

IFAR Small grants Program final report

Title: Research capacity building on mycotoxins in Cameroon through a study on diversity in *Fusarium* species causing ear rots of maize and sorghum in Cameroon, West Africa.

NARS professional: Dr. Zachee Ngoko, Plant Pathologist, Institute for Agricultural Research and Development (IRAD), Bambui, Box 80, Bamenda, Cameroon.

IITA liaison scientist: Dr. Ranajit Bandyaypaday, Plant Pathologist, IITA, Ibadan, Nigeria in collaboration with Dr. John Leslie, Kansas State University (KSU), USA with funding from USAID.

Duration of the project: June to December 2004.

Objective:

The objectives of this proposal were to build capacity of a NARS scientist in Cameroon to study the distribution and diversity of *Fusarium* species in Cameroon and subsequently determine the extent of contamination of maize and sorghum grains with *Fusarium* mycotoxins during pre- and post-harvest stages.

Background

Ten scientists from Burkina Faso, Cameroon, Costa Rica, China, Ethiopia, Kenya and India were recognized by IFAR, a foundation, dedicated to fostering scientific excellence in agriculture through the Consultative Group on International Agricultural Research (CGIAR) by way of partnerships, collaboration and awards in 2004. We were among these recipients. In collaboration with Dr Ranajit Bandyaypaday was planned for June to December 2004. From the support provided by IITA and Kansas State University, a one-year contract was signed between the Institute of Agricultural Research for Development (IRAD and the International Institute of Tropical Agriculture (IITA). With this agreement, Dr Zachee Ngoko was seconded to IITA Nkolbisson, Yaoundé starting November 1. 2004 to continue the work started on *Fusarium* diversity in Cameroon.

Work carried out:

Capacity Building (Human resources)

1. Dr. Ngoko received training on *Fusarium* identification in a workshop during 25 September to 2 October 2004 at the University of Pretoria, South Africa. The training dealt with *Fusarium* handling procedures and new morphological, genetic and molecular tools used for *Fusarium* identification. Practical hands-on experience with a collaborative research activity was carried out.
2. Dr Ngoko visited IITA maize pathology laboratory in Ibadan for two weeks. During this period we applied *Fusarium* identification methodologies and ELISA techniques to quantify total Fumonixins in maize samples collected in Nigeria, in order to harmonize the work protocol between Cameroon and Nigeria. Several interactions took place between Dr Ngoko and Dr Menkir, (Maize breeder); Dr Badu Apraku (WECAMAN coordinator), Dr Olu Osiname Cereals Agronomist, (WARDA liaison Scientist), Sam Ofilade, (Biometrician).
3. Dr Ngoko also participates to two seminars (One internal and the other one International). This was a very good exposure to the international communities in Ibadan.
4. A secondment agreement was signed between IRAD and IITA whereby Dr. Ngoko will spend at least 30 % of his working time in IITA Humid Forest Station in Nkolbisson Yaoundé. During this period, mycological analysis of samples collected in the WHL and northern Cameroon and especially those collected from market places in Cameroon earlier in the season will be carried out.

Capacity building (Equipments)

The project bought:

- A computer and accessories
- A digital camera
- Laboratory equipments including:
 - Elx800 Universal Microplate Reader
 - Kits for fumonixins analysis
 - Automatic pipettes

B. Fusarium Diversity in Cameroon

1. Maize and sorghum grain samples were collected from the humid forest and Western Highlands (September 2004). In this agro-ecological areas the survey was conducted with the collaboration of Dr Mwangi Maina (IITA Plant Pathologist. Samples were collected from 15 locations (5 in Center province, 5 in West and 5 in North West). In each location, 81 samples were collected from maize cobs (2 grains per cobs taken from the tip of the cob); they were kept in appropriate plastic bags pending incubation on PPA. From each fifth cob, about 0.5 kg of maize grains was collected for mycotoxins analyses. These samples were stored in a fridge pending analysis.

2. In the Soudano-sahalian areas the team was made up of Pr John F. Leslie (Molecular Biologist Kansas State University, Kansas USA), Dr Ranajit Bandyaypaday, (Senior Plant Pathologist IITA Ibadan Nigeria), Dr Zachee Ngoko, (Plant Pathologist, IRAD Bambui, Bamenda Cameroon).

In this part of Cameroon, the survey was conducted in 12 locations from Mbe in Adamaoua Province to Moutouroua in the Extreme North province. In each location, 81 samples were collected and immediately incubated in PPA vials for fungi identification, biological and molecular investigations. Each fifth plant (head for sorghum and ear for maize) was threshed and 0.5 kg collected for mycotoxins analysis. Every day the grains samples collected were air dry to reduce the relative humidity.

Information related to each harvesting procedures and techniques were documented.

Samples handling procedures

Samples were divided into two sets. A complete set was sent in Kansas State University for analyses. A second set from the samples collected in the humid forest and western highlands was stored in the fridge in Yaoundé IITA Plant Pathology laboratory pending mycological and chemical analysis for different mycotoxins produced by *Fusarium* and to determine the association between mycotoxin profile and *Fusarium* species composition.

Others information collected

GPS information was also collected.

Expected outputs and impact: Enhanced collaboration between IITA and IRAD through a plant pathologist from Cameroonian national programs trained in new methods to identify *Fusarium* species and to quantify mycotoxins. The funding would improve research capacity and leadership roles of the Cameroonian NARS.

Looking ahead

This expected out will come to completion with the following realizations:

A. *Fusarium* diversity in Cameroon

- Data are awaited from Pr John Leslie (Kansas State University) to map up *Fusarium* in Cameroon.
- Mycological analysis on the sub-samples collected in the humid forest and western highlands in addition to the earlier collected market samples to be carried out.

B. Extend of contamination of maize and sorghum grains with toxigenic *Fusarium* and related mycotoxins.

All samples (maize and sorghum) collected in the sahalian zone were sent to Kansas State University.

Fumonixins analysis of one set of maize samples collected in the humid forest and western highlands and the market samples (western highlands) to be executed.

C. Varietal predisposition to pre-and post-harvest contamination

The evaluation of some Cameroon maize genotypes (15-20 genotypes) to ear rots due to *Fusarium* spp and subsequent mycotoxins contamination will be carried out in and Bambui and Foubot (Dschang ?)

1. Available

- Work protocol (see annex)
- Land in Bambui (1300 m a.s.l.), Foubot (1000 m a.s.l.) and possibly Dschang (1500 m a.s.l.)
- Collaborators: 1 student and a technician

2. Future needs

- Land preparation
- Purchase of field and office inputs

D. Capacity building

Training in mycotoxin analyses and risk assessment: Period and location to be arranged by Dr Bandyapadyay Ranajit.