

# USDA Agricultural Outlook Forum 2002

## **The Future of Agricultural Biotechnology in World Trade: An African Perspective**

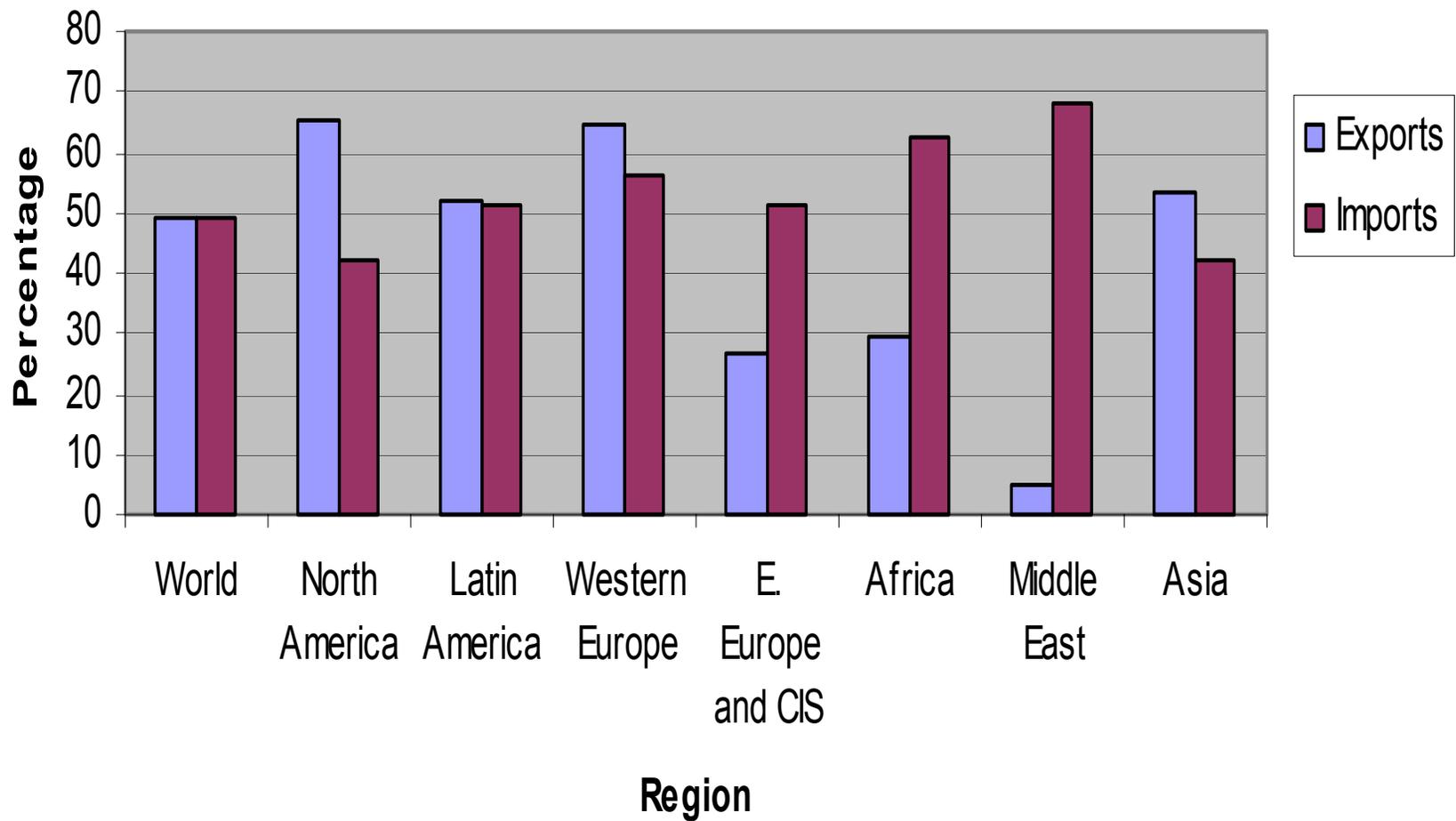
**Dr. Florence Wambugu  
Executive Director**

