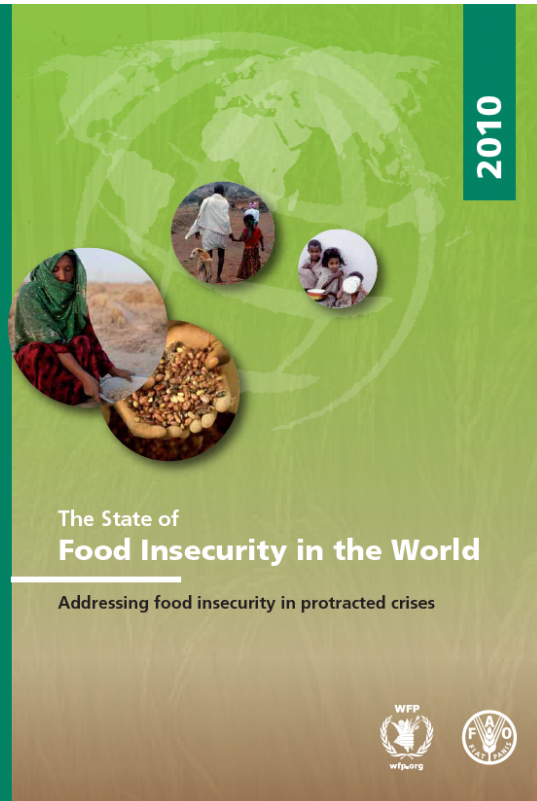
Enhance research



PROMISE

**FEED THE WORLD through
increased productivity**

,The hunger curve‘



Cortesia de Angelika Hilbeck

CERVEJAS COM ALTO TEOR DE MILHO

Amostras de algumas das cervejas mais consumidas no país alcançam teor de milho e outras gramíneas tropicais pouco inferior a 50%, sugere análise da USP de Piracicaba. São elas:

Antarctica

Antarctica Malzbier

Antarctica Original

Antarctica Subzero

Bohemia

Brahma Extra

Brahma Malzbier

Caracu

Crystal Malzbier

Glacial

Itaipava Malzbier

Kaiser Summer Draft

Nova Schin

Nova Schin Malzbier

Nova Schin Munich

Skol

Skol Beats



Que hacer ?

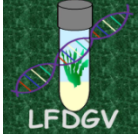
Muchas cosas, pero de forma colectiva;
Aumentar los proyectos de investigación
participativa;
Restablecer la asociación entre campesinos
y consumidores;
Resolver el descompaso entre políticas
publicas y la realidad de los campesinos.



Pesquisa participativa
com sementes crioulas
permite o resgate da
dignidade dos
agricultores



¿ Que hicieran otros
países?



POR BIODIVERSIDAD. EL CONCEJO METROPOLITANO APROBÓ DECLARATORIA

Lima ya es territorio libre de transgénicos

Conveagro saludó la iniciativa y exhortó al gobierno a promulgar la Ley de Moratoria por diez años.

La Municipalidad de Lima, en su sesión plenaria del Concejo Metropolitano, aprobó ayer el dictamen que declara a Lima como "Territorio Libre de Transgénicos u organismos genéticamente modificados (OGM)".

Presidida por la alcaldesa Susana Villarán, la declaratoria fue aprobada por amplia mayoría, con el objetivo de proteger, de manera precautoria, la salud de los limeños, así como preservar la biodiversidad y el medio ambiente.

En base a ello, el municipio pro-



LIMA. Sesión del Consejo de la Municipalidad que dirige Susana Villarán.

Convención Nacional del Agro Peruano (Conveagro), presente en la sesión, saludó la declaratoria que se

cumplir otras obligaciones.

