



Science For A Better Life

# The Future of Pesticides

Dana Sargent  
December 2013 | Raleigh, NC, USA



## Forward-Looking Statements

This presentation may contain forward-looking statements based on current assumptions and forecasts made by Bayer Group or subgroup management.

Various known and unknown risks, uncertainties and other factors could lead to material differences between the actual future results, financial situation, development or performance of the company and the estimates given here. These factors include those discussed in Bayer's public reports which are available on the Bayer website at [www.bayer.com](http://www.bayer.com).

The company assumes no liability whatsoever to update these forward-looking statements or to conform them to future events or developments.



# Agenda

- Global Is Our New Reality
- Consumers Drive the Supply Chain
- Food Is Politics
- Agriculture Is Changing, Too
- We Can Seize Great Opportunity



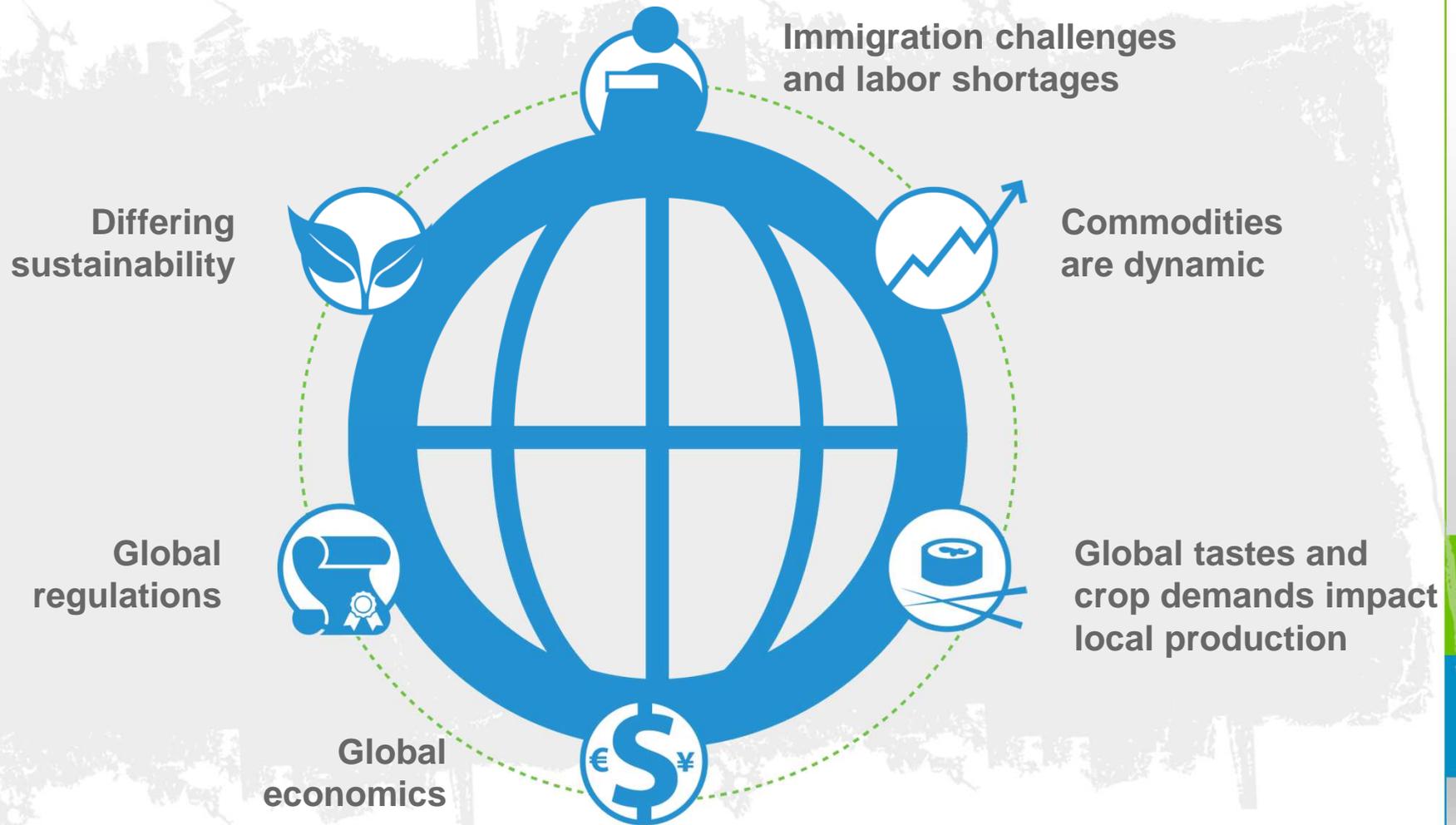


# The World is Changing





# Global is the New Local



A large graphic of a globe, rendered in blue and green, is centered on the page. The globe is partially obscured by a green banner that runs horizontally across the middle. The background of the globe is a faded, grayscale image of a city skyline with various buildings and structures.

**GLOBAL IS OUR NEW REALITY**

Bayer CropScience



# Neonicotinoid Ban

BBC News - Bee deaths: EU to ban neonicotinoid pesticides

www.bbc.co.uk/news/world-europe-22335520

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29 April 2013 Last updated at 10:15 ET

## Bee deaths: EU to ban neonicotinoid pesticides

COMMENTS (872)

The European Commission will restrict the use of pesticides linked to bee deaths by researchers, despite a split among EU states on the issue.



There is great concern across Europe about the collapse of bee populations.

Neonicotinoid chemicals in pesticides are believed to harm bees and the European Commission says they should be restricted to crops not attractive to bees and other pollinators.