**A Harvest Biotech Foundation Int'l (AHBFI)**

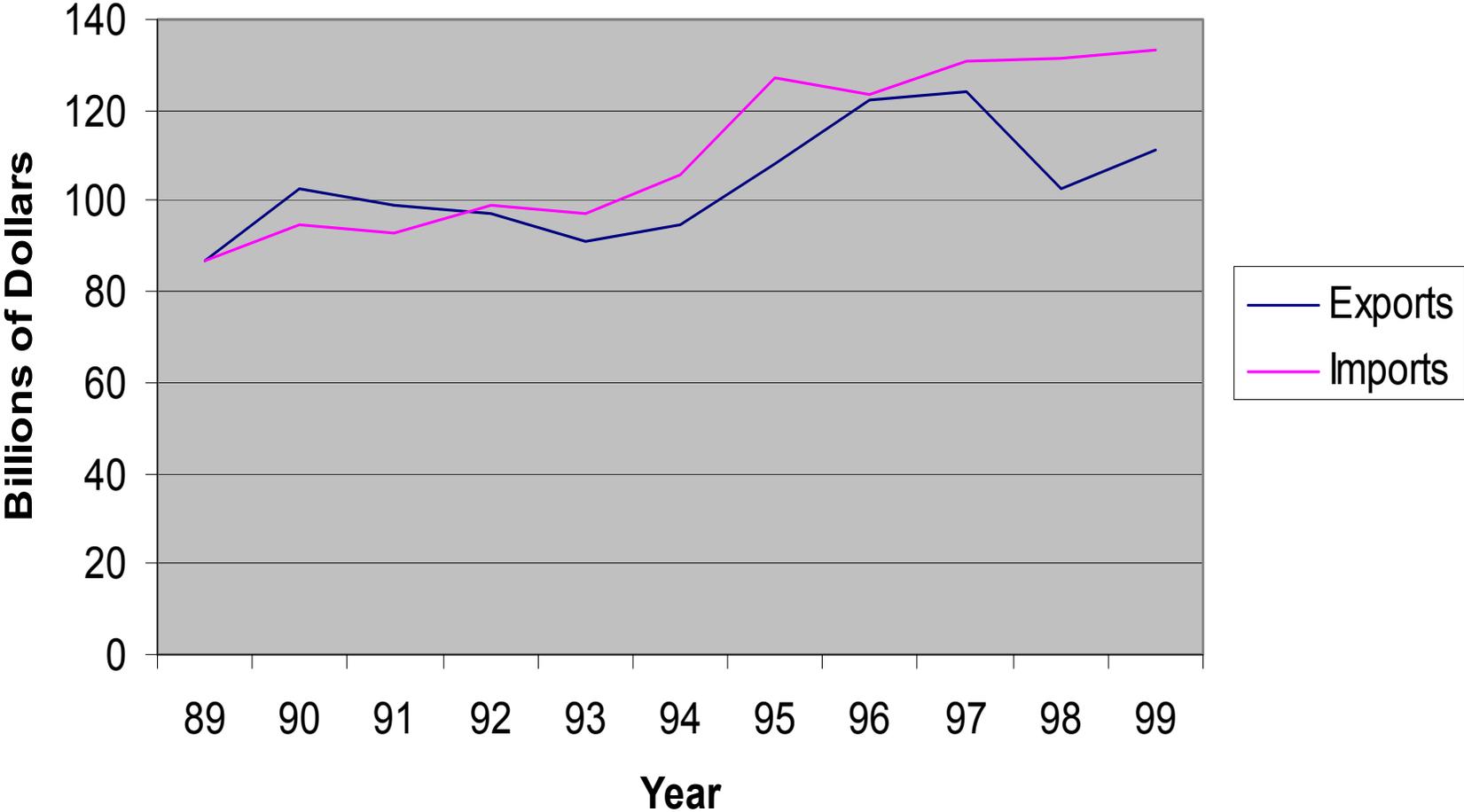
# Take away message

- **Africa especially Sub Saharan Africa (SSA) have serious food deficits, is a big untapped new market for global biotech trade**
- **Africa has embraced biotechnology crops and products with benefits to people, environment & biodiversity ; impact demonstrated**
- **Current biotech products from private sector have “trickle effects” on the economy but alone will not bring food security in Africa**
- **To open African market for global biotech trade will require strengthening internal biotech capacity and infrastructure for equal partnership with the North**

