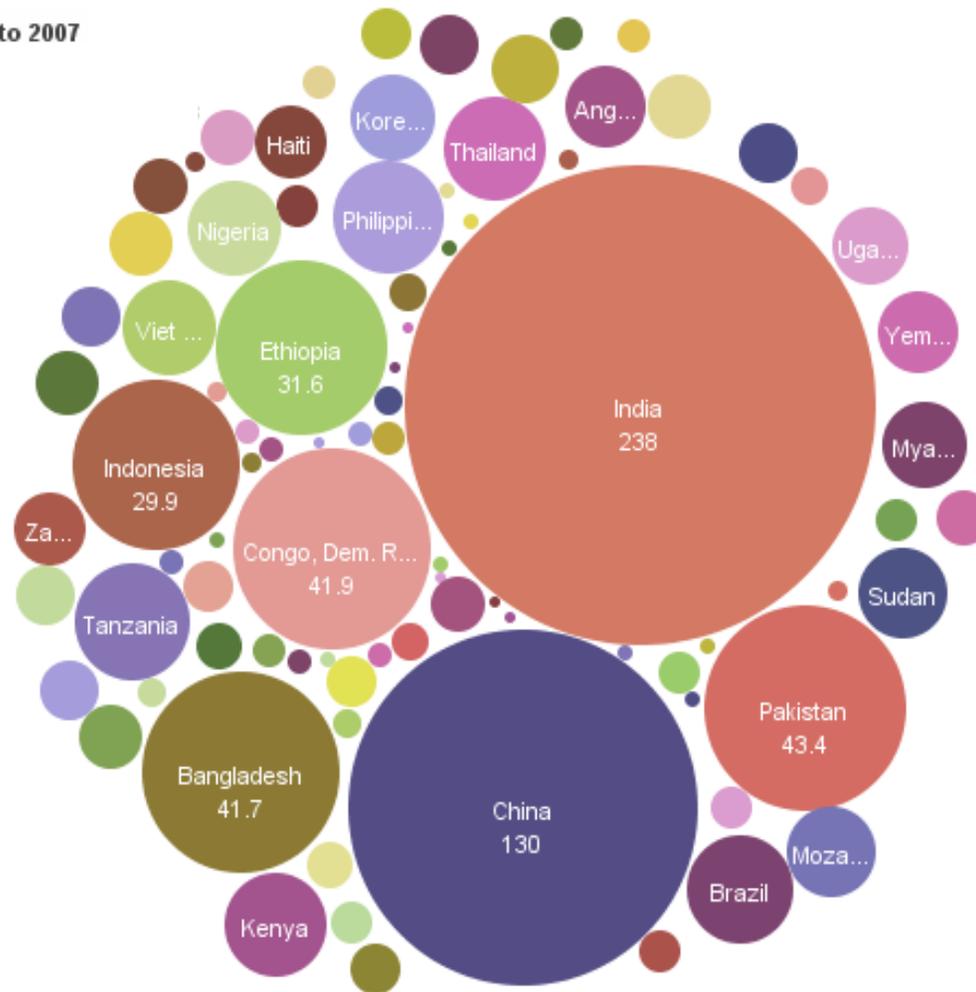




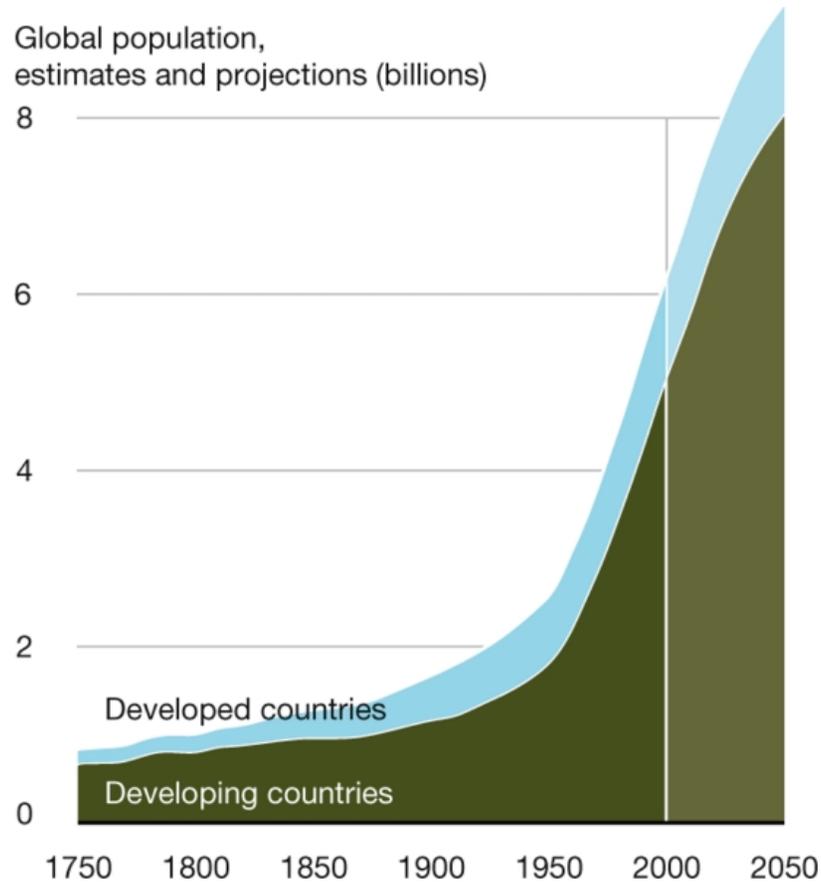
# Hunger Today

Millions of people, 2005 to 2007

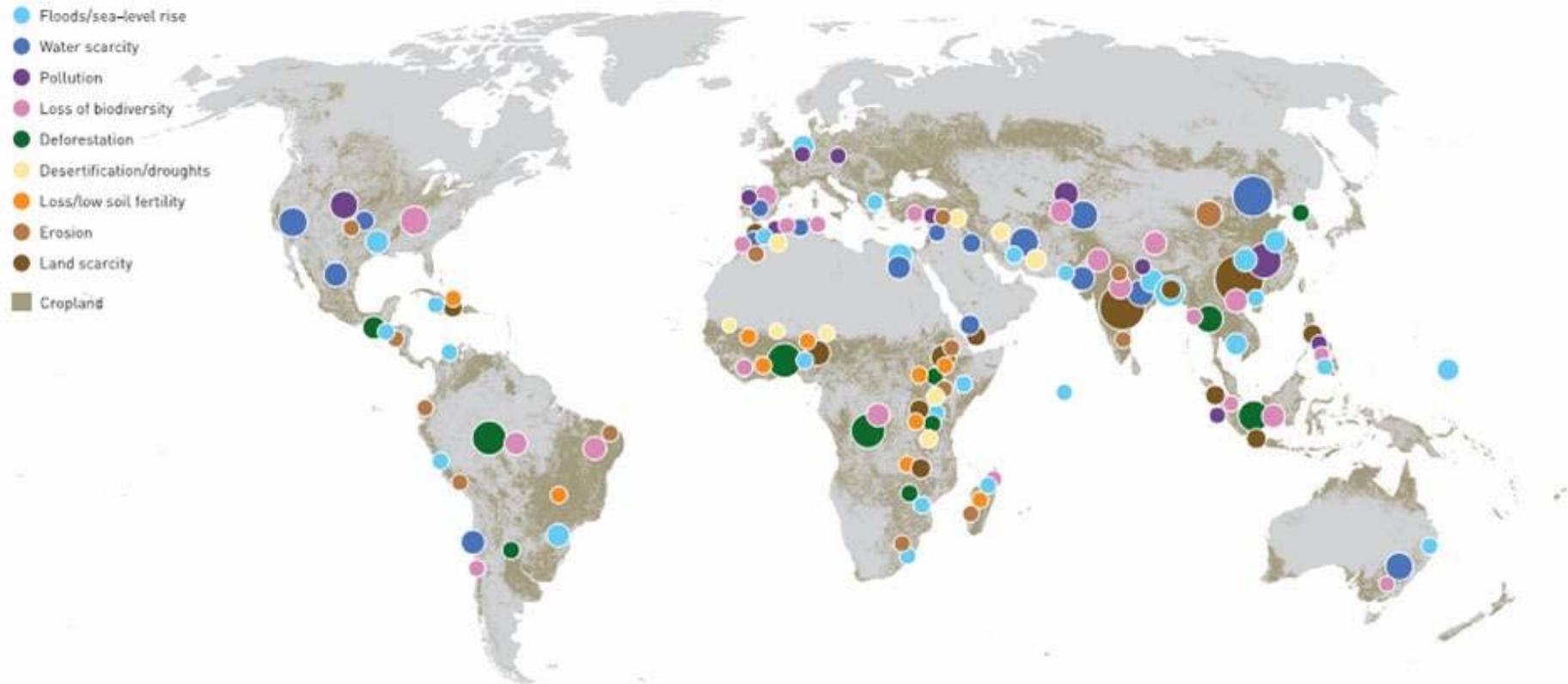


Jack A. Bobo | Senior Advisor for Biotechnology | U.S. Department of State

# Hunger Tomorrow?

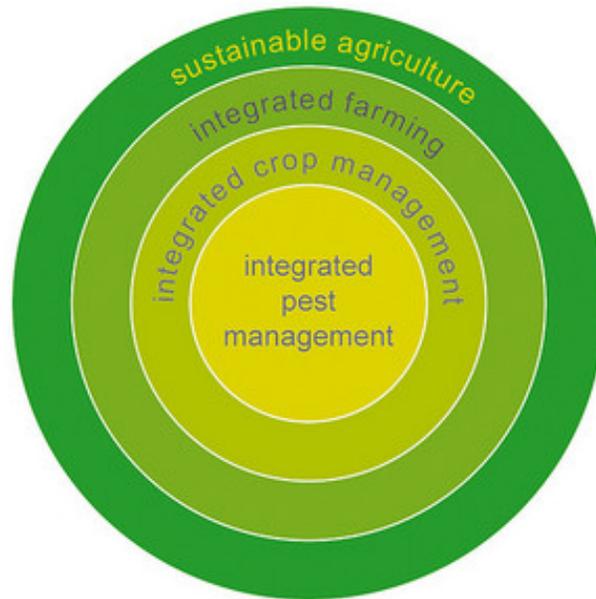


# Food Constraints



Source: SOLAW, FAO 2011

# “Sustainable Intensification”

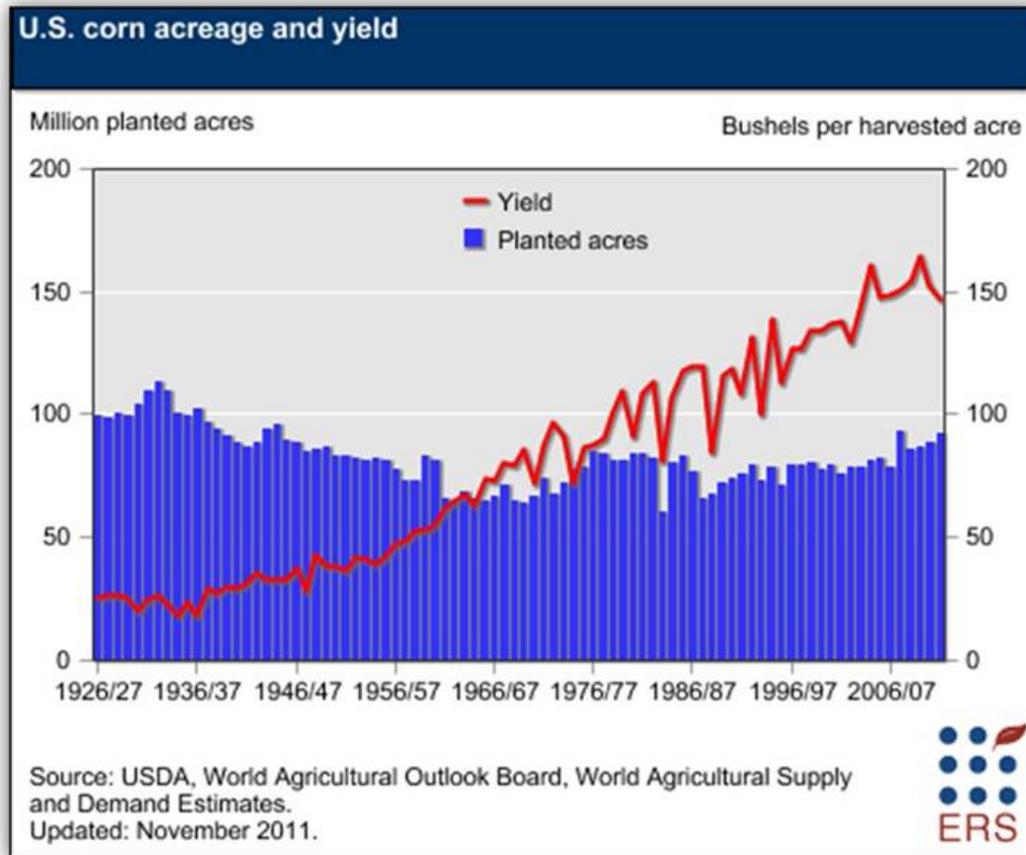


## We have the technology

# 70% more food by 2050, using...



# Science



# Soybean Pipeline

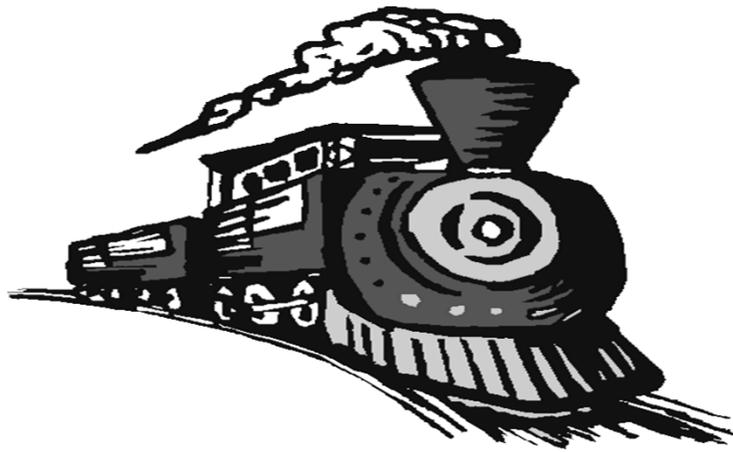
## LEGEND

Pest Management	Increased Yield	Nitrogen Utilization	Stress Tolerance	Crop Composition
-----------------	-----------------	----------------------	------------------	------------------

