Agricultural Biotechnology Background

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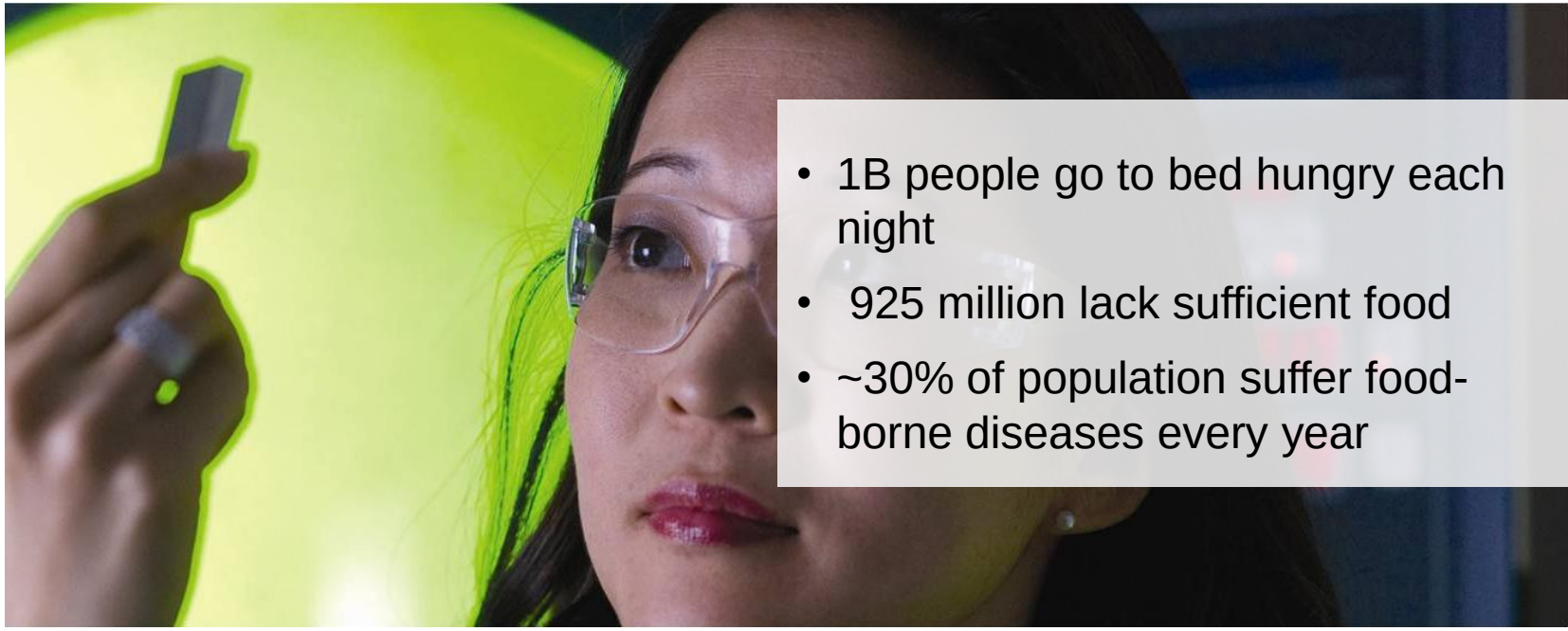
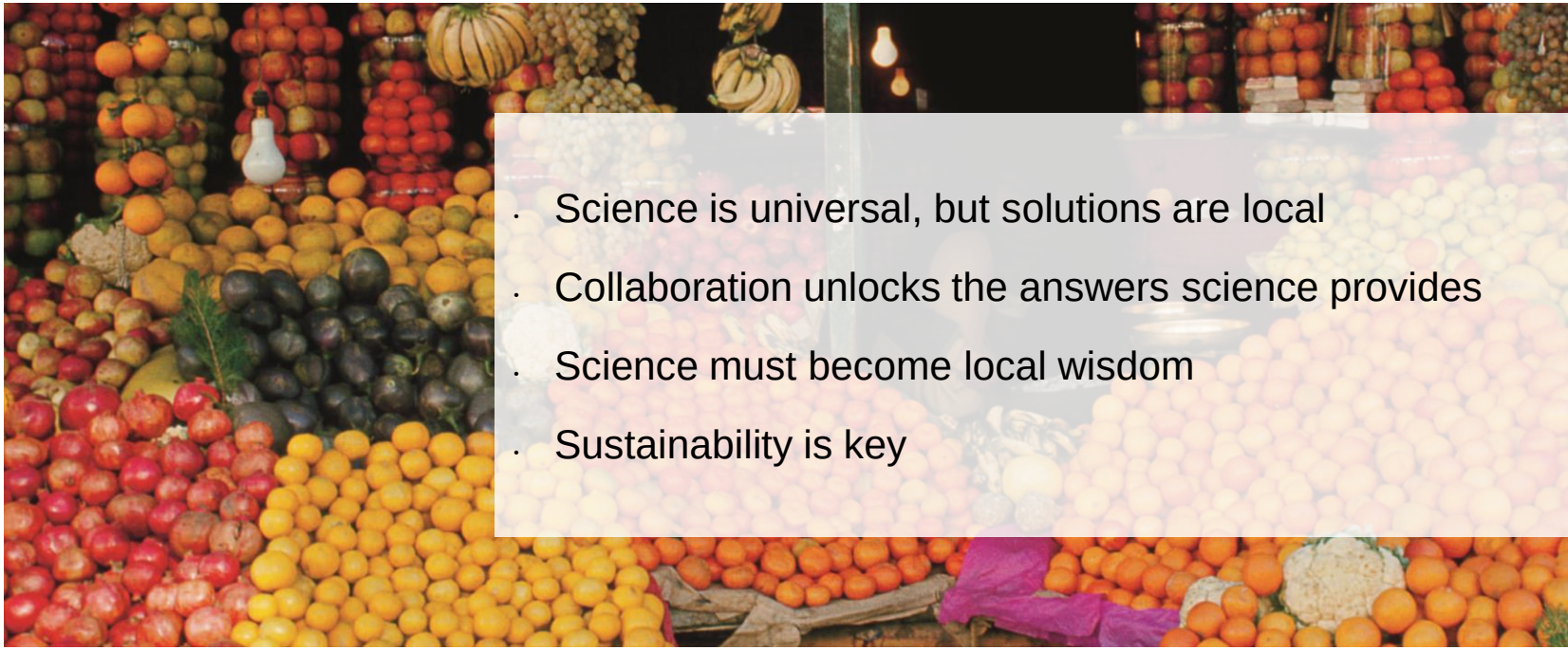
Food security and safety



