

GM detection in Africa: Needs and challenges

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GMO Testing Facility

UNIVERSITY OF THE FREE STATE • UNIVERSITEIT VAN DIE VRYSTAAT • YUNIVESITHI YA FREISTATA

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Global Status of GM Crops and Commodity Flow

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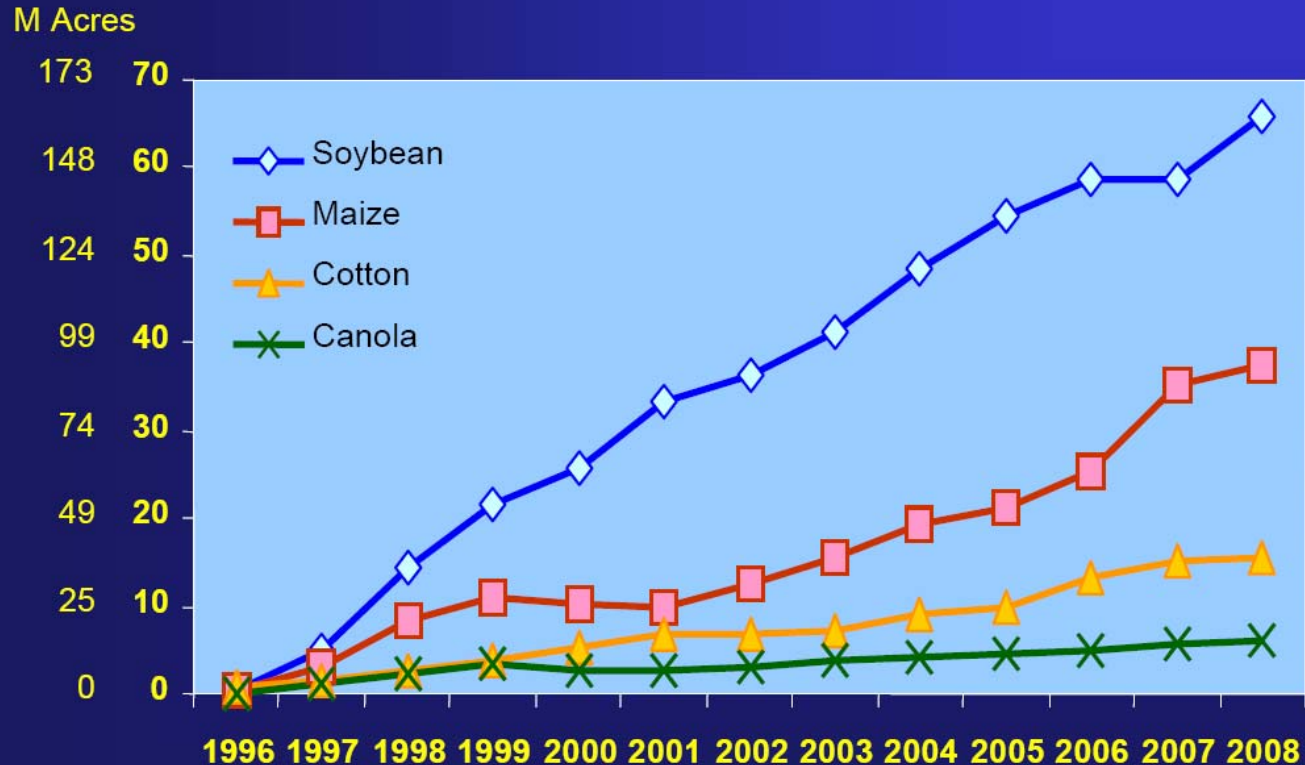
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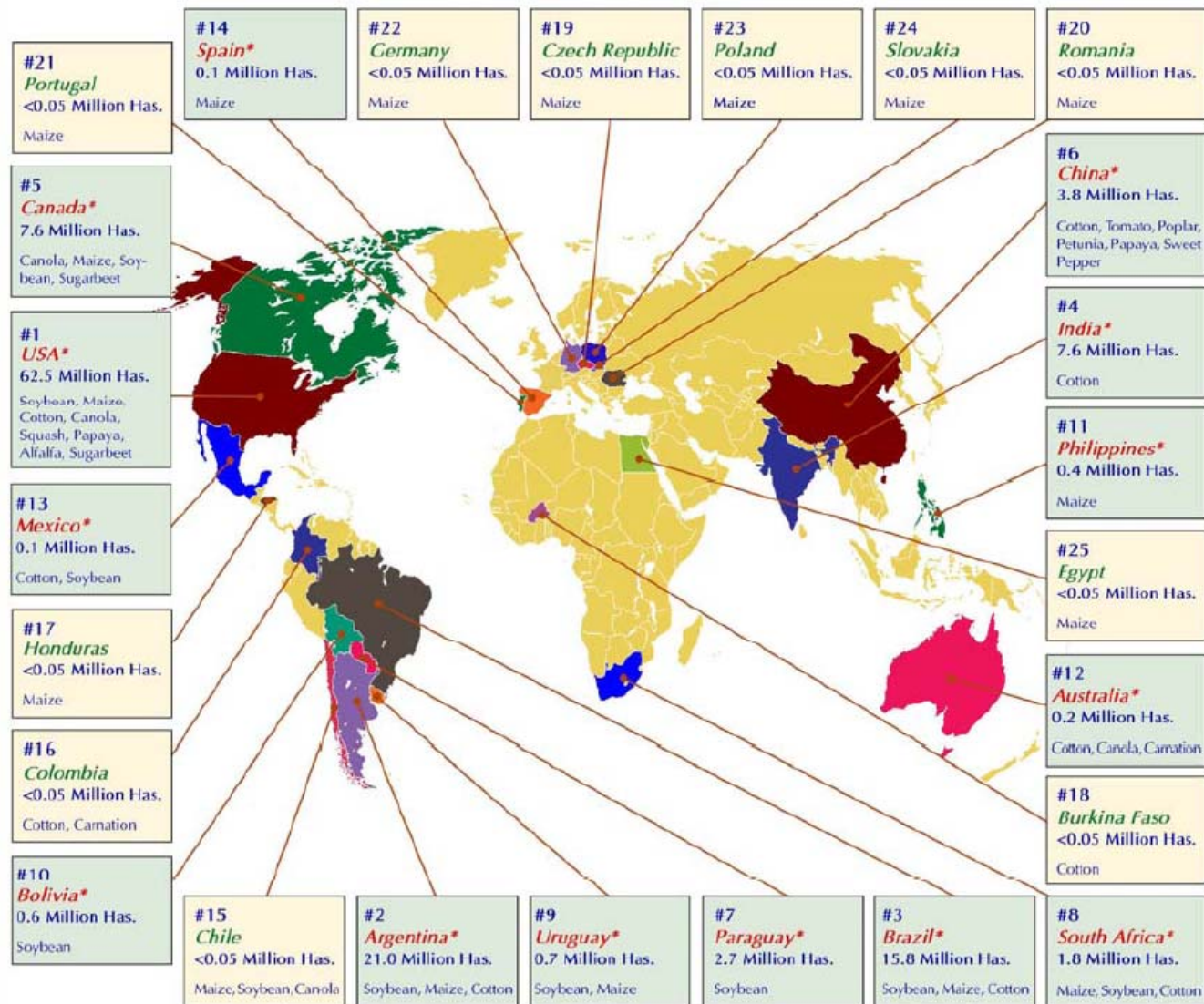
World Production of GM Crops

