NORMAN E. BORLAUG INTERNATIONAL AGRICULTURAL SCIENCE AND TECHNOLOGY FELLOWSHIP PROGRAM (BORLAUG FELLOWSHIP PROGRAM)

FISCAL YEAR 2015 REQUEST FOR EXPRESSIONS OF INTEREST for FOOD SAFETY & PROCESSING

Application Deadline: June 7, 2015
Email: BorlaugFellowships@fas.usda.gov
Website: http://www.fas.usda.gov/programs/borlaug-fellowship-program

Catalog of Federal Domestic Assistance Number (CFDA) – 10.777

USDA Funding Opportunity Number: BFP-2015-Food Safety & Processing
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2015 Borlaug Fellowship Program: Food Safety & Processing

U.S. DEPARTMENT OF AGRICULTURE
FOREIGN AGRICULTURAL SERVICE
BORLAUG FELLOWSHIP PROGRAM

Summary of Award Opportunity

USDA’s Foreign Agricultural Service (FAS) is seeking U.S. universities to host English-speaking agricultural scientists from low and middle-income countries under the Norman E. Borlaug International Agricultural Science and Technology Fellowship Program (Borlaug Fellowship Program). These Fellows have been competitively selected based on research priorities, academic and professional accomplishments, commitment to Borlaug Fellowship Program goals, and leadership qualities. The Fellow’s proposal and research plan appears at the end of this notice. USDA recommends that the program begin in Fall 2015; however, priority should be given to a time that is appropriate for the Fellow’s proposed research topic. The program’s duration should be 12 weeks unless otherwise indicated.

Each Fellow has a specific research topic. Here is a summary of the applicants and a brief description of their research topics:

1. Fellow 1 (Female); Zambia; Food Safety: Development of food safety control system for Zambia.
2. Fellow 2 (Female); Egypt; Food Safety: Development of food safety, food control, and microbiological hazards of meat.
3. Fellow 3 (Female); Vietnam; Food Safety: Improving analytical skills, methods of control antibiotics, mycotoxin, and growth promotant residues in feedstuff and products of animal origin using advanced techniques. (LC MS/MS and GC)
4. Fellow 4 (Female); Tanzania; Food Safety/Aflatoxin: Identify the fungal strains, the level of aflatoxins, and conduct an analysis of the contamination of groundnuts.
5. Fellow 5 (Female); Egypt; Food Safety Policy: Investigate the implementation of sequencing technologies, microbial research, molecular diagnosis and epidemiology to support the diagnosis and control of animal diseases diagnostic.
6. Fellow 6 (Female); Malawi; Food Safety/Aflatoxin: To evaluate aflatoxin contamination levels in groundnuts under different drying methods.
7. Fellow 7 (Female); Rwanda; Food Safety (Post Harvest Technology/Aflatoxin): Identify the prevalence of aflatoxin in wheat to determine genetic diversity of Aspergillus flavus and correlation of aflatoxin contamination to specific nutrient content of wheat for improved health and trade accessibility.
8. Fellow 8 (Male); Rwanda; Food Safety (Post harvest Technology/Aflatoxin): Evaluation of aflatoxin levels in maize flour products.
9. **Fellow 9** (Male); Mexico; Food Processing: Research local vegetal species using different methods.

10. **Fellow 10** (Female); Ghana; Food Processing: Research use of soybeans and peanuts in the preparation of complementary foods (weanimix) in Ghana with the goal of identifying strategies that will facilitate the production and consumption of nutritious and aflatoxin-safe weanimix.

Section IX provides each Fellow’s proposal with background information and research plan.

This notice identifies the Borlaug Fellowship Program deadline, legislative authority, eligibility and proposal requirements, funding restrictions, cost share requirements, allowable and unallowable costs, reporting requirements, program purpose and priorities, focus areas and recommended topics, application and submission information, application review, selection and notification process, agency program contact information, and mailing address.

**CATALOG OF FEDERAL DOMESTIC ASSISTANCE:** This program is listed in the Catalog of Federal Domestic Assistance under 10.777.