- 1B people go to bed hungry each night
- 925 million lack sufficient food
- ~30% of population suffer food-borne diseases every year

There is a science to feeding the world



- Science is universal, but solutions are local
- Collaboration unlocks the answers science provides
- Science must become local wisdom
- Sustainability is key

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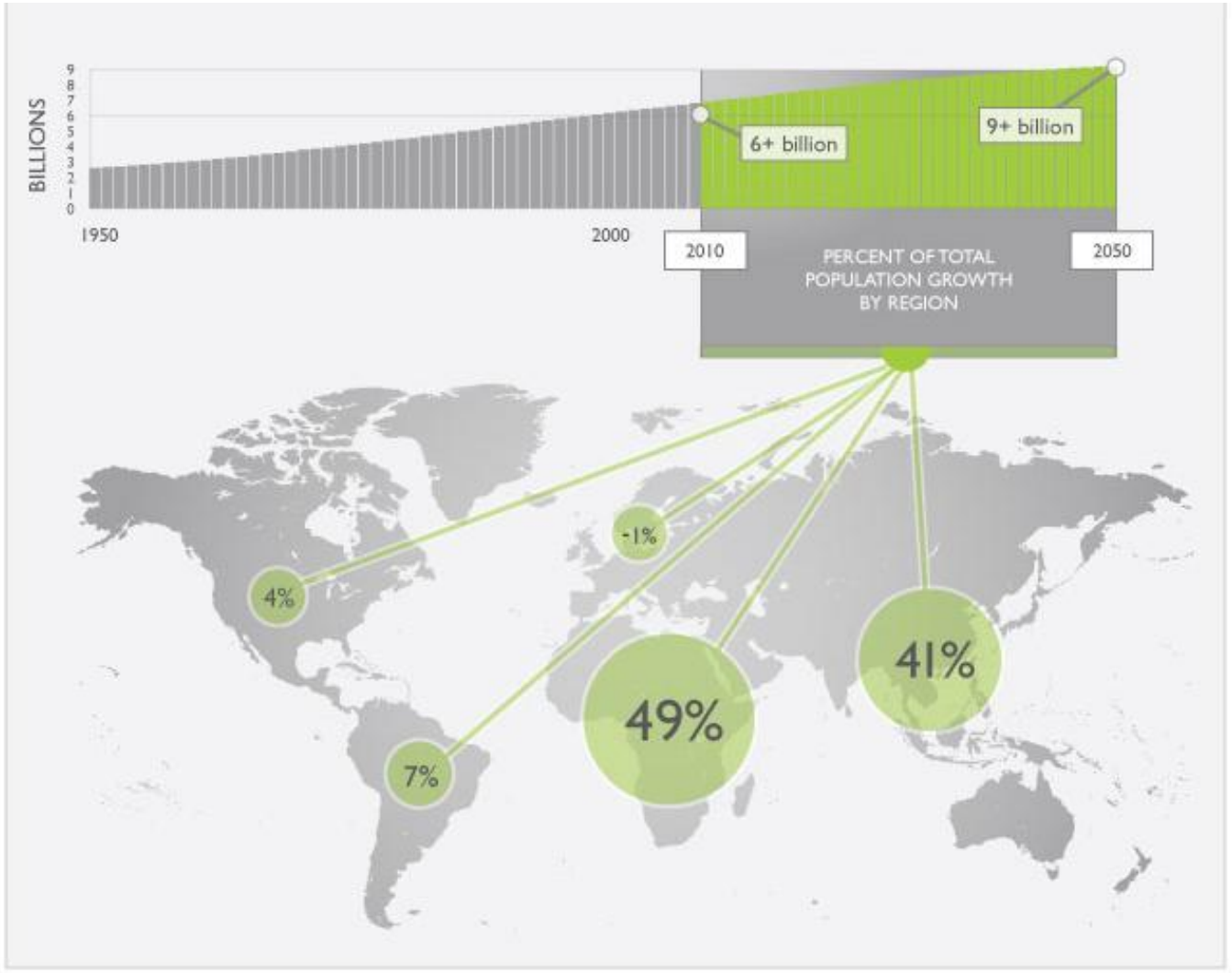
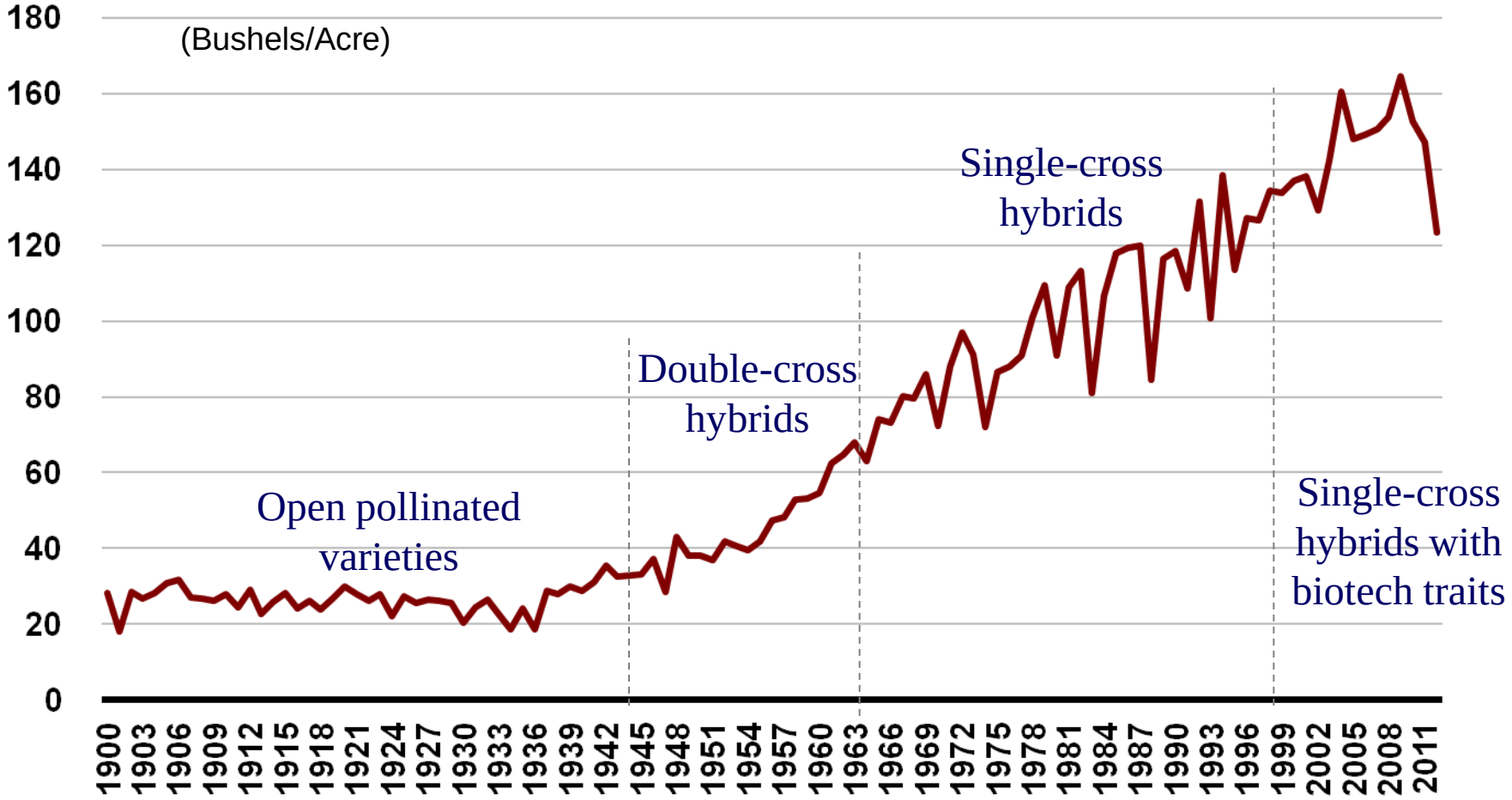
Global Population Growth and Percent of Growth by Region 2010-2050



