

## Africa RISING

### Interim report of the mycotoxin contamination in Tanzania Early Win Project

IITA, 6 July 2012

The project was successfully launched through an inception workshop on 18 and 19<sup>th</sup> April at IITA Mikocheni offices. The aims of the workshop were realised as all stakeholders reached consensus on what was needed to be done and which staff and institutions were to lead each set of activities. Significant publicity was generated to increase awareness as to the intentions of the project (Annex 1).

Four survey teams were selected to collect 500 maize and 500 cassava samples, from across those regions producing these crops, as follows:

1. TPRI and IITA for Dodoma, Manyara and Tanga regions
2. TFDA for Mwanza, Shinyanga, Rukwa and Tabora regions
3. SUA for Morogoro, Iringa and Ruvuma regions
4. MAFSC for Mtwara region

A protocol was developed to ensure that standard practices were used for site selection, sample collection and for the questionnaire used to gather associated information from the household representative who provided the sample (Annex 2).

In order, to ensure that DALDOs were provided background information to help them appreciate the issue of mycotoxins a factsheet was developed (see attached) and similarly in order to inform household and market vendors a factsheet was developed in Kiswahili (see attached).

The status of sample collection is shown in the attached spreadsheet –*samples required Collected and Balance still to be collected 6-7-12.xlsx*.

All samples are being dried, ground and sub-sampled at IITA Tanzania and for maize will be pre-tested using serological methods for aflatoxin and fumonisin. For those testing positive 250 samples will be sent to IFA Tulln. All 500 prepared samples of cassava will be forwarded to IFA Tulln for full mycotoxin screening (quantification and qualification). Results will be shared and discussed via a wrap up workshop.

## **Annex 1; Publicity generated:**

Projects to combat mycotoxin contamination in Tanzania launched, 2012. Africa Science News 26th April, 2012. <http://www.africasciencenews.org/en/index.php/life-and-style/49-food/410-projects-to-combat-mycotoxin-contamination-in-tanzania-launched>

Daily news, Research to control food contamination launched [http://dailynews.co.tz/index.php/local-news/4461-research-to-control-food-contamination-launched 24/04/12](http://dailynews.co.tz/index.php/local-news/4461-research-to-control-food-contamination-launched-24/04/12)

Feed the Future, Research to control food contamination launched <http://feedthefuture.gov/country-tagged-content/tanzania?page=1>

IITA News Blog, Making food safe: Two projects to combat mycotoxin contamination in Tanzania launched <http://iitanews.blogspot.com/2012/04/making-food-safe-two-projects-to-combat.html>

Africa news science, <http://www.africasciencenews.org/en/index.php/life-and-style/49-food/410-projects-to-combat-mycotoxin-contamination-in-tanzania-launched>

CGIAR roots and tubers, Making food safe: Two projects to combat mycotoxin contamination in Tanzania <http://www.rtb.cgiar.org/news-blog/feeds/b3e7b943cb36a95fd9aa96ddf5ddec94>

Non-Profits blog, Making food safe: Two projects to combat mycotoxin contamination in Tanzania <http://nonprofitblogs.info/making-food-safe-two-projects-to-combat-mycotoxin-contamination-in-tanzania-launched/>

The Guardian (an editorial), We can rescue our agriculture, <http://www.ippmedia.com/frontend/index.php?l=40864> 24/04/12

Newstime Africa, Making food safe: Two projects to combat deadly mycotoxin contamination in Tanzania launched <http://www.newstimeafrica.com/archives/25409> 26/04/12

Netherlands Aid, Food Dangers, Poison, <http://www.nl-aid.org/continent/sub-saharan-africa/food-dangers-poison/> 26/04/12

The Citizen, Killing ourselves and our cows softly, <http://thecitizen.co.tz/sunday-citizen/-/22677-killing-ourselves-and-our-cows-softly> 27/5/12

Pulver Media, <http://www.pulvermedia.com/8d7adeceh608e66532912/killing-ourselves-and-our-cows-softly.html>

Multi-stakeholder workshop to launch two new mycotoxin projects for Tanzania; funded by USAID and BMGF/DFID. IITA e-Bulletin No. 2117 (23-27 April 2012)

