

Transgenic Maize in Mexico: threatens food sovereignty and security



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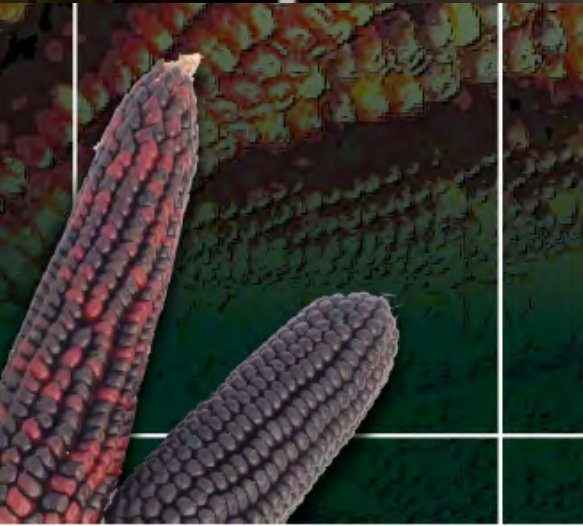


**Unión de Científicos
Comprometidos
con la Sociedad**

From México to the World: 15.4% world's food plants



MEXICO: Centre of maize origin and diversification

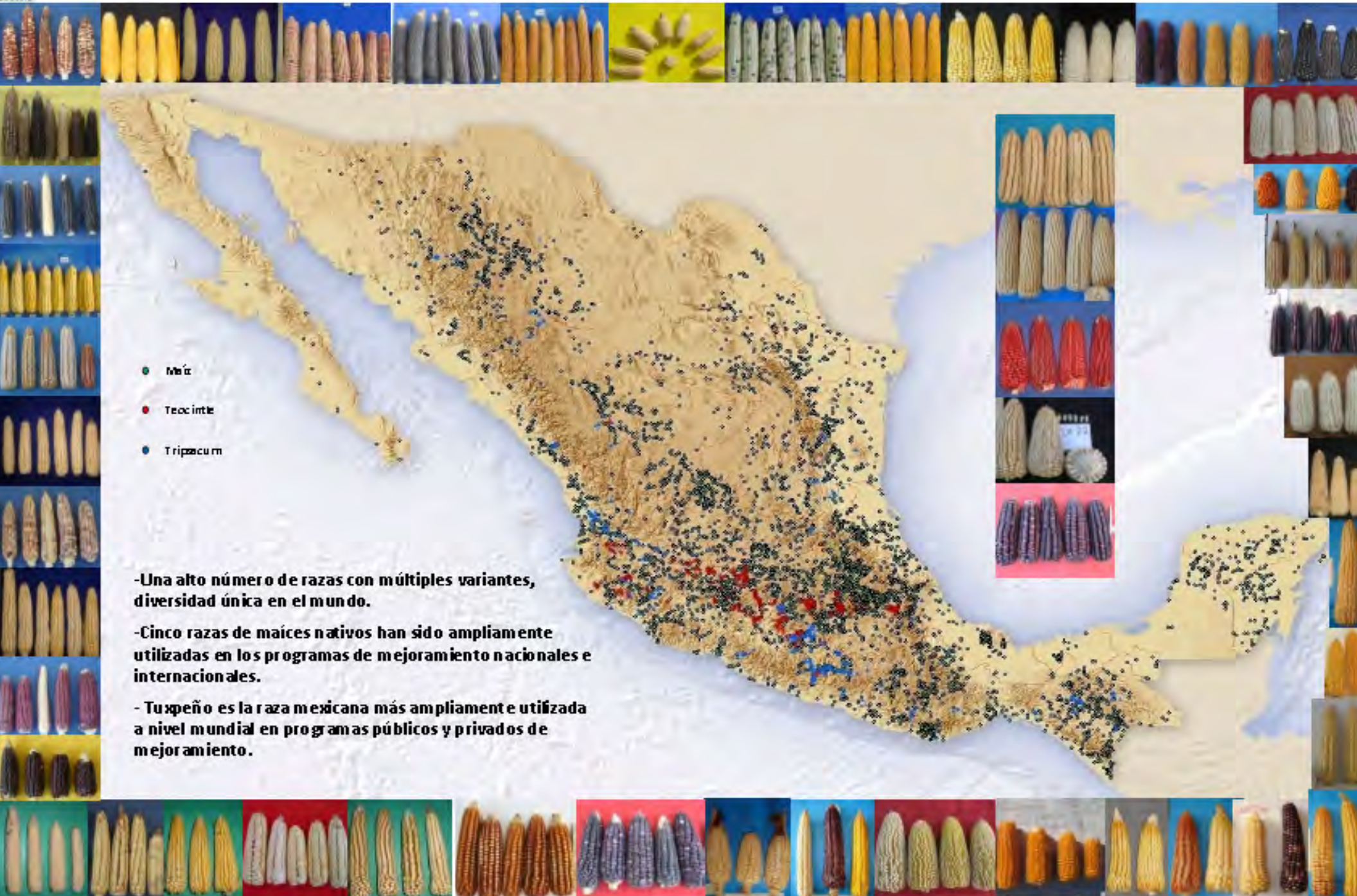


fotos: F. Eccardi

- 59 landraces
- 1000s varieties

All of MEXICO: Centre of origin

RAZAS DE MAÍZ DE MÉXICO



- Maíz
- Teocintle
- Tripsacum

-Una alto número de razas con múltiples variantes, diversidad única en el mundo.

-Cinco razas de maíces nativos han sido ampliamente utilizadas en los programas de mejoramiento nacionales e internacionales.

- Tuxpeño es la raza mexicana más ampliamente utilizada a nivel mundial en programas públicos y privados de mejoramiento.

