

Current Status of Agricultural Biotechnology Adoption and Regulation in the Region

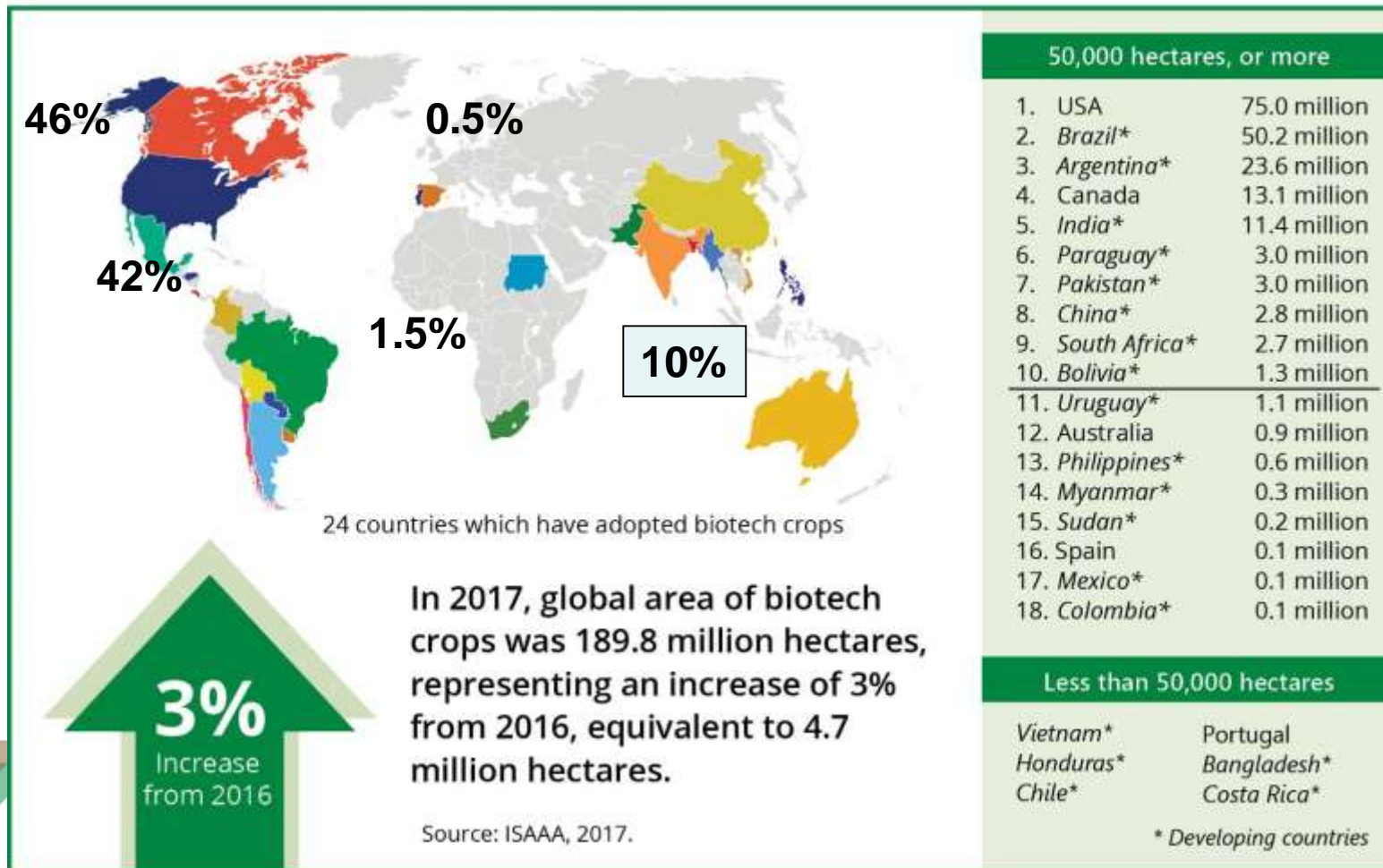
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Global Area of Biotech Crops, 2017: By Country (Million Hectares)