Source: United Nations

Global Harvest Initiative, 2011 GAP Report

US CORN YIELD (1900-2012)



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Source: USDA

- ***The SCIENCE of improving yield, quality, and stability***

Teosinte

Modern maize

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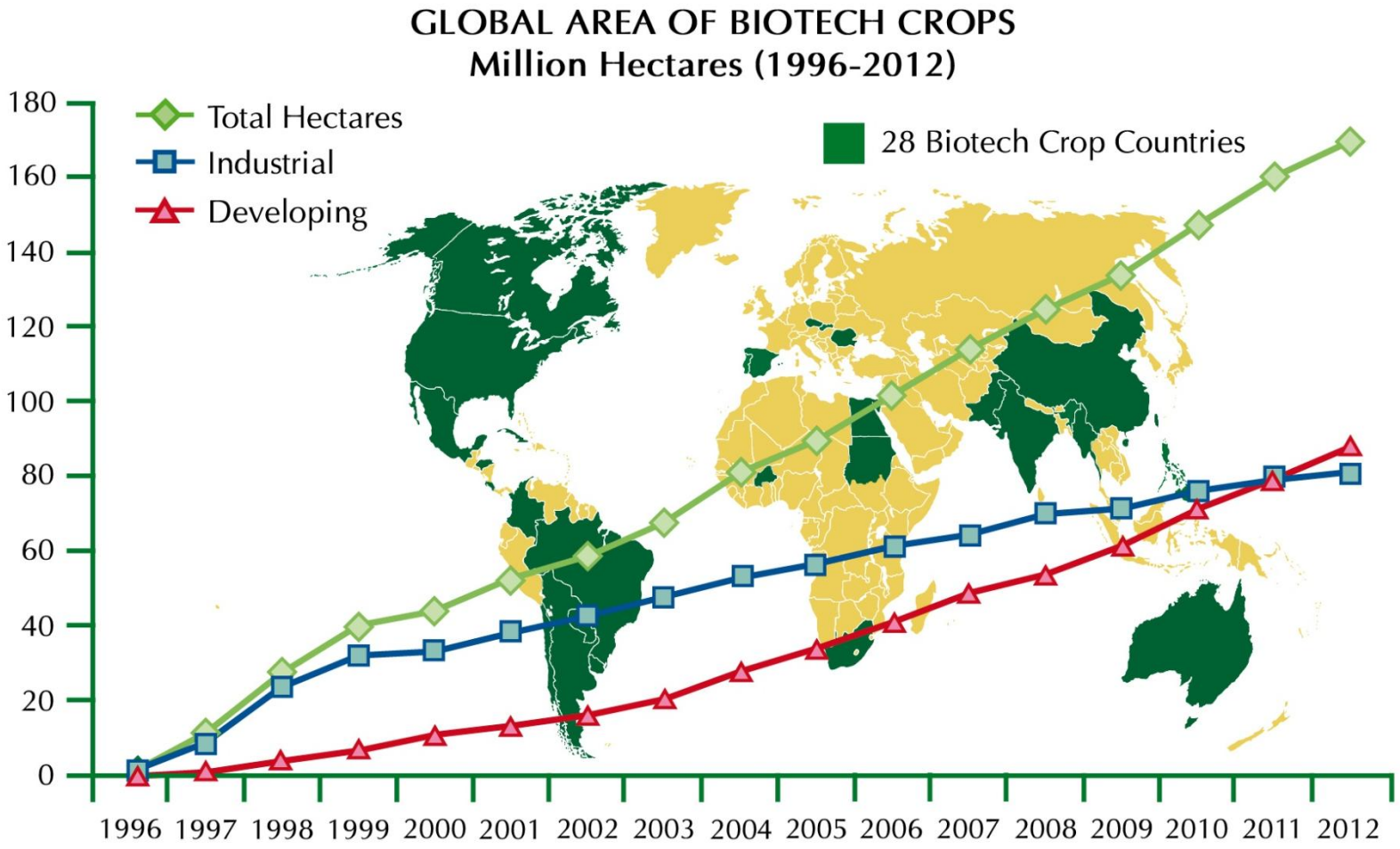
Biotech Landscape: Global Adoption