Honeybees are vital for pollinating crops - a job that would be very costly without them.

But many farmers and crop experts argue that there is insufficient data.

Fifteen countries voted in favour of a ban - not enough to form a qualified majority. According to EU rules the Commission will now have the option to impose a two-year restriction on neonicotinoids - and the UK cannot opt out.

The Commission says it wants the moratorium to begin no later than 1 December this year.

The UK did not support a ban - it argues that the science behind the proposal is inconclusive. It was among eight countries that voted against, while four abstained.

Wild species such as honey bees are said by researchers to be responsible for pollinating around one-third of the world's crop production.

Related Stories

- Scientists divided on pesticide ban
- Bee campaigners march on Parliament
- Ban pesticides to save bees, say MPs

Features & Analysis

- Happy My second photograph
- Adieu How US wounds

Bee-harming pesticides banned in Europe | En

www.theguardian.com/environment/2013/apr/29/bee-harming-pesticides-banned-europe

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Environment > Bees

## Bee-harming pesticides banned in Europe

EU member states vote ushers in continent-wide suspension of neonicotinoid pesticides

• Have your say: is the EU right to ban pesticides?

Damian Carrington  
The Guardian, Monday 29 April 2013 11.05 EDT



Article history

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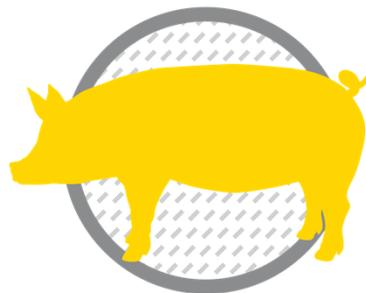
# Global Tastes and Crop Demands Impact Local Production



Growth of Asian middle class  
impacts food production.



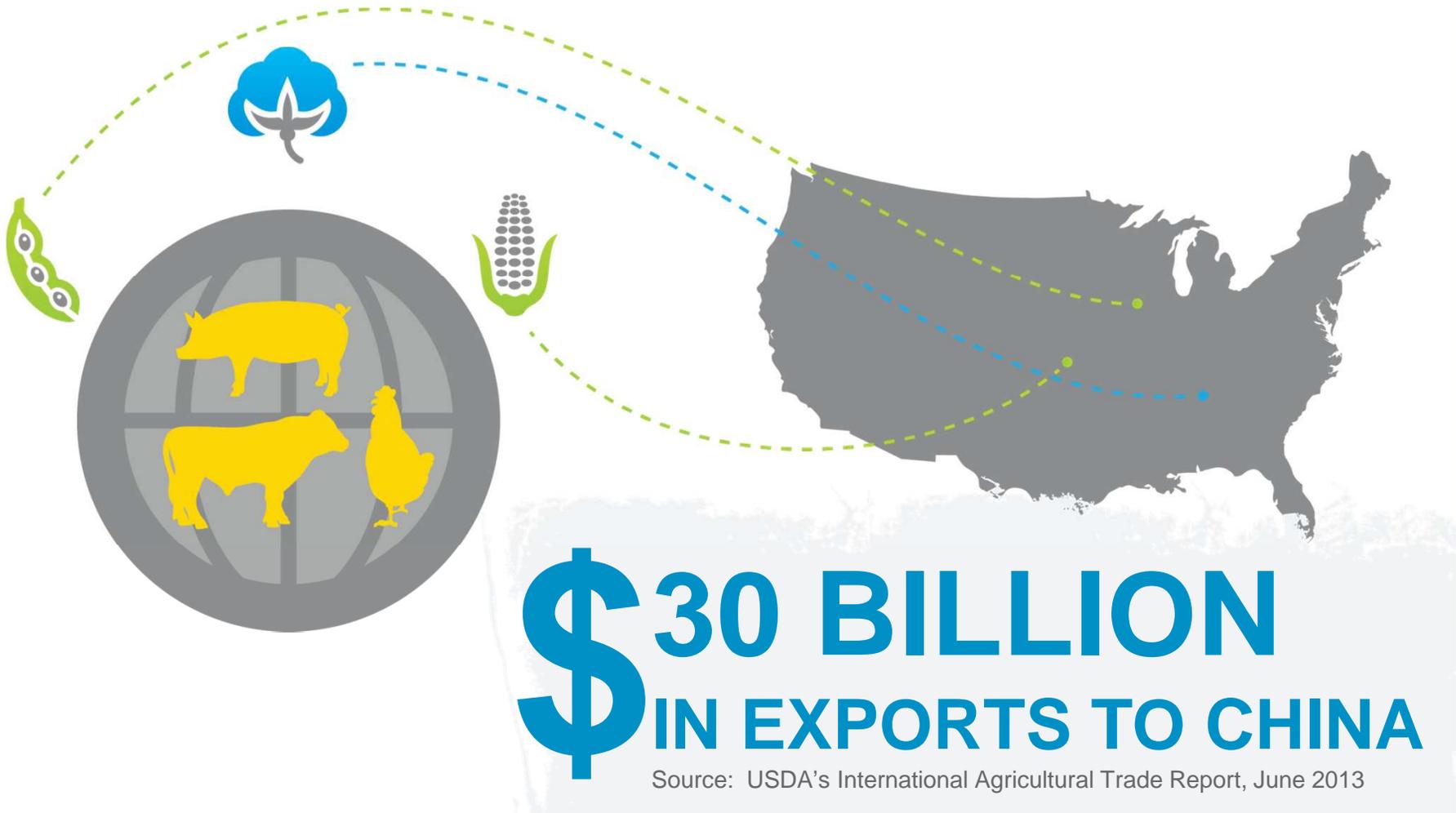
# New Global Economies



**Smithfield.**



# Economic Growth in U.S. Driven by Global Economy



# The Arab Spring and the Global Food Crisis



When grain prices spiked in 2007-2008, Egypt's bread prices rose 37%.

