

Meeting on the Coordination of CGIAR Mycotoxin Research
A collaboration between the CRPs on
Agriculture for Nutrition and Health (A4NH), Maize, and Grain Legumes
ILRI, Nairobi, Kenya
September 3-4, 2012
Key Issues, Decisions, and Action Points

September 3, 2012

Setting the context and information sharing

Introduction

Participants from CGIAR research programs (CRPs) and partner research groups met for two days to share current activities and outputs related to mycotoxin research and to plan how these different activities might work together across the different CRPs and CGIAR research centers. The list of participants is included in the Annex.

Each of the centers and partners provided presentations on their current mycotoxin research activities, issues they are facing, and the group discussed how these can fit together. The key issues as presented and brought up in discussion are summarized below by center/project.

Information Sharing: Key issues

ICRISAT, presented by Farid Waliyar

- How can the four different interventions (host resistance, cultural practices, bio-control agents, and pre- and post-harvesting technologies) be combined into single packages that are region specific and cost variable (“no cost”, low cost, and high cost)?
- We need more research on post-harvest techniques, such as drying, and how to promote it to farmers.
- Are the key purposes for diagnostics being met?
- How can we equip others who are working in the areas of technology transfer and market development?
- How will we facilitate the transfer of agriculture technology?
- How will we evaluate our programs?
- What will the data management and sharing strategy and policy look like?

IITA, presented by Ranajit Bandyopadhyay

- Do we have research covering parts of the value chain relevant to nutrition and health?
- What are the risk management tradeoffs in terms of the tolerable levels of aflatoxins for humans? In Kenya, for example, it has not been adequately examined.
- What is the environmental impact of aflasafe™ and is there enough supporting evidence?
- USAID is working on a regional license; what can we do to facilitate the process?
- Are there any and/or is there a need for a long-term ecology study of aflasafe™ in Africa?

CIMMYT, presented by George Mahuku

- Should the scope of mycotoxin research include fumonisins?
- Communicating a simple message to policy makers and implementers will be important. Just as often occurs in the communication of nutritional information, we do not want to confuse people or appear to give conflicting guidance.

ILRI, BecA Hub, presented by Jagger Harvey

- There is enough existing prevalence data for Kenya to know aflatoxin is an issue, so how much more prevalence data needs to be collected?
- Other data should be used to inform these models and avoid duplication of efforts.
 - Ranajit has aflatoxin data for several hundred sites in Kenya and Tanzania and they are willing to share with BecA.
 - They have grain samples from their work in Tanzania that they are also willing to share.
- What issues are we missing in terms of diagnostics?
 - What are the practicalities of the models for farmers? What's a short-term solution?
 - Models would provide guidance on suitability - performance of different hybrids in different conditions – rather than prediction.
- Toxin contamination is so variable, so how useful will the models be?
 - Key: have as many sites as possible (HarvestChoice – 600 farms/country)
 - Next step: longitudinal study across several seasons and years.
 - BecA is confident that even after the first year, they can identify risk areas.
- Data like what BecA is generating will be relevant to an upcoming CGIAR meeting on data and knowledge management strategies.

A4NH/Agriculture Associated Diseases, Delia Grace

- There are five research activities within three priority areas for this subcomponent. Four are managed by ILRI, but the fifth area on mycotoxins is still under development.
- How will mycotoxins work as a research program and what types of activities fit?

A4NH/Food Safety and Nutrition in Value Chains, Laurian Unnevehr

- A new issue that hasn't been looked at through a value chain framework is examining how we lose nutritional value as a food product moves through the value chain.
- Some key commodities (fruits and vegetables) are noticeably absent from the current activities on nutrition and food safety in value chains.

A4NH/RCT on aflatoxin and child stunting, Nouhoum Traore

- Should A4NH pursue a similar study in Nigeria next year? It could be a good comparison study to the previous work on groundnuts in Mali. There is a possible linkage to the Millennium Villages Project in Nigeria; they are collecting a lot of nutritional data.

Considerations for the study design

- Talk to Kitty Cardwell at USDA about her study in West Africa and the dietary intake data she collected. This study in West Africa compared three exposure zones and then three villages within each zone.
- Several ethical considerations were raised about randomizing at the household level and community reaction to maize swapping.
- Screening the baseline health status of the children will be important.
- There was a similar study conducted in India with a number of political and ethical issues.
- If breast milk is tested and it exceeds maximum levels, then there's an obligation to treat and this will have study implications. Same could be said with the levels of aflatoxin in households.

September 4, 2012

Next steps – Plans for identified joint research and gap filling

Introduction

Participants started from a list of key mycotoxin research areas in the CGIAR and considered how A4NH could best add value. Three major areas were selected based on their potential to be used as platforms for other research studies and to harmonize existing efforts within the CGIAR system.