## Share of Agricultural Products in Trade in Primary Products, 1999



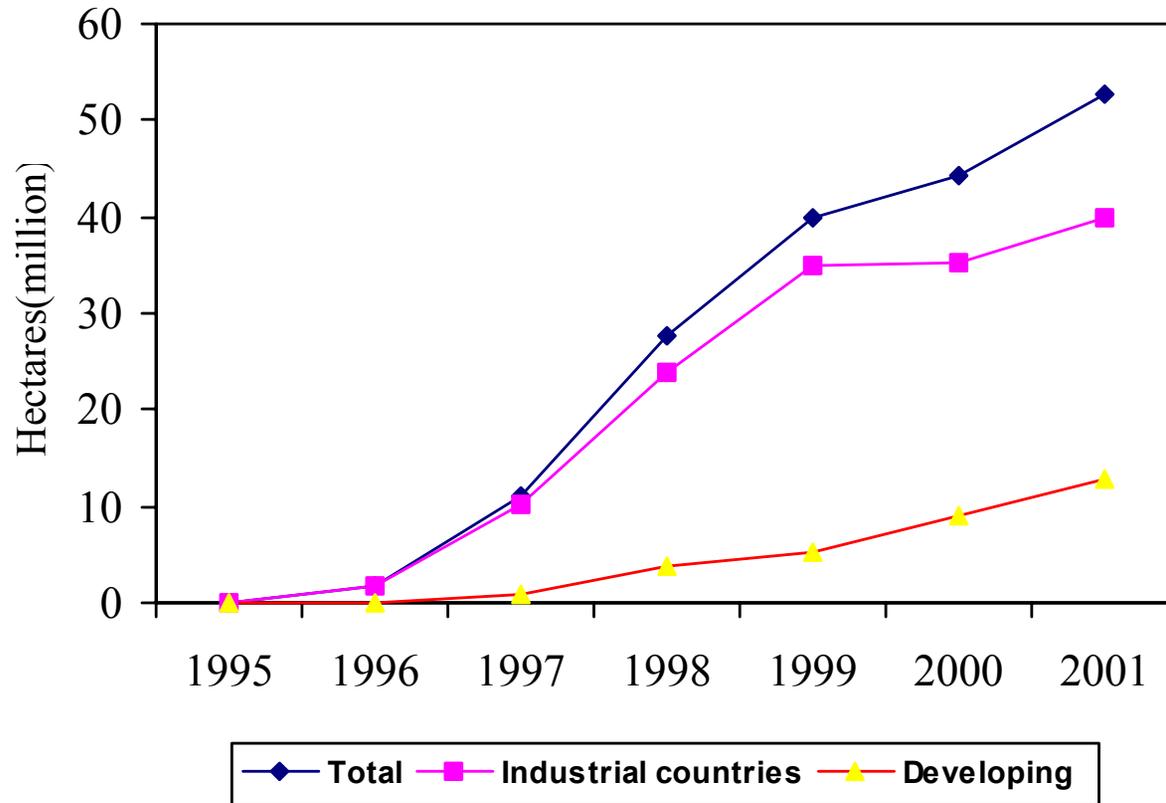
# Merchandise Trade of Africa



Source: International Trade Statistics 2000, WTO

# Global Trends in Transgenic Crops

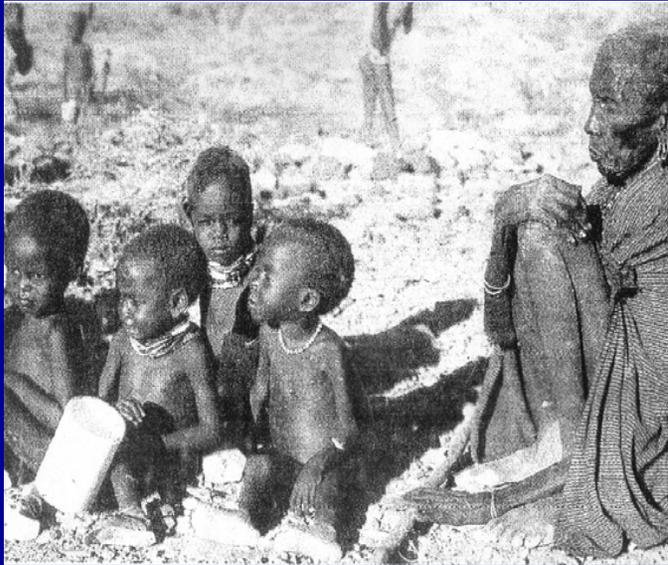
(Source: Clive James, 2001)