Biological diversity intimately
linked to cultural diversity in
Mexico:
dynamic process
of environment,
biology and
culture

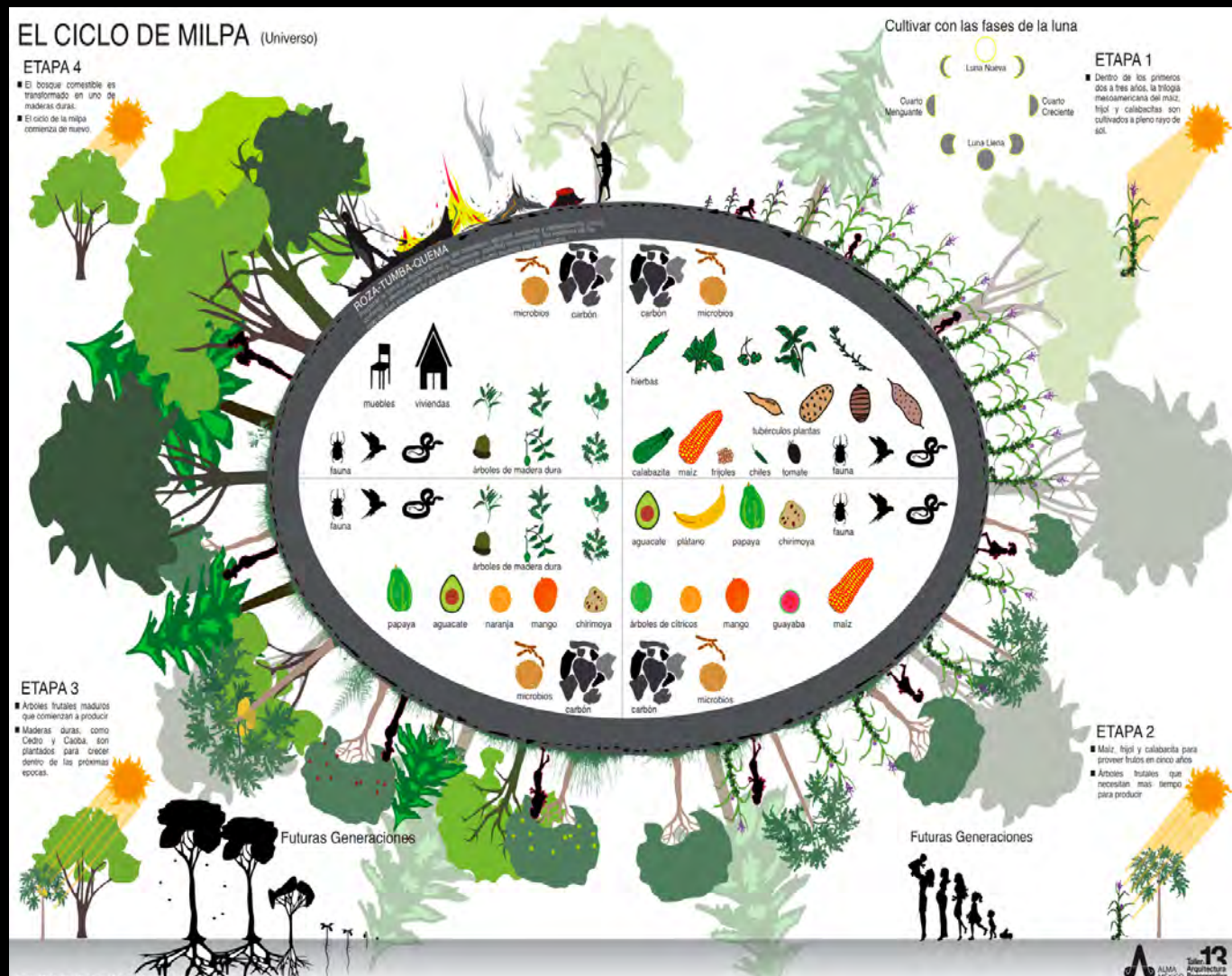


Staple food, that implies:
deep cultural & nutritional
importance; world cultural heritage



Sustainable and successful cultivation in *MEXICO* for over 8000 years! From sea level to highlands: *healthy and diverse food, efficient use of natural resources. Important*

for climate change... Multi-cropping System: "MILPA"



Dismantling this peasant agriculture:

USA-MEX NAFTA: signed on Jan 1 1994

2008: All crops included >> dumping
of VERY LOW quality maize

1920-1980 State support

1982 – Neoliberal state: Intl. trade
agreements and State reduces public costs

Agroindustries in power: subordination and
complete desmantling of Mex agriculture

Consequences of US-MEX free trade:

- 1991: 8.2 million agricultural producers
2006: dropped to 6.1 million.*
- Increase in agricultural exports only for the elites & import basic crops: maize, rice!*
- % of Total Gross Income: drastic decrease*
- Concentration in a few large producers & corporations. Exodus of rural populations.*
- Rural institutions for conservation and agroecological production abandoned.*
- Increase of agrottoxics: health effects!*

*MAIZE IMPORTS INTO MEXICO: dumping
of very low quality yellow maize!*

1994: no maize imports; self-sufficient



*2006-2009: up to > 7 million tons, even
above the NAFTA quota.*

*1991 to 2006: US maize price decreased in
59%!!!*



Industrial AGRICULTURE and Green
Revolution: environmental and
health issues worldwide

*TRANSGENIC CROPS:
at the spearhead of this
unsustainable model*

Miguel Altieri, 2012

75% of maize consumed by humans still produced by small holder peasants and indigenous families

Hybrids of the Green Revolution were not able to displace native maize; cannot grow where landraces can.

But transgenics can destroy biologically and socioeconomically the landrace-based agriculture of Mexico: disastrous consequences for the whole world!!

*Commercial lines of transgenic maize:
Bt, insect pest resistance
RR, tolerant to herbicides (glyphosate)*