Global Area of Biotech Crops, 1996 to 2008: By Crop (Million Hectares, Million Acres)



Source: Clive James, 2009





* 14 biotech mega-countries growing 50,000 hectares, or more, of biotech crops.

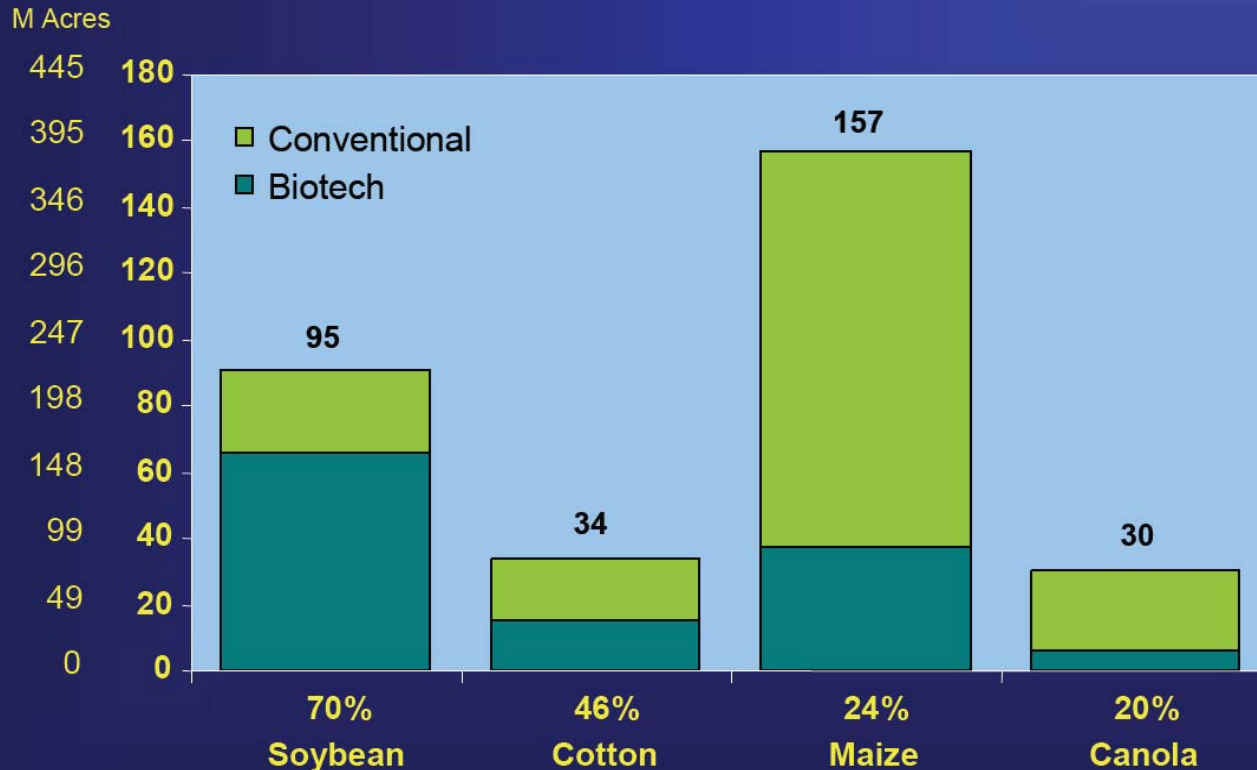
World Distribution of GM Crops

Distribution by Country	million Ha
USA	62.5
Argentina	21.0
Brazil	15.8
Canada	7.6
India	7.6
China	3.8
Paraguay	2.7
South Africa	1.8