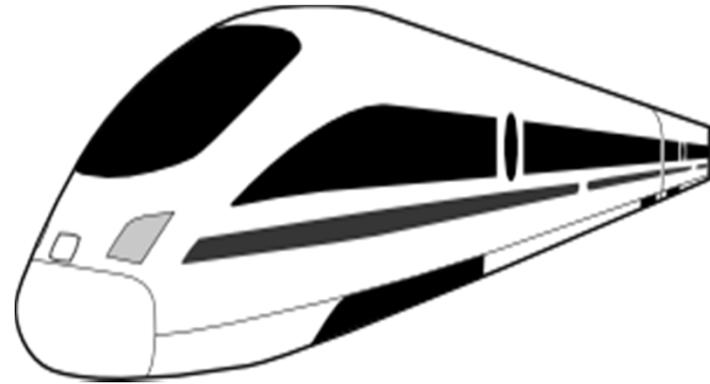
EARLY DEVELOPMENT		ADVANCED DEVELOPMENT (NEXT 5-7 YEARS)	
Herbicide Tolerance	Next Generation Multiple Mode (Pioneer/DuPont)	Herbicide Tolerance	Dicamba (Monsanto)
Insect Resistance	2nd Generation Insect-Protected Genuity® RR2 Yield® (Monsanto)	Herbicide Tolerance	Optimum® GAT®: Glyphosate ALS Tolerance (Pioneer/DuPont, 2013-2014)
Insect Resistance	Hemiptera/Stink Bug (Pioneer/DuPont)	Herbicide Tolerance	HPPD (Syngenta, Bayer CropScience)
Insect Resistance	Lepidopteran (Pioneer/DuPont)	Herbicide Tolerance	DHT: 2,4-D + Glufosinate (Dow AgroSciences)
Nematode Resistance	SCN (Pioneer/DuPont)	Herbicide Tolerance	GlyToI® + HPPD (Bayer CropScience, M.S.Technologies)
Nematode Resistance	SCN (Syngenta)	Herbicide Tolerance	GlyToI® + HPPD + LL (Bayer CropScience, M.S.Technologies)
Nematode Resistance	SCN + RR2 (BASF)	Herbicide Tolerance	Imidazolinone (BASF, Embrapa/Brazil)
Disease Resistance	Asian Soybean Rust II (Pioneer/DuPont)	Insect Resistance	1st Generation Insect-Protected Genuity® RR2 Yield® (Monsanto)
Disease Resistance	(Syngenta)		
Fungal Resistance	(BASF)		
Higher-Yielding	2nd Generation (Monsanto, BASF)	Higher-Yielding	1st Generation (Monsanto, BASF)
Increased Yield	(Pioneer/DuPont)	Plenish™	High Oleic Oil (Pioneer/DuPont)
Increased Oil & Improved Feed Efficiency	(Pioneer/DuPont)	SDA Omega-3 Enriched	(Monsanto, Solae)
		Vistive® Gold	Low Saturated, Zero Trans-Fat Oil (Monsanto)