"En el mes del campesino peruano que alimenta a los peruanos

●●● EL DATO

PROMULGACIÓN. Conveagro se pronuncia: "Esperamos que el presidente de la República, Alan García, reconozca que su gestión está errada en promover el ingreso de transgénicos al país y, haciendo el mea culpa respectivo, promulgue la Ley de Moratoria por 10 años aprobada por el Congreso, con el voto de sus mismos partidarios. El agro peruano, que fue desatendido por este gobierno, merece por lo menos esta última señal", anotó el dirigente agrario Jorge Prado.

cipio sienta su posición sobre el tema, en vista de que el Ejecutivo puede observar la norma aprobada

França proíbe definitivamente milho transgênico da Monsanto



Recomende



56.732 views



108



Salva

AP



75 municipios declarados
libres de transgénicos **92%** de los
cantones



Orotina, Montes de Oro, San Mateo, Turubares, Pococi, Carrillo, Alajuelita, Bagaces, Golfito, Siquirres, Paríta, Matina, Mora, Alfaro Ruiz, Coronado, San Rafael, La Cruz, Limón, Tilarán, San Carlos, Alajuela, Tarrazú, León Cortés, Acosta, Poas, Valverdevega, Santa Bárbara, Upala, Puntarenas, Liberia, Heredia, Atenas, La Unión, Flores, Guácimo, Goicoechea, El Guarco, Puriscal, Escazú, Grecia, Guatuso, Naranjo, Palmares, San Ramón, Alvarado, Oreamuno, Paraíso, Turrialba, Abangares, Hojancha, Nandayure, Nicoya, Santa Cruz, Barva, Belén, San Isidro, Santo Domingo, Talamanca, Aguirre, Buenos Aires, Corredores, Coto Brus, Esparza, Osa, Aserri, Desamparados, Dota, Montes de Oca, Moravia, Perez Zeledón, San José, Santa Ana, Tibás, Garabito, San Pablo.





Para defender al maíz en su integridad, la única opción es apoyar la restauración de aquellos sistemas, procesos y dinámicas que crearon al maíz y lo mantuvieron diverso durante tantos siglos.

Ninguno de estos procesos es posible sin la permanencia de los pueblos indígenas y campesinos que los pusieron en marcha.

Arte: Laura Ortiz

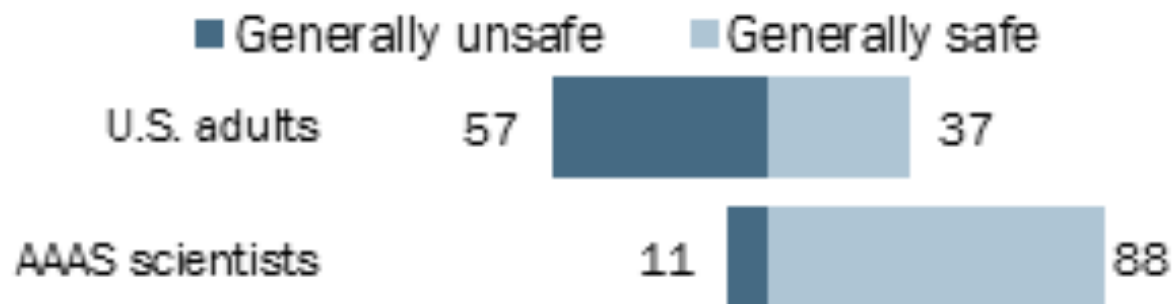


¿ Que piensan los
cientificos y el pueblo ?



Eating Genetically Modified Foods

% of each group saying it is generally safe or unsafe to eat genetically modified foods