**AWARD TYPE:** Cost Reimbursable Agreement for U.S. Universities

**DEADLINE:** Applications must be received by June 7, 2015.


FAS reviews proposed project costs to make certain those costs are reasonable and allowable per applicable federal regulations. This program is subject to the provisions of 2 CFR Part 200, grant, cooperative, joint venture, and cost-reimbursable agreement recipients/cooperators (including, universities, non-profits, States, Cities/Counties, Tribes, for-profits, and foreign organizations) are subject to Title 2 of the Code of Federal Regulations and other legal requirements, including, but not limited to:

1. 2 CFR Part 25, Universal Identifier and Central Contractor Registration
2. 2 CFR Part 170, Reporting Subaward and Executive Compensation Information
3. 2 CFR Part 175, Award Term for Trafficking in Persons
4. 2 CFR Part 180 and Part 417, OMB Guidelines to Agencies on Government wide Debarment and Suspension (Nonprocurement)
5. 2 CFR Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. University indirect costs for cost reimbursable agreements are limited to 10% of direct costs (7 USC 3319a).
Section I: Funding Opportunity Description

A. PROGRAM DESCRIPTION

The Norman E. Borlaug International Agricultural Science and Technology Fellowship Program promotes food security and economic growth by increasing scientific knowledge and collaborative research to improve agricultural productivity. This program targets promising, early- to mid-career, English-speaking scientists and policymakers from developing or middle-income countries. Fellows spend 8-12 weeks in the United States and work one-on-one with U.S. scientists in their field. Mentors coordinate the Fellows’ training, and they visit the Fellows’ countries for 5-10 days within 6-12 months after completion of the training in the U.S. to continue collaborative efforts.

During the program, the Fellows learn new research techniques, gain exposure to the latest scientific developments in various fields of agriculture, access fully-equipped laboratories and libraries, and learn about unique public-private partnerships that help fund agricultural research and science. Equally important, this program provides international scientists and policymakers with opportunities to establish long-term contacts with U.S. scientists and to apply newly gained knowledge from U.S. institutions to their country's research and development programs.

B. PROGRAM RESPONSIBILITIES OF HOST INSTITUTIONS

Assignment of a Principal Investigator (Training Coordinator)
The host institution will designate a contact person as the Principal Investigator (PI) responsible for coordinating all administrative and programmatic arrangements.

Assignment of a Mentor
A key component of the program is matching the Fellow with a mentor. The host institution will select an appropriate mentor for one-on-one work with the Fellow for the duration of the program.

Mentor Roles
- The mentor will establish a professional relationship, providing guidance and training in the Fellow’s research and studies.
- The mentor will work with the Fellow before arrival to discuss appropriate work plan, site visits, and other arrangements. A work plan should be agreed upon and finalized no later than 2 weeks after the program start date.
- The mentor will provide draft of work plan through the PI to USDA/FAS for consultation and approval approximately 2 weeks before the commencement of the program.
- The mentor agrees to commit a significant amount of time each week for one-on-one work with the Fellow during the program.
- The mentor will continue communicating with the Fellow beyond the end of the program in the U.S. through the mentor visit.
Mentor will submit quarterly progress reports that indicate all program activities conducted (form SF-PPR).

The mentor may assign other faculty members to assist with Fellow’s training and research activities.

Mentor may not be assigned to multiple Fellows during the same time frame.

**Mentor Follow-up Visit**

- The mentor visit to the Fellow’s home institution is required, not optional.
- The mentor will work with the Fellow to plan a follow-up visit to the Fellow’s home country. The trip should occur within 6 months to 1 year after the program ends.
- The PI should provide USDA/FAS with an agenda for mentor’s travel, including goals and objectives.
- USDA/FAS must be consulted prior to finalizing plans or purchasing plane tickets. Mentor’s travel information must be provided for emergency contact purposes and country clearance if necessary.
- The mentor will provide a trip report highlighting the trip’s activities and results through the PI to USDA/FAS within 30 days after the visit.
- The mentor should plan to meet with the USDA/FAS Attaché or staff from the U.S. Embassy while they are traveling. USDA/FAS can assist with coordination prior to the trip.

