Integrated Groundnut Aflatoxin Management

M. Osiru & F. Waliyar
ICRISAT- West and Central Africa

Regional Conference on the Aflatoxin Challenge in West African States
18-20 November, 2013

ICRISAT
Science with a human face
International Crops Research Institute for the Semi-Arid Tropics

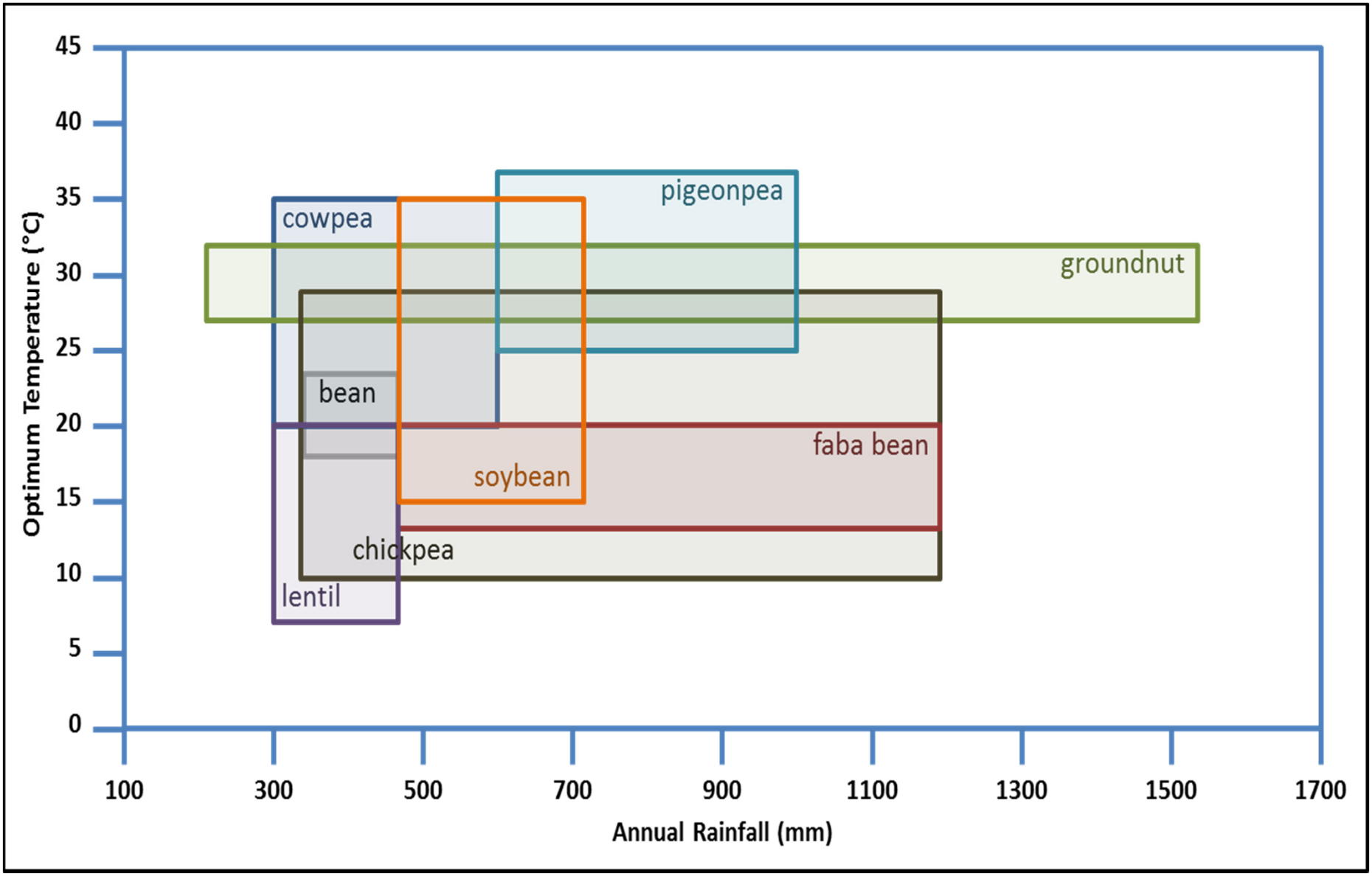
Presentation Outline

1. The groundnut aflatoxin problem in the Semi-Arid Tropics – examples from Mali

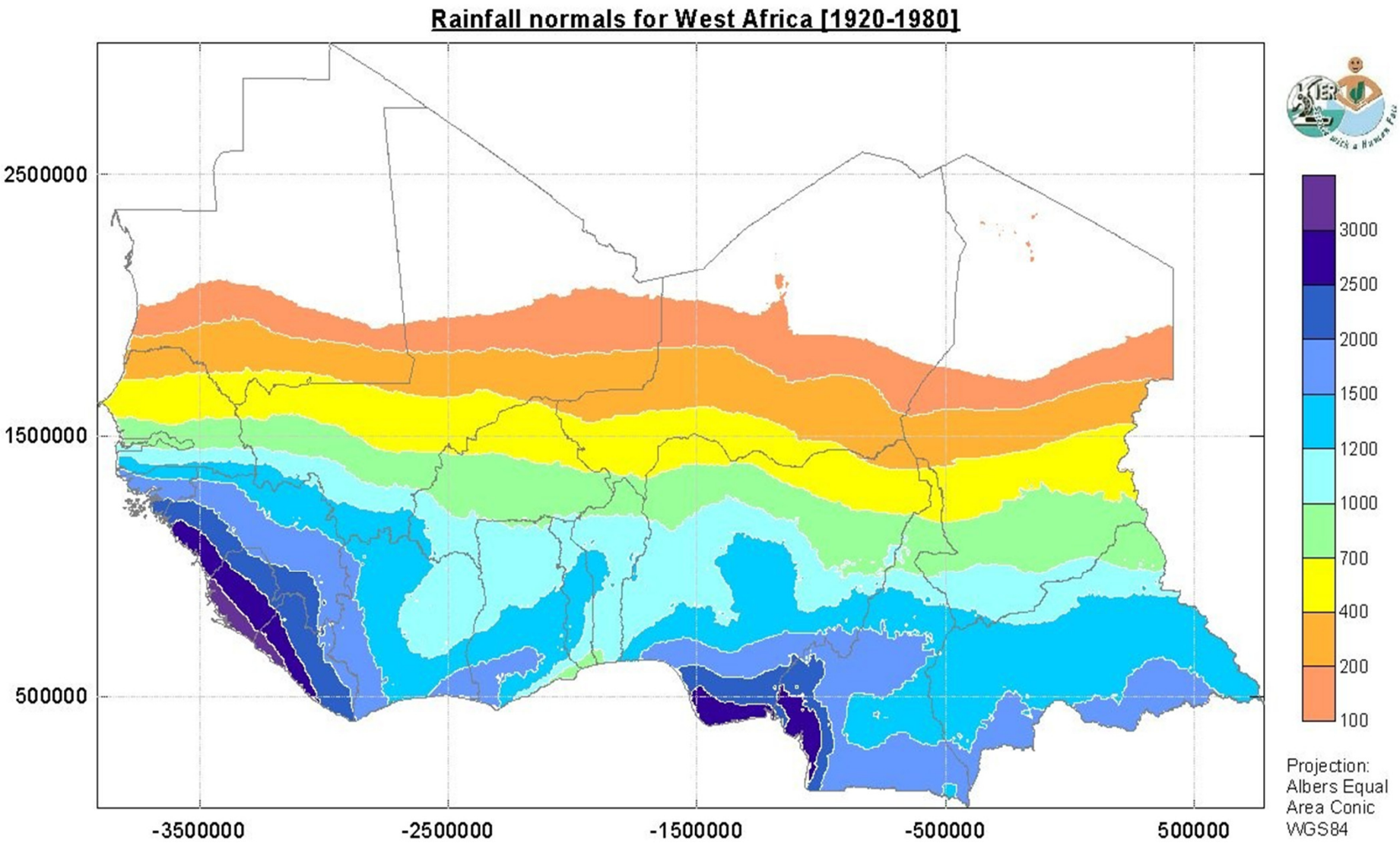
2. ICRISAT's approach for integrated management of aflatoxin

3. Prioritising future AR4D interventions

Where do the important legumes grow?