With unemployment rising as well, more people depended on subsidised bread – but the government did not make any more available. Egypt's annual food price inflation continued and had hit 18.9% before the fall of President Mubarak.

Although the Arab revolutions were united under the slogan "the people want to bring down the regime" not "the people want more bread", food was a catalyst.



<http://www.guardian.co.uk/lifeandstyle/2011/jul/17/bread-food-arab-spring>

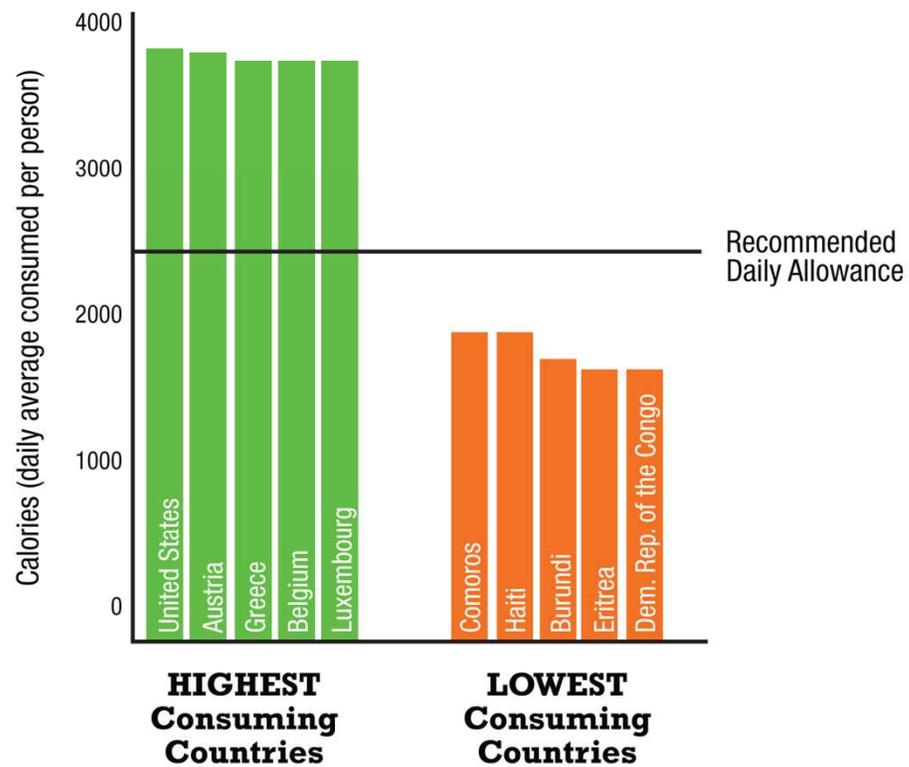


# CONSUMERS DRIVE THE SUPPLY CHAIN



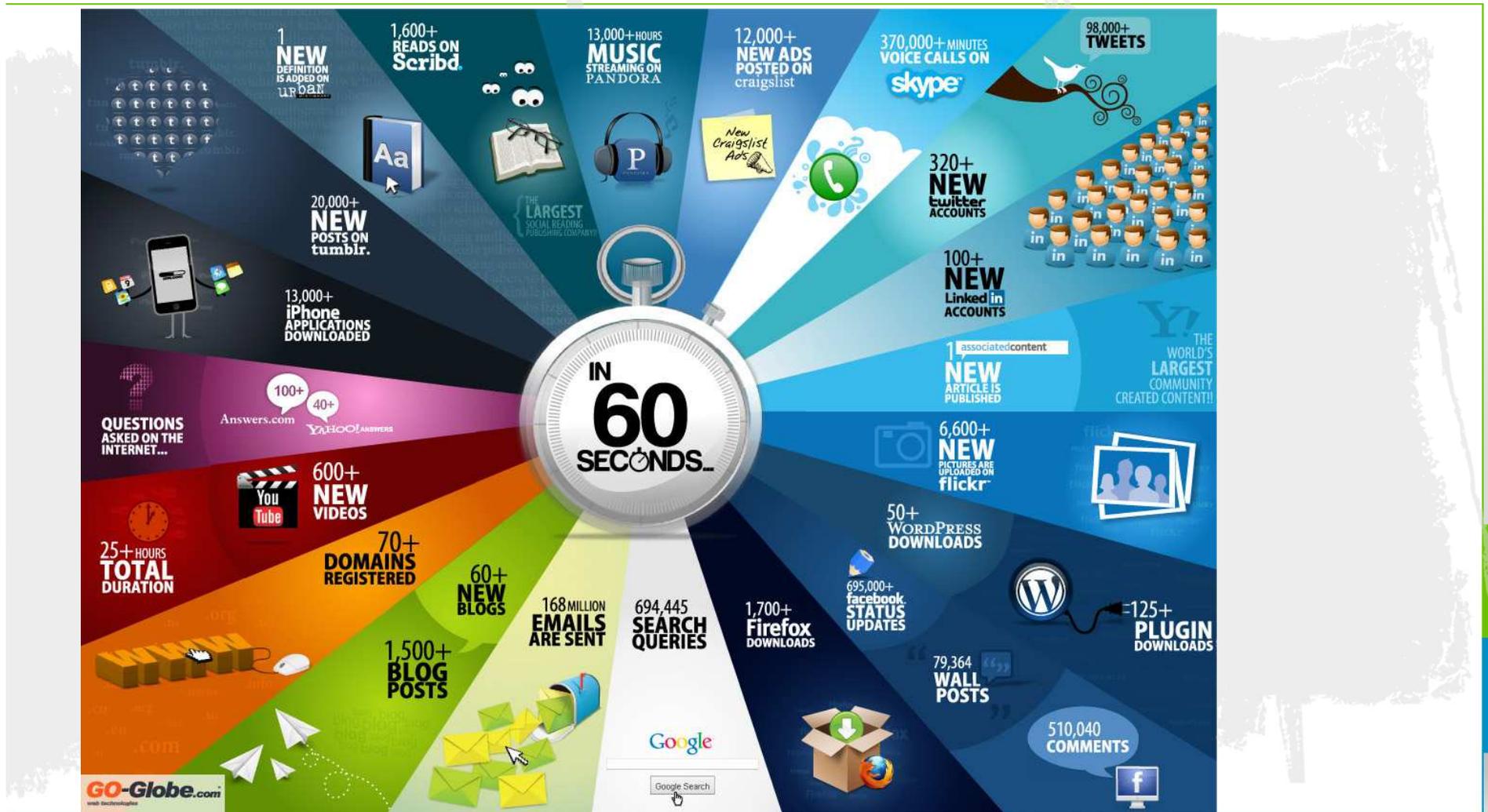
# Global Food Disparity

## Calories Consumed



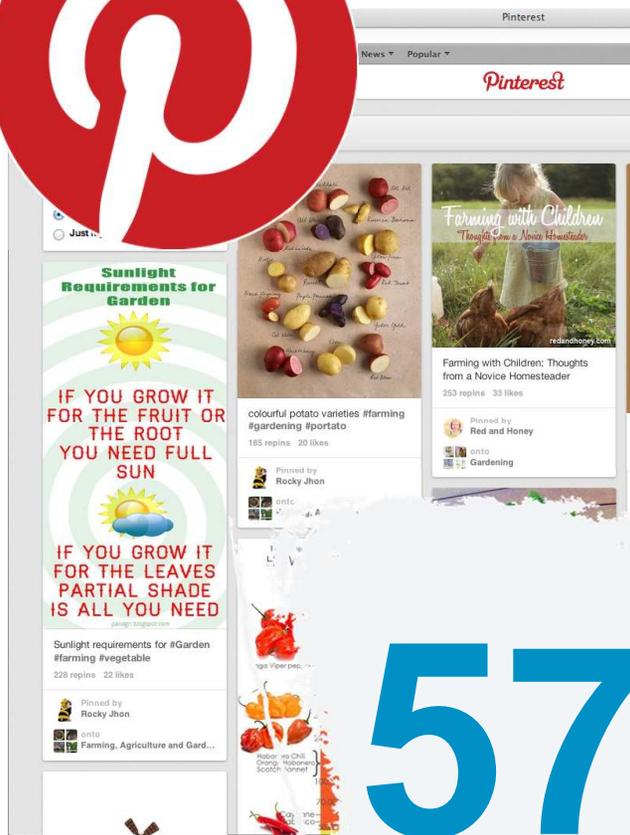


# Information Overload

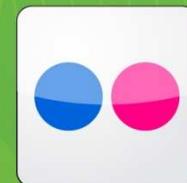




# Skyrocketing Interest in Food and Farming



# BAYER CONNECT SOCIAL HUB





# Agriculture is Not the Main Opinion Leader



**Mark Bittman** ✓  
@bittman  
Writer on food for New York Times; author of How to Cook Everything. See also: markbittman.com. Note: RT is not an endorsement.  
