Panel Discussion on Technology Development

Cassava (Claude Fauquet)

Sub-Regional BioScience Centers (David Taylor)

Environmental Research on Maize (Elie Osir)

Banana (W Tushemereirwe)

Jonathan Crouch

Global Theme Leader, Biotechnology

ICRISAT

International Crops Research Institute for the Semi-Arid Tropics, India & Across Africa

Evolution of Post-modern Plant Breeding

Some questions …?

Key Specific Points of Discussion
from the individual presentations

PRIORITIES: How do the quick start activities described fit within the evolving strategy at a national and sub-regional level

BIOTECH SOLUTIONS: Can quick-start activities be used to fill gaps and synergize the national and regional strategies

OTHER GAPS: Are there gaps in the application of biotech (to key constraints across Africa) that are not being addressed through these activities or those emerging from the focal country and sub-regional programs.

Criteria for Priority Setting

The PROCESS: Important to establish a common, clear process for effective national to sub-regional to regional integration

Area or production – total or per capita

Crops for poverty alleviation or economic development

Solutions required now or those foreseen

AATF currently at the stage of dealing with this issue (quantitative and consultative but not anecdotal)

Gaps in National, Sub-Regional and Regional Strategies

Farmer needs-driven gaps vs. gaps in knowledge or gaps in a comprehensive approach

Diversified portfolio to buffer against changes in the social, economic and ecological environments

Challenge of urbanization and globalization (offer more simply scenarios once small-holders become integrated into the market)

Strategies for today or strategies for creating new opportunities tomorrow

Crop Priorities from the Sub-Regional Fora

	ASARECA	SADC	CORAF
Highest priority	Maize, Beans, Cassava, Cotton	Maize, Cowpeas, Cassava, Beans, Fruit trees, Exotic vegetables, and groundnuts	Maize, rice, sorghum and millet - Cowpeas and groundnuts - Cotton, Para rubber, cocoa and oil palm - Cassava, sweet potato and yam - Wood, Banana/Plantain, Fruits and Vegetables
		Cowpeas and groundnuts	
High priority	Sorghum, Groundnuts, Bananas, and Coffee	Sugarcane, Sorghum, Tobacco, Rice, Pearl millet, and coffee	
		Cassava, sweet potato and yam	
Others	Wheat, Potatoes, Rice and Sweet potato	Nuts, Sweet potato, Cotton, Potatoes, Tea, Sunflower, and wheat	

Technology Priorities from the Sub-Regional Fora

What will be done through purely conventional means?

Highest Priority Crops

COMMODITY	CONSTRAINT (in rank order)	PROPOSED INTERVENTION		TIME -FRAME
Maize	Stalk borer		GMO	Short-term
	Storage pests		GMO	Medium-term
	Drought	MAS	GMO	Long-term
Beans	Bruchid		GMO	Mid-term
	Anthracnose	MAS	GMO	Long-term
	Angular leaf spot	MAS	GMO	Long-term
Cassava	Cassava mosaic virus		GMO	Short-term
	Cassava mealy bug	MAS		Short-term
	Starch quality		GMO	Short-term
	Cyanide	MAS		Short-term
			GMO	Long-term
	Cassava brown streak virus	Diagnostics		Short-term
		MAS		Long-term
	Cassava green mite	MAS		Mid-term
Cotton	Bollworm		GMO	Short-term
	Insect pests		GMO	Medium-term
	Weeds		GMO	Short-term
	Bacterial blight	MAS		Short-term
	Fungal wilt	MAS		Short-term

MAS = Molecular Markers GMO = Genetically modified organism/Transgenic

Source: ASARECA Biotechnology Initiative (2nd draft).

Technology Priorities from the Sub-Regional Fora

Can we justify some parallel approaches?