GM Crop Type

Global Adoption Rates (%) for Principal Biotech Crops (Million Hectares, Million Acres), 2008



Current GM Traits

- **GM Traits (1st Generation GMOs)**

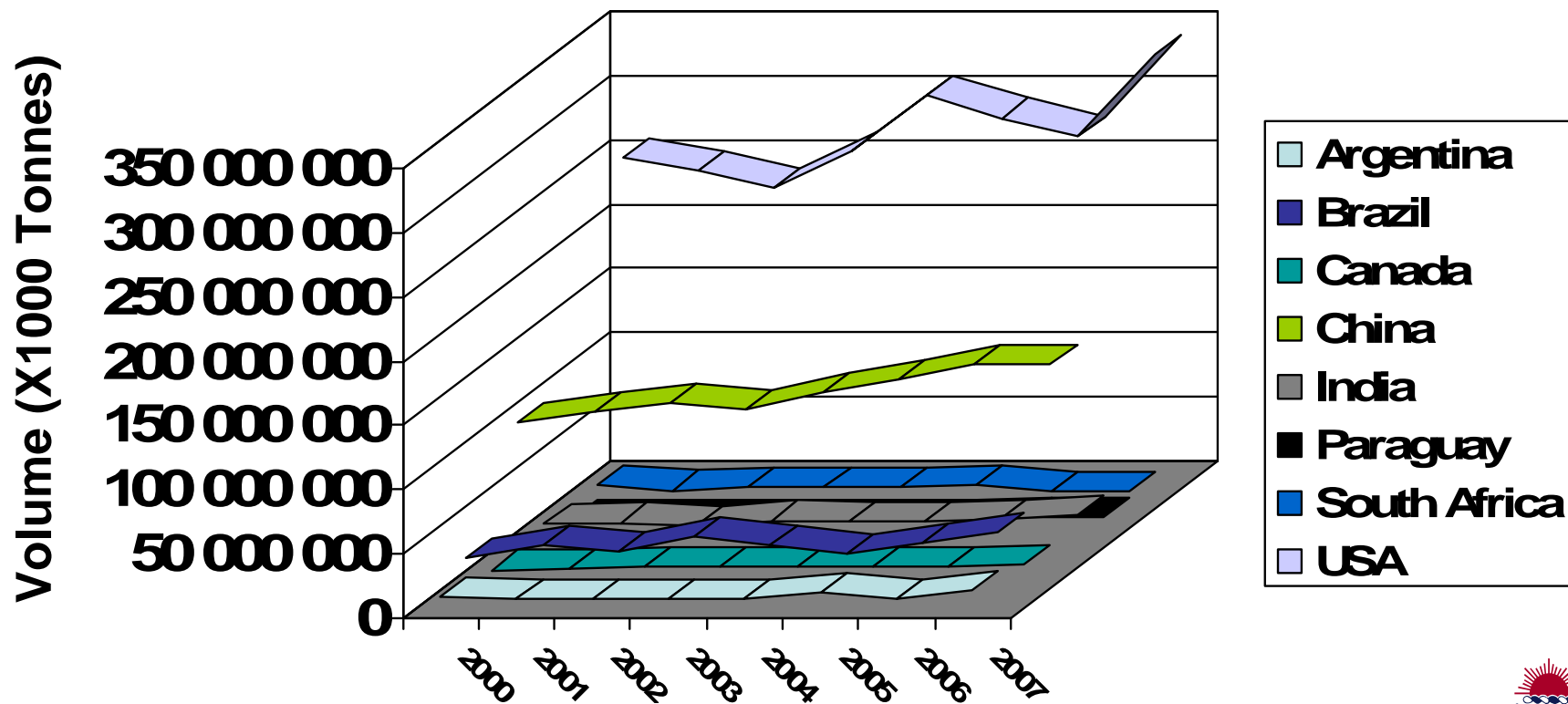
- Herbicide Tolerance (HT)
- Insect Resistance (IR)
- Stacked Genes (HT and IR)