New York City · markbittman.com

5,034 TWEETS   90 FOLLOWING   **382,633 FOLLOWERS**   Follow



**Michael Pollan** ✓  
@michaelpollan  
Author of Cooked; Food Rules; In Defense of Food; The Omnivore's Dilemma; The Botany of Desire; A Place of My Own and Second Nature.  
Berkeley, CA · michaelpollan.com

1,776 TWEETS   206 FOLLOWING   **321,295 FOLLOWERS**   Follow



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1,401 TWEETS   455 FOLLOWING   **6,673 FOLLOWERS**   Follow



# Brands Value Consumer Engagement

“Maybe you could post a picture of these happy “Family farms” in which you say your animals are raised with the best care?”



**GEE L.**

*from Kingston, ON*

OUR ANSWER:

Thanks for your question, Gee.  
How about instead of a picture,  
we show you a video?

29 Aug 2012

● Values



Link: <http://yourquestions.mcdonalds.ca/questions/4820>



Agriculture • (ag-ri-kuhl-cher)  
noun

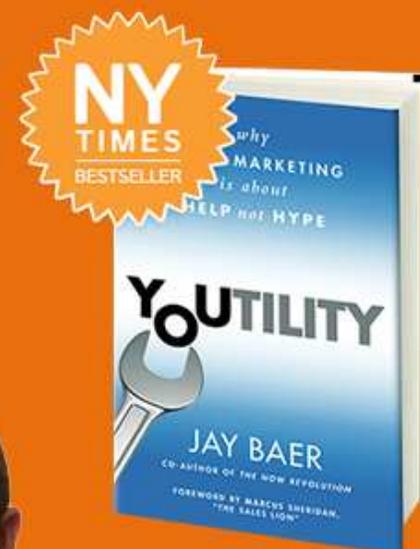




“At the end  
of the day,  
trust is all  
you have.”