Region planted 19.1 million hectares, 3.3% increase compared to 2016

17 Countries/Regions Formally Adopting Biotech Crops in Asia-Pacific, 2017



9 Importing Countries/Regions:

Japan

Indonesia

Malaysia

New Zealand

Singapore

South Korea

Taiwan, China

Thailand

Turkey

Biotech Crop Adoption in Asia-Pacific, 2017

| Country | Hectares (+/-) | No. Farmers | Adoption Rate |
|----------------------------|----------------------|-------------|---------------|
| India (Cotton) | 11.4 M (+6%) | 7.5 M | 93% |
| Pakistan (Cotton) | 3 M (+3%) | 725,000 | 96% |
| China (Cotton, Papaya) | 2.8 M | >6 million | 95% |
| Australia (Canola, Cotton) | 924,000 (+8%) | (300) | 24%, 100% |
| Philippines (Maize) | 642,000 (-21%) | 470,500 | ~47% |
| Myanmar (Cotton) | 320,000 | 455,000 | 92% |
| Vietnam (Maize) | 45,000 (+29%) | 37,500 | 4% |
| Bangladesh (Eggplant) | 2,400 (+242%) | 27,000 | 5% |

9 Biotech Importing Countries/Regions in Asia-Pacific

| Countries | Imported Biotech Crops |
|------------------|--|
| Indonesia | Maize, soybeans, and sugarcane |
| Japan | Alfalfa, canola, carnation, cotton, maize, papaya, potato, rice, rose, soybeans, and sugar beets |
| Malaysia | Canola, carnation, cotton, maize, potato and soybeans |
| New Zealand | Alfalfa, canola, cotton, maize, potato, rice, sugar beet, and wheat |
| Singapore | Alfalfa, canola, cotton, maize, soybeans and sugar beet |
| South Korea | Alfalfa, canola, cotton, and maize, soybeans |
| Taiwan, China | Canola, cotton, maize, soybeans and sugar beets |
| Thailand | Maize and soybeans |
| Turkey | Maize and soybeans |



Increase in Biotech Crop Adoption

Savings on insecticide application and labor cost for IR technology realized (India, Pakistan, Vietnam, Bangladesh)

Clear and science-based regulatory guidelines (India, Pakistan, Myanmar)

Improved prices and demand for cotton and canola

Favorable weather conditions for planting

Overwhelming government support in Bangladesh



Menacing Counterfeit/Illegal Seeds

India

- 3.5 million packets for 800,000 hectares affected
- Breakdown of resistance to pink bollworm

Philippines

- reduced biotech crop maize adoption accounted from seed sales
- 10% of market share was occupied by counterfeit seeds

Negative Impact

- Threatens effectivity and longevity of the technology
- Dangerously cheats farmers for costly and unprofitable seeds
- Loss of farmer's trust to the technology



Biotech Crops in the Pipeline

| Country | Biotech Crops in the Pipeline |
|-------------|---|
| India | High yielding mustard, eggplant, soybeans, cotton, maize, pigeon pea, chickpea |
| Pakistan | IR/HT cotton, IR/HT maize |
| China | Bt/phytase maize, Bt rice, IR/HT cotton |
| Australia | High Yielding and Stress tolerant wheat and barley, virus resistant potato, safflower with high oleic acid, and Fusarium-wilt resistant and Beta carotene-enriched banana |
| Philippines | Bt eggplant, Golden Rice, Delayed ripening and PRSV-R papaya, Bt cotton |
| Myanmar | New Biotech cotton varieties |
| Vietnam | New IR/HT maize varieties |
| Bangladesh | New Bt eggplant varieties, Golden Rice, late blight resistant potato, Bt cotton |

Economic Benefits of Biotech Crops, (US\$ Million)

Source: Brookes and Barfoot, 2018 Forthcoming

| Country | 2016 Alone | Start date to 2016 |
|--------------------|------------|--------------------|
| India (2002) | 1,523 | 21,122 |
| Pakistan (2010) | 483 | 4,794 |
| China (1997) | 990 | 19,645 |
| Australia (1996) | 133 | 1,157 |
| Philippines (2003) | 82 | 724 |
| Myanmar (2006) | 50 | 358 |
| Vietnam (2014) | 5 | 5.4 |