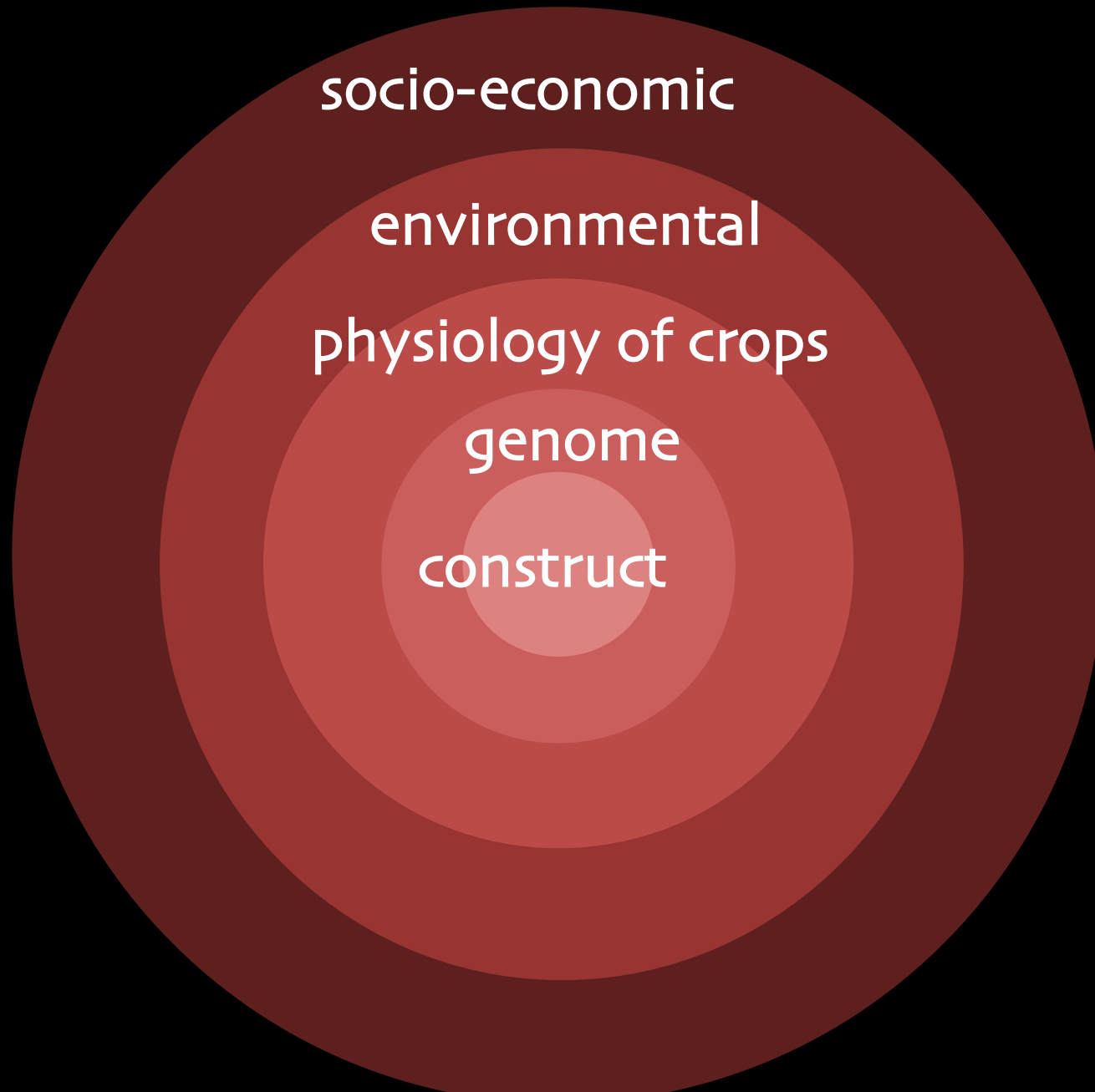
*Common sense: No transgenic maize
should be allowed into Mexico*

- Technological insufficiency vs sustainable “Milpa”
- Environmental and health risks and dangers
- Corporate control & dismantling of peasant agriculture
- Economic and political dependence on large monopolistic corporations

UNCOTROLLABLE
AND
IRREVERSIBLE!!!



Nested uncertainties, insufficiencies, risks and dangers



Recombinant Constructs Introduced Into Transgenic Crops

35S (virus) Bt (bacteria)

Transferible ADN
(virus o bacteria)



***Protein of
interest Bt***

plasmid (bacteria)

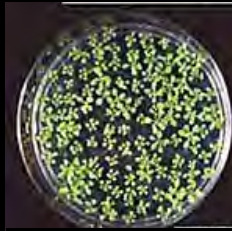
Res to antibiotic

Experimental procedure to transgenesis



T1
T3

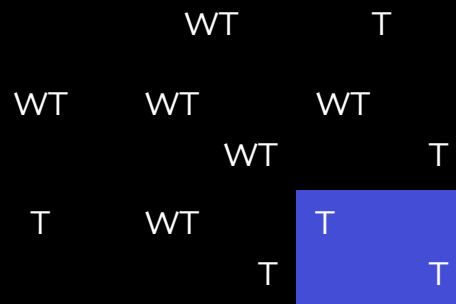
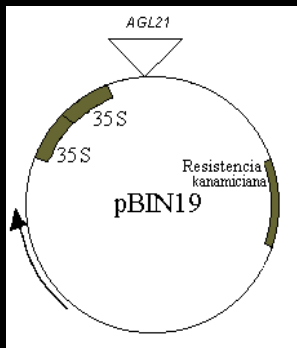
X



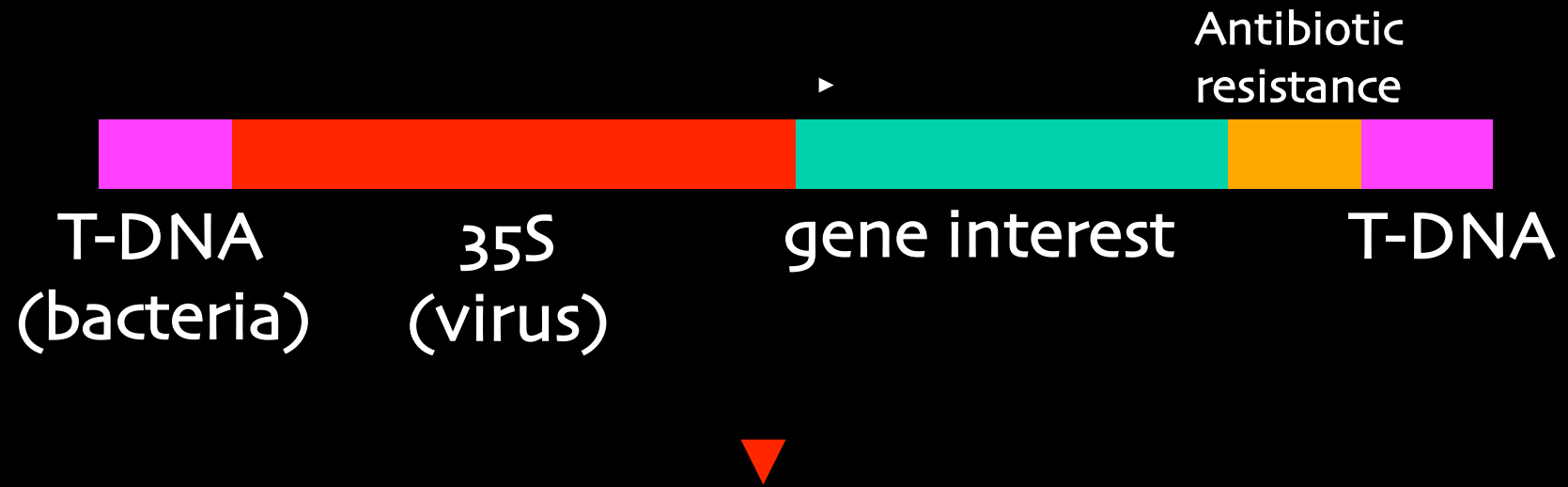
T2



T2...



