

SCIENCE FORUM 2013

Nutrition and health outcomes: targets for agricultural research
23–25 September 2013, Bonn, Germany



Independent Science
and Partnership
Council

BMZ



Federal Ministry
for Economic Cooperation
and Development

Integrated Groundnut Aflatoxin Management

M. Osiru* & F. Waliyar
ICRISAT

Breakout Session 4 on Food Security

Science Forum 2013

Nutrition and health outcomes: targets for agricultural
research, 23–25 September 2013, Bonn, Germany



Research
Program on
Nutrition
and Health



Presentation Outline

1. Opportunities for a food and nutrition secure world
2. The groundnut aflatoxin problem in the Semi-Arid Tropics
3. ICRISAT's approach for strengthening aflatoxin management
4. Building effective partnerships for impact
5. Prioritising future R4D interventions
6. Managing risks



SSA's Share of World Raw Groundnut Exports by Volume

Period	Share of World Exports (%)				
	SSA	Nigeria	Senegal	Malawi	Sudan
1962-1969	88.6	45.6	17.4	2.25	8.2
1970-1981	43.5	8.5	2.7	0.01	15.2
1982-1991	4.4	0.0	0.6	0.00	1.7
1992-2005	5.2	0	1	0.05	0.4

Levels of over 3000 ppb found, mean of 164ppb recorded in West Africa

Source: FAOSTAT

The groundnut aflatoxin problem in sub-Saharan Africa

1. Cultivars and farming practices
2. Weather conditions
3. Drought stress during pod maturity
4. Time of harvest / pod removal
5. Method of harvest / drying
6. Rains at harvest and delayed drying
7. Mechanical / insect damage
8. Storage conditions
9. Conditions of packing and distribution
10. Inadequate monitoring and enforcement of food safety standards



SCIENCE FORUM 2013

Nutrition and health outcomes: targets for agricultural research
23–25 September 2013, Bonn, Germany