- **Pipeline Traits**

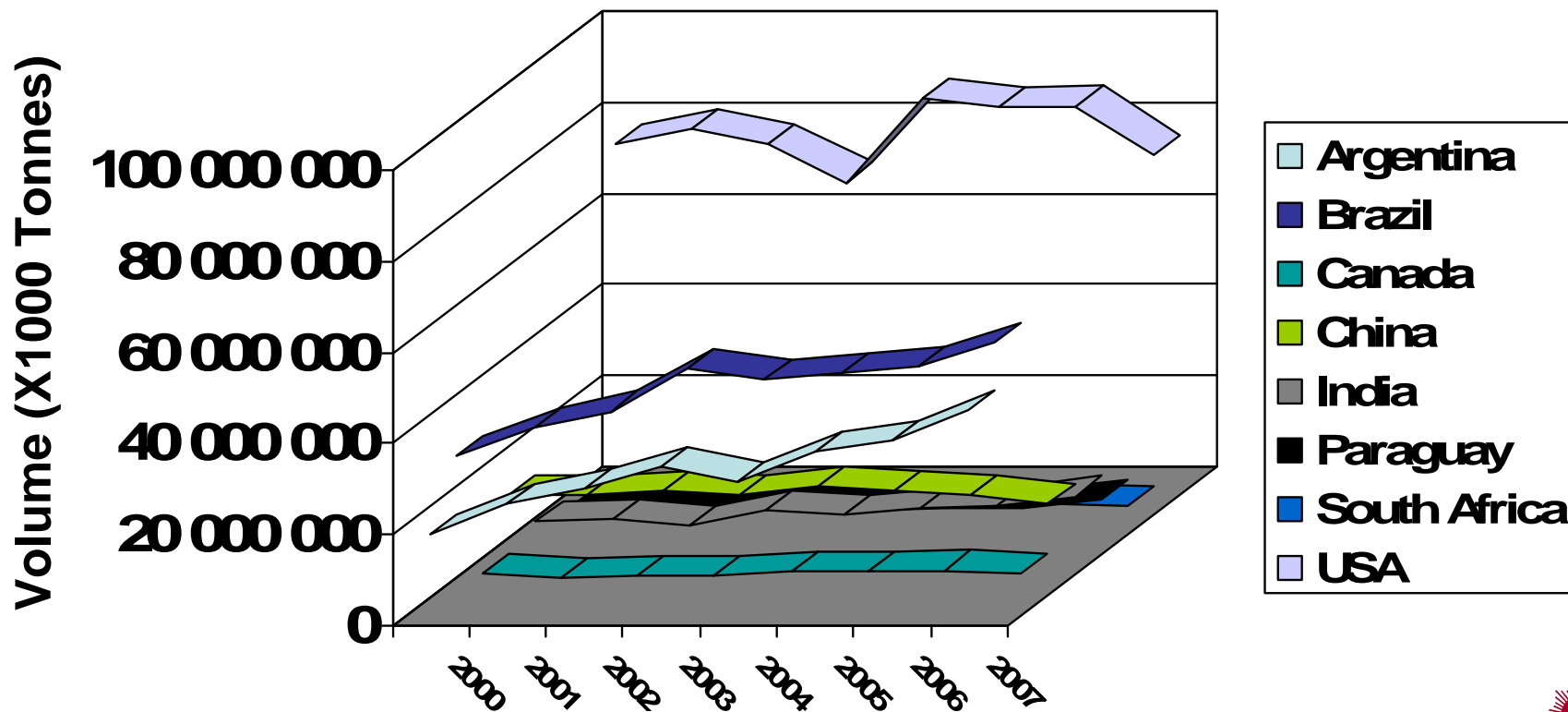
- Enhanced Nutrition (2nd Generation GMOs)
- “Pharming” (3rd Generation GMOs)



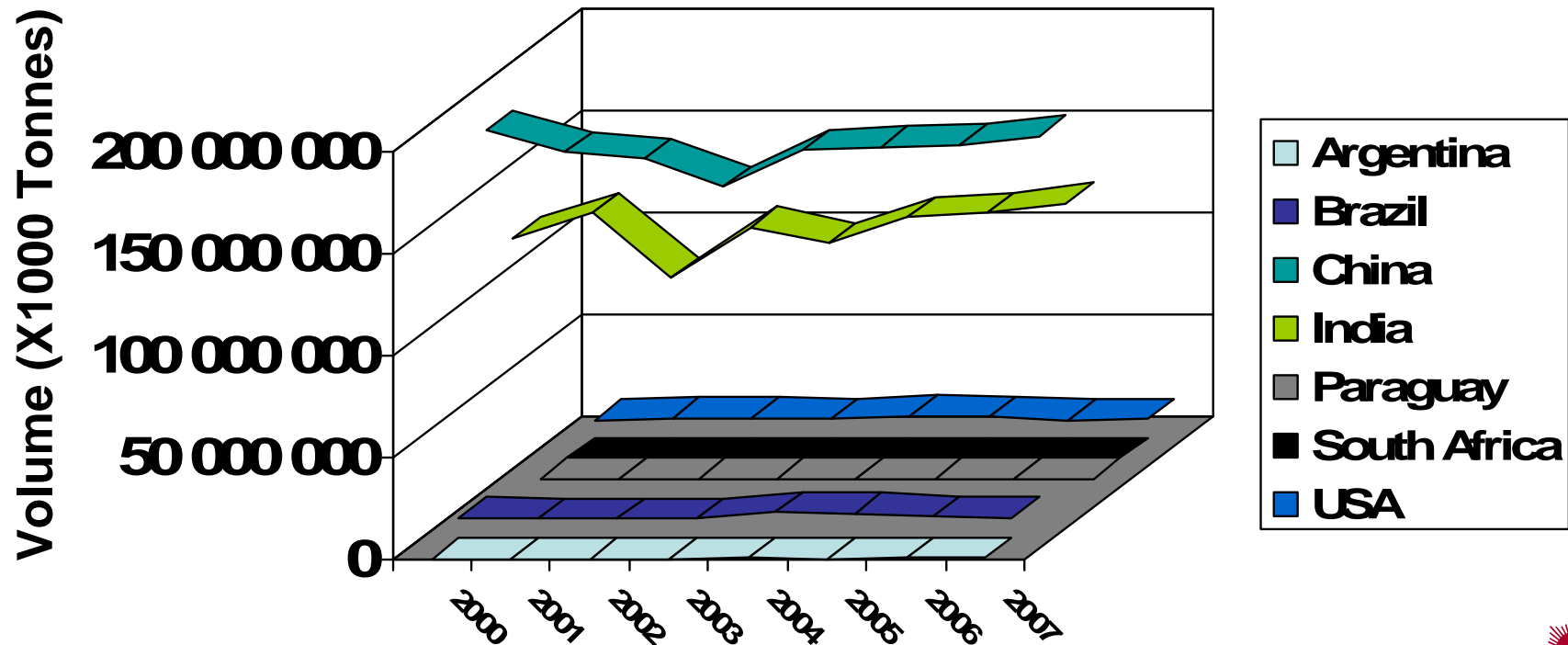
Maize Production by 'GM' Producing Countries