Pseudo-technology

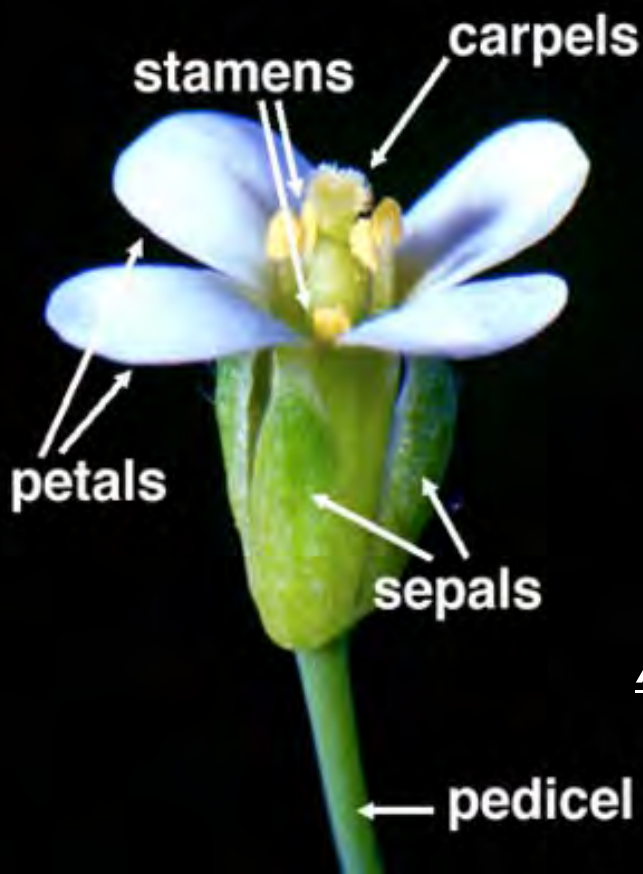


Unpredictable insertion sites & dynamic genome

Genetically identical individuals are different!

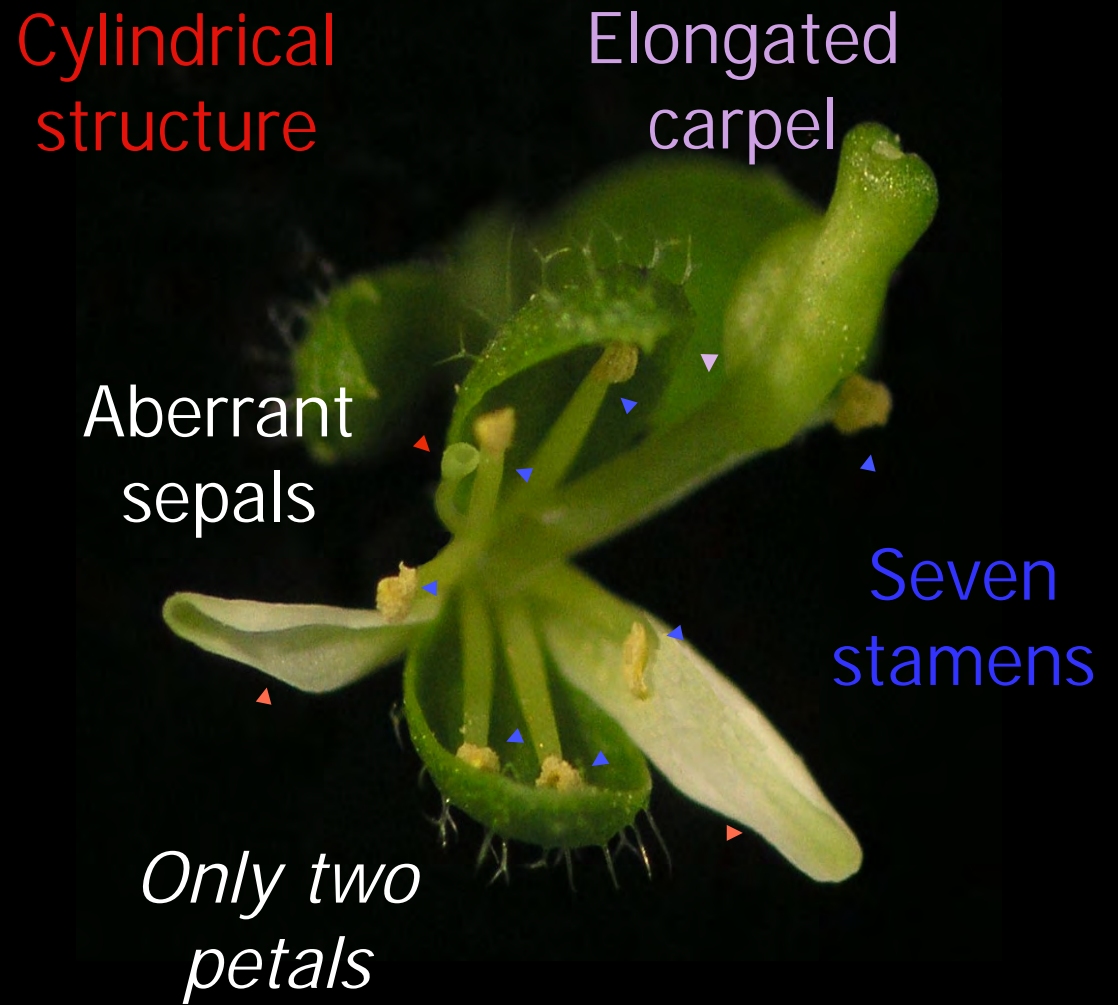
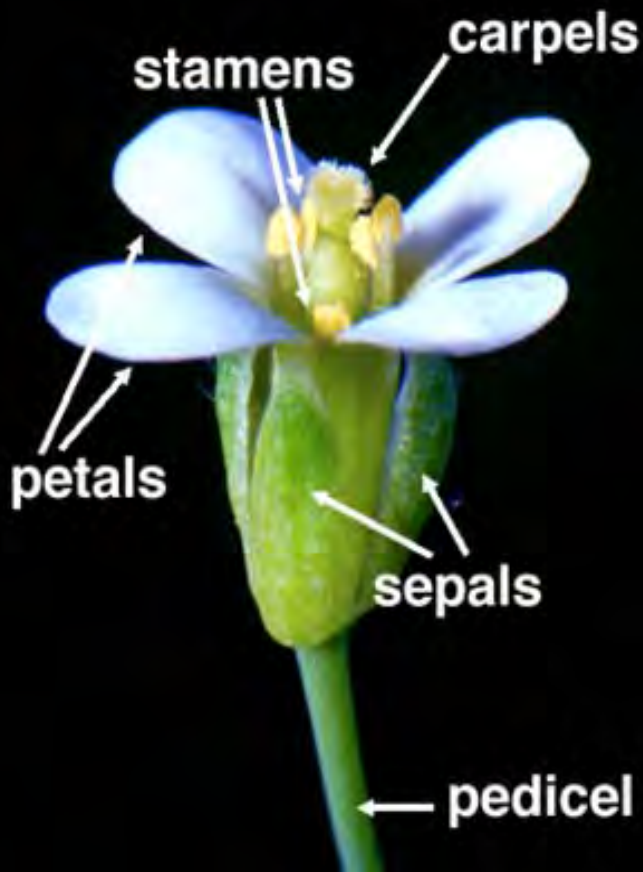
A posteriori selection!