Independent Science
and Partnership
Council

BMZ



Federal Ministry
for Economic Cooperation
and Development

An Integrated approach for strengthening aflatoxin management

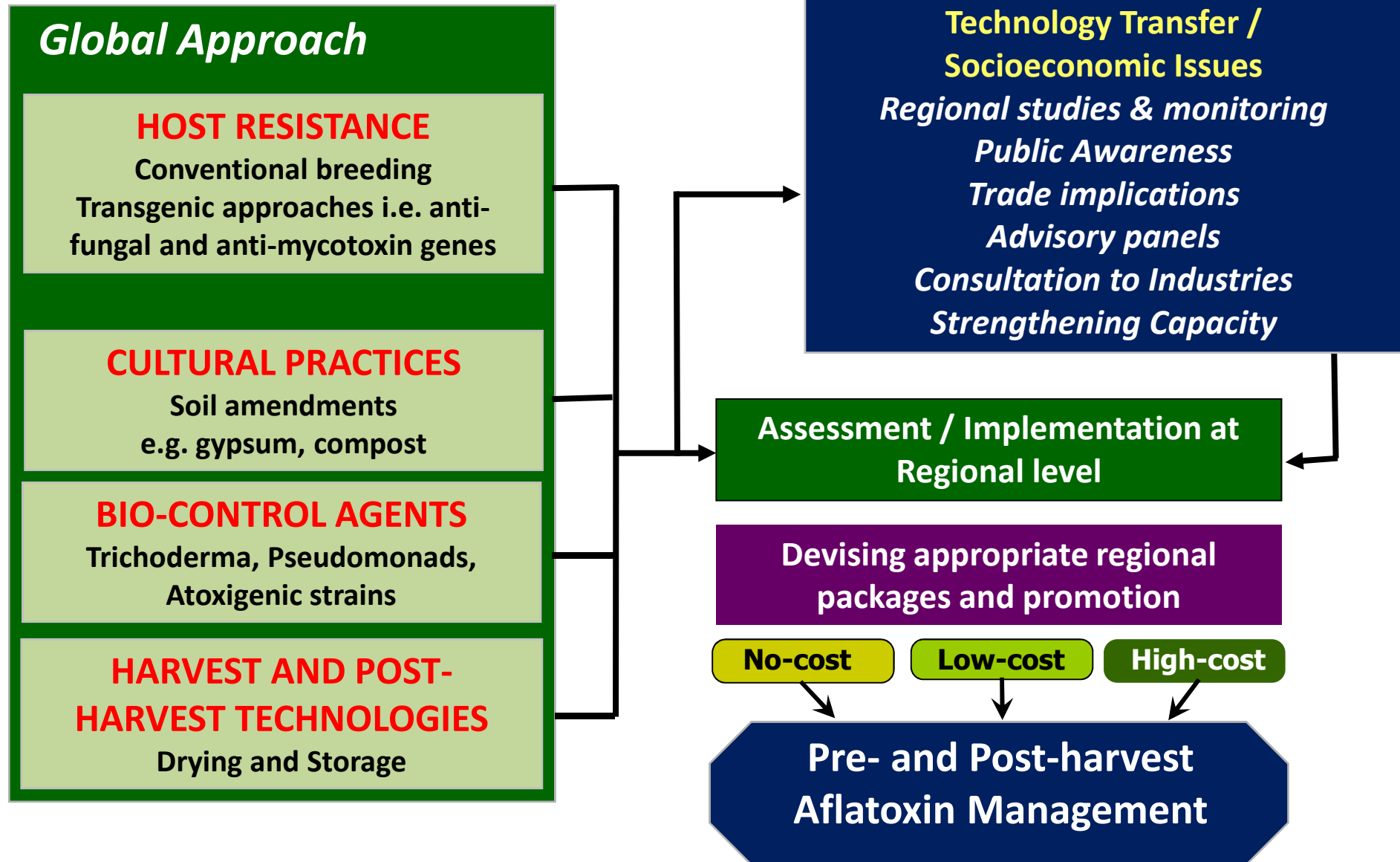


Research
Program on
Nutrition
and Health

Development and use of detection technologies

- Used specific antibodies and developed test kits for screening and quantification of 4 mycotoxins (Aflatoxin B1, Aflatoxin M1, Ochratoxin A, Fumonisin B1) individually
- Developed competitive ELISAs
 - Indirect Competitive ELISA
 - Direct Competitive ELISA
- Supported establishment of mycotoxin testing labs in India, Kenya, Mali, Malawi, Mexico, Mozambique and Nigeria