Jack A. Bobo | Senior Advisor for Biotechnology | U.S. Department of State

# Competing World Views

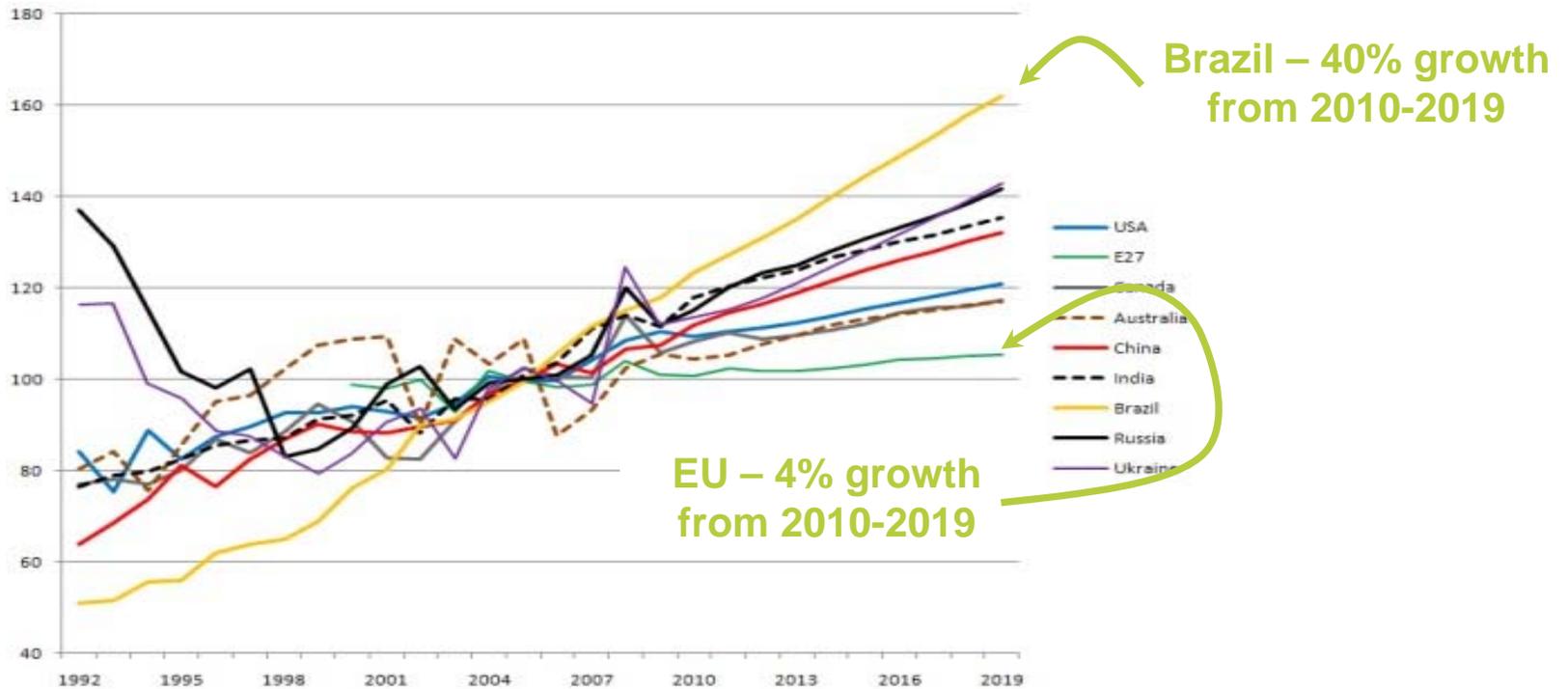


**Slow Food**

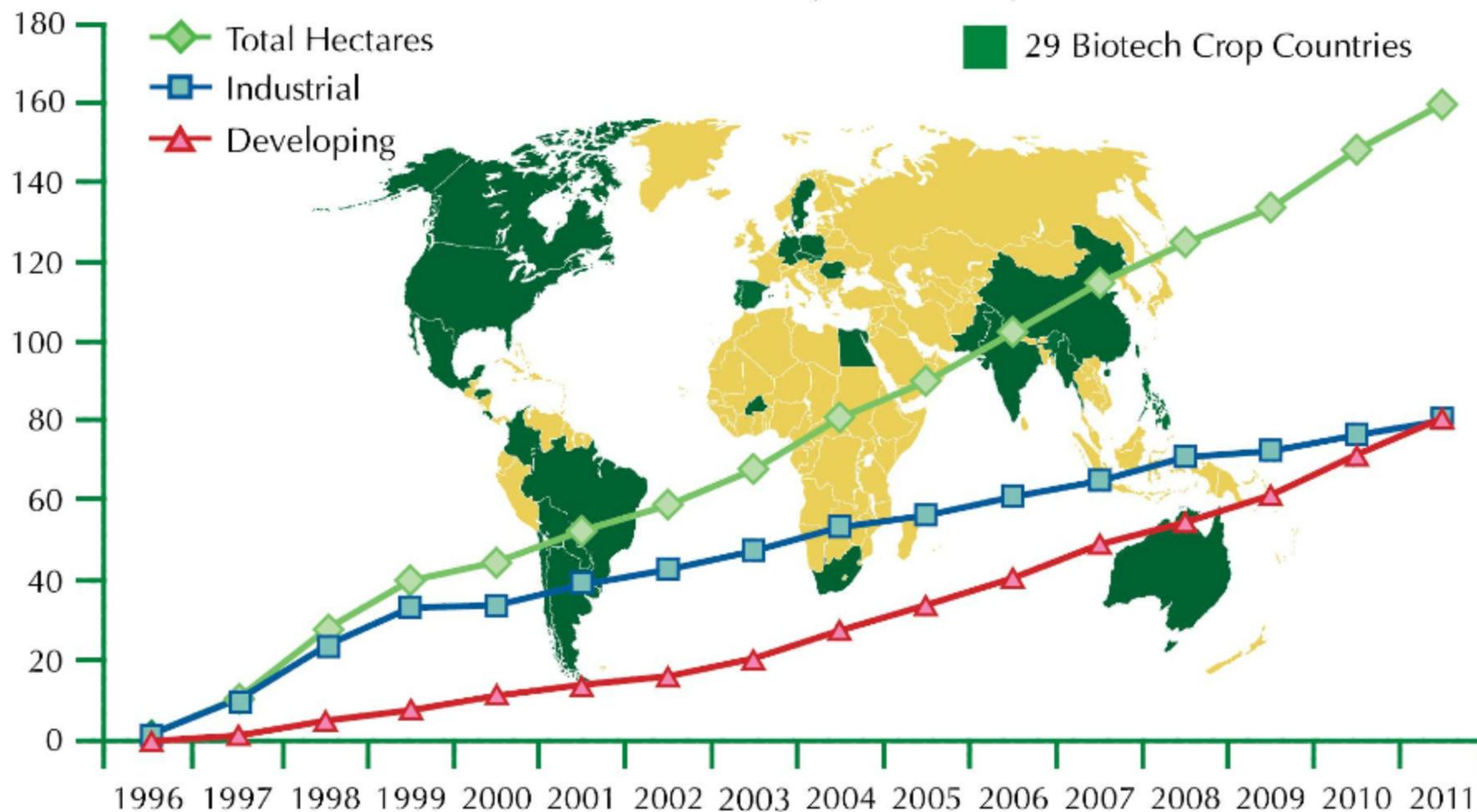


**Fast Food**

# A Tale of Two Trends



## GLOBAL AREA OF BIOTECH CROPS Million Hectares (1996-2011)



*A record 16.7 million farmers, in 29 countries, planted 160 million hectares (395 million acres) in 2011, a sustained increase of 8% or 12 million hectares (30 million acres) over 2010.*