WCA: The Challenges



Food insecurity and chronic malnutrition, Land degradation, poor soil fertility, pests & diseases; Frequent drought and high temperatures; Socio-political instability

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

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

Farmers' fields

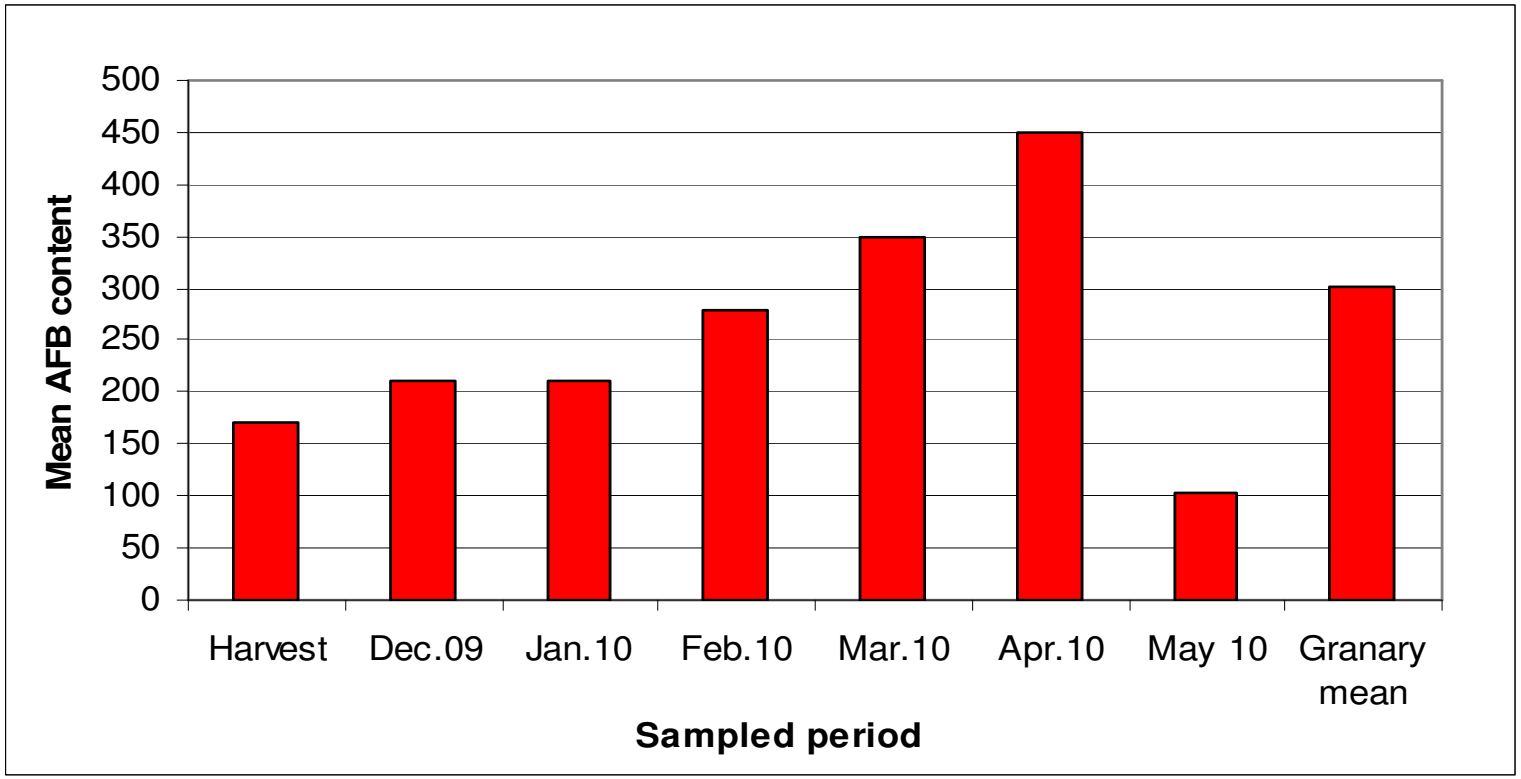
Granaries

Traders

Markets

Aflatoxins contamination in 30 farmers' granaries

Kolokani region



Farmers' fields

Granaries

Traders

Markets

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

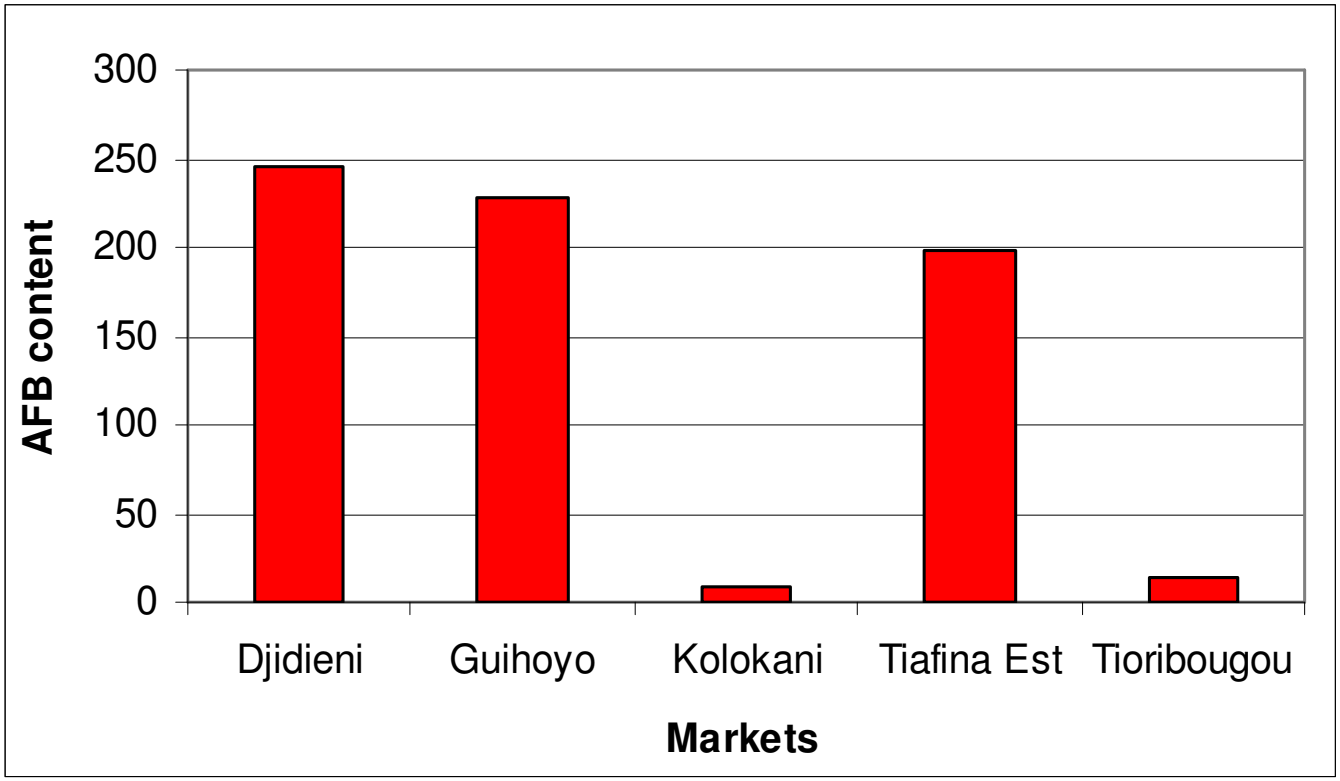
Farmers' fields

Granaries

Traders

Markets

Market survey for aflatoxin contamination in Kolokani region*



Farmers' fields

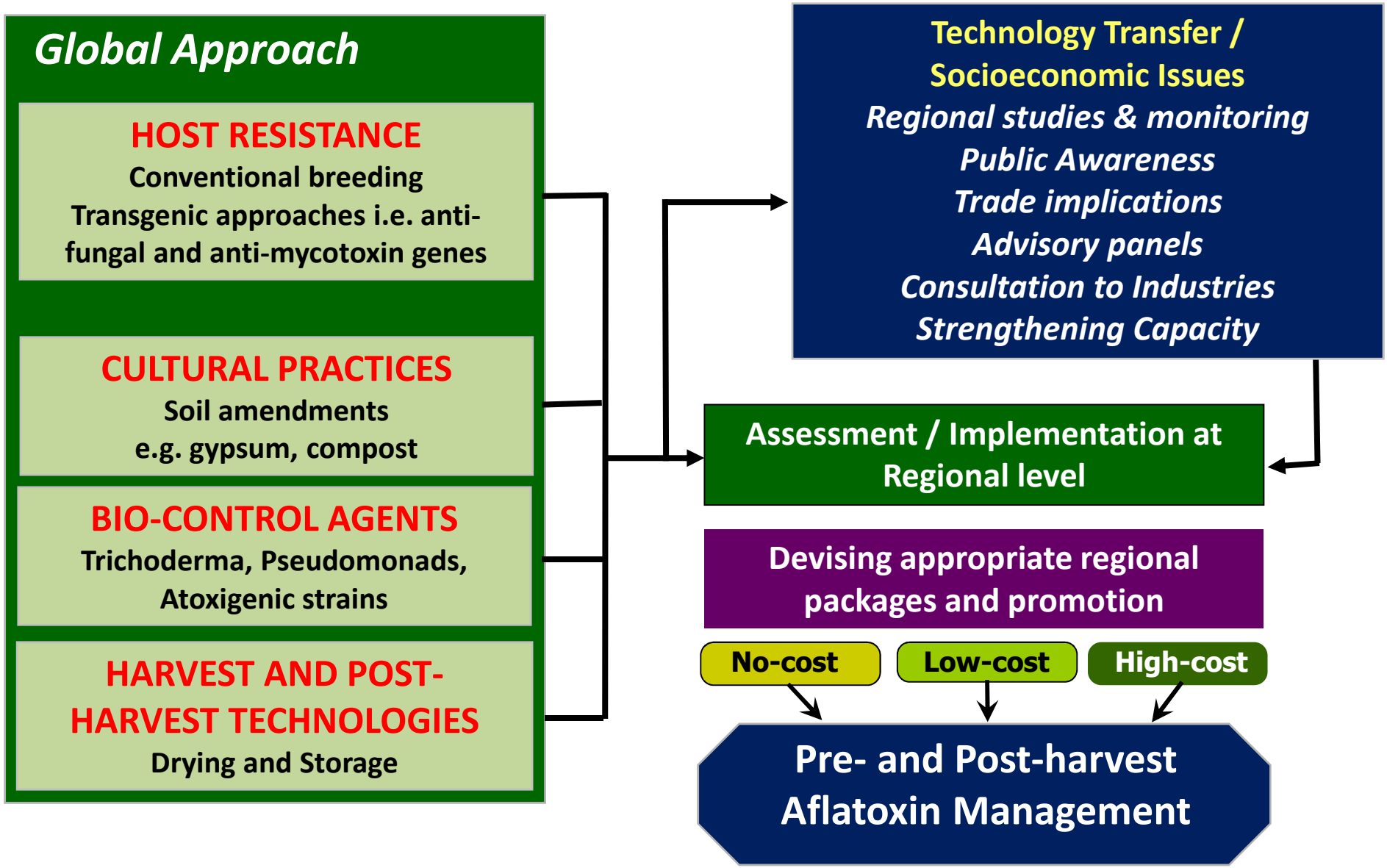
Granaries

Traders

Markets

*Mean aflatoxins levels (µg/kg) in 5 markets for the targeted villages in Kolokani region

An Integrated Approach to Manage Aflatoxin Contamination



Testing and transferring resistant improved varieties to farmers