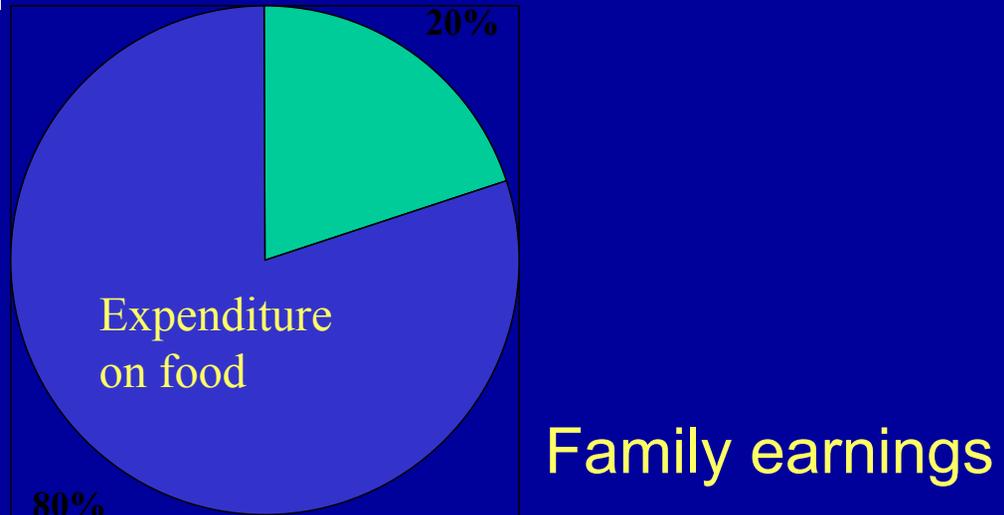
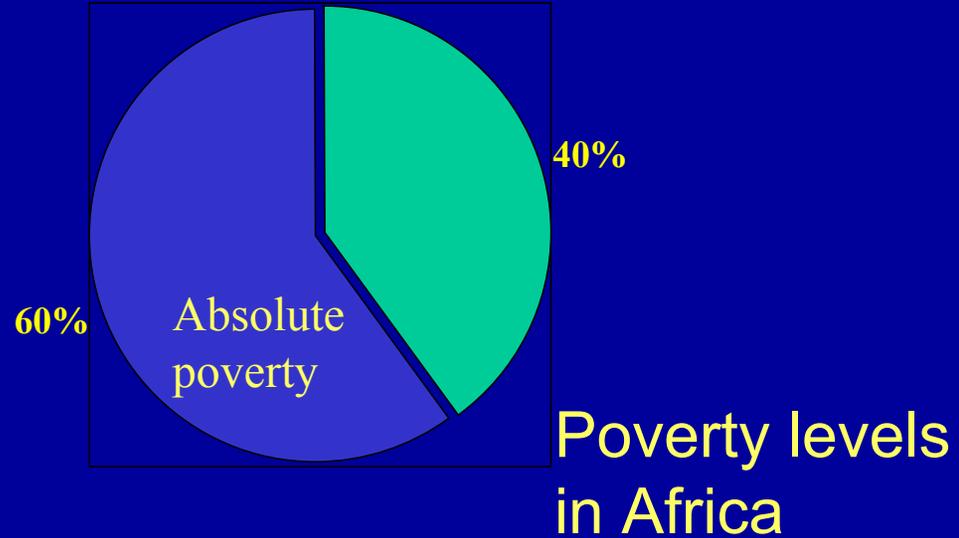
# Main Trade Issues Restricting Export Of Biotech Products

- Requirements for labeling
- Traceability
- Segregation of biotech products
- Public acceptance
- Anti-GM lobby groups controversies

# The need to fight hunger and poverty



Hunger and Poverty



# Global Biotech Status of selected Crops

<b>Crop</b>	<b>Africa (Av.Yield t/ha)</b>	<b>World (Av.Yield t/ha)</b>	<b>Biotech status</b>
Maize	1.7	4.11	GM tech. available
Cassava	8.4	9.98	R&D
Sugarcane	62.3	64.4	GM tech. on pipeline
Sweetpotato	4.8	14.7	GM tech. available
Potato	11.3	16.1	GM tech. available
Wheat	2.01	2.54	GM tech. available
Bananas	6.0	48.11	GM tech. on pipeline
Soybeans	0.7	2.08	GM tech. available
Rice	2.2	3.7	GM tech. available

# Which biotech opportunities could cause greatest impact in Africa?

Crop	*Production constraints	Other
Maize	Stem borer, MSV	Quality enhancement: Vit. A, Iron, Protein, enhanced oils
Bananas	Sigatoka, weevil, panama	
Sweetpotato	Weevil, viruses	
Sugarcane	SCMV, stem borer	
Cassava	CMV, bacterial wilt	
Rice	Sheath blight, bacterial blight	Quality enhancement: Vit. A,
Cotton	Bollworm	
* For all crops:	Weeds	Herbicide tolerance