# Opposition to Technology

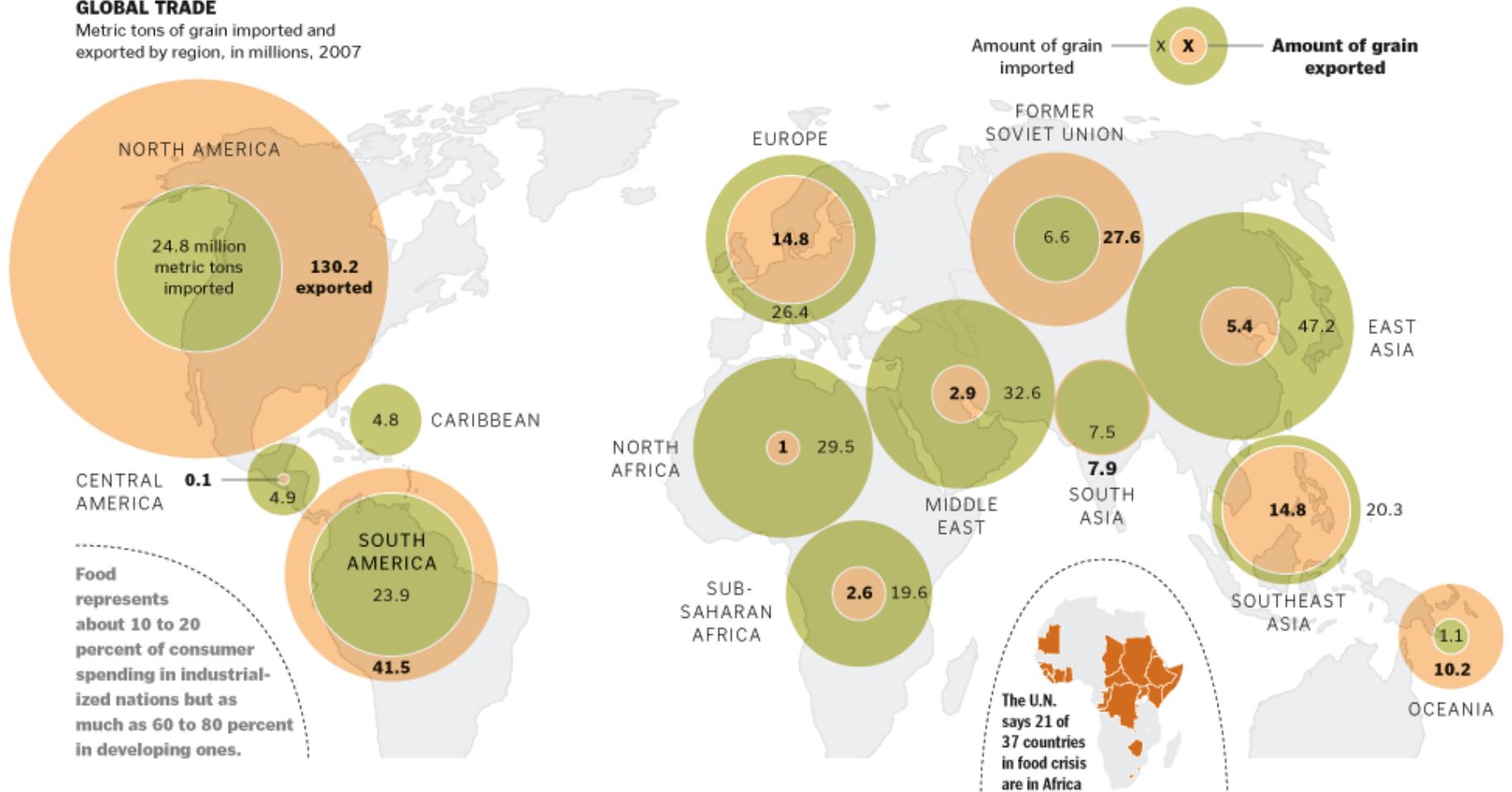


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# Global Demand

## GLOBAL TRADE

Metric tons of grain imported and exported by region, in millions, 2007



Source: Washington Post

# Opposition to Trade



Michael McGuerty





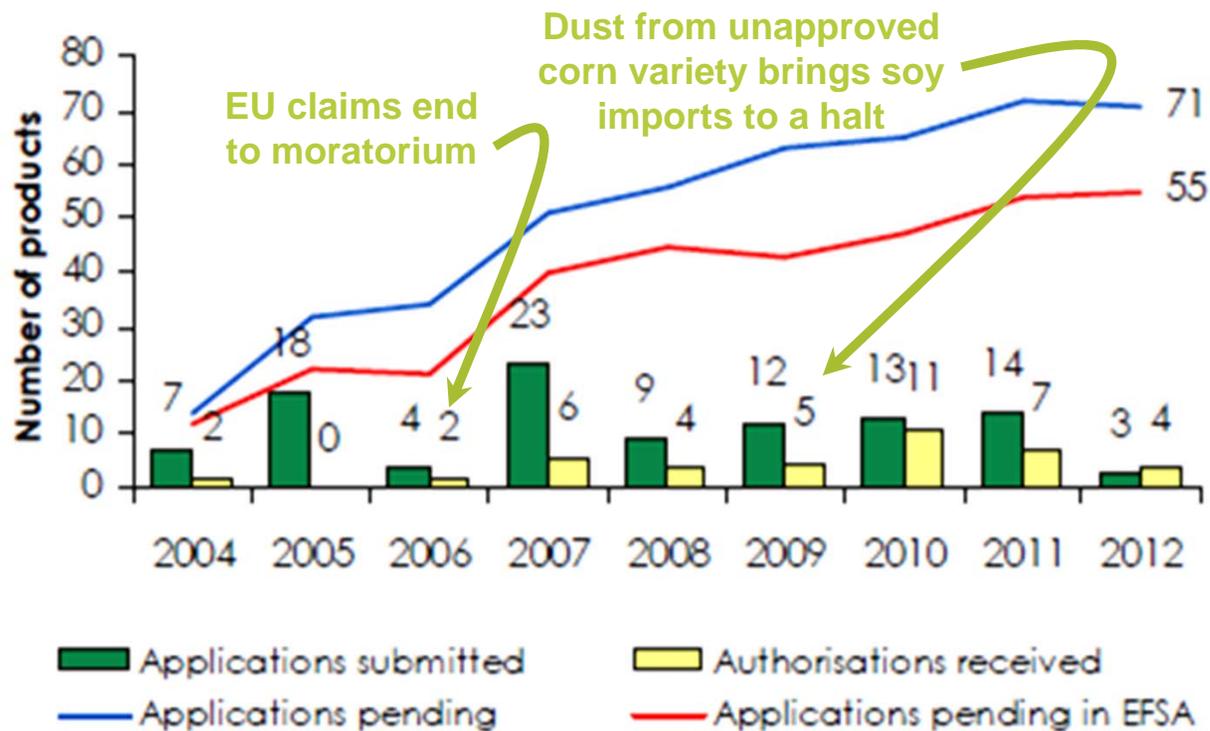
# Wreck #1

## Slow Approvals

# Slow?



## EU Submissions and Authorizations



# Or Broken?



## Timelines for GM products with a positive EFSA safety opinion and awaiting Commission action:

**timelines not compliant with EU law**      **timelines compliant for the moment**

Product	EFSA Opinion	Days waiting for the Commission to schedule vote at committee level <sup>1</sup> : maximum: 3 months	Days waiting for the Commission to schedule vote in Appeal Committee maximum: 2 months <sup>2</sup>	Days after Council/ Appeal vote - waiting for approval
1507 maize (c)	03/03/2005	voted after 1462 days	1131 days and counting	
Bt11 maize (ipc)	19/05/2005	voted after 1385 days	1131 days and counting	
LL Rice62 (ffip)	30/10/2007	1613 days and counting		
NK603 maize (ffipc)	11/06/2009	1007 days and counting		
MON810 maize (ffipc)	30/06/2009	1006 days and counting		
MS8xRF3 rapeseed(ff)	22/09/2009	922 days and counting		
GT73 oilseed rape(ffip)	15/12/2009	838 days and counting		
MON863 maize (ffip)	30/03/2010	733 days and counting		
MON89034x1507xMON88017x 59122 maize (ffip)	27/09/2010	552 days and counting		
MON89034x1507xNK603 maize (ffip)	27/09/2010	552 days and counting		
MON531 cotton (ffip)	16/09/2011	198 days and counting		
MON88017 maize (c)	10/11/2011	143 days and counting		
MON1445 cotton (ffip)	16/12/2011	107 days and counting		