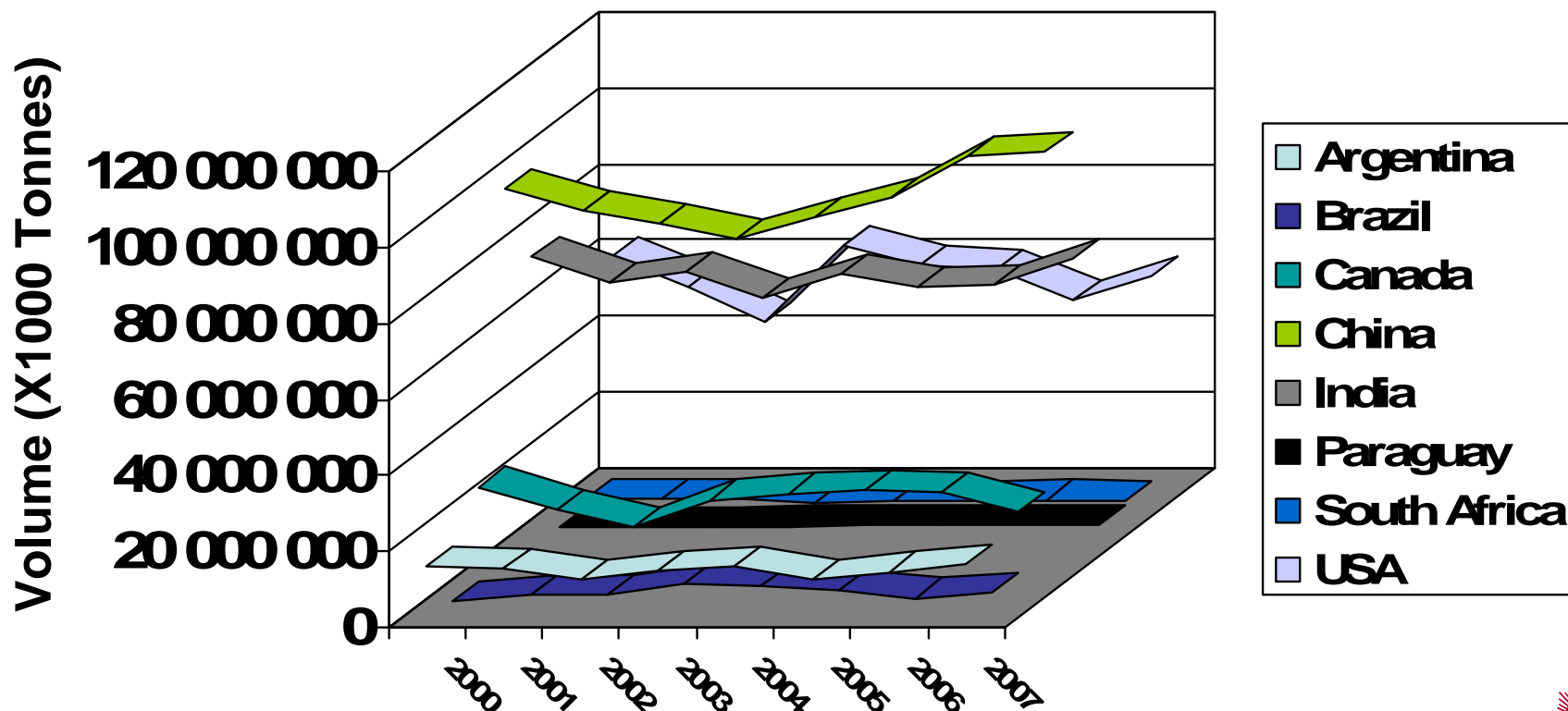
Soybean Production by 'GM' Producing Countries



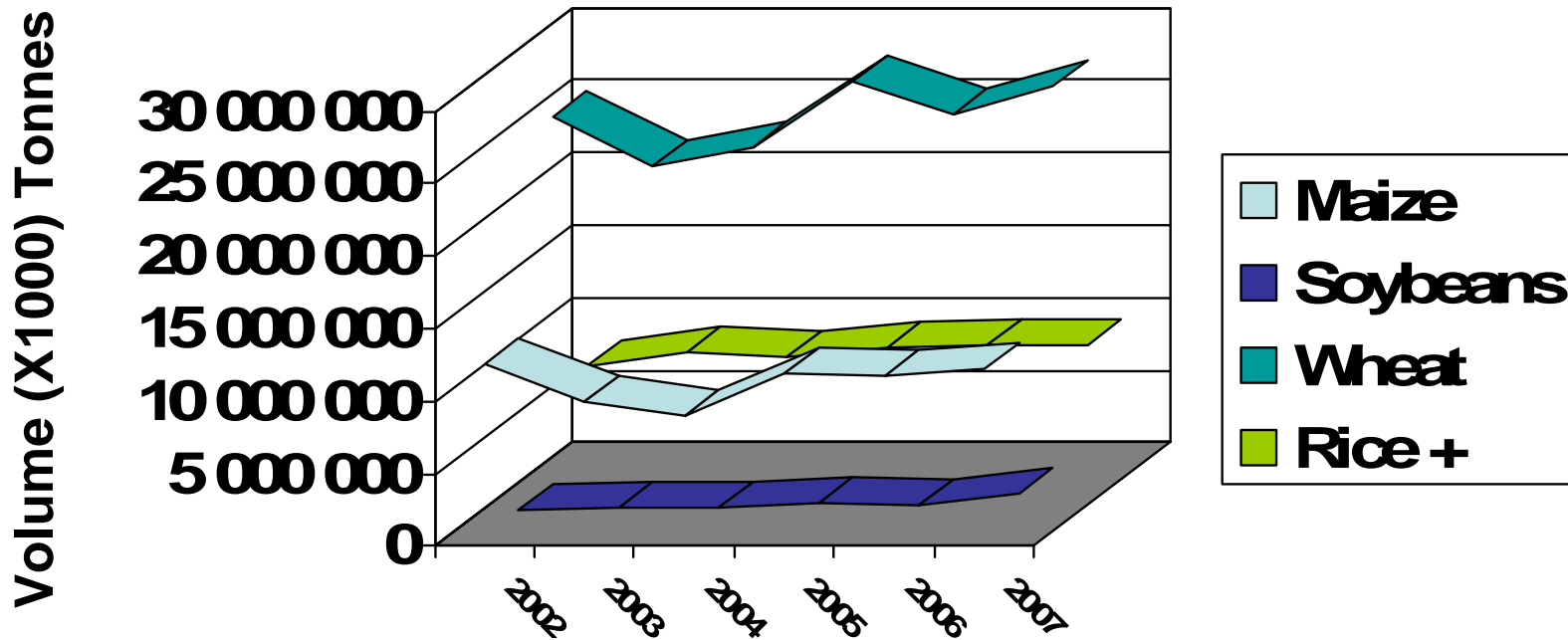
Rice Production by 'GM' Producing Countries