**Visa**

- USDA/FAS will provide a DS-2019 for the Fellow to request and obtain a J-1 Visa. USDA/FAS will provide instructions to the Fellow regarding the application process, the amount of lead-time needed, and any paperwork required. The visa start and end date will be coordinated with the host institution who will be responsible for purchasing round trip plane tickets for the fellow to come to the U.S. for his or her program.

**Travel and Transportation**

- The host institution must comply with the Federal Travel Regulations (41 CFR 300 et seq.).
- The host institution will provide round trip, economy class, international airfare from the Fellow’s home to the university.
- The host institution is responsible for arranging and purchasing all domestic travel related to the Fellow’s training program.
- The host institution will provide housing for the Fellow for the duration of the training program, taking into account gender and cultural norms.
- The host institution will pay lodging fees directly. The host institution will not require the Fellow to pay for his or her lodging expenses, whether through reimbursement or advance payment.
- Lodging should include a private bedroom, private or shared bathroom, access to a laundry room, and access to a kitchen with pots, pans, and utensils.
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- Basic necessities, such as sheets, towels, and cleaning supplies (if not already provided), should be provided for Fellow’s use. The Fellow should not have to pay for these items.
- Lodging should be within walking distance to the campus/training location or easily accessible by public transportation.
- If public transportation is required to access campus/training location, the host institution will provide the Fellow with a bus pass or proper allowance for transportation expenses.
- When planning lodging options, the host institution should check with the Fellow and account for any special dietary restrictions or preferences.

Meals and Incidentals (M&IE)
- The host institution will provide each Fellow with meal and living allowances for the duration of stay.
- Daily M&IE allowance shall be calculated based on current GSA per diem rates. The host institution can determine the frequency of per diem allotments, but the Fellow must receive per diem within the first week of the Fellowship. Inform the Fellow and USDA/FAS immediately if this cannot be accommodated.

Emergency Health Insurance
- The host institution must purchase emergency health insurance for the Fellow for the duration of stay, as required for all J1 Visa holders (22 CFR 62.14).
- The Fellow should not be expected to purchase his or her own health insurance and then be reimbursed.
- The host institution will educate the Fellow as to what is covered under health insurance policy, especially highlighting that pre-existing medical conditions are not covered.
- The host institution will alert USDA/FAS staff if any health/medical conditions arise during the Fellowship.

Communication
- The host institution will initiate contact with the Fellow as soon as possible.
- The host institution will develop the training program in consultation with USDA/FAS and the Fellow.
- The host institution will keep USDA/FAS informed regarding any logistical or program planning.
- The host institution will notify USDA/FAS immediately upon Fellow’s physical arrival and departure from the U.S.
- The host institution will provide USDA/FAS with the Fellow’s temporary U.S. address and phone number, and emergency contact numbers for the PI, mentor, or other appropriate institution personnel. This information is required so that Fellow can be reached in the event of an emergency.
Fellowship Program
- The host institution will provide educational materials and supplies to each Fellow necessary for their full participation in the fellowship.
- The host institution will pay for all fees related to the Fellow’s training program, such as (but not limited to) technology fees, administrative fees, laboratory fees, etc.
- The host institution will arrange relevant field visits to a local farm, processing plant, private industry, or other related industry as applicable to the Fellow’s training program.
- The host institution will ensure the Fellow submits an interim and final report (2-3 pages each) to USDA/FAS before the Fellow leaves the United States. USDA/FAS will provide a report template.