High Priority Crops

COMMODITY	CONSTRAINT (in rank order)	PROPOSED INTERVENTION		TIME -FRAME
Sorghum	Striga	MAS	GMO	Mid-term
	Shoot-fly	MAS	GMO	Mid-term
	Drought	MAS	GMO	Long-term
Groundnut	Viruses	MAS	GMO	Mid-term
	Drought	MAS	GMO	Long-term
	Thrips and Aphids	MAS	GMO	Long-term
Banana	Lack of clean planting material	Tissue Culture		Short-term
	Sigatoka		GMO	Short-term
	Fusarium wilt	MAS	GMO	Mid-term
	Nematodes	MAS	GMO	Mid-term
	Weevils		GMO	Mid-term
Coffee	Coffee wilt	Diagnosis MAS		Short-term
				Long-term
			GMO	Long-term
	Coffee berry disease	MAS		Short-term
			GMO	Long-term
	Coffee rust	MAS		Short-term
			GMO	Mid-term
	Lack of improved planting material	Tissue Culture		Short-term
	Insect pests		GMO	Mid-term

MAS = Molecular Markers GMO = Genetically modified organism/Transgenic

Source: ASARECA Biotechnology Initiative (2nd draft).

General points of discussion concerning

Technology Development in Africa

- Our discussion about *Technology Development* needs to be firmly embedded into the context of critical *partnerships in a complex environment*
- Complex problems can rarely be resolved through *single point interventions*
- There is rarely a linear innovation pipeline to impact, we must focus on *systemic processes*
- What technologies will the system require in *the future* (particularly high value crops for small-holders)

The Multi-dimensional Priority Setting and Partnership Needs Pyramid

Needs	Farmers and end-users
Polices	NEPAD ASARECA – SADC – CORAF National Ministries
Development Agencies	World Bank, FAO, IFAD, UNDP
Donors	USAID – ABSP II – PBS Rockefeller Foundation – AATF - DFID – EU etc.
Researchers	Universities – NARS – Farmers CGIAR – Regional Centers – Advanced Labs etc.
Disciplines	Germplasm - Tissue culture – Genomics – Transgenics Plant Breeding - Seed Systems - Natural Resource Management – Social Science