An Integrated Approach to Manage Aflatoxin Contamination



SCIENCE FORUM 2013

Nutrition and health outcomes: targets for agricultural research
23–25 September 2013, Bonn, Germany



Independent Science
and Partnership
Council

BMZ



Federal Ministry
for Economic Cooperation
and Development

Mean aflatoxin (ppb) in farmers fields at harvest, in 3 regions of Mali Nov, 2009 to June, 2010

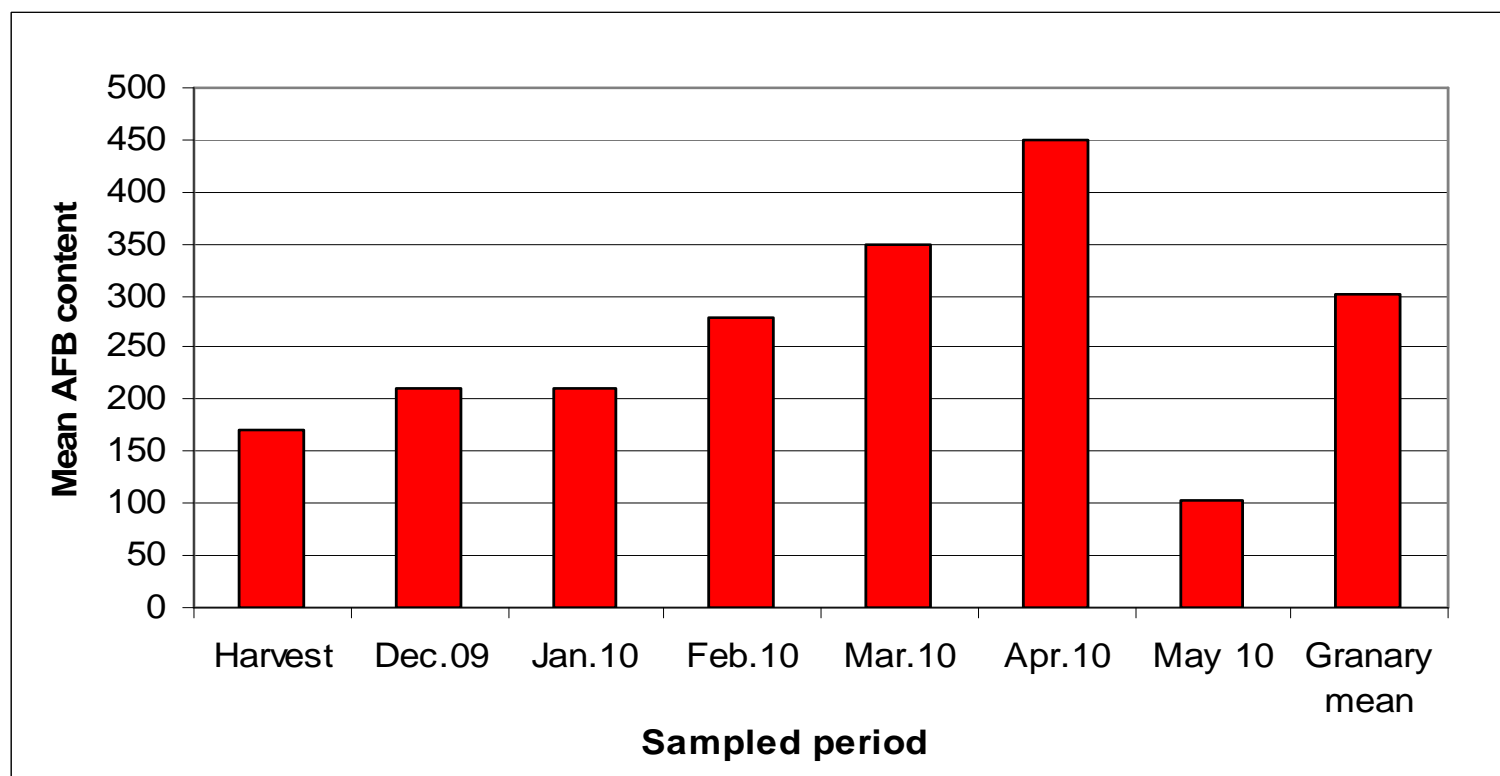
Aflatoxin	Kolokani	Kita	Kayes	Mean	Farmers' fields
Detection rate (%)	85.55	88.88	91.66	88.70	Granaries
Mean (ppb)	108.5	45.1	27.1	60.2	Traders
Range	0-1678	0-246	0-217	0-1678	Markets



