



**IFAR 2006 Professional Development Program  
Completion Report  
[800 words]**

**Instructions:**

Please submit the completion report by email, using this form, through the sponsoring CGIAR Center to [ifar@ifar4dev.org](mailto:ifar@ifar4dev.org) within three months after the completion of the fellowship.

*Please check if Thalwitz Scholarship*

*Yes*

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Name of Applicant    -Dr. Flora Oluwafemi-----  
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Sponsoring CGIAR Center                      International Institute for Tropical Agriculture,  
Ibadan, Nigeria-----

### I. Work Program goals achieved (maximum length: 200 words)

Aflatoxins are a group of carcinogenic mycotoxins produced by *Aspergillus flavus*, *A. parasiticus*, and *A. nomius*. Due to the ubiquitous occurrence of aflatoxins, detoxification is highly desirable. We investigated a biological detoxification method using *Lactobacillus* species. Maize grains with moisture content of 17% were artificially inoculated with 1 ml of  $10^6$  spores/ml of toxigenic *Aspergillus flavus* (LA 3228) and atoxigenic *Aspergillus flavus* (LA3279) separately for 6 days at ambient temperature. We created four concentrations (50, 100, 200, 500 ng/kg) of aflatoxin B<sub>1</sub> (AFB<sub>1</sub>) from inoculated maize grains. *Lactobacillus acidophilus*, *L. brevis*, *L. casei*, *L. delbruekii*, and *L. plantarum* were used to inoculate fermenting maize at 37°C. The residual AFB<sub>1</sub> in maize was determined using TLC Scanner 3. All treatments showed significant reductions ( $P < 0.05$ ) in AFB<sub>1</sub>. Inoculation increased the pH of the medium from 4.0 to 5.0. AFB<sub>1</sub> in maize lots with 50 ng/kg was reduced by 44.5%, while the level of AFB<sub>1</sub> in grain lots having 500 ng/kg aflatoxin was the least reduced by 29.9%. *L. plantarum* was the most efficient organism amongst those screened for degrading aflatoxin. Use of lactic acid bacteria, which already has the Generally Regarded As Safe (GRAS) status, should be encouraged as a bio-detoxification agent.

### II. Plans for follow-up (maximum length: 200 words)

**Development Of Transgenic Corn Cultivars Capable Of Catabolism/Interference With Toxin Production:** The literature search as to work in this aspect showed that up to date no work has been done on this topic with respect to isolation of aflatoxin degrading genes from lactic acid bacteria. This will involve culturing of lactic acid bacteria cells. Sequencing the genome of *L. plantarum* and compare this genome with genome of lactic acid bacteria that is non-degrading would assist to isolate the degrading genes. Mapping the resistance genes in maize is necessary because different maize inbreds or landraces may have different reactions to aflatoxin resistance, a genetic trait that transferable. Successful lines can be cultured on tissue culture. These new variants can be multiplied. Field trials can be run by artificially inoculating the transformants with toxigenic strains of *Aspergillus flavus*. Successful trial experiment will lead to multiplication of seeds. The seeds will have inherent ability to resist aflatoxigenic moulds in the field and also improve post-harvest characters. This experiment if successful will solve the aflatoxin problem immensely..

**III. Report budget utilization including whether budget was spent as planned (maximum length: 100 words)**

The budget utilization was more or less as per plans. A freezer cum refrigerator was purchased for the grantee out of the project funds and delivered to her lab in the University. The Laminar Flow Hood was not purchased, but with prior approval from IFAR, the allocation was used by the grantee to participate in 1) a training workshop on toxigenic fungi, and 2) an international conference on mycotoxins (Bari, Italy) where she presented a poster. Professional development allowance of \$1000 was provided to the grantee. The total expenditure on the project was \$11,169 against IFAR allocation of \$11,000.

**IV. Assessment of the fellowship experience and general comments. (maximum length: 300 words)**

The fellowship experience is one that cannot be forgotten. Firstly I want to appreciate the sponsors for giving me this great opportunity to be awarded this fellowship. As a result of the fellowship I was able to participate in a mycotoxin-training program in Italy where I acquired more skills, interacted with scientists from all over the world. It broadened my perception of the field of mycotoxicology. We were taught modern techniques on mycotoxin detection and improvements on existing methodologies in order to achieve excellent results. Apart from the education and social aspects of the mycotoxin training program sponsored by IFAR, the far reaching effect of the training on the output of the project was enormous. The methodology was improved and had direct impact on the reproducible results obtained in the 5 replicates each in 70 treatments totally 140 samples. The credit of this success is largely due to the CGIAR center where most of the work was carried out. This is the International Institute of Tropical Agriculture, Ibadan, Nigeria. Nigerians see it as an Institute in Developed countries and indeed that was exactly what I experienced in this Institute. Before the commencement of the experiment all necessary equipment, chemicals had been put in place. All logistics as to efficient experimentation was on ground. This enabled me to actualize the objectives of this study. Working late into the night was made possible because the security was in place and most especially access to Internet facility was right there in the laboratory. We could easily check literatures and be current of happenings in the field of study. I would there make an appeal to the sponsors to continue sponsoring programs such as this in order to improve to the food security and availability of wholesome foods to teeming populations of developing countries.