# **Africa Embraces Biotech crops and products – Way forward**

- **Strengthen local biotech capacities and infrastructure for food security and exports**

## **Examples with North/South partnerships**

- **South Africa Biotech venture capital funds for local biotech institutions**
- **Nigeria govt internal biotech support US\$ 26 M**
- **Egypt has biotech capacity and infrastructure to support internal and external trade.**

# Biotech Trade Barriers In Africa

- **Gm-crops and beef fed on GM crops face trade barriers in Europe e.g Bt-maize in SA, beef Namibia**
- **Horticultural exports to EU: GM carnation**
- **Cash crops: Cofee, tea, cocoa (No GM currently in Africa)**

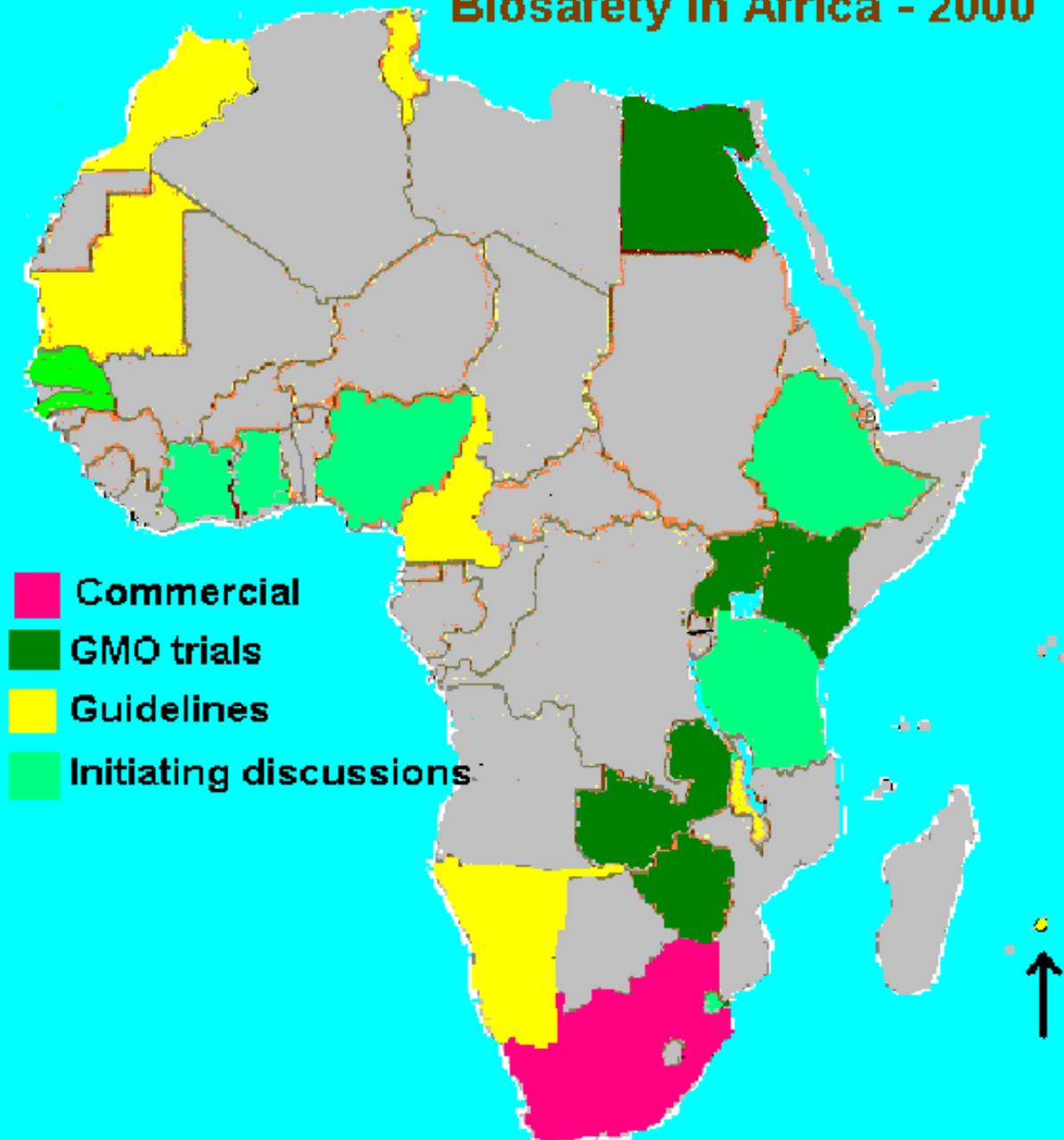
# Gm-biotech Trade In Africa And Future Trends