—JAY BAER

Quote from his recent  
speech to AgChat Foundation  
with advice to industry





# (Mis?) Information Proliferation



Current billboard on Route 28 just outside Woodstock, New York



# One Example...

The screenshot shows a web browser window displaying a blog post from Whole Foods Market. The browser's address bar shows the URL [www.wholefoodsmarket.com/blog/three-month-update-gmo-labeling](http://www.wholefoodsmarket.com/blog/three-month-update-gmo-labeling). The page features the Whole Foods Market logo and the title "WHOLE STORY The Official Whole Foods Market® Blog". The main article is titled "Three-Month Update on GMO Labeling" and is attributed to A.C. Gallo, dated June 18, 2013. The article text discusses the company's commitment to labeling GMO products by 2018 and details the Non-GMO Project Verified program. A sidebar on the right contains navigation links for related posts, recent posts, blog roll, archives, and a search bar. A "Welcome" message is also present at the bottom of the sidebar.

Three-Month Update on GMO Labeling

By A.C. Gallo, June 18, 2013 | [Meet the Blogger](#) | [More Posts by A.C.](#)

When Whole Foods Market announced in March that by 2018, all products in our U.S. and Canadian stores must be labeled to indicate whether they contain genetically modified organisms (GMOs), we said we would provide updates of progress and milestones reached along the way. We have made a start and want to share progress with you.

**Two methods of non-GMO verification**

We believe non-GMO verification needs to be robust, science-based, credible, and based on standards created by multiple stakeholders. Accordingly, we have designated certified organic, which prohibits the intentional use of GMOs, and the Non-GMO Project Verified program as the only two verification methods that we will permit as substantiation that a product can be considered non-GMO within Whole Foods Market. Although not required, some manufacturers and producers have doubly verified their certified organic products with the Non-GMO Project Verified program, a practice our customers have responded to positively.

We will not be developing our own unique non-GMO labeling standard nor acting as an accreditor to evaluate additional non-GMO verification programs. Although other non-GMO verification systems for both organic and non-organic products may arise, certified organic and the Non-GMO Project Verified are the most widely used and recognized.

These two methods to determine labeling are only relevant for products based on or containing ingredients created from crops approved by the U. S. and Canada for GMO production. Those crops currently are: corn, soy, canola, cotton, sugar beets, alfalfa, Hawaiian papaya, zucchini, and yellow summer crooked neck squash.

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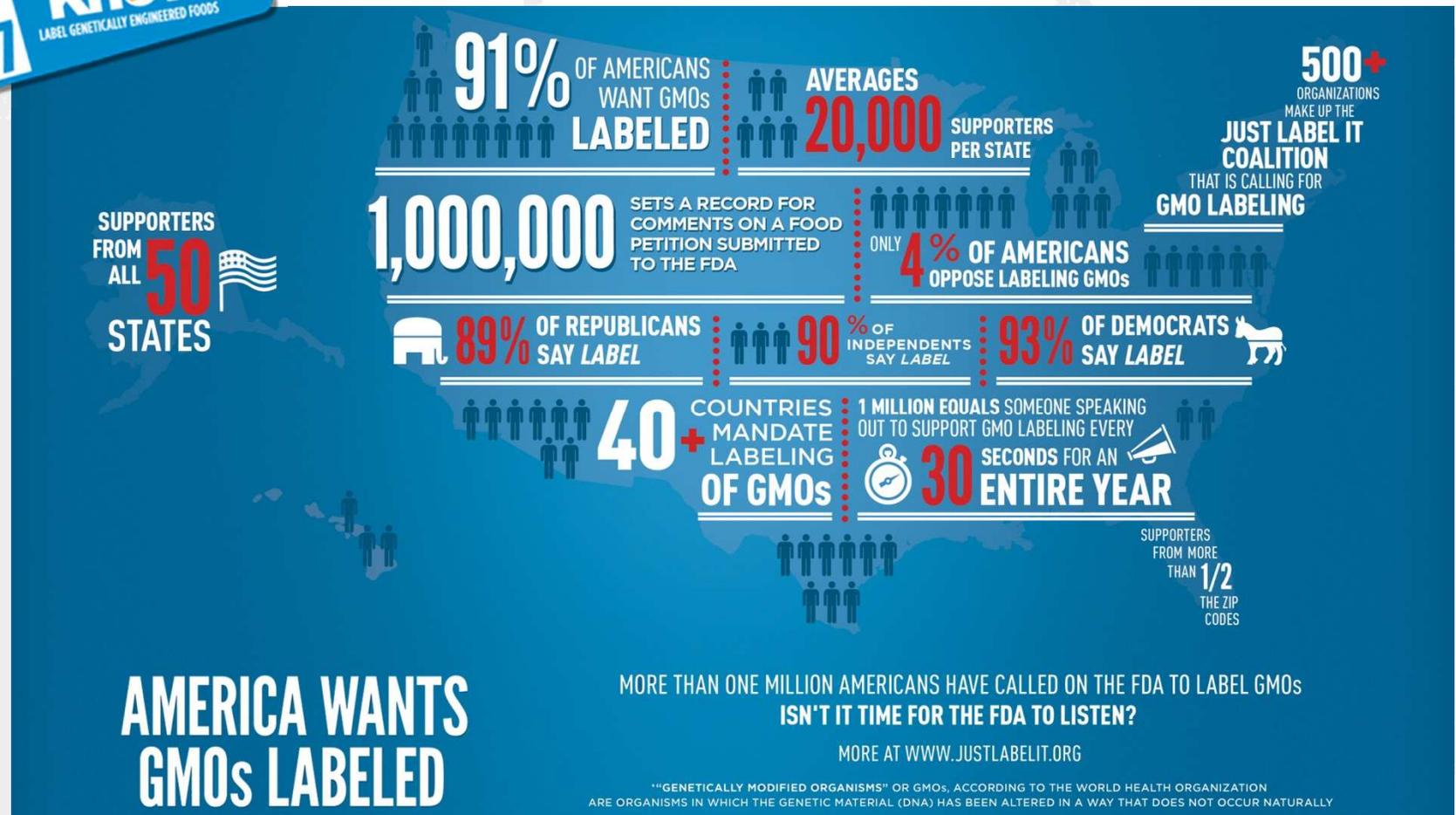
ABOUT THE BLOG

Welcome to Whole Story, the official blog of Whole Foods Market. Don't know us? In a nutshell, we are the world's leading natural and organic grocer and we're passionate about healthy food and a healthy planet. Learn more about us.