Bangladesh
(2014)

US\$1,868 per hectare

Abdullah et al, 2018

These are enormous benefits that can only be derived from biotech crops, and non-adoption in these countries can result in huge opportunity cost that will escalate poverty, malnutrition and political instability



Biotech crops contribute to economic stability

India (Bt cotton) - no. 1 world cotton producer, saved losses caused by American bollworm and boosted cotton yield to 500 kg lint per ha

Pakistan (Bt cotton) – produced 14 million bales in 2017, targets up to 4.2 million hectares to produce 22 million bales, reduce cotton importation

China (Bt cotton) – good harvest since 2015 stabilized cotton prices and made the country self sufficient in cotton

Australia – Bt cotton reduced land usage by 33% since 10 years ago and achieved 40% increase in water productivity since 2003

- the profitability of biotech canola attracted more farmers to plant in 2017



Biotech crops contribute to economic stability

Philippines – Biotech maize made the country self sufficient in feed maize reducing importation, with potential for export

Myanmar- Bt cotton commercialization increased textile and apparel export which achieved US\$2.2 billion in 2017

Vietnam – continued Bt maize cultivation could decrease imports for food and feed currently at 9.5 million tons

Bangladesh – Bt eggplant reduced hazardous exposure to insecticides and obtained clean and high eggplant yield



Countries that have enforced National Biosafety Regulations

Enabling regulatory framework and strong government support and political will:
Australia, Bangladesh, Myanmar, Pakistan

High rankers with one crop biotech crop adopted, biosafety framework negatively influenced by political will India, China, Philippines, Vietnam

Countries that have enforced National Biosafety Regulations

- Have a strong biosafety regulations and gearing up to commercialize again: Indonesia, Iran
- Have strong biosafety regulations but have never planted and high importation Republic of Korea, Japan, New Zealand, Malaysia
- Started to be one of the leaders in Asia but negatively influenced by critics: Thailand

Investments in National Biosafety Regulations

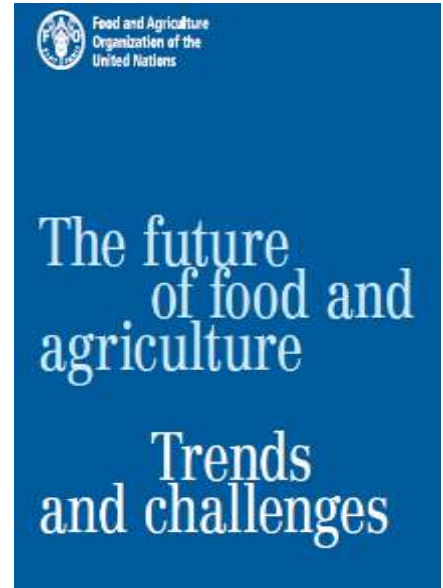
- Technology in conjunction with conducive policies can double food production
- Regulation should be science/evidence based, fit for purpose, and harmonized globally

Countries that have Biosafety Regulations at various stages of development:

Bhutan, Cambodia, Sri Lanka, Laos Republic and Nepal

Challenges in Asia:

- 60% of world's population reside in Asia
- 87% of the world's small holders are in Asia
- 1/3 of its land area is arable and lack fresh water resources
- Fast-growing population demanding quality for food grown sustainably



Biotechnology continues to be important to meet the 50% increase in food demand by 2050!



BRIEF 53

EXECUTIVE SUMMARY

Global Status of Commercialized Biotech/GM Crops in 2017:

Biotech Crop Adoption Surges as Economic Benefits Accumulate in 22 Years



Up to 17 million farmers in 24 countries planted 189.8 million hectares (469 million acres) in 2017, an increase of 3% or 4.7 million hectares (11.6 million acres) from 2016.

No. 53 – 2017

Thank you