Transgenesis:
Unprecise and
unpredictable once
released to
environment



Arabidopsis thaliana

Transgenesis: Unprecise and unpredictable once released to environment

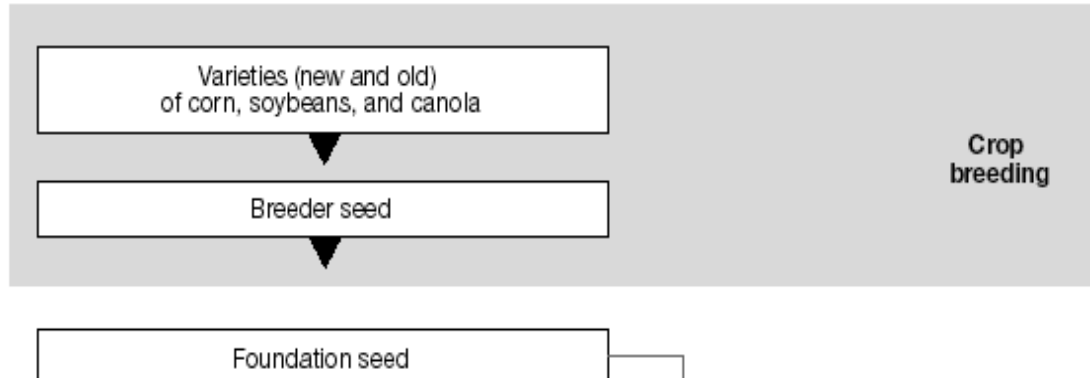


Maize diversity, food sovereignty &
security; biosecurity and peasant
agriculture: at risk!!

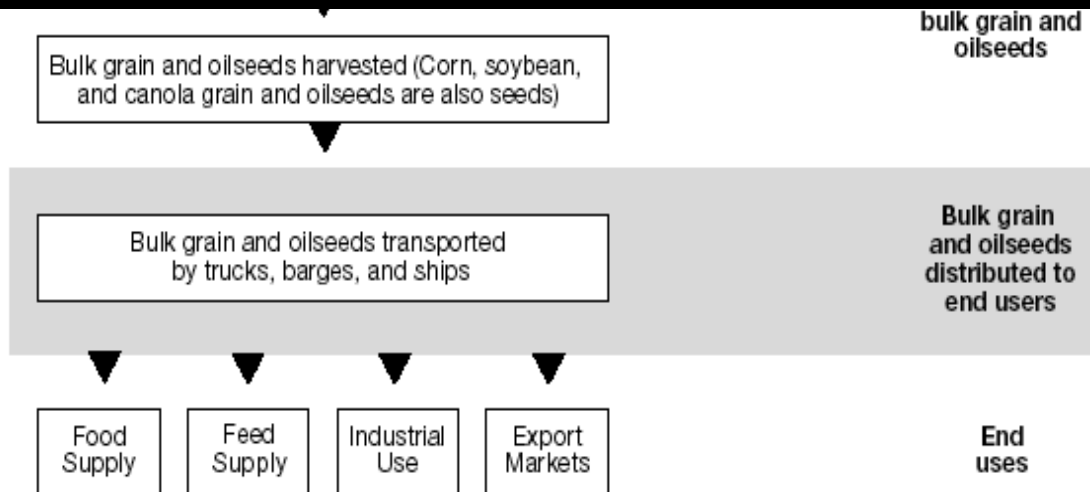


Coexistence of transgenic and non-
transgenic maize without T contamination:
impossible!!

Figure 1-1 **Seeds in Commodity Agriculture: How Seeds of Corn, Soybean, and Canola Varieties Move from Plant Breeders to End Users**