Research
Program on
Nutrition
and Health

Aflatoxins contamination in 30 farmers' granaries

Kolokani region



Farmers' fields

Granaries

Traders

Markets

SCIENCE FORUM 2013

Nutrition and health outcomes: targets for agricultural research
23–25 September 2013, Bonn, Germany



Independent Science
and Partnership
Council

BMZ



Federal Ministry
for Economic Cooperation
and Development

Mean aflatoxin (ppb) in samples from traders, in Kolokani and Bamako Dec 2009 to February 2011

Aflatoxin	Kolokani	Bamako	Mean
Detection rate (%)	93.85	96.13	95
Mean (ppb)	132.6	111.3	122
Range	0-1823	0-2231	0-2231

Farmers' fields

Granaries

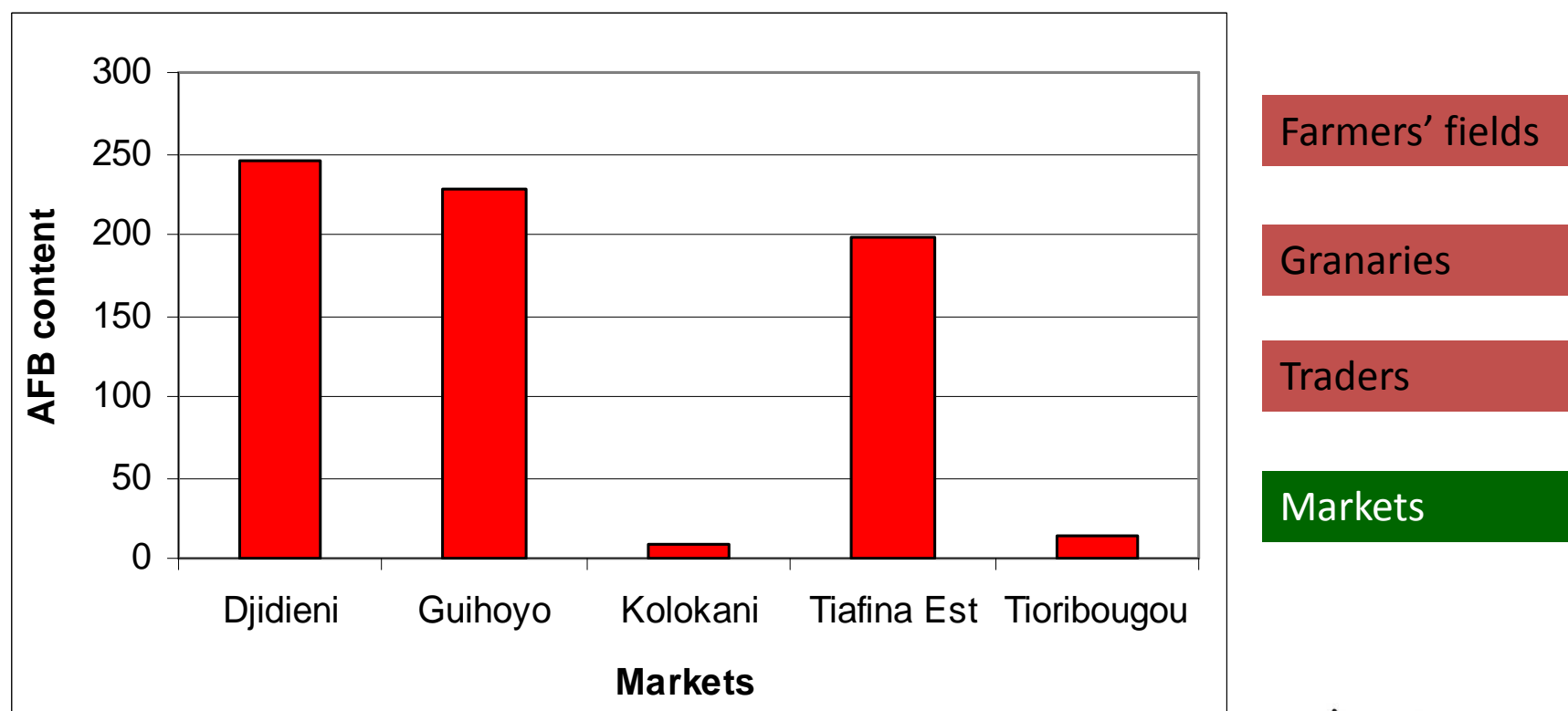
Traders

Markets



Research
Program on
Nutrition
and Health

Market survey for aflatoxin contamination in Kolokani region*



*Mean aflatoxins levels ($\mu\text{g}/\text{kg}$) in 5 markets for the targeted villages in Kolokani region

SCIENCE FORUM 2013

Nutrition and health outcomes: targets for agricultural research
23–25 September 2013, Bonn, Germany



Independent Science
and Partnership
Council

BMZ



Federal Ministry
for Economic Cooperation
and Development

Percent reduction by single or multiple cultural practices

Agronomic practice	Aflatoxin reduction
Cereal crop residues	53%
Farm Yard Manure (FYM)	59%
Lime	68%
Combination of FYM and residues	74%
Combination of lime and residues	81%
Combination FYM and lime	84%
Combination of FYM, lime and residues	85%



Research
Program on
Nutrition
and Health

Building effective partnerships



- NASFAM negotiated fair trade and non-fair-trade contracts – EU and South Africa
- Communities receive premium for quality nuts
- Made possible by:
 - ICRISAT support to monitoring production from planting to export
 - Low cost screening tools for aflatoxin detection to ensure safety of product
- NASFAM success
 - presents example of the catalytic role standards can play in promoting supply-chain development
 - synergies between public and private sector actors
 - Incentives for quality production

Prioritising future R4D interventions

- Strengthen diagnostics for aflatoxins, including their accessibility
- Increase local knowledge of the extent of the aflatoxin problem in specific areas
 - soil sampling; toxigenic profiles; relationship with farmer practices;
 - Monitor agricultural commodity value chains to devise management strategies
 - Identify high risk populations
- Undertake further adaptive research to develop and promote innovative best bet management techniques
- Strengthen partnerships (PS- FO- Governments) to provide incentives for aflatoxin management

High returns on investment; Quick wins

- Research on aflatoxin management will result in:
 - Higher yield/production from improved crop, pest and soil management technologies
 - Higher sales- local and exports and improved incomes
 - Reduced disease burden from improved monitoring and aflatoxin management
 - Women will benefit from nutritious weaning foods
- Groundnuts are grown on over 19million hectares and have an US\$8.2 billion market value – this value is expected to more than double by 2050



SCIENCE FORUM 2013

Nutrition and health outcomes: targets for agricultural research
23–25 September 2013, Bonn, Germany



Independent Science
and Partnership
Council

BMZ



Federal Ministry
for Economic Cooperation
and Development

Finally....

Pick the low hanging fruit.....

Integrated management approaches using cultural approaches should be prioritized because it presents a simple, attainable, and scalable approach to managing aflatoxins and ensuring impacts on nutrition of the rural poor



Research
Program on
Nutrition
and Health