Orientation
- The PI/Training Coordinator will communicate directly with the Fellow at least 4-8 weeks before his or her arrival in the U.S. to ensure that all pertinent information is provided, including:
  - Name and contact information of PI/Training Coordinator
  - Name and contact information of mentor
  - Institution information, weather information, and clothing needs
  - Housing and M&IE allowance
  - Program plan and anticipated site visits
  - Professional development expectations
  - Reminder to bring any necessary prescription medications
  - Explain what is and is not covered under emergency health insurance policy (e.g. no pre-existing conditions, no dental, etc.)
- Institution will provide an orientation upon the Fellow’s arrival to acquaint them with campus and community resources:
  - Explain and demonstrate local bus/transportation options
  - Explain cultural and legal expectations
  - USDA will provide a welcome and orientation packet for mentors

Progress Reports
- The Principal Investigator or Mentor will submit quarterly progress reports. The Principal Investigator or Mentor will use Performance Progress Report (SF-PPR) to submit quarterly progress reports.
- The Principal Investigator or Mentor will submit a final report to USDA/FAS within 30 days after the Mentor visit. USDA/FAS will provide additional guidance and a template for the final report.
- Reports should include the following:
  - Summary of activities, accomplishments, and any problems encountered or overcome
  - Photographs, when possible
  - Completed program evaluations and action plan
- An invoice cannot be paid if a progress report is past due.
Financial Reporting

- Financial reports will follow the Uniform Administrative Requirements for Grants and Agreements, 2 CFR 215.
- Invoices will use the Request for Advance or Reimbursement (SF-270).
- Invoices will be submitted electronically to SF-270InvoicesMailbox@fas.usda.gov and copied to the USDA/FAS program manager and USD/FAS program assistant.
- A final invoice must be submitted within 90 days of the end of the period of performance for the agreement.
- A detailed breakdown of expenses must be included with SF-270. Payment will not be processed without supporting documentation.
- A summary of expenses that aligns expense totals to the agreement’s budget line items must be included.
- Costs must be reported in accordance with the regulations that govern the agreement, and must follow the applicable Federal cost principles 2 CFR 200. The institution cannot be reimbursed for costs that are contrary to the specific terms of the agreement or are outside its scope.
- A Federal Financial Report (SF-425) must be submitted quarterly and within 90 days of the end of the period of performance for the agreement.
- An invoice cannot be paid if a financial report is past due.

Section II: Award Information

A. ESTIMATE OF FUNDS
Awards are anticipated to range from $25,000 to $36,000 per fellowship. USDA Foreign Agricultural Service will fund agreements for the Borlaug Fellowship Program. For more information on the Borlaug Program, please visit our website at: http://www.fas.usda.gov/programs/borlaug-fellowship-program.

B. START DATES AND PERFORMANCE PERIODS
Activities pursuant to this REI will be for a 2 year period. The estimated start date is on or about July 1, 2015 through June 30, 2017. Fellowships will begin between September 2015 and August 2016 depending on appropriate timing for activities to occur based on any seasonal needs for the program.

C. TYPE OF AWARD
USDA will enter into a cost reimbursable agreement with selected universities (7 CFR 3319a). Program staff will maintain involvement in the administration of the Borlaug Fellowship Program.
Section III: Eligibility Information

A. ELIGIBILITY REQUIREMENTS
Proposals may be received from U.S. state cooperative institutions or other colleges and universities and minority serving institutions (MSIs). Proposals from smaller academic institutions, MSIs (in particular American Indian, Alaska Native, Pacific Islander, Hispanic, Asian American, and African American institutions) are especially encouraged to apply.

A proposal from a consortium of organizations must be submitted as a single proposal with one U.S. institution serving as the lead and all other organizations as team members, when applicable. An individual mentor must be identified for each Borlaug Fellow. A single mentor may not host two fellows simultaneously. The Principal Investigator (PI) and mentor must hold a position at an eligible U.S. institution.

B. COST SHARING AND MATCHING REQUIREMENTS
• This program has no statutory formula.
• This program has no matching requirements.