## **Annex 2; Sampling protocol for maize, cassava and groundnuts from field, household and market in Tanzania**

### **Introduction**

This document is produced as a guide for collection of dried maize, cassava and groundnuts samples for mycotoxins analyses under two projects which are being run concurrently:

1. Mycotoxin contamination in Tanzania: quantifying the problem in maize and cassava in households and markets which is funded by AFRICA RISING initiative of USAID Feed the Future (FtF). This project involves eight regions of Tanzania which are Tanga, Manyara, Dodoma, Mwanza, Morogoro, Iringa, Ruvuma and Mtwara with an objective of quantifying mycotoxin contamination levels on maize and cassava in Tanzania, and provide an objective basis for commissioning interventions to dramatically improve the health and livelihoods, and increase income of rural households.
2. Expansion of Biological control to manage Aflatoxin in maize and groundnut using regionally-adapted beneficial fungi in Eastern and West Africa. In this project nine regions of Tanzania will be involved which are Manyara, Dodoma, Tabora, Rukwa, Shinyanga, Morogoro, Iringa, Rvuma and Mtwara. The objective of this project is to develop and then manufacture a biocontrol product (Aflasafe™) based on native atoxigenic strains of *Aspergillus spp.* that can reduce aflatoxin contamination by as much as 99% and hence improve the health and livelihoods, and increase income of rural households.

In this survey work, samples of the above mentioned crops will be collected from 11 regions for the two projects and within the regions two to six districts have been selected based on availability of the crops. There will be four survey groups and each group will be constituted by the following personnel:

- 1 scientist from the leading institution (IITA, TPRI, MAFSC, TFDA and SUA); 2 scientists will be required where two vehicles are used, so that each scientist will lead a sub-group for sampling)
- 1 local Extension Officer
- 1 driver from the leading institute (two where two vehicles are used)

The leading institution will pay all the costs involved in the survey by sourcing out from the funds supplied by IITA according to the contract.

DSAs for all personnel: 65,000/= shillings per person per day for scientists, 55,000/= shillings per person per day for drivers and 10,000/= shillings per person per day for local Extension Officer provided that they will not require accommodation, compensation to the farmer for the collected sample which is 0.5 kg minimum and 1kg maximum (the cost will be based on the current local market price plus 10%)

The following tables show the survey programs for each of the four groups.

**Survey 1: To be led by International Institute of Tropical Agriculture (IITA) and Tanzania Pesticides Research Institute (TPRI) and DALDO**

Region	District	AR	PACA*	AR maize stored	AR cassava fresh/dried	AR cassava processed	PACA groundnut field
		maize field					
Manyara	Babati	50	20*	50			20
	Kiteto	50	20*	50			
	Hanang	50	20*	35			
Dodoma**	Bahi				30		20
	Chamwino						20
	Dodoma			30			
	Kondoa	50	20*	35	30		
	Kongwa	50	20*	50			30
	Mpwawa						20
Tanga	Pangani					30	
	Handeni					30	
<b>Total</b>		<b>250</b>	<b>100</b>	<b>250</b>	<b>60</b>	<b>60</b>	<b>110</b>

\* Maize field for PACA samples to be sub-sampled from AF samples

\*\* For Dodoma, in addition to DALDO need to include Anthony Lyamunda of CESOPE: [cesopetz@gmail.com](mailto:cesopetz@gmail.com) , +255 754 340 690, Dodoma town

**Survey 2: To be led by Tanzania Food and Drugs Authority (TFDA) and DALDO**

Region	District	AR	PACA	AR maize stored	AR cassava fresh/dried	AR cassava processed	PACA groundnut field
		maize field					
Tabora	Urambo						20
	Nzega						20
Rukwa	Nkasi		20				
	Sumbawanga		20				
Shinyanga	Kahama						20
	Bukombe						20
Mwanza	Ukerewe					60	
	Misungwi					60	
<b>Total</b>			<b>40</b>			<b>120</b>	<b>80</b>

**Survey 3: To be led by Sokoine University of Agriculture (SUA) and DALDO**

Region	District	AR	PAC A	AR	AR	AR	PACA
		maize field		maize stored	cassava fresh/drie d	cassava processed	groundnu t field
Morogor o	Kilosa		20	10		20	
	Ifakara		20			20	
Iringa	Iringa Rural		20	10		20	20
	Makambak o		20			20	
Ruvuma	Songea		20	10		20	
	Mbinga		20	10		20	
<b>Total</b>			<b>120</b>	<b>40</b>		<b>120</b>	<b>20</b>