GA21 maize (ffipc)	16/12/2011	107 days and counting		
MON87701xMON89788 soybean (ffip)	15/02/2012	46 days and counting		
MON 531xMON1445 cotton (ff)	28/03/2012	5 days and counting		

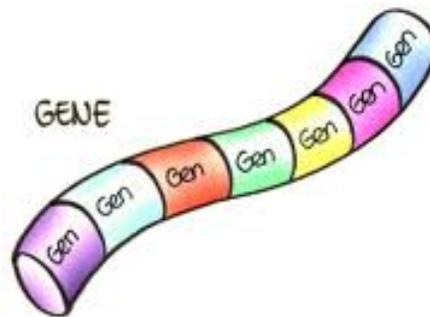
ff=food, feed and industrial use    i=import    p=processing    c=cultivation

"In terms of the risk management stage, nearly all respondents, whether [member state] Competent Authorities or stakeholders, believed this was not fully operational."  
 - EU Report on the state of the biotech regulatory system

# Wreck #2

## Stacked Products

Combining two or more GE traits through conventional breeding



# Stacks will cripple the system

No review of stacks		Separate review of stacks		No review of stacks		Separate review of stacks	
Two Traits	Two Approvals	Two Traits	Three Approvals	Six Traits	Six Approvals	Six Traits	720 Potential Approvals
	Okay		Okay		Okay		
	Okay		Okay		Okay		
			Okay		Okay		
		Combinations also approved			Okay		
					Okay		
					Okay		
							$6 \times 5 \times 4 \times 3 \times 2$
							720 permutations
							8-way stacks already exist

# Wreck #3

## Low Level Presence

### Unauthorized GE Products in the Food Supply



# Sources of LLP

**“Asynchronous approval” (AA) - Where at least one cultivating country has already authorized a GE crop while other (importing) countries have not.**

**“Isolated foreign approval” (IFA, or “asymmetric approval”) - Where a cultivating country has authorized a GE crop, but its developer does not seek approval in foreign markets.**

**Research events - Where a country has authorized the cultivation of a GE crop in field trials only, but due to accidental admixture, traces end up in the commercial crop or food supply.**