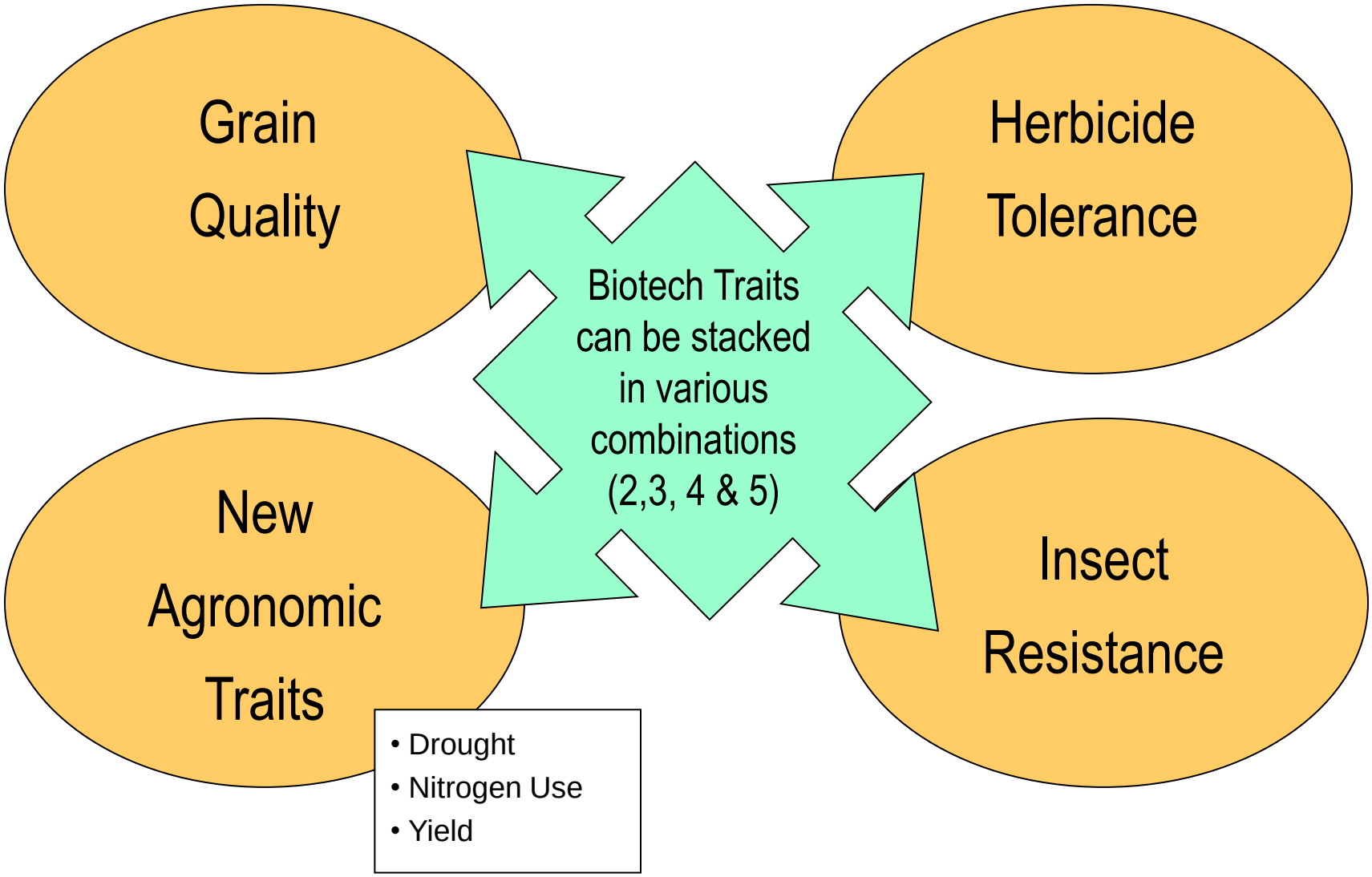
Source: James, Clive. 2013. *ISAAA Brief* : Ithaca, NY