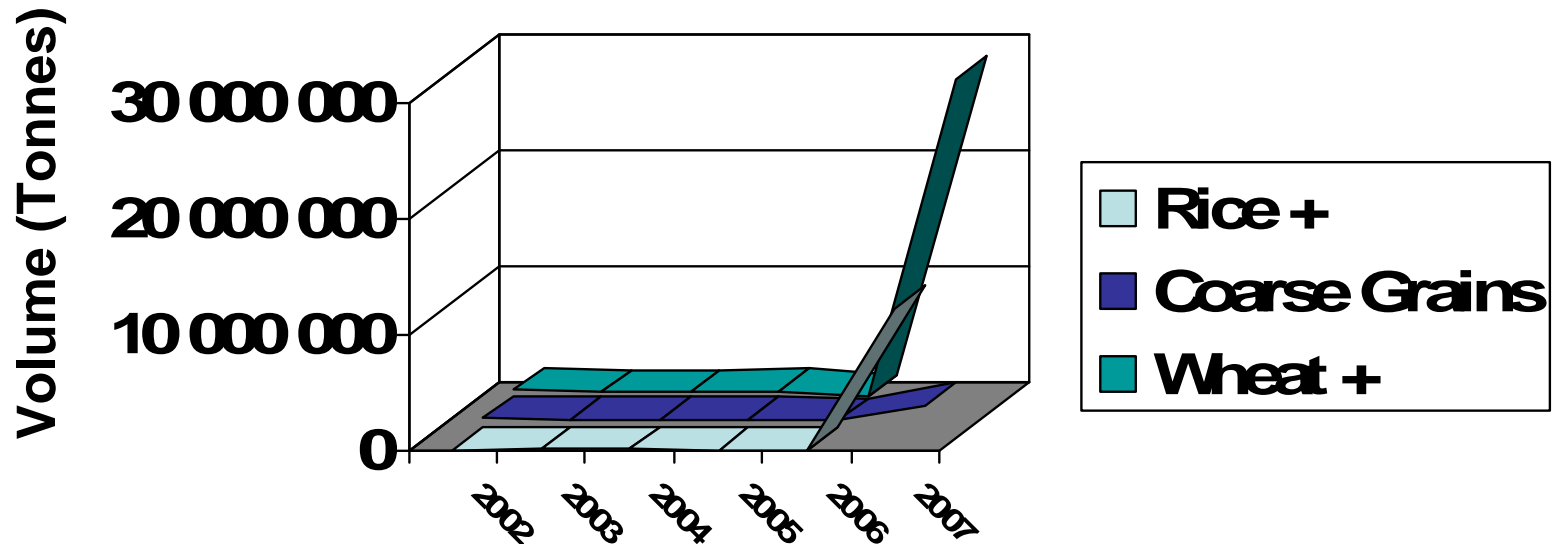
Wheat Production by 'GM' Producing Countries