Source: AgBioForum

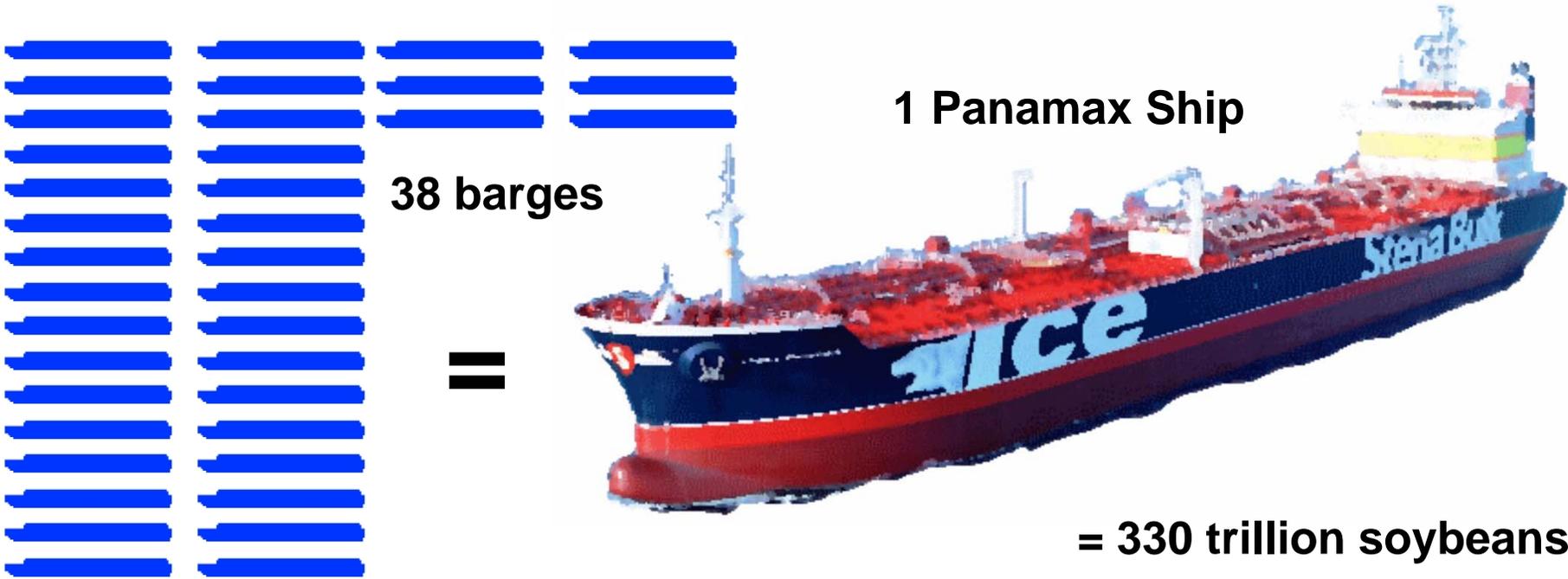
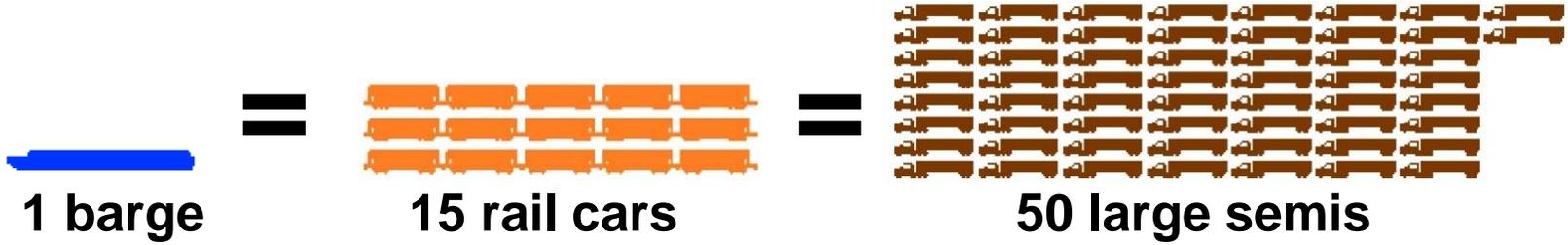


# EU Snapshot

Crop	Asynchronous approvals*	Foreign domestic approvals#	Total sources for LLP
Soybeans	2	1	3
Maize	6	5	11
Rapeseed	0	1	1
Cotton	3	9	12
Rice	1	4	5
Potatoes	0	2	2
Other crops	0	8	8
All crops	12	30	42

Notes: \* Number of individual events authorised for commercial use in at least one country worldwide, and submitted but not yet authorised in the EU. # Number of events not submitted for authorisation in the EU but already in the regulatory pipeline in at least one country worldwide. Source: Based on the overview tables in the Appendix.

# Co-mingling



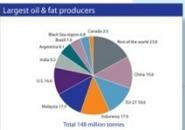
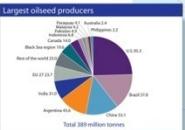
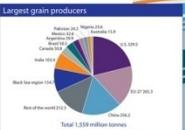


# World Map Grains & Oilseeds

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# Movement

www.rabobank.com  
Head & Equities Research and Advisory  
for@rabobank.com



### Key

The trade flows focus on the grains and oilseeds, leading in the complex in which these crops are and partly or fully relevant to the complex, processed (barley and barley are not included to avoid a complex of data).

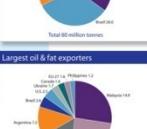
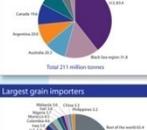
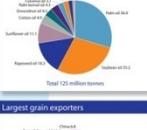
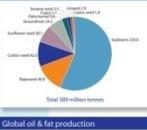
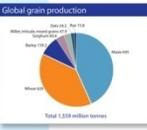
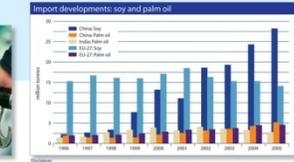
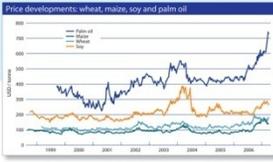
The data in this map refer to the 2005/06 crop year. The minimum requirement for drawing a trade line is 100,000 tonnes. Trade lines on the map do not necessarily follow the actual trade routes.