Insect Control Biotech Corn Event

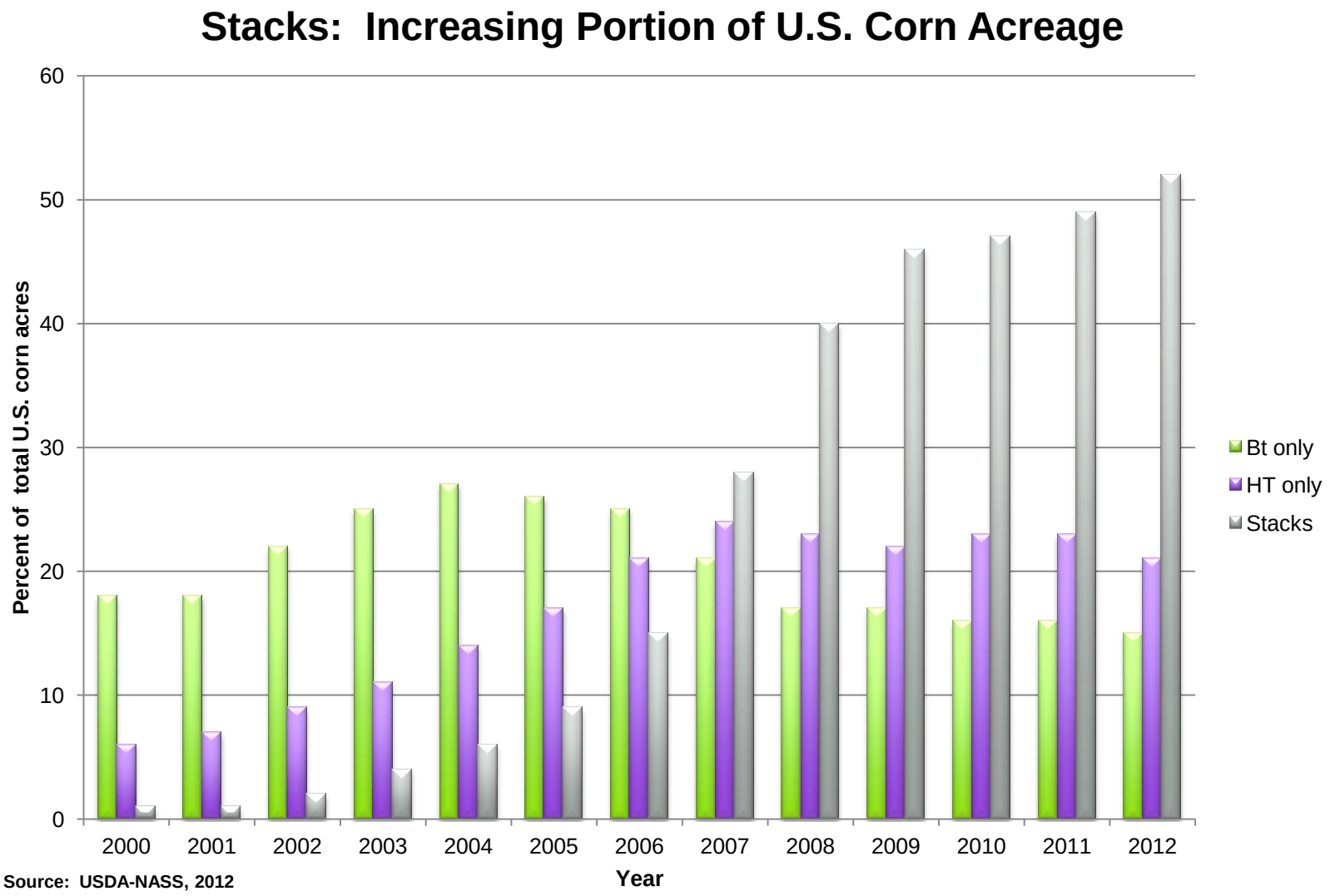
Biotech: maize roots protected from corn rootworms by Cry 34/35

Not biotech: roots eaten by corn rootworms

Breeding Stacks



Breeding Stacks: Significant Increase



Source: USDA-NASS, 2012

Source: USDA

Regulation of Breeding Stacks

Varies by Country

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Breeding Stacks

Because of increased grower demand and increased use globally, breeding stacks may