We're lucky to have a whole bunch of smart, passionate people doing



# ...Leading to Social Legislation





# Regulations Affect Local Production

## Asia curbs US imports of wheat after genetically modified sample found

Billions in food exports at stake following disclosure by US Department of Agriculture of the existence of the GM wheat

Suzanne Goldenberg, US environment correspondent



theguardian.com, Friday 31 May 2013 15.21 EDT

Jump to comments (142)



An examiner demonstrates the process of analysing a genetically modified wheat sample. Photograph: Leica/Won/Reuters

## Farmers portray gloomy outlook

Tweet 0

+1 0

Share 1

Print

Email



(0) Comments

Minn. (AP) — The bill, billed as “finding the bill,” but U.S. Reps. Collin C. Claitor said Aug. 6 they can’t expect to break the isolation.

The Senate has approved a farm bill to govern farm stamps. But, the House has passed a bill only, splitting off

to a separate measure to seek deeper cuts to food stamps.

A Democrat on the House Agriculture Committee, said while negotiators will discuss the bill, he’s not hopeful of its passage.

**UNLEASH THE T TO UNLOCK POTENTIAL.**

**T Series Soybeans**

[Learn More >](#)



# Pushing Sustainability Back to the Farm

YIELD AND REVENUE  
INFORMATION

COMMUNITY  
INVESTMENT



ENVIRONMENTAL  
CONTRIBUTION

ENERGY

WASTE

WATER



**THE ROAD AHEAD  
IS BRIGHT...**



# Face of the Farmer is Changing

		Today	Future
<b>Sustainability</b>	Production Systems	Conventional	Precision Technology
	Production Output	Commodities	Differentiated Products
	People	Aging "Lifestyle"	Younger, technology-weaned Innovators
	Policy Influence	Local and Limited	Global, Regional, National
<b>Risk Management</b>	Location	Geographically Concentrated	Regionally Diversified
	Structure	Informal Family-owned Business	Professionalized Corporate
	Scale	Small to Mid-sized	Large with Economies of Scale
	Technology	Uniform, Static	High Tech, Constant Adaptation
<b>Business Management</b>	Mindset	Grower of Crops	Value Chain Businessmen
	Relationships	Limited and Concentrated	Extensive and Regional / Global
	Competitive Advantages	Hard Assets: Land, Machinery, Infrastructure	Soft Assets: Know-how, Networks, Information
	Strategy	Rigid	Flexible, Dynamic