- **Trade in GM crops in Africa in future will focus on local and international markets to fill in food deficits and avoid European trade barriers.**
- **Trade in GM-biotech products from Africa will expand through S/S strategic alliances: Africa, China & India.**
- **Preferential trade agreements: (South Africa & China) – major markets in Africa and Asia & trade blocks in Africa: COMESA, ECOWAS, EAC. SADC**
- **S.Africa – 42% Africa GDP, exporter to Africa and will influence GM acceptance and acceleration in Africa.**

# Challenges

- **Influence of anti-GM groups especially from Europe**
- **Lack of information, data, websites, libraries**
- **Inadequate institutional & human capacity**
- **Limited capital to access GM products**
- **Lack of biotech IP**
- **Limited regulatory & policy agencies NBCs**

## Biosafety in Africa - 2000



# **Demonstrated Biotech impact and appropriateness in Africa**

# Maize: Constraints - Maize Streak Virus

## Stem borers



- **MSV major constraint in Africa.**
- **Yield losses: 20-100% in some years.**
- **20 yrs. research by IRS and NARS but no impact to farmers in Kenya.**

# Impacts



KARI released MSV resistant hybrid in 5 yrs with biotech intervention VS 20 yrs conventional breeding .

10 other MSV resistant hybrids being evaluated in National performance Trials

Germplasm base for future improvements

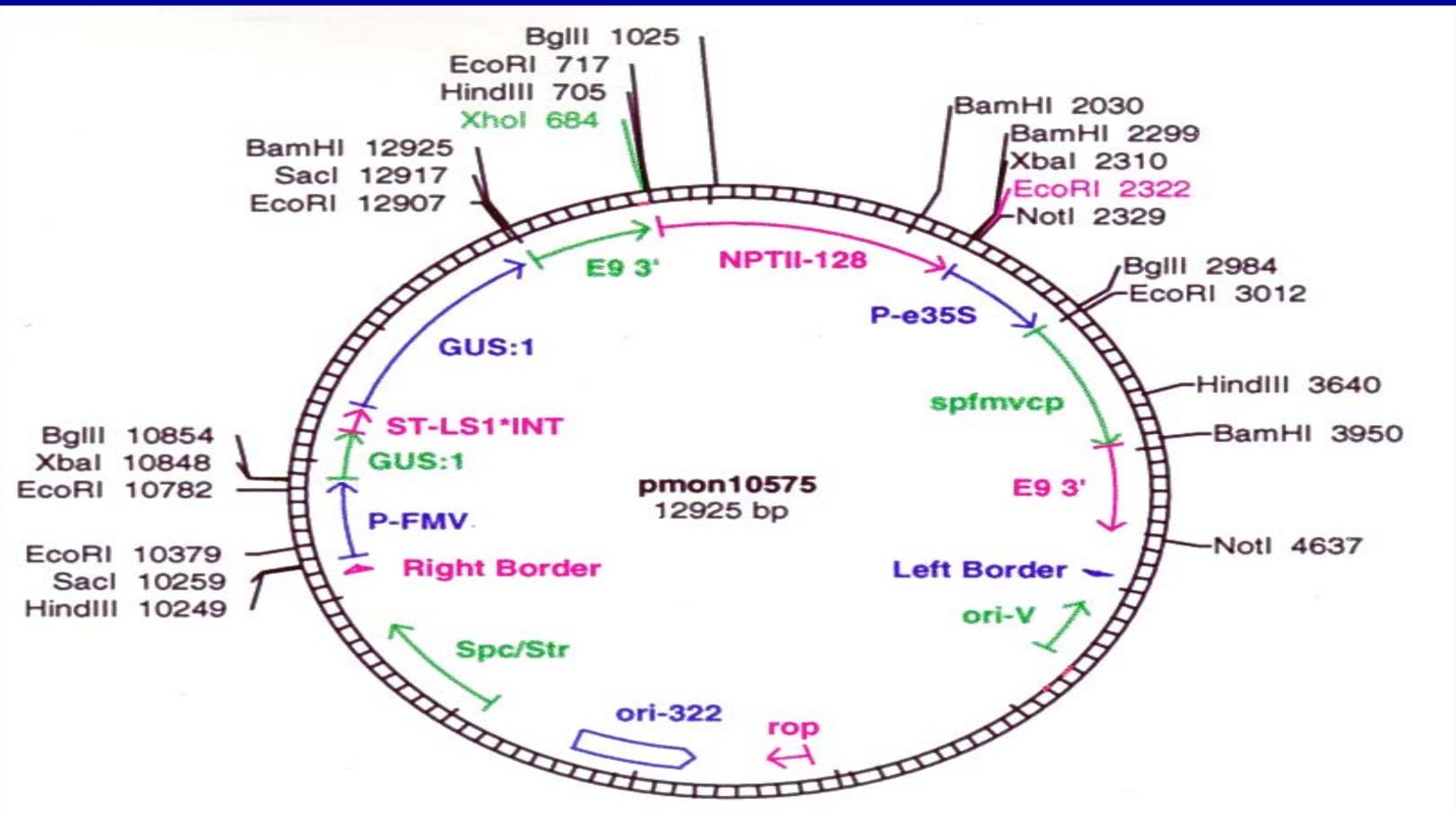
# Sweetpotato Production Constraints



**Virus and weevil  
infected, loss of  
20-80%**



**Healthy potato**



CP-gene construct for SPFMV resistance development

# Capacity Building



**“Mock trials” and evaluating the economic importance of the transgenic variety.**

# Transgenic Field Trial



## Expected Impact

- Increased annual production by at least 15%
- Increased farmers income (est.US\$ 41 M. annually)
- Food security for 1 million people without additional production costs.