2500 germplasm lines screened and sources of resistance to pod wall, seed coat and cotyledon identified in cultivated peanut

- Many varieties show high levels of resistance across tests, locations
- Resistance needs to be combined with integrated management

Genotype	Aflatoxin (ppb)
ICGV 89092	0.2
ICGV 91289	0.4
ICGV 00362	0.7
ICGV 86168	0.7
ICGV 02313	0.9
ICGV 91283	1.2
ICGV 06423	1.5
ICGV 99240	1.8
ICGV 07220	2.1
ICGV 91324	2.1
ICGV 01258	2.5
ICGV 91278	2.7
ICGV 93305	2.8
ICGV 91317	3.4
ICGV 89106	3.9
ICGV 91304	3.9
ICGV 89115	4.1

ICRISAT
Science with a human face

ICRISAT
Science with a human face

CGIAR
RESEARCH PROGRAM ON
Agriculture for Nutrition and Health

Demonstration of simple and affordable Good Agricultural Practices(GAP's) to mitigate aflatoxin contamination in groundnut

Pre-harvest

- Farmyard manure @2tons / per acre
- Applying Trichoderma culture to soil @ 1 kg/per Hectare
- Seed treatment with dithane M 45@3g/kg
- Applying gypsum @200kg /per acre
- Care should be taken while doing inter cultivation practices
- Avoid end of season drought with supplementary irrigation
- Harvest the crop at optimum maturity

Post-harvest

- Damage to the pods at the time of harvest should be avoided .
- Do not keep the harvested material on soil for longer time .
- Dry the stripped pods to less than 10% moisture (around 8% is better)
- Sun drying before and /or after pod-stripping should be done .
- Do not dry the diseased / infected produce along with healthy ones .
- Use new / clean gunny or poly bags to store the groundnuts

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%
Sorting	90%

Development and use of detection technologies

- 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
- Hold annual International Training Courses- next year West Africa

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

Thank you!

- *A4NH, the CGIAR Research Program on Agriculture for Nutrition and Health-* ***a4nh.cgiar.org***
- *CRP GrainLegumes*
- *Other partners*

ICRISAT
Science with a human face

International Crops Research Institute for the Semi-Arid Tropics

ICRISAT is a member of the CGIAR Consortium