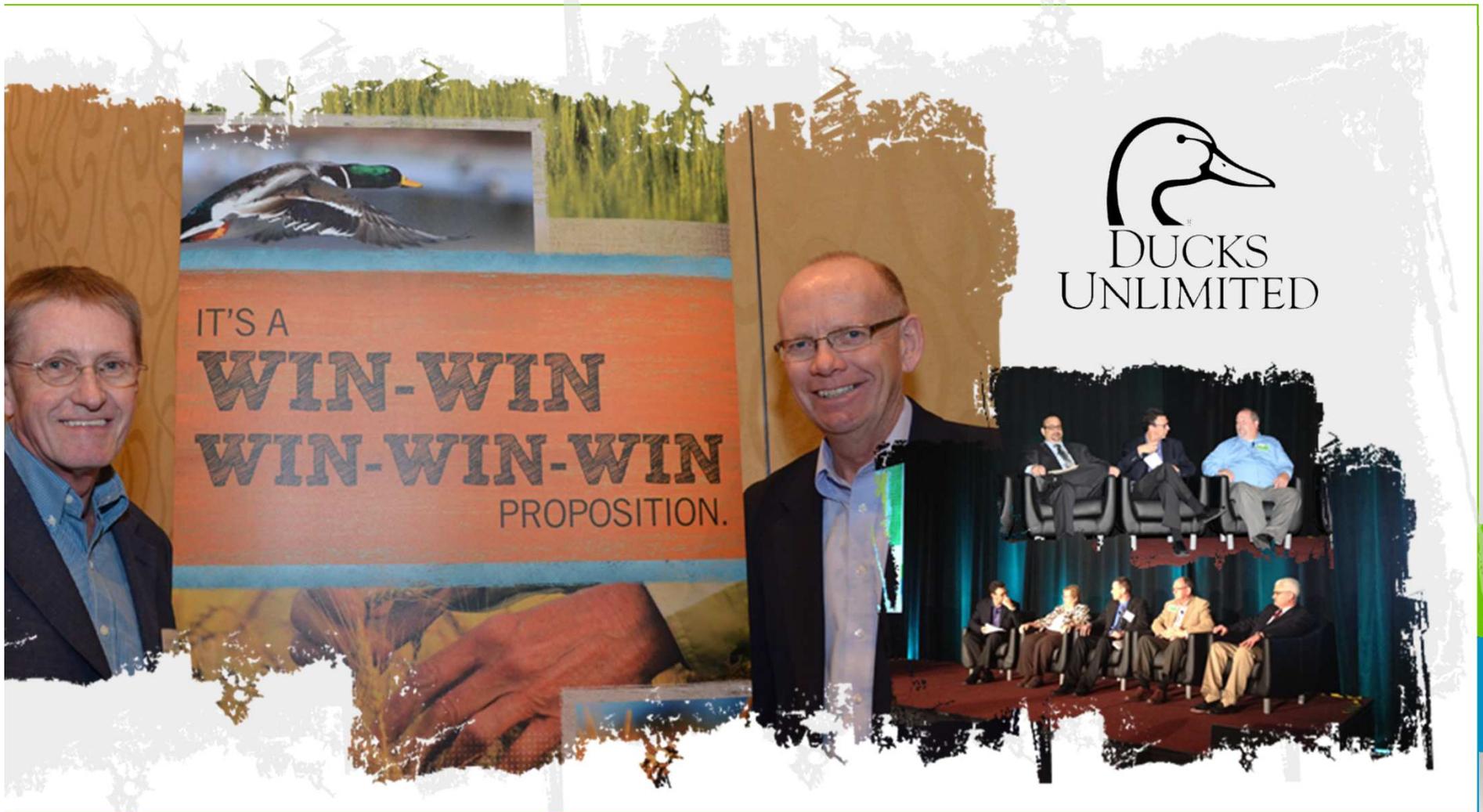


# Evolving The Way We Think of "Agribusiness"





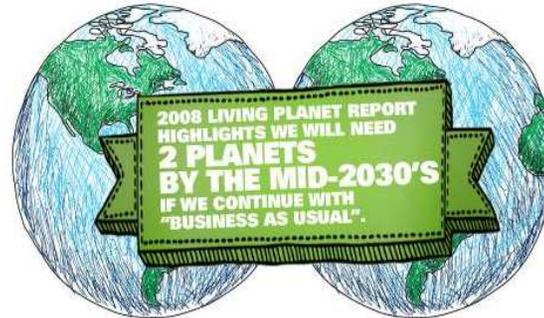
# Engaging with Others



# Technology and the Productivity Gap



**TECHNOLOGY  
ENABLES  
SUSTAINABILITY**



*“we have never needed progress in science more than we need it right now.... never ...and we have never been in a position to deploy it in the way that we can today. We are on the verge of amazing, amazing events in many fields”*

Michael Spector, TED 2010  
<http://www.youtube.com/watch?v=7OMLSs8t1ng>





# Ramping Up Innovation Needed

The UN Food Agency notes that investment in R&D is "the most productive way to support agriculture." Despite such evidence, the crop protection industry overall is seeing a decline of active ingredients in development.

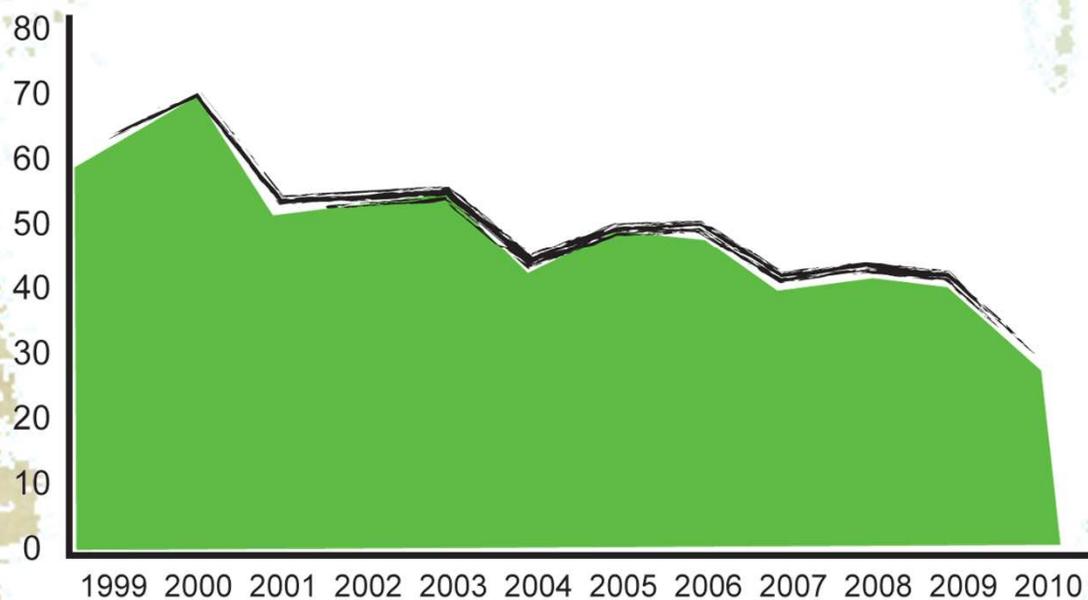




# Decline in AI Development

## Agrochemical Active Ingredients in Development

a.i.s in development



© Phillips McDougall



# Need for Substantial Investments

The Crop Protection industry makes a significant investment in R&D

In the past 50 years, food production has doubled, while the total # of cultivated farmland has not changed.