Goals of the morning session were to identify

- What – the key activities and outcomes for each research area
- How – who will do what, what partners/resources/communication efforts we need in each area

Original list of CGIAR mycotoxin research areas	Priority list of mycotoxin research areas for A4NH
<ul style="list-style-type: none">• Breeding/agronomy/control technologies (including post-harvest strategies)• Value chains• Diagnostics• Risk assessment (livestock and human health)• Policy/regulation/advocacy• Evaluation/impact assessment• Scaling up and out	<ul style="list-style-type: none">• Risk and impact assessment• Value chains• Biocontrol

1. Risk and Impact Assessment, facilitated by Delia Grace

Overview of risk assessment methodology

- There are a number of identified burdens of mycotoxins, including but not limited to:
 - poor human health
 - economic costs of illness and economic costs of lost agricultural assets
 - lost opportunities
- Risk is the probability of negative impact on human health combined with the severity.
- Before calculating risk, you need to calculate hazards. We need dietary data (exposure assessment) stratified by age groups, gender, HIV status in order to characterize the degree of risk from “farm to fork.”
- We also must consider whether the risk has been described quantitatively or qualitatively.

Challenges

Risk to Human Health

- Known and unknown impacts on human health
 - Liver cancer
 - Malnutrition – childhood stunting
 - Other diseases – immune suppression, diarrheal diseases
- Currently available consumption data is inadequate for Sub-Saharan Africa, it may be better in Latin America and Southeast Asia. We need to understand the hazards related to consumption.

Cost of Illness

- Normally presented in terms of DALYs; more research needed in this area to demonstrate to policy-makers the financial burden of ignoring the problem.

Agriculture-Related Economic Costs

- It would be challenging to separate the costs due to aflatoxins and the rest (insects, drought)
- There are trade losses that have to be considered.
- We need to identify control points, in order to determine where will we have the most impact and what are the alternatives for the smallholder (in terms of feasibility, costs, acceptability)

Opportunities

Data collection

- Provide advice on existing data collection efforts to add more consumption questions/modules.
- DHS would be a great start - USAID missions fund the DHS and has an opportunity to look at tools and request additional questions/modules; Francesca has initiated dialogue with DHS to get serum aflatoxin added to the DHS, which would provide global coverage data.
- Conduct a data collection workshop on nutritional methods for collecting consumption data.

Data

- Compile data that has already been collected; CGIAR's data is mainly on the agriculture side.
- Develop strategies to share data effectively.
- Develop a shared database on household consumption data. PACA could host it and promote it; A4NH would have to lead development/management.

Diagnostics

- We have a strong background/capacity in diagnostics in the agriculture sector.
- Key issues are the high cost and developing diagnostics that are fit for our purposes.

Collaboration across sectors

- Convene an expert group on mycotoxins to develop a broad risk framework that could be used to facilitate the discussion between agriculture and health to work out the risks, modeled after the WHO FERG's (Foodborne Expert Reference Group).
- Collaborate with CRP on Maize on their upcoming workshop on biocontrol; add a health component.
- Ask other centers to share project information on projects with health risk components.

Strategic countries

- Target countries with growing industries in mycotoxin-vulnerable livestock species (poultry)
- Start with the countries with demonstrated interest (Kenya, Tanzania) and use experience there as leverage within the region and beyond.
- Focus today has been on Africa; we will need a separate plan for Asia. PK Joshi (IFPRI), B.M. Prasanna (CIMMYT), and Ranajit (IITA) will follow-up.

2. Food safety and nutrition in value chains, facilitated by Laurian Unnevehr

Overview of the value chain assessment framework

- Comes from a business strategy framework.
- It describes the process of mapping the activities from inputs → production → processing → storage → consumption and the actors, economic transactions, and governance within the system.
- Value chain framework provides a tool for integrating analysis of the economic and technology elements present in an agriculture value chain.

Examples of public-private partnerships in value chain work

- IITA and Nestle
 - Used using maize in the production of infant foods, but made a concerted effort that the poor quality maize was not left behind for household consumption.
- Mars
 - Pet food in India
- ICRISAT and Government of Malawi
 - Introduced ELISA test kits in Malawi to enable export of groundnuts
- PlumpyNut and ICRISAT
 - testing
- WFP and ICRISAT
 - Local purchasing and testing
- IITA and seed companies
 - Collaborating to commercializing aflasafe™

Current/recent projects in this area

- West Africa (IITA) – cashew/shear nut export
- MyDairy (ILRI) - dairy in Kenya
- aflasafe™ (IITA) - biocontrol across Africa, particularly Nigeria
- WFP local purchasing