**Survey 4: Done by Ministry of Agriculture Food Security and Cooperatives (MAFSC) – Naliendele and DALDO**

Region	District	AR	PAC A	AR	AR	AR	PACA
		maize field		maize stored	cassava fresh/drie d	cassava processe d	groundnu t field
Mtwara	Nanyumbu						20
	Masasi					60	20
	Tandahimba					60	
<b>Total</b>						<b>120</b>	<b>40</b>

Samples will be collected from households and markets. Within a household, field and stored samples will be collected separately. The samples collected will be delivered to IITA in Dar-es-Salaam as soon as the work is completed for grinding, sub-sampling, packaging and dispatch to laboratories for mycotoxins analyses.

## Materials required for each survey group in the field

- Protocols
  - 10 for Survey group 1
  - 10 for Survey group 2
  - 10 for Survey group 3
  - 10 for Survey group 4
- Questionnaires:
  - 850 for Survey group 1
  - 250 for Survey group 2
  - 350 for Survey group 3
  - 200 for Survey group 4
- Coloured-printed and laminated mycotoxin factsheets for DALDOs in English
  - 25 for Survey Group 1
  - 25 for Survey Group 2
  - 25 for Survey Group 3
  - 25 for Survey Group 4
- Coloured-printed and laminated mycotoxin factsheets for farmers in Kiswahili
  - 1050 for Survey Group 1
  - 500 for Survey Group 2
  - 400 for Survey Group 3
  - 250 for Survey Group 4
- GPS handsets:
  - 2 handsets for Survey group 1
  - 1 handset for Survey group 2
  - 1 handset for Survey group 3
  - 1 handset for Survey group 4
- Paper bags (brown A3 envelopes) of 5kg capacity for dried sample from each sampling station: household or market:
  - 840 pieces for Survey group 1
  - 248 pieces for Survey group 2
  - 308 pieces for Survey group 3
  - 165 pieces for Survey group 4
- Rubber bands:
  - 840 pieces for Survey group 1
  - 248 pieces for Survey group 2
  - 308 pieces for Survey group 3
  - 165 pieces for Survey group 4

- Polrique bags of 50kg capacity to store the collected samples:
  - 87 pieces for Survey group 1
  - 27 pieces for Survey group 2
  - 33 pieces for Survey group 3
  - 18 pieces for Survey group 4
  
- Clip boards:
  - 4 pieces for survey group 1
  - 2 pieces for survey group 2
  - 2 pieces for survey group 3
  - 2 pieces for survey group 4
  
- Pencils for data recording on the questioner:
  - 4 boxes for survey group 1
  - 2 boxes for survey group 2
  - 2 boxes for survey group 3
  - 2 boxes for survey group 4
  
- Pencil sharpeners:
  - 4 pieces for survey group 1
  - 2 pieces for survey group 2
  - 2 pieces for survey group 3
  - 2 pieces for survey group 4
  
- Marker pens:
  - 8 pieces for survey group 1
  - 4 pieces for survey group 2
  - 4 pieces for survey group 3
  - 4 pieces for survey group 4
  
- Sisal rope, to use a 0.5m long piece for one polrique bag:
  - 44 running meters for survey group 1
  - 14 running meters for survey group 2
  - 17 running meters for survey group 3
  - 10 running meters for survey group 4
  
- Umbrellas:
  - 4 pieces for survey group 1
  - 2 pieces for survey group 2
  - 2 pieces for survey group 3
  - 2 pieces for survey group 4

## **District Survey Planning Meeting**

The scientist from the survey leading institution need to find the contacts of the DALDOs of the districts where the survey is supposed to be done well before the date of District Survey Planning Meeting to request for the meeting and venue within the district offices. DALDO contacts may possibly be found from the Regional Agricultural Offices or from the Ministry of Agriculture Food Security and Cooperatives (MAFSC).