become a burden for regulatory systems globally and asynchronous approvals may become a barrier to trade.

- Science-based regulations
- Safety assessments of individual events apply to the stacked event
- Scientific knowledge about the events is used as a basis for the potential for traits to interact
- Harmonization of regulations globally

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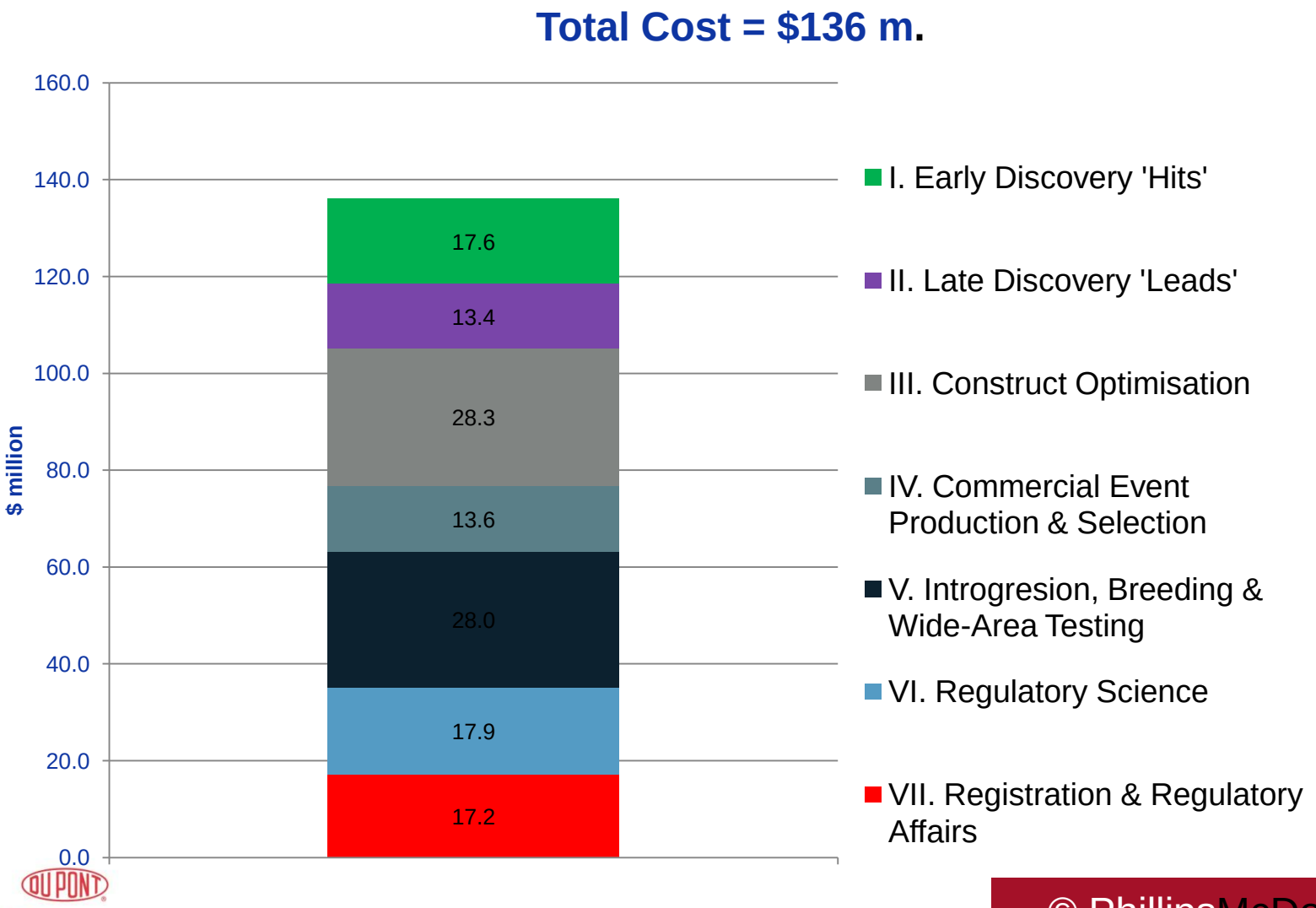
Costs associated with new biotech trait R&D