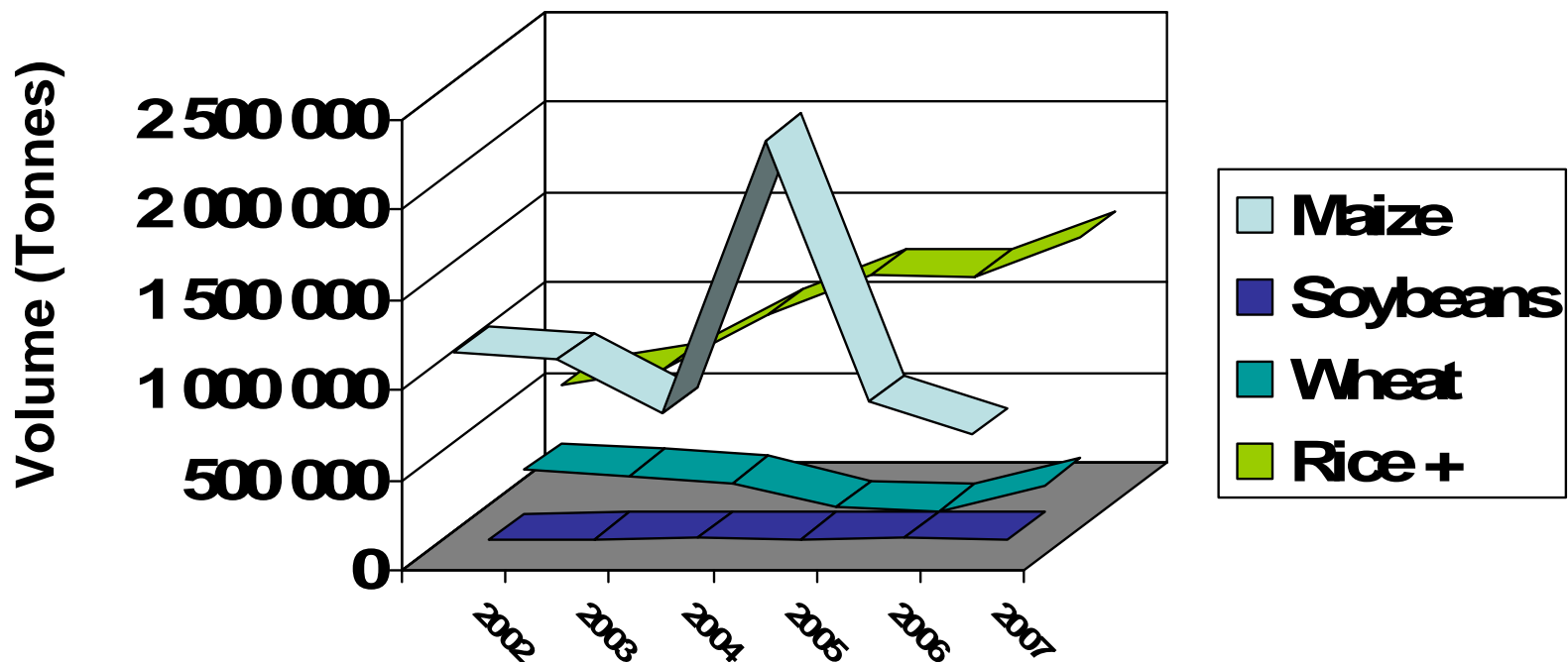
African Commodity Imports



Food Aid to Africa from the USA



African Commodity Exports



Commodity Flow Into Africa

- **Countries in Africa Import considerable Amounts of Bulk Commodities**
- **GMO Producing Countries are Under the Biggest Exporters of Bulk Commodities**
- **African Countries Importing Bulk Commodities will be Exposed to LMOs**



Why do we Need GMO Detection?

- **GMO Producers**

- Traceability to assure seed purity and segregation

- **Food & Feed Industry**

- To ensure compliance with national legislation
- Trade: Ensure compliance with legislation in the country of import

- **Competent Authorities**

- Compliance with legislation
- Compliance with International Agreements
- Monitoring



GM Detection is a Challenge



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Events Per Crop Type

Crop	Trait	Genes	Number of commercial events ^a	Producing countries ^b
Canola	Herbicide tolerance	EPSPS, PAT	8	Australia, Canada, USA
Cotton	Herbicide tolerance, Insect resistance	EPSPS, PAT, Cry1Ac, Cry2Ab, Cry1F, vip3A	16	Argentina, Australia, Brazil, Canada, China, India, Mexico, South Africa, USA
Maize	Insect resistance, Herbicide tolerance	Cry1Ab, Cry1AC, Cry1F, Cry3A, Cry3Bb1, Cry9C, Cry34Ab1, Cry35Ab1, EPSPS, PAT	41	Argentina, Brazil, Canada, Philippines, South Africa, Spain, Uruguay, USA
Soybean	Herbicide tolerance	EPSPS, PAT	6	Argentina, Bolivia, Brazil, Canada, Mexico, Paraguay, South Africa, Uruguay, USA
Other food crops	Trait	Genes	Number of commercial events ^a	Producing countries ^b
Papaya	Virus resistance	Viral coat protein	1	China, US
Squash	Virus resistance	Viral coat protein	2	US
Sugar beet	Herbicide tolerance	EPSPS, PAT	3	Canada, USA
Sweet pepper	Virus resistance	Viral coat protein	Unknown	China
Tomato	Delayed ripening	Unknown	Unknown	China

^a Only includes events that are commercially grown

^b Countries growing more than 50 00 ha or more

(www.Agbios.com)



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Basic Needs and Gaps for GM detection in Africa

- No technical support for GM detection in Africa
- No mechanism for cooperation between GM detection laboratories in Africa
- No guidelines for best practice / minimum criteria
- No mechanism to facilitate training
- No proficiency appraisal of laboratories
- No links with other Networks





SANGL

SOUTHERN AFRICAN NETWORK FOR GM DETECTION LABORATORIES



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SOUTHERN AFRICAN NETWORK FOR GM DETECTION LABORATORIES

- **Established in 2009 in Harare**
- **9 member countries in the SADC region**
- **Facilitation mechanism: RAEIN-Africa**
- **SANGL management**
 - **Coordinationor: Prof. Chris Viljoen**
 - **Co-coordinator: Dr. Dahlia Garwa**

- **The Regional Agricultural and Environment Initiatives Network**
- **Southern African network organization that promotes participatory development of appropriate science and technology and S&T policies for sustainable management of the environment and agricultural production systems**

Participating Countries

- Botswana
- Namibia
- Malawi
- Mozambique
- Swaziland
- South Africa
- Tanzania
- Zambia
- Zimbabwe