Challenges

- We're missing information on the link between nutritional quality/food safety along the value chain and willingness to pay.
- Public-private partnerships are essential, so how do we form more and more strategically?
- For standards, we need to focus on the private sector because it's quicker. Get them the right diagnostics so they can test. What's the cost of the tests and are they practical? Testing becomes frustrating for the producers because such a high % of their supply cannot meet standards and they have no alternative markets (what about the clays/animal feeds).
- Clay binding may be worth testing. There's a current test – as a treatment – in Ghana. It is considered a food additive and may be on the GRAS (Generally Regarded as Safe) list.
 - What about when binding is constrained by poor quality?
 - There are some human health concerns - in Asia and parts of Africa, pregnant women have been known to eat this clay.
- Is adapting HACCP for risk assessment a good model?

Opportunities

Policy and advocacy

- There are emerging technologies (clay, blanching) that can be used to mitigate risks. Policymakers and the development community would benefit from a background paper that reviews the technology portfolio, followed by a workshop to integrate those technologies.
- Issue an innovation challenge for promising technologies along the value chain. Peter Cottey, USDA, could advise us.

Economics

- Description of both health impact and economic impact is key. IFPRI can provide modeling capabilities, which may provide compelling evidence for investment in addressing the problem.
- Consider more market experiments to determine consumer willingness to pay for high quality and safe foods.
 - IITA has some WTP data from West Africa (Dr. Coulibaly) for shea nut butter and cashew nut.

Standards

- The private sector has experience in adapting quality control standards to real-world situations vs. internationally established standards (i.e., CODEX). A multiple authored white paper on lessons learned from the private sector on this issue would be valuable.

Behavioral Change Communication

- Consumers may not be aware of aflatoxin risks along the value chain. We need to understand the best way to provide information, motivate behavior change, and demonstrate the value of proven interventions, to address both on-farm consumption and consumption through formal markets. This is a research gap.

Collaboration

- Establish a working group on value chains as a vehicle for information-sharing across centers.
- Identify a center contact person who would serve as the go-to person on quality and safety issues in value chains.

3. Biocontrol, facilitated by Ranajit Bandyopadhyay

Challenges and opportunities related to aflasafe™

There are two larger types of issues: (1) practical issues of turning it into a product and (2) issues of pushing it to scale. Six groups of issues are outlined below and the challenges and opportunities were presented together.

IP and IPG issues

- Who owns the strains?
- How do we have access them?
- Who owns the technology?
- AATF is involved; they are a good partner for IP issues /public availability.

Country v regional strains

Currently IITA's work is limited to countries where funding is available and so only country strains are in development; the goal is to develop regional strains.

- Collection needs to increase. Gaps in countries (Uganda, Burundi, Malawi) need to be filled in order to develop a regional strain.
- A regional harmonization of registration protocols could speed this process.

Expansion into other countries

- There are delivery issues, specifically, how can we use private companies to help with delivery and keep it accessible to the poor?
- How do we utilize public-private partnerships strategically to scale-up?

- ICRISAT has a transfer of technology platform and IITA is using that model for aflasafe™. They never give 100% of the technology to a single company; they have the choice to share it across different companies written into the licensing agreement.
- Funding from the G-20 AgResults initiative has helped in working out production-side issues. Ranajit will share this project document with the team.

Economic analysis

- Willingness to pay studies in multiple countries
- IPR and harmonization of rules and regulations

Methods for including it in the value chain

- What is the environmental and ecological impact over time?
 - IITA monitors the occurrence of the strains in the pilots test areas. They do not monitor the microbial content of the soil.
- Key question: If a.flavus is controlled, what happens to the other mycotoxins?

Public health

- We need health impact studies, but this will take some time.
For example, what does 70% reduction in pre-harvest mean for human exposure?
 - We could model it using scenarios.
 - We could make some ex ante assumptions or use expert opinion in models.
 Feed the Future might be a potential resource to do an initial study and identify the weaknesses, which could later be used to build a risk assessment model.
- Examination of unintended consequences
 - Basic due diligence has been done on aflasafe™, but some basic monitoring – not detailed biological sampling – of workers and consumers along the value chain might prove valuable.
 Some areas of exploration:
 - Health consequences for people working in the fields
 - Health consequences for storage facility workers
 - IITA conducted a 2-year study to compare spores in treated and untreated fields and found no difference in the number of spores; the percent of toxigenic spores was lower in the treated fields.
 - Another study conducted in India, not by IITA, found very serious impact on human health.
- Francesca is aware of a CDC proposed project to explore the correlation between commodity contamination level and serum aflatoxin and maybe other health factors.
- Could we add something to the Community Connector?

Additional issue

Are there plans to expand biocontrol efforts to other mycotoxins or other species?