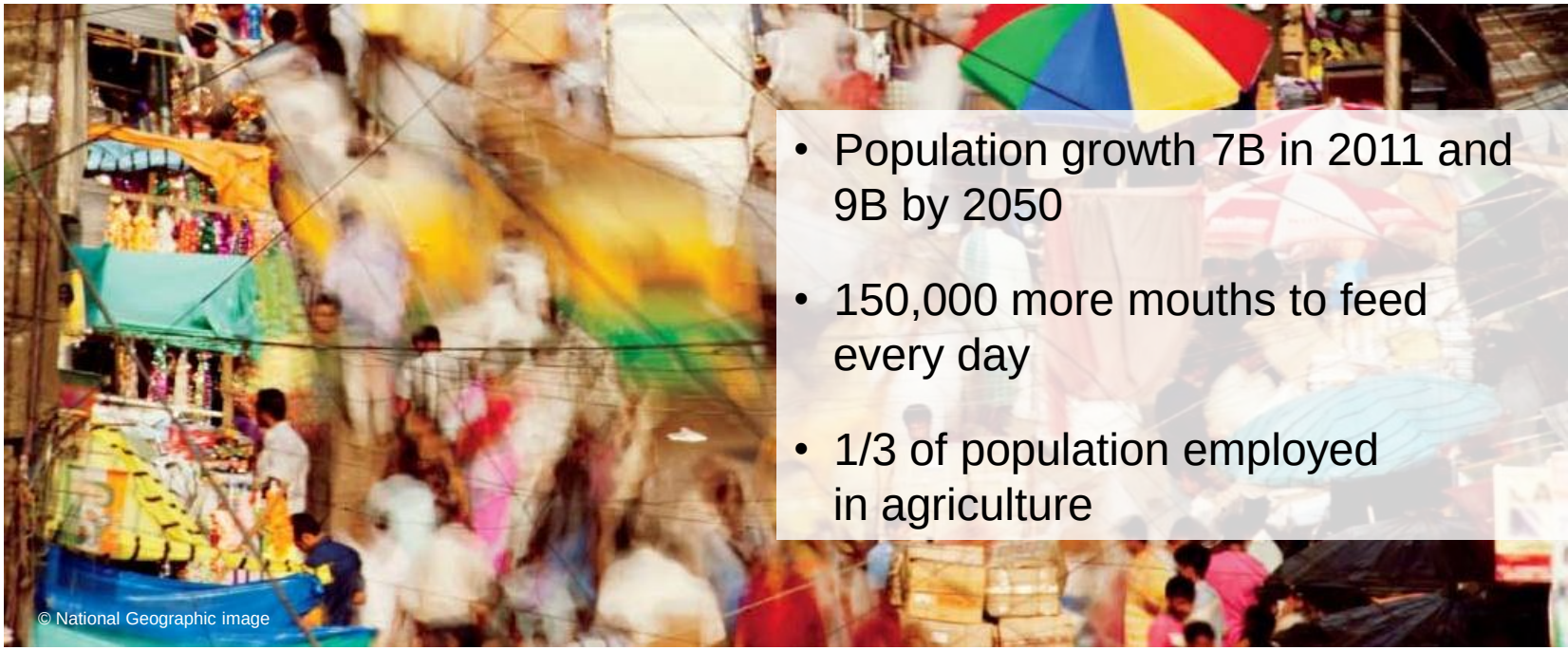
Source: Crop Life International

Key points from survey of leading companies

- Average cost of discovery, development and registration of a new biotechnology derived crop trait introduced between 2008-2012 is $136 m.
- Discovery accounts for 22.8% and 23.0% of total cost and time involved respectively.
- Regulatory and registration accounts for 25.8% and 36.7% of total cost and time involved respectively.
- The trend in the number of genetic sequences being subjected to screening in order to develop one trait is increasing.
- The time from the initiation of a discovery to commercial launch is 13.1 years on average.
- The timeline trends indicate a shorter product discovery phase, but increasing time spent on regulatory approvals.

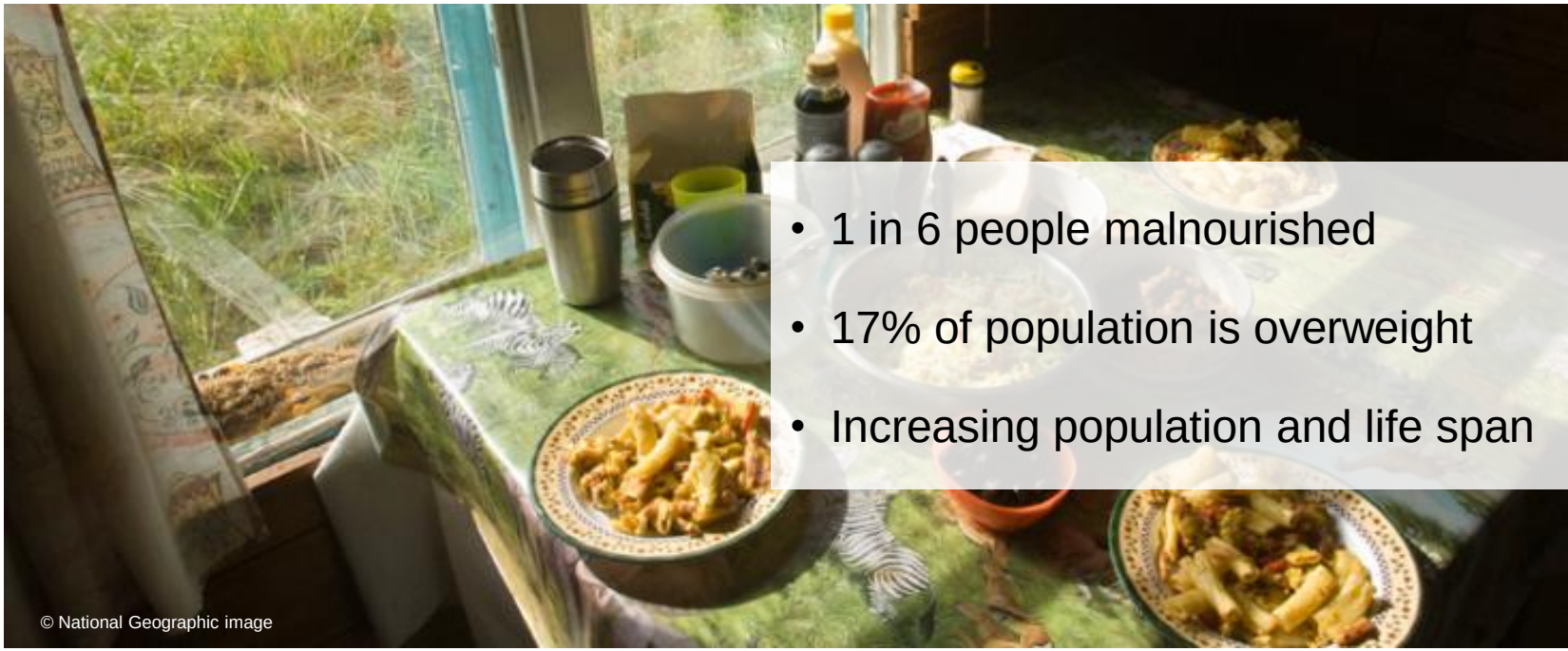
Source: Crop Life International

Higher food productivity



- Population growth 7B in 2011 and 9B by 2050
- 150,000 more mouths to feed every day
- 1/3 of population employed in agriculture

Healthier, more nutritious food



- 1 in 6 people malnourished
- 17% of population is overweight
- Increasing population and life span

Call to action

•We need all the technologies in the tool kit to address the challenge.

•Biotechnology is one essential tool to meet the productivity demand in a sustainable manner.

•Governments, NGOs and the private sector need to collaborate in a whole new way to meet the challenge.

•We all need to listen and be willing to engage in productive dialogue around complex issues.

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