2004: transgenic contamination of almost all American maize



GONE TO SEED

Transgenic Contaminants in the Traditional Seed Supply

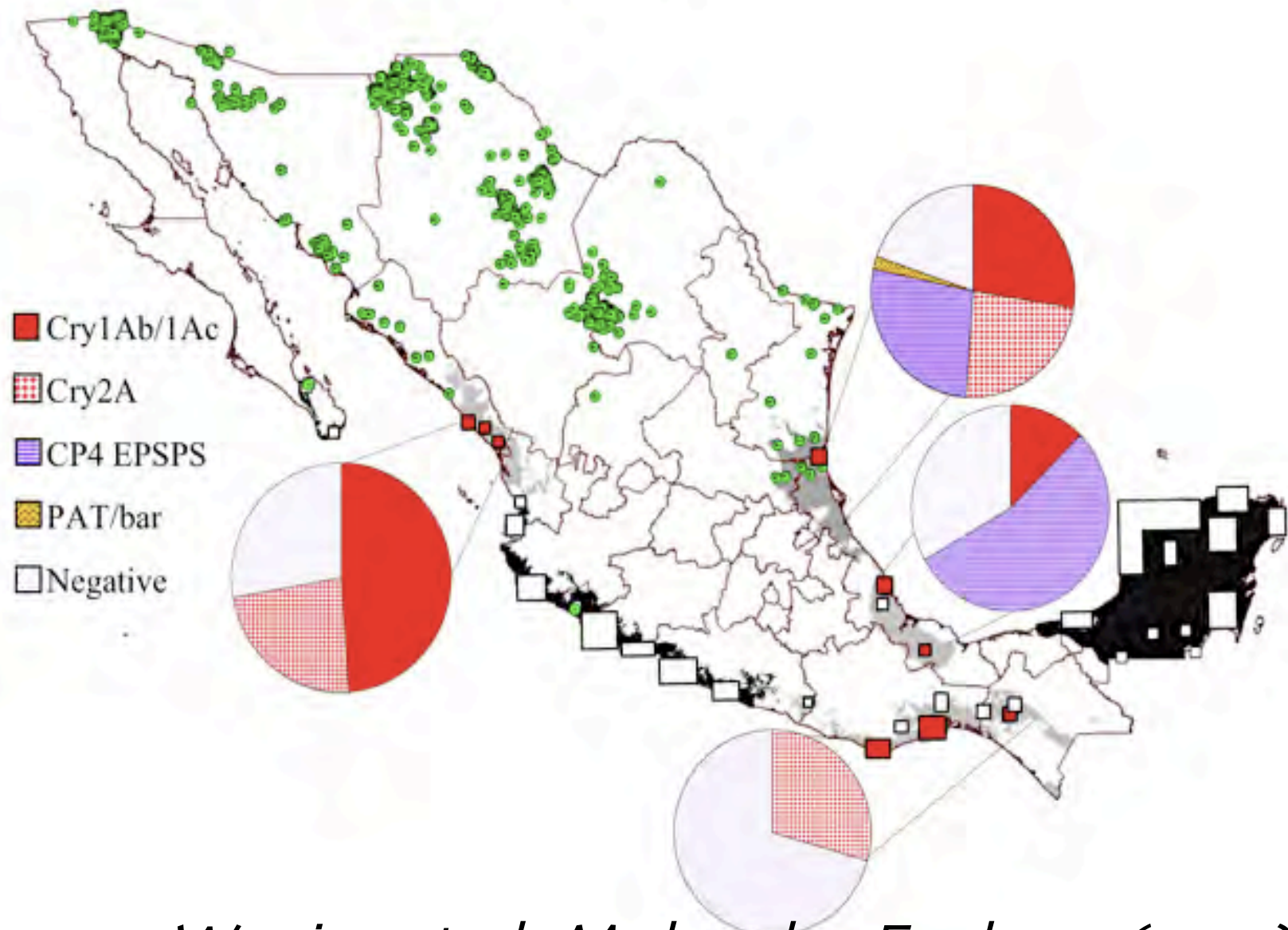


Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

**Closed system:
yet, 65% seed
stocks
contaminated!!**

Cotton: Contaminated after a few years! Only planted in N; reached the S!!

Figure 5. GM cotton permits and transgene presence among metapopulations.



Wegier et al, Molecular Ecology (2011)

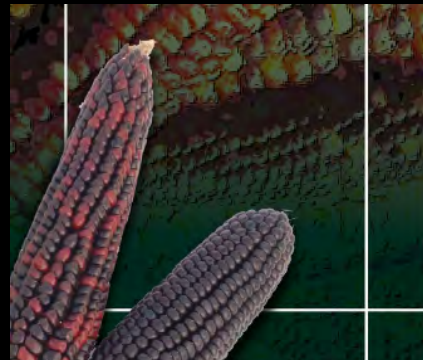
Maize is more "promiscuous" than
cotton:
Each cob formed by many males





Key to study gene flow in Mexico:

- 2001: Quist y Chapela (Nature 414:541-543)
- 2001: INE & CONABIO (UNAM & CINVESTAV): we corroborate the data!
- **Ortíz-García Sol et al. 2005:** No transgene presence!!! Hidden positives! Scientific misconduct? Fraud?
- 2008-12: Our papers finally published



Molecular Ecology

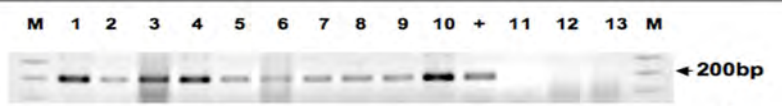
(2009) 18, 750–761 doi: 10.1111/j.1365-294X.2008.03993.x

Transgenes in Mexican maize: molecular evidence and methodological considerations for GMO detection in landrace populations

A. PIÑEYRO-NELSON, J. VAN HEERWAARDEN,
B. H. R. PERALES, J. A. SERRATOSHERNÁNDEZ,
C. A. RANGEL, M. B. HUFFORD, P. GEPTS,
A. GARAY-ARROYO, R. RIVERABUSTAMANTE
and E. R. ÁLVAREZ-BUYLLA

Nature (November 2008)

A. Snow (Molecular Ecology 18; 2009)



a.

sample 4
sample 8
sample 10
35SP CaMV

GAAGATGCTCTGCCGACAGTGGTCCC
TGAAGATGCTCTGCCGACAGTGGTCCC
TGAAGATGCTCTGCCGACAGTGGTCCC
TCAAGATGCTCTGCCGACAGTGGTCCC
TGAAGATGCTCTGCCGACAGTGGTCCC

sample 4
sample 8
sample 10
35SP CaMV

CCACCCACGAAGGAGCATCGTGGAAAAAGAAAGACGTTTCCA
CCACCCACGAAGGAGCATCGTGGAAAAAGAAAGACGTTTCCA
CCACCCACGAAGGAGCATCGTGGAAAAAGAAAGACGTTTCCA
CCACCCACGAAGGAGCATCGTGGAAAAAGAAAGACGTTTCCA
CCACCCACGAAGGAGCATCGTGGAAAAAGAAAGACGTTTCCA

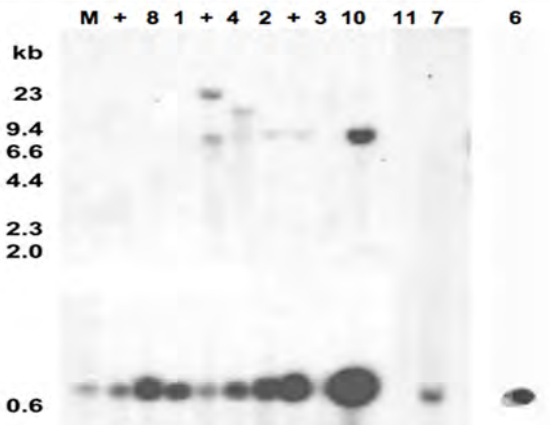
sample 4
sample 8
sample 10
35SP CaMV

ACCACGTCCTTCAAAGCAAGTGGATTGATGTGATATCTCTCCA
ACCACGTCCTTCAAAGCAAGTGGATTGATGTGATATCTCTCCA
ACCACGTCCTTCAAAGCAAGTGGATTGATGTGATATCTCTCCA
ACCACGTCCTTCAAAGCAAGTGGATTGATGTGATATCTCTCCA
ACCACGTCCTTCAAAGCAAGTGGATTGATGTGATATCTCTCCA

sample 4
sample 8
sample 10
35SP CaMV

CTGACGTAAGGGGATGACGACACAATCCCACCTATC
CTGACGTAAGGGGATGACGACACAATCCCACCTATC
CTGACGTAAGGGGATGACGACACAATCCCACCTATC
CTGACGTAAGGGGATGACGACACAATCCCACCTATC
CTGACGTAAGGGGATGACGACACAATCCCACCTATC

b.



c.