### Key data per country

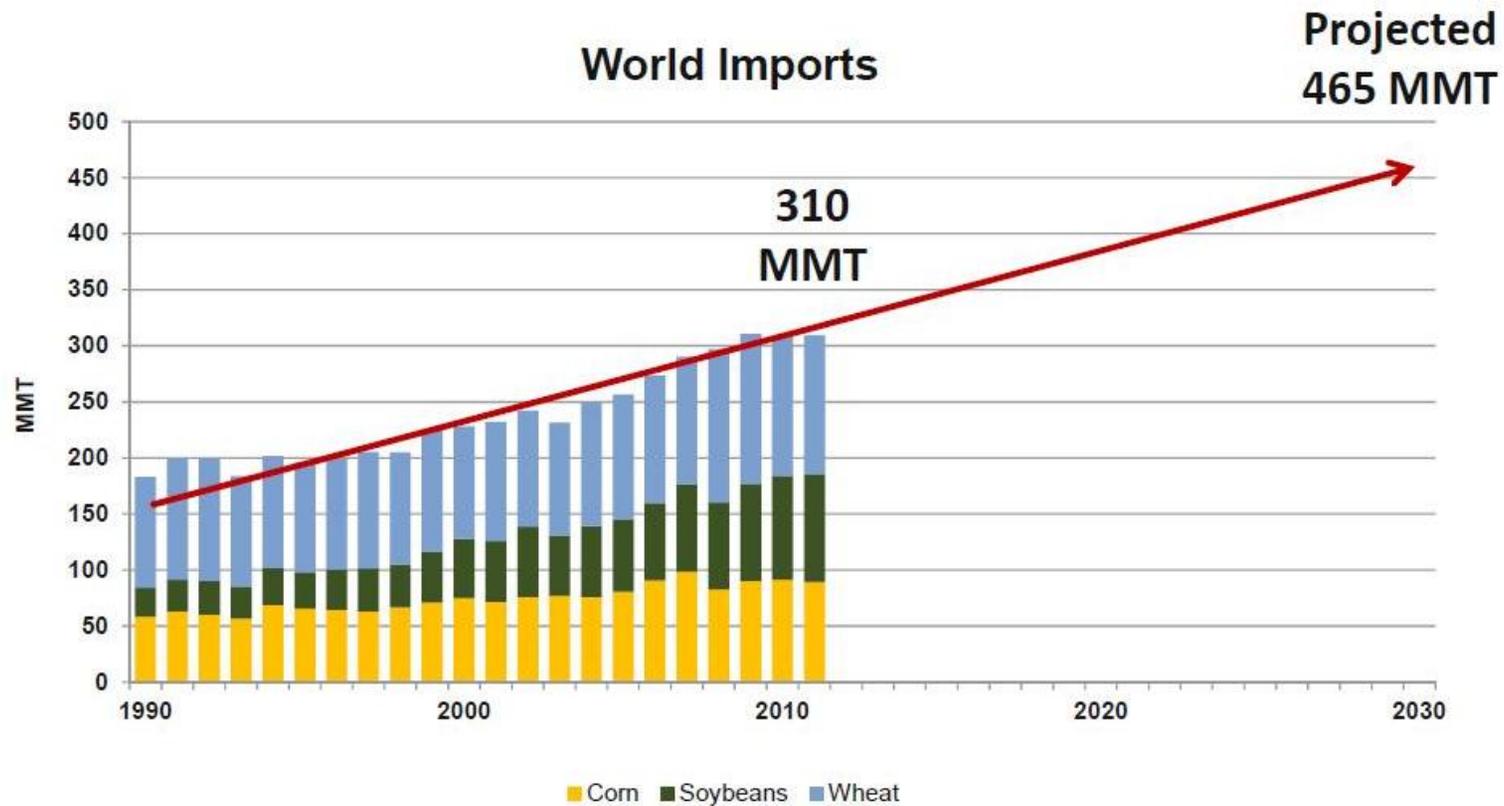
Country	Production (1,000 tonnes)	Exports (1,000 tonnes)	Imports (1,000 tonnes)
USA	3,100	2,500	1,500
Canada	2,500	2,000	1,000
India	1,500	1,000	500
Brazil	1,000	800	400
Argentina	800	600	300
Russia	700	500	200
China	600	400	100
Mexico	500	300	100
Australia	400	300	100
France	300	200	100

### Conversion chart

General	Wheat/Try	Rapeseed
1 hectare	1 hectare	1 hectare
1 tonne	1 tonne	1 tonne
1 bushel	1 bushel	1 bushel
1 cwt	1 cwt	1 cwt
1 metric ton	1 metric ton	1 metric ton



# Increasing



# Hard Truths

If you test, you will find

Zero is a very small number

You get what you pay for





Many GE products + Many countries +  
Slow approvals + Stacked reviews +  
Zero tolerance (for LLP)  
= Trade Wreck

# Everybody Pays

EU ag economy runs on cheap animal feed

Imports \$15 billion in biotech animal feed each year

Livestock production accounts for 40% of the total value of agricultural production

Impact on EU pig meat sector (deviation from the baseline, %)

PORK	MEDIUM		WORST CASE	
	2009	2010	2009	2010
Net Production	-0.9%	-1.8%	-29.3%	34.7%
Import	28.6%	74.3%	637.0%	5461.0%
Exports	-0.3%	-1.1%	-86.0%	-85.3%
Consumption	-0.9%	-1.6%	-23.9%	-17.4%

Impact on EU poultry sector (deviation from the baseline, %)

POULTRY	MEDIUM		WORST CASE	
	2009	2010	2009	2010
Net Production	-1.7%	-2.6%	-29.2%	-43.9%
Import	6.6%	10.6%	92.5%	158.3%
Exports	-2.9%	-5.9%	-100.0%	-100.0%
Consumption	-1.0%	-1.5%	-15.7%	-20.3%

Impact on EU beef meat sector (deviation from the baseline, %)

BEEF	MEDIUM		WORST CASE	
	2009	2010	2009	2010
Net Production	0.0%	0.0%	-1.1%	2.1%
Import	12.7%	14.0%	397.4%	295.8%
Exports	-41.2%	-95.1%	-100.0%	-100.0%
Consumption	1.2%	1.5%	30.2%	23.1%

DG Agri Report

[http://ec.europa.eu/agriculture/envir/gmo/economic\\_impactGMOs\\_en.pdf](http://ec.europa.eu/agriculture/envir/gmo/economic_impactGMOs_en.pdf)

# Could it happen?





# It happens every day

## EU Rapid Alerts – March 2012

March 26, 2012	Vermicelli noodles	GM Rice	China
March 26, 2012	Gnocchi	GM Rice	China
March 23, 2012	Noodles	GM Rice	China
March 23, 2012	Papaya	GM Papayas	Thailand
March 23, 2012	Red yeast rice	GM Rice	China
March 23, 2012	Biscuits	GM Rice	China
March 19, 2012	Vermicelli noodles	GM Rice	Hong Kong
March 19, 2012	Rice protein powder	GM Rice	China
March 16, 2012	Papayas	GM Papayas	Thailand
March 16, 2012	Bakery products	GM Rice	China
March 15, 2012	Vermicelli noodles	GM Rice	Hong Kong
March 14, 2012	Basmati rice	GM Rice	Pakistan
March 14, 2012	Chestnut	GM chestnut	China
March 14, 2012	Sesame	GM sesame	China
March 13, 2012	Organic Papaya	GM Papayas	Thailand
March 13, 2012	Rice crackers	GM promoter	China
March 8, 2012	Vermicelli noodles	GM Rice	China

EU countries detecting unauthorized products: Germany, Italy, Portugal, Slovenia, Great Britain

# What next?





Things will get worse before they get better

Creating the potential for severe market disruptions

Which might help policies align with market realities



# **Jack A. Bobo**

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U.S. Department of State