C. FUNDING RESTRICTIONS
This is a cost reimbursable agreement issued under 7 U.S.C. 3319a.

Section IV: Application and Submission Information

A. ADDRESS TO REQUEST APPLICATION PACKAGE
This announcement contains all instructions and links to all forms required to complete the application. All applications must be submitted in a single PDF document. The application deadline is June 7, 2015. No mailed or facsimile submissions will be accepted.

B. CONTENT AND FORM OF APPLICATION SUBMISSION:
Institutions may submit proposals to host more than one Borlaug Fellow. Institutions interested in hosting one or more Fellows should submit a proposal following the guidelines below:

• Complete SF-424 Application for Federal Assistance for a single Borlaug Fellow. USDA/FAS cannot accept applications for multiple fellows in a single application.
• Indicate the name of the institution applying to host the Fellows
• Indicate the country, research interest, and reference number
• Identify a mentor. A Mentor may not be assigned to multiple Fellows who are in the U.S. at the same time.
• Provide a tentative research plan based on the Fellow’s research proposal and action plan, including topics covered, field visits, and other activities
• Include a narrative description of the proposed fellowship, how it will be administered, and the role of the university faculty and support staff
• Provide a summary of relevant institutional capabilities for hosting international scientists and policymakers in the proposed field
• Briefly describe the research expertise and international experience of the mentor in the Fellow’s field of interest
• Provide a one to two page curriculum vitae for the mentor and other collaborating researchers involved in the proposed program (not included in the page count maximum)
• Identify the expected skills or knowledge to be acquired by the Fellow at the end of the program
• Complete a budget using Standard Form -424A- Budget Information Non Construction Programs, including a detailed budget worksheet (see page 11) and a budget narrative.
  ▪ Provide a budget narrative (mandatory). All line items should be described in sufficient detail to enable FAS to determine that the costs are reasonable and allowable for the project in accordance with federal regulations.
  ▪ If attendance at the World Food Prize in Des Moines, Iowa during October 2015 is feasible, the budget should include time and funding for the Fellow and Mentor to attend. An adjustment to the Fellow’s M&IE must be made for the time spent in Iowa.
• Complete AD-3030, Representations Regarding Felony Conviction and Tax Delinquent Status for Corporate Applicants.
• Complete AD-3031, Assurance Regarding Felony Conviction or Tax Delinquent Status for Corporate Applicants
• Complete the Host University Administrative Checklist on university administrative policies
• Submit all application materials in a single email. Include all application information that is not a specific form in a single PDF document.

Successful applicants will be required to submit all relevant national certifications and compliance documents prior to awards being issued.
HOST UNIVERSITY ADMINISTRATIVE CHECKLIST

Please complete the following checklist concerning the university’s policies on providing per diem funds to exchange visitors. This information is for USDA internal use only and does not determine your eligibility to serve as a host institution.

<table>
<thead>
<tr>
<th>Host University Policies</th>
<th>YES</th>
<th>NO</th>
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<tbody>
<tr>
<td>Will the mentor listed in the proposal be present for the majority of the fellowship?</td>
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<td>Will the mentor be able to spend time meeting with fellow individually each week?</td>
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<td>Will the university be able to provide per diem within the first week of the Fellow’s arrival?</td>
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<td>Will the university be able to provide fully furnished lodging with kitchen facilities?</td>
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<td>Does the university withhold federal tax on the participants’ per diem and housing?*</td>
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*Note that Borlaug Fellows (as trainees, not students) are considered EXEMPT INDIVIDUALS under the IRS Substantial Presence Test for tax purposes. The exemption falls under one or both of the following categories: either the Foreign Government-Related Individuals standard or the Closer Connection Exception. The only requirement is to complete IRS Form 8843 (Sections 1 and 2). No taxes should be withheld from Borlaug Fellows since they are exempt.
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### Budget Worksheet