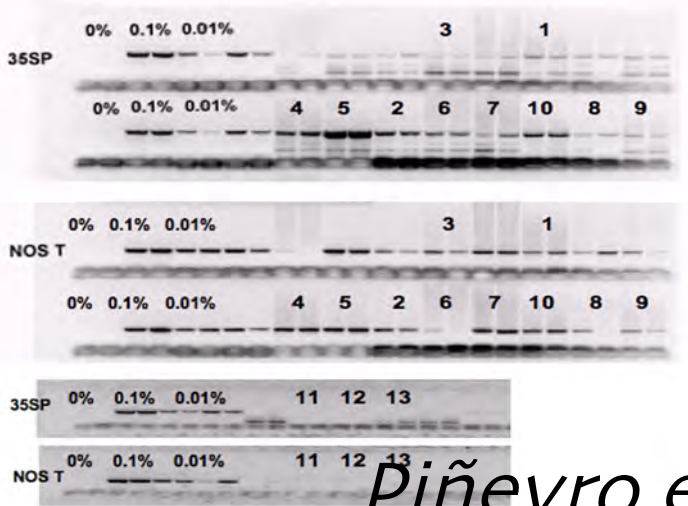


Figure S1. PCR analyses performed by GID on maize seed samples from the 2002 collection

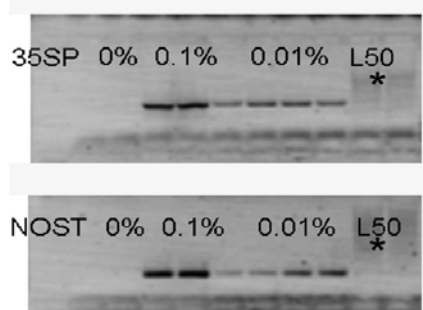
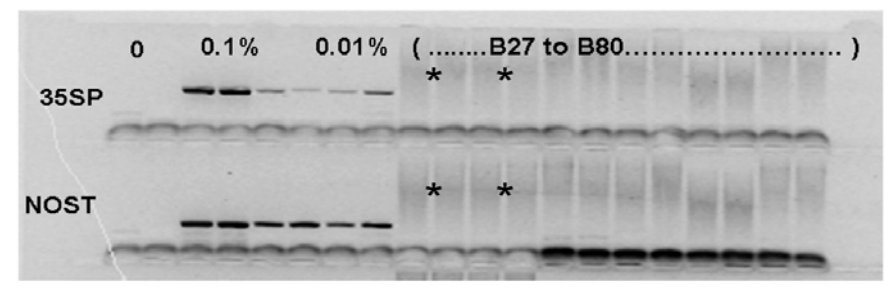
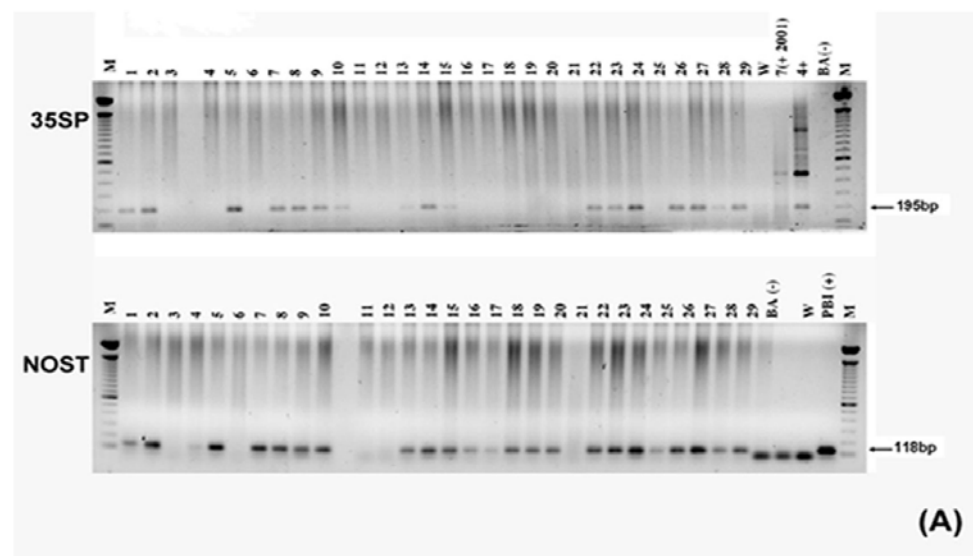
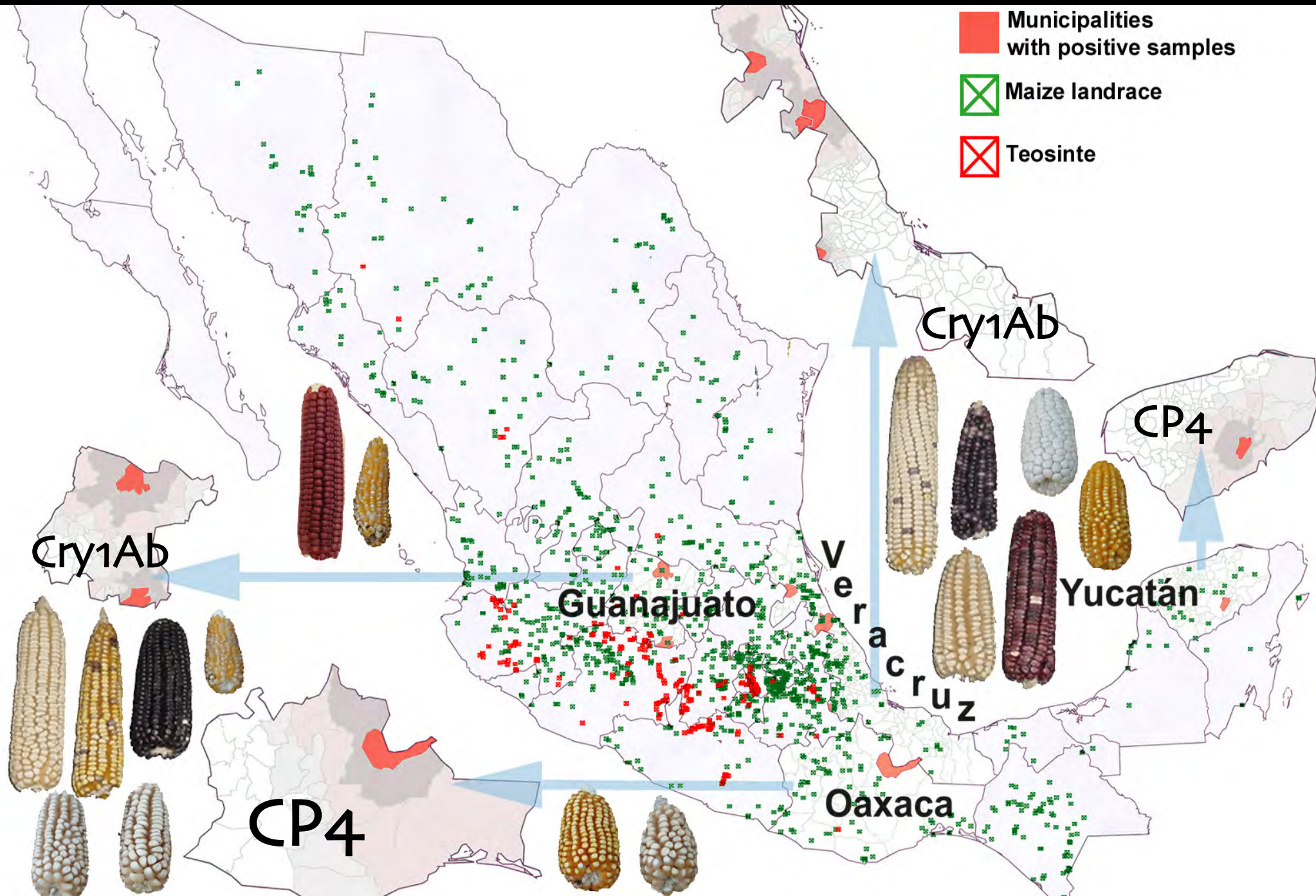