# Cotton in Makhatini South Africa

## Bt-cotton

- Small compact plant
- Many mature bolls ready for harvest
- -3 sprays for non bollworm pests



## Non Bt-cotton

- Large plant, excessive vegetative growth
- Difficult to spray
- Few bolls to harvest
- 10 sprays for all insect pests



# Benefits for Small scale Growers

- Reduced handling of hazardous chemicals
- Improved efficiency, yields
- Reduced use of broad spectrum insecticides
  - environmental conservation
- Savings on time, labour and costs

# Constraints for Small scale Growers

- Affordability
- Limited micro-credit
- Ownership
- Management

# Participatory rural appraisals

## Tools

- Discussions stakeholders
- Field surveys

## Priority

Clean seedlings

Solution

Tissue culture



# Availability of Plantlets: Local private-public sector biotech. labs



**Large-scale micro-propagation capacity 6M  
producing tc banana, pyrethrum & sugarcane**

# Tc vs. sucker results



**Tc no mgmt. 30kg**



**Sucker no mgmt. 10kg**



**Tc with mgmt. 60kg**



**Sucker with mgmt. 20kg**

# Technology Transfer: Doing it with the farmers



**Encouraging “family partnerships and gender sensitivity”**

# Field training & management



**On-farm**

**ITSC expert  
discuss with  
farmers.**



**Tc sucker  
selection for  
optimal results**

# Farmers proudly managing tc orchards



**Orchard establishment: Mrs. Muthoni Maina, small-scale farmer in her orchard.**



**Mr. Ogiri and son - vigour and uniformity of tc-banana, 8 months**

# Impacting Hunger and Poverty



## Esther Gacugu: 1 acre

- Traditional banana 200 plants; yield 10 bunch. of 20Kg income \$30/yr
- 120 tc planted 1997, yield 90 bunch. of 45Kg income \$600.

### Impact on poverty

- Kitchen & orchard expansion, water tank & paying school fees
- Esther now group leader, trainer tc seedling distributor