Host Institution:
Estimated Dates:
REI#/Country/Fellow#

<table>
<thead>
<tr>
<th>SF-424 Category</th>
<th>Line Items</th>
<th>Rate</th>
<th>Days</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fellow's Logistical Expenses</td>
<td>TRAVEL/Housing</td>
<td>1. Lodging</td>
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<td></td>
<td>TRAVEL</td>
<td>2. Meals and Incidentals</td>
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<td>OTHER</td>
<td>3. Federal Tax</td>
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<td></td>
<td>TRAVEL</td>
<td>4. Medical Insurance</td>
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<td>TRAVEL</td>
<td>6. Local Transportation</td>
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<td>TRAVEL</td>
<td>7. Airfare - International</td>
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<td>TRAVEL</td>
<td>8. Airfare - Domestic (If Applicable)</td>
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<td>Subtotal</td>
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<tr>
<td>Fellow's Professional Development</td>
<td>TRAVEL</td>
<td>1. Field Tours</td>
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<td>SUPPLIES</td>
<td>2. Educational Materials and IT Expenses</td>
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<td>SUPPLIES</td>
<td>3. Shipping Materials</td>
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<td>Subtotal</td>
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<td>Host Institution Fees</td>
<td>PERSONNEL</td>
<td>1. Training Coordinator (Salary)</td>
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<td>FRINGE BENEFITS</td>
<td>1.b. Training Coordinator (Fringe Benefits)</td>
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<td>PERSONNEL</td>
<td>2. Mentor Fee</td>
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<td>FRINGE BENEFITS</td>
<td>2.b. Mentor (Fringe Benefits)</td>
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<td>SUPPLIES</td>
<td>3. Laboratory Expenses</td>
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<td>Subtotal</td>
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<td>World Food Prize Symposium (Oct. 2015; If Applicable)</td>
<td>TRAVEL</td>
<td>1. Domestic Transportation</td>
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<td>TRAVEL</td>
<td>2. Lodging</td>
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<td>OTHER</td>
<td>3. Conference Fee</td>
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<td>Subtotal</td>
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<td>Mentor Follow up Activity (5-10 Days)</td>
<td>TRAVEL</td>
<td>1. Mentor Airfare – International</td>
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<td>TRAVEL</td>
<td>2. Mentor Domestic In-Country Travel (If Applicable)</td>
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<td>TRAVEL</td>
<td>3. Lodging</td>
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<td>TRAVEL</td>
<td>4. Meals &amp; Incidentals</td>
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<td>SUPPLIES</td>
<td>5. Supplies for Trainings/Workshops</td>
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<td>Subtotal</td>
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<td>INDIRECT</td>
<td>Indirect Costs/Overhead (10%)</td>
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<td>Total Request</td>
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Total Program Costs

| | | | | Total Request |
C. SUBMISSION DEADLINES AND TIMES

Submit all application materials in a single email. The following forms are required: SF-424, SF-424A, AD-3030, and AD-3031. Include all application information that is not a specific form in a single PDF document.

Funding opportunities will be advertised via the USDA/NIFA listserv. All proposals must be submitted to the email address below with all required forms. Proposals not submitted to the application email address by the stated deadline will not be accepted.

- Borlaug Fellowship Program Email: BorlaugFellowships@fas.usda.gov

D. FUNDING RESTRICTIONS

Allowable Costs:
To help in this review and to expedite the award process, budgets must include a narrative detailing all line items. The categories listed below are examples of some of the more common items found in project budgets. All items should be described in sufficient detail that would enable FAS to determine that the costs are reasonable and allowable for the project per federal regulations.

1. Salaries and Fringe Benefits:
Requested funds may be allocated toward salaries, fringe benefits, or the combination thereof. Only individuals that hold positions at eligible U.S. institutions should be listed in this category.

2. Travel:
For domestic travel, provide the purpose of the travel and information used in calculating the estimated cost, such as the destination, number of travelers, and estimated cost per trip. There are several restrictions associated with traveling on federal funds. In most cases, airfare must be purchased in economy class from a U.S. carrier. Travelers must also adhere to federally mandated domestic per diem guidelines. Additional information may be found in the circulars listed in the “Legislative Authority” section of this announcement.

3. Supplies:
All personal property excluding equipment, intangible property, and debt