Farmers, End-users, NGOs and the Private Sector

Integration throughout the process

Biotech-based

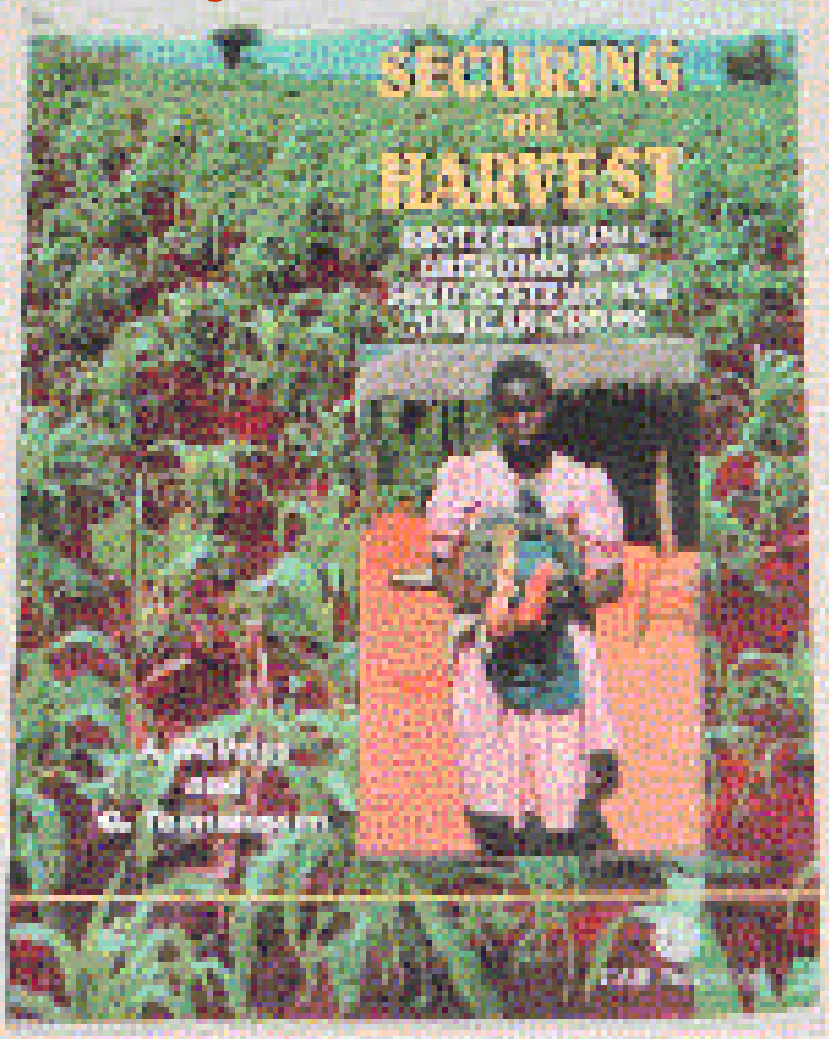
Agro-ecology orientiated

Participatory

Crop improvement

Biotechnology, Breeding and Seed Systems for African Crops (2001)

Joe DeVries and Gary Toenniessen



As applications of biotechnology become more routine, they are being increasingly integrated with breeding programs to result in a very different sort of crop improvement program …

NEW PARADIGMS IN PLANT BREEDING

Versus biotech interventions in plant breeding

Substantial impacts will come through a systemic process rather than a traditional innovation pipeline

Technology impacts will be constrained without developments in conventional breeding capacity

Holistic solutions to complex problems vs. biotechnology interventions

- Stable yields and enhanced livelihoods in addition to higher productivity
- Modern [conventional] varieties often diffuse very slowly

"Many of the biotechnology innovations proposed for use by smallholders feature qualities that may not be immediately obvious to farmers"
(the differences in transgenic crops may be even more subtle)

Robert Tripp et al. (ODI)

Information flow, development and regulation of seed markets

(growth of SME seed companies beyond hybrid maize combined with public initiatives and capacity development of seed and agrochem merchants)

Farmer-representation in decision-making process of public biotech-based programs

(a new paradigm taking the interaction beyond priority setting and variety selection)

New institutional and policy environments for technology development

Institutional arrangements of agricultural research are a key constraint to applying science to alleviate poverty

(generic and reductionist green revolution-type interventions can not provide sustainable solutions for Africa)

Flows of knowledge between institutional nodes is a key to innovative performance

(increasing the connectivity within and between institutions and sector is critical)

Andy Hall et al (NRI)

The donor community must become intensively interactive

To collectively develop consensus priorities and strategies

To define complementary action plans together with the array of stakeholders

Thank you

Technology Development Panelists

Each will overview the rationale for their research, describing the problem addressed by the technology and partners involved in the project, thus profiling the type and range of activities that have been funded by USAID over the past year.

[1] Cassava (Claude Fauquet)
[2] Sub-Regional BioScience Centers (David Taylor)
[3] Environmental Research on Maize (Elie Osir)
[4] Banana (W Tushemereirwe)

(all discussion after the last speaker)

Key Points of Discussion

How do the quick start activities described fit within the evolving strategy at a national and sub-regional level

Can quick-start activities be used to fill gaps and synergize the national and regional strategies

Are there gaps in the application of biotech to key constraints across Africa that are not being addressed through these activities or those emerging from the focal country and sub-regional programs.

Continuous process of institutional change
to engage with complexity yet define clear goals
(adopt a truly participatory research-for-development paradigm, involving both farmers and private sector, in a systemic manner)

Establish a continuous process of analysis and learning from successes in relevant regional contexts

Complex linkages between new technologies, poverty reduction and economic growth
(no linear relationship between publically funded innovation and poverty reduction)

Andy Hall et al (NRI)

Diffusing, adapting and translating advances from model systems

Multisector partnerships in all areas of innovation and implementation/commercialization - INCUBATOR
(synergies from bringing together previously unassociated disciplines/networks)

A systems approach (agro-ecology-based breeding)
(interdisciplinary packages of solutions from biotechnology and breeding through natural resource management and socio-economics providing)

Diffusing, adapting and translating advances from model systems
(capturing spillovers for lesser studied crops from the global investment in rice, maize, Arabidopsis, soybean and Medicago etc. to resolve specific scientific goals)

Crouch and Serraj et al (CGIAR)