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SOUTHERN AFRICAN NETWORK FOR GM DETECTION LABORATORIES

Characteristics of the Network

- **Non-political**
- **Participation is voluntary**
- **Non-prescriptive**
- **Participation is endorsed by the managing authority of the laboratory and the National Focal Point**



Structure of the Network

- Laboratories must be represented equally
- The Network consists of a central coordinating reference laboratory (HUB) and participating labs (NODES)
- Laboratories nominate a participant in the Network
- Decision making is based on consensus
- Network is operated in partnership with RAEIN-Africa



Functioning of the Network

- **Communication Network**
 - Email and Internet
 - Discussion Group - Technical Advice
- **Task Groups**
 - Establish Guidelines on Minimum Performance Criteria and Best Practice
- **Training**
 - Facilitate Training through Workshops
- **Arrange Proficiency Schemes**



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SANGL Objectives

1. To build and strengthen capacities for GM detection in Southern Africa
2. To establish guidelines and harmonised methods for sampling and GM detection based on internationally accepted protocols
3. To achieve international recognition in GM detection in all participating labs
4. To compile technical guidance papers on GM detection issues



SANGL Objectives cont.

5. To establish links with other international GM detection laboratories and Networks
6. To establish an interactive communication platform for GM detection laboratories in Southern Africa
7. To establish inter-laboratory collaboration between GM detection labs of the network
8. To mobilise resources to support the activities of the SANGL Network



Stakeholder Mapping

- **Network partners**

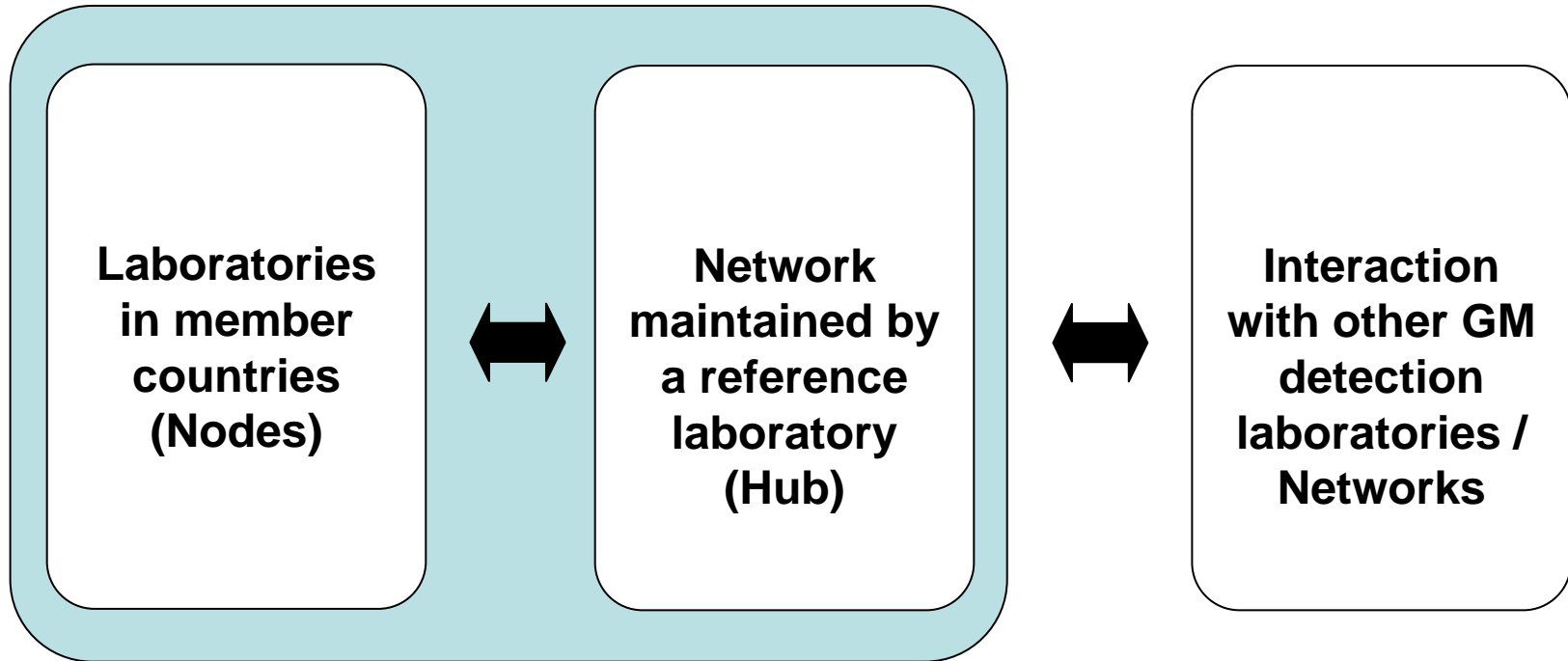
- Participating GM detection laboratories

- **Potential partners**

- Donors
 - Other GM detection laboratories and Networks
 - Other institutions



Model for the Network



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SANGL Activities

- **Workshop to establish SANGL: November 2009**
- **Training workshop in GM detection: September 2010**
- **Strategic planning: 2011**



SANGL Coordination



Dr Dahlia Garwa, Dr Phumzile Dlamini, Dr Dorothy Kangwa-Mulenga, Prof Chris Viljoen

GM detection Workshop 2010

- DNA extraction
- DNA concentration determination
- Gel based PCR detection
- Real-time GM screening
- Real-time PCR quantification



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Training Workshop in GM Detection





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