Prior to sampling work, a meeting will be conducted in DALDO'S office in the district in question to introduce the projects' objectives and plan for the survey. Together with the DALDO, this meeting will involve one scientist from the institution leading the survey. The DALDO will provide district map to facilitate planning for the villages to be visited. He/she will also provide phone numbers of the local Extension Officers located in the villages to be visited. The leading scientist and the DALDO will discuss and agree on the survey itinerary to get the most representative samples from the district. Each Extension Officer will be phoned by the scientist from the leading institution from DALDO's office to ensure his/her availability during the survey planning meeting. Arrangements are then be done with the local Extension Officers so that the scientist can meet each of the in their respective villages for sampling. The scientist from the leading institution will train Extension Officers about administering the questionnaires and sampling procedures in the field when they meet.

## **Sampling methods and procedures**

In order to provide representative samples and consistence in sampling method for all groups, the following points should be taken into account by each survey group:

- In each sampled district, 10 villages are selected from the list of villages having the product in question. The villages are selected as far apart as possible in order to represent the whole district. The list of villages is expected to be provided by the DALDO.
- From each village 2, 3 or 5 samples are collected basing on the number of total samples needed from that district. For instance if a total number of samples needed in a district is 20 and as we need 10 villages from the district, 2 samples (households/markets) will be needed; consequently 3 and 5 samples will be needed from a village where the total number of samples from the district is 30 and 50 respectively.
- Clear and detailed explanation should be given to farmers about what is needed and for which purpose. This will minimize farmers' suspicions and the feeling that their dried cassava for instance is too dirty to be given to researchers (guests). It is very important that we do not collect only clean samples and for the farmer to realise that all samples are acceptable and will not reflect badly on them. The bad samples are more likely to have mycotoxin contamination
- Effective time use
  - After the Extension Officer is trained on the sampling procedures and the use of the questionnaires the following are proposed to effectively use the time.



- Where 2 samples are required per village, the Extension Officer and the scientist will take one household separately which are reasonably far from one another to interview the farmer and collect the sample
- Where 3 samples are required per village, the Extension Officer and the scientist will share the first household/market and then they will separate, each taking a different direction and reasonably distant from one another
- Where 5 samples are required per village, the two will do as point three above to have the first three samples and then each will again take another direction for the fourth and fifth samples

### Sampling procedures

1. Briefly and clearly explain the interviewee your intention and reason of collecting from him/her the sample of the crop in question.
2. Fill in the questionnaire provided with all information needed as indicated.
3. Show the coloured-printed photographs of crops infected with mycotoxins to the interviewee and ask if he/she has seen such symptoms in his/her crop. Fill in his/her answer on the appropriate space in the questionnaire.
4. See the package(s) of the sampling space and draw sub-samples from each if there are more than one packages of the same lot as will be explained by the interviewee, then mix the sub-samples to have the required quantity of sample.
5. Put the sample in the paper bag (envelope) provided.
6. Correctly, using a pencil write a label by copying the sample code already filled in on the questionnaire on a piece of paper and put this label inside the envelope containing the sample.
7. Roll the envelope containing the sample and the label from the bottom upwards, and when reaching the flap remove the paper tissue from the flap to expose its sticky side, then press the flap on the side of the envelope to hold on and prevent unrolling.
8. Correctly write the same sample code on the roll and wrap on a rubber band.

**NOTE:** Sample code writing on the questionnaire is very important and labels must be written onto outside of envelope and also onto a piece of paper placed inside the envelope. The label should be made up of the following sequence:

**day and month / crop / district / farm code.**

The crop names will have to be abbreviated (CA. for cassava, GR. for groundnuts and MA. for maize) but the district names written in full. In the sample code everything will be written in capital letters, for example, 1405/CA/HANDENI/01 where 14 stands for the 14<sup>th</sup> day and 05 for the month of May, CA for cassava, HANDENI is the name of a district and 01 is the farm code meaning that it was the first farm visited in Handeni District. The next sample collected on the same day in this example will then be 1405/CA/HANDENI/02.

9. Place the rolled envelope of the sample in the polirique sack and proceed for the next sampling station (household/market).

10. When the polrique sack has accommodated samples of approximately 50kg, tie it up at the 'neck' using sisal rope and pack it in the car. Start another empty sack in the next sampling station.
11. Keep all samples dry in the vehicle and avoid any moisture risk. For this reason a vehicles used in these surveys are preferably station wagons to avoid spoilage by rain if the vehicle is a pick-up.
12. Temporary storage of the samples awaiting for dispatch to IITA Dar-es-Salaam should also be done in a moisture-free environment.
13. Dispatch the samples to IITA Dar-es-Salaam, ensuring moisture-free environment.
14. In case the collected sample (especially cassava) is not dry (i.e. feels moist and cool to the touch) the sample must be air-dried. This can be done in either the village or ward or district office room or in the hotel room. This is to avoid keeping moist samples that may develop unwanted microbes and contaminants. This should be done carefully with clear labeling in order to not mix up samples and in a way to prevent spoilage, theft, wind disruption or eaten by animals.