Yearly Investment in R&D  
**\$3.7B\***

Average R&D costs for 1 CP Product to reach the market  
**\$256M**

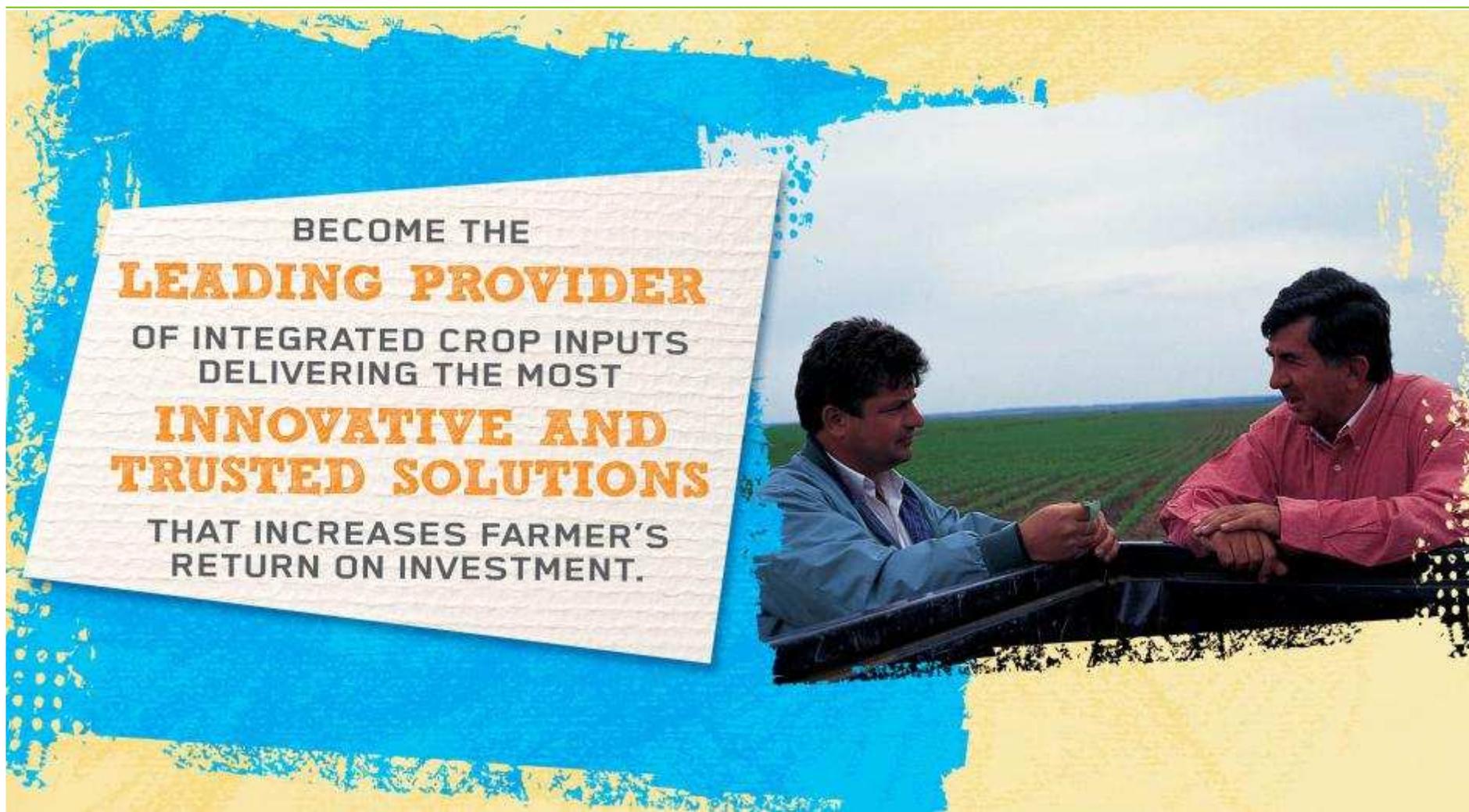
Timeframe for 1 product to reach the market  
**~ 10 YEARS**

Average R&D costs for seeds and traits to reach the market  
**\$136M**

\*CLA Study



# Our U.S. Strategic Intent



# Integrating Solutions for Individual Customer Needs



Depending on specific market conditions, individual solutions for **customer needs** can be made available through different technology platforms



**Synthetic Chemistry**



**Biologics**



**Seeds & Traits**



# Integrating approaches to get the best out of crops

## Chemical Crop Protection

- Herbicides
- Fungicides
- Insecticides
- Safener
- Seed treatments

## Seeds & Traits

- Herbicide tolerant traits
- Insect resistant traits
- Yield optimization traits
- Photosynthetic efficiency traits
- Drought resistance traits
- ...

## New Science Areas

- Biologics
- Plant health
- Resistance inducers
- Synergists/enhancers
- Signal cascade moderating compounds
- Soil enhancing effects

## Supporting Emerging Technologies

- Molecular breeding
- Computational biology
- Diagnostic tools
- Proteomics
- Epigenetics
- Quantitative metabolomics
- Synthetic biology





# Top 5 Reasons

Investing  
\$1.1 bio  
in **R&D**

Increased  
focus on  
services

Boots  
on the  
ground

Outstanding  
products  
today and  
tomorrow

\$78 million+  
recently  
invested in  
RTP U.S.  
infrastructure



# Agriculture Is Promising ... for All of Us

And our opportunity is NOW!

- World is changing like never before
- Global challenges are U.S. opportunities
- Need for food security is growing as population grows
- Industry opportunity to embrace & engage in evolution of this new ag



*"You may never know what results come of your action, but if you do nothing there will be no result"*

Mahatma Gandhi

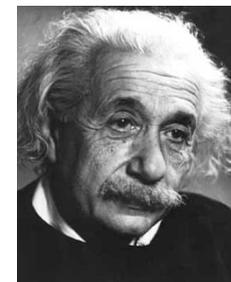


**Bayer is working on solutions that can contribute to solving global problems**

**We can fuel our growth while minimizing any negative impacts of doing business**

*"The significant problems we face cannot be solved at the same level of thinking we were at when we created them"*

Albert Einstein, 1946



An aerial photograph of a cornfield with rows of crops. A large green rectangular box is overlaid in the center, containing the text "THANK YOU!". To the right of the field, there is a color-coded map overlay showing different soil or crop zones in blue, orange, and yellow.

**THANK YOU!**