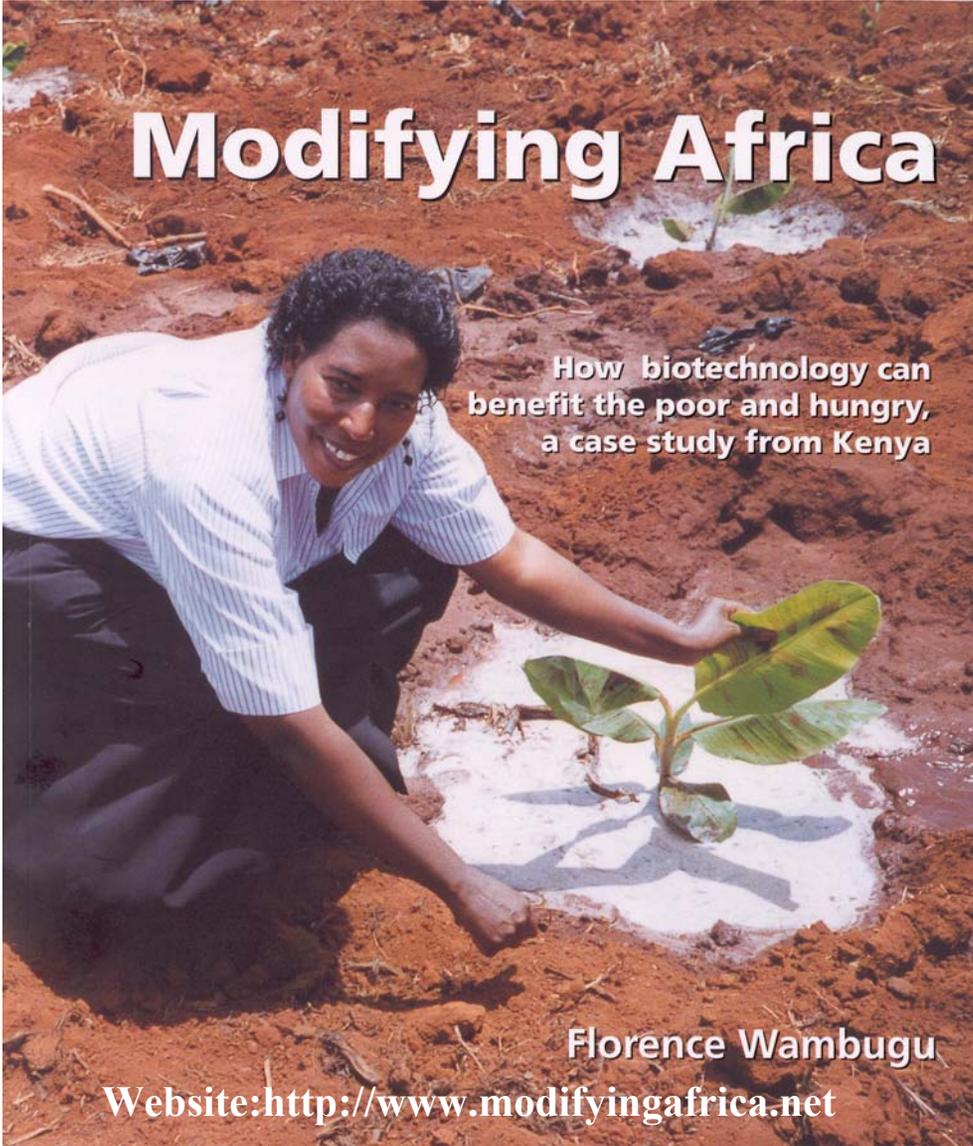


Uniformity in maturity ideal for surplus marketing & entrepreneurship

# Food security and income generation for the poor



**Sourcing micro-credit/revolving fund**



# Modifying Africa

How biotechnology can  
benefit the poor and hungry,  
a case study from Kenya

Florence Wambugu

Website: <http://www.modifyingafrica.net>

# **Gm-crops & products Trade In Africa; Private Sector Dominates**

- **All commercial GM-crops in Africa from private Biotech companies from USA - all in South Africa. Bt-Cotton, Bt-maize & h. tolerant soya bean**
- **In SSA only one crop from public/private sector (USA/Kenya) partnership in the GM-sweetpotato has been field tested in Kenya.**
- **Private biotech comp. holds 80% of biotech IP – Great influence on world trade & needs African mkt.**
- **Africa has negligible biotech IP, little influence on world trade.**



**A Harvest Biotech Foundation International (AHBFI)**

**California ♦ Nairobi ♦ Johannesburg**

**Website: <http://www.ahbfi.org>**

- **Leadership training biotech & regulatory IP**
- **IP negotiations for donations and licenses**
- **Biotech Lab.& field work for crops & products**
- **Effective biotech communications**

# AHBFI Four Point Strategy

- **Biotech crops mobilization for public good : For GM crops Africa need advanced biotech lab/ field**
- **Regulatory training: educate,train , mentor for expertise & leadership training in biotech for African countries**
- **IP negotiations for access through collaborations**
- **Effective biotech communications: to open way for biotech products; to manage anti-GM groups controversies, through presentations, materials, books, websites.**