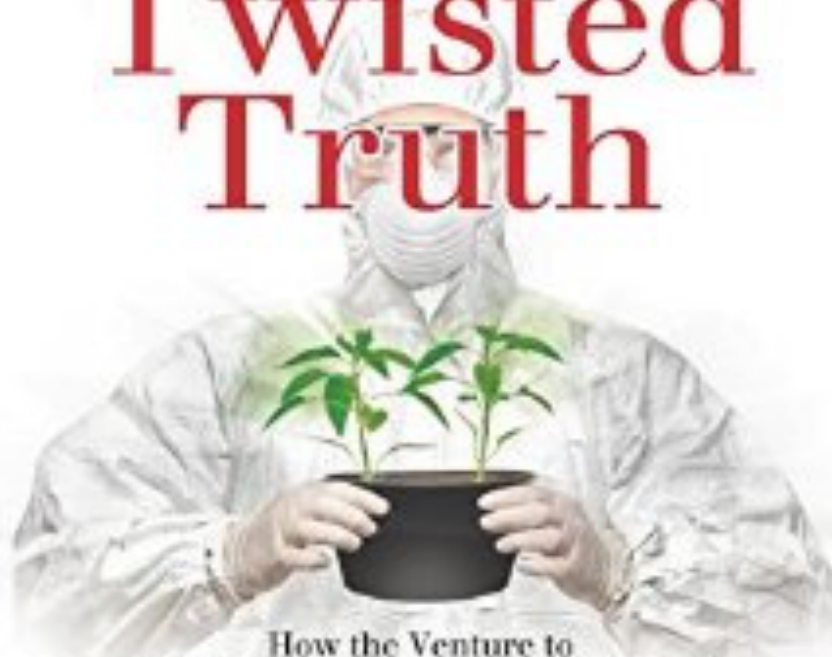
Survey of U.S. adults Aug. 15-25, 2014. Q38. AAAS scientists survey Sept. 11 - Oct. 13, 2014. Q28 Those saying don't know or giving no answer are not shown

PEW RESEARCH CENTER



"ONE OF THE MOST IMPORTANT BOOKS OF THE LAST 50 YEARS."
— Jane Goodall, from the Foreword

Altered Genes, Twisted Truth



How the Venture to
Genetically Engineer Our Food Has
Subverted Science, Corrupted Government,
and Systematically Deceived the Public

STEVEN M. DRUKER

Genes alterados,
Verdad Destorcida:
Como la Venture de
manipular
genéticamente
Nuestra Comida
subvirtió la Ciencia,
Corrompió Gobiernos
y sistemáticamente,
engañó el público.



RIESGOS.....

Riesgos no están relacionados a lo que los científicos saben, más a lo que ellos no saben.

Riesgos están asociados a **incertidumbres**.

Caruso, D. Intervention. San Francisco, Hybrid Vigor Press, 2006, 252p.

En el contexto de la **incertidumbre** que progresa la esperanza, el juicio y la valoración de la subjetividad, capaz de concretizar lo inesperado.

Lieber, RR. & Romano-Lieber NS. Risco, incerteza e as possibilidades de ação na saúde ambiental. *Rev. Bras. Epidemiol.*, 6(2):121-34, 2003.

Diversidade genética, ambiental e cultural

Oligopólio e dominação

MONSANTO



syngenta

DU PONT

 **BASF**
The Chemical Company

 Dow AgroSciences

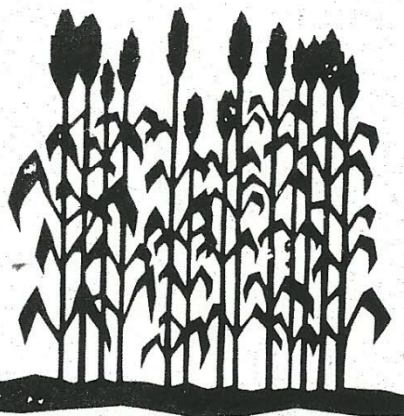
 Bayer CropScience





Conclusiones

Son muchos los efectos **adversos** ya ocurridos, tan pocos los **estudios** científicos en los trópicos y ningún **seguimiento** establecido, condiciones claras de gran **incertidumbre económica, social y de seguridad alimentaria**, o que requiere el uso del principio **precautorio**.



**OUR CULTURE
OUR FREEDOM
OUR RIGHTS
OUR FAMILY
WAY OF LIFE
ARE ALL ROOTED
IN OUR LAND**



gracias
rubens.nodari@ufsc.br