## Questionnaire

### Questionnaire for field / market samples from surveys for Mycotoxins

FARM INFORMATION	
Interviewee (Farmhead) name:  Sex: M <input type="checkbox"/> F <input type="checkbox"/>	Date:  Interviewer name and institution:
Farm code/number:	GPS latitude:
Region:                      District:	GPS longitude:
Village:	GPS altitude:
Education: primary <input type="checkbox"/> secondary <input type="checkbox"/> tertiary <input type="checkbox"/> none <input type="checkbox"/>	Money received for sample:
Wealth status: bicycle <input type="checkbox"/> motorcycle <input type="checkbox"/> car <input type="checkbox"/> tractor <input type="checkbox"/> truck <input type="checkbox"/> oxen <input type="checkbox"/> power tiller <input type="checkbox"/> none <input type="checkbox"/>	Signature:
Have you heard of mycotoxins yes                      no <input type="checkbox"/> <input type="checkbox"/>	Have you ever been sick after eating food made from the crop you gave us? yes <input type="checkbox"/> no <input type="checkbox"/>
Comments, if any:	

**MAIZE, CASSAVA AND GROUNDNUTS**

Sample type (MAIZE): pre-harvest <input type="checkbox"/> post-harvest <input type="checkbox"/> cob <input type="checkbox"/> grain <input type="checkbox"/>		Sample type (GROUNDNUTS): pre-harvest <input type="checkbox"/> post-harvest <input type="checkbox"/> unshelled <input type="checkbox"/> shelled <input type="checkbox"/>	
Processing method (CASSAVA): Makopa <input type="checkbox"/> Kivunde <input type="checkbox"/> Udaga <input type="checkbox"/> Kondowole <input type="checkbox"/> Nyange <input type="checkbox"/> Smoked <input type="checkbox"/> Other: _____			
Previously grown crop(s):		Planting date:	
Harvested date:		Harvest date (expected):	
Tillage method: none <input type="checkbox"/> hand/hoe <input type="checkbox"/> ox <input type="checkbox"/> Other: _____		Planting pattern: flat <input type="checkbox"/> on ridges <input type="checkbox"/> on mounds <input type="checkbox"/>	
Pre-harvest treatment (name(s) and quantity):		Post-harvest treatment (name(s) and quantity):	
Harvested wet or dry? wet <input type="checkbox"/> dry <input type="checkbox"/> do not know <input type="checkbox"/>			
Drying methods: mats <input type="checkbox"/> roof <input type="checkbox"/> floor <input type="checkbox"/> smoke <input type="checkbox"/> Other: _____			
Storage (MAIZE AND CASSAVA): on cob <input type="checkbox"/> as grains <input type="checkbox"/> in sacks <input type="checkbox"/> not in sacks <input type="checkbox"/> open crib <input type="checkbox"/> mud house <input type="checkbox"/> brick sheltered <input type="checkbox"/> Other: _____		Storage (GROUNDNUTS): unshelled <input type="checkbox"/> shelled <input type="checkbox"/> in sacks <input type="checkbox"/> not in sacks <input type="checkbox"/> open crib <input type="checkbox"/> mud house <input type="checkbox"/> brick sheltered <input type="checkbox"/> Other: _____	
Sample source for households :      home <input type="checkbox"/> away from home <input type="checkbox"/> :  <5km <input type="checkbox"/> 5-10km <input type="checkbox"/> >10km <input type="checkbox"/>		Sample source for markets: Did the seller produced the product? Yes <input type="checkbox"/> No <input type="checkbox"/> :  obtained from how far away: <5km <input type="checkbox"/> 5-10km <input type="checkbox"/> >10km <input type="checkbox"/>	
How long has it been stored (weeks):		Intended use:  household <input type="checkbox"/> market <input type="checkbox"/> animal feed <input type="checkbox"/>	
Comments/Remarks:			