Other Issues

Mycotoxins in animal health and links to human health

- This is not being addressed by other CRPs, so interest expressed in coordinating with the CRP on Livestock and Fish.
- Is this a public vs a private good?
 - Would it benefit the livestock sector (private good) or smallholders (public good)?

- Concluded, this will not be a priority area of focus in the mycotoxin portfolio for A4NH. It does seem like aflatoxin would be a strategic focus for the CRP on Livestock and Fish, particularly for poultry.

Building a strategic partnership with PACA

- Two different white papers have been identified as opportunities in today's discussion, should we use PACA to help with delivery and dissemination?
 - The process to get PACA's endorsement of the papers could be a very slow.
- CGIAR should manage the database, but PACA could promote it.
- There's an upcoming launch on October 31 and paper on aflatoxins prepared by Abt Associates will be distributed to ministers. Ranajit will do the main presentation to the ministers and A4NH will be a part of this presentation.

Data and knowledge management system – key questions to keep in mind

- We need an inventory of what we have now.
 - How can what we have now be shared?
- How do we encourage/facilitate communication flow?
 - TeamSpace is not accessible to everyone?
- The CRP on Policies, Institutions and Markets is committed to having a data platform. We'll tack on nutrition/health to that platform. Amanda is staying in touch with those people.
- Data quality is also an issue.
 - On the health and nutrition side, that's where we need to make a contribution to our national partners.
 - No standardized method of sampling or tools or report the quality of the methods.
 - It would be helpful to put the data in a data warehouse with comments on validity.
- Everyone was encouraged to provide data contacts to Amanda.

Diagnostics

- How do we move forward on diagnostics?
 - Jagger may coordinate this effort unless we hear otherwise. Send contacts to him.
- We could identify companies involved who are interested in reducing their costs.
 - George will start working on compiling this list.

ANNEX

A more coordinated CGIAR agenda

MAIZE	GRAIN LEGUMES	AG/NUTRITION/HEALTH
Control Technologies - Bio-control - Breeding / resistance Post-Harvest Technologies - Storage - Handling	Control Technologies - Bio-control - Breeding / resistance Post-Harvest Technologies - Storage - Handling	Understanding ag / nutrition / health effects Risk assessment (ag-health) – analysis and assessment of mitigation technologies
Surveillance/Diagnose Maize	Surveillance/Diagnose G_nuts	Methods ag-health impacts
Maize Value Chains - Organization of chains - Integration of control - Standards and certification - Economic incentives and risk assessment - Impact assessment	G-nut Value Chains - Organization of chains - Integration of control - Standards and certification - Economic incentives and risk assessment - Impact assessment	Prioritization and impact assessment of ag-health risks and impacts - In value chains (food safety more broadly) - Cross-sectoral metrics - Joint ag-health IA
Policy and advocacy	Policy and advocacy	Policy and advocacy

List of Potential Partners for the Priority Research Areas for A4NH

Risk and Impact Assessment

University of Maryland
 Johns Hopkins University
 University of Leeds
 Felicia Wu, U. of Pittsburgh
 Indian medical groups
 CODEX
 Medical Research Council of South Africa
 CRSP
 Tufts study in Uganda (hazards/consumption)
 Abt Associates
 GAIN
 Harvard (HIV and aflatoxin)
 U.S. CDC

Current or Recent Projects Related to the Priority Research Areas for A4NH

Risk and Impact Assessment: Human Health

AflaControl
 RCT on aflatoxin and child stunting
 MTT – dairy & maize
 On-farm surveys in Kenya and Tanzania
 Statistically mining existing blood samples to re-examine relationship between aflatoxin and child stunting
 Mycotoxin Contamination in Tanzania project
 Working document of activities in Kenya from formal and informal reports
 Study in Burkina Faso – consumption data
 Household consumption data from Bangladesh and India

Value Chains: Food Safety and Nutrition

Maize in production of infant formula, protective measures in place to prevent home consumption of contaminated maize left on-farm
 Using contaminated products in pet food
 ELISA kits in Malawi to enable export of groundnuts
 Coordinating testing with PlumpyNut
 Local purchasing and testing
 Commercializing aflasafe™
 Cashew and shea nut export in West Africa
 MyDairy project in Kenya

Biocontrol

None identified beyond aflasafe™ (above)

Organization

IFPRI
 ILRI
 ILRI
 ILRI - CAAREA
 IFPRI - Jef Leroy
 Africa Rising /IITA
 IITA - Charity
 ICRISAT
 IFPRI

Organization

IITA & Nestle
 Mars & ???
 ICRISAT
 ICRISAT
 WFP & ICRISAT
 IITA & local seed co.
 IITA
 ILRI

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