Figure S2. PCR amplification of the 35S and NOST from DNA extracted from maize leaf samples collected in 2004.



(A)

CP4EPSPS and Cry1Ab; Dyer et al ABuylla (2009)



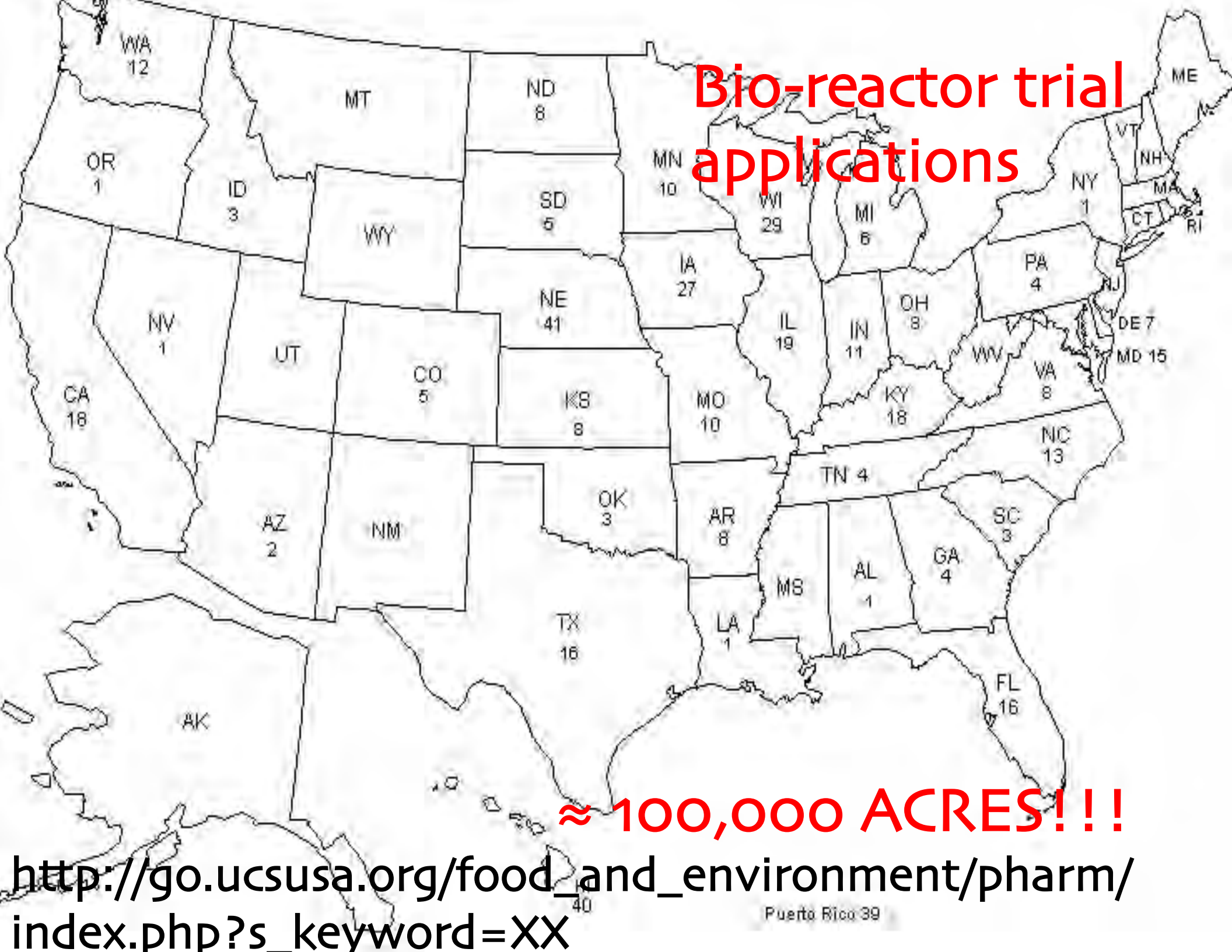
*The transgenes of non-food lines
(bio-reactors maize) can also reach the
food chain!*



Non-food bio-reactor transgenic maize lines: > 70,000 hectares in USA trials!



Bio-reactor trial applications



≈ 100,000 ACRES!!!

http://go.ucsusa.org/food_and_environment/pharm/index.php?s_keyword=XX

Socioeconomic consequences

– Patented constructs in
landraces!!!
Patent lawsuits!!



– Organic & free of GMOs markets:
cancelled!!!

– Technological &
political dependence
On large corporations



Peasant & indigenous organizations, NGOs and scientists stopped release of Transgenic Maize



September 2013:
collective action
established a
de facto moratorium!
Government sides
with corporations!

Real agricultural issues & needs in Mexico: biodiversity and Milpa system

- Climate change
- Altitude
- Special soil types
- Water shortage
- High temperature
- Soil
- Phenology
- Colour
- Texture
- Taste
- Texture
- Others...

CONCLUSIONS

1. Free trade USA-Mexico agreement: negative environmental, social and public health consequences for Mexico. Peasant sector and small food producers, among the ones who suffered the most.
2. Transgenic maize releases in Mexico should be forbidden permanently and local landraces protected from transgene contamination: threatens food sovereignty & security worldwide.

Claire Hope Cummings (2005)

“Science, evidence or even moral persuasion will be useless once the options are gone”

Additional information:

Unión de Científicos

Comprometidos con la Sociedad

UCCS, México

www.unionccs.net

Please sign our petition!

¡Muchas Gracias!

Maize is our staple food, at the heart of our culture and the livelihood of peasant and autochthonous communities

To preserve it free of transgenes and as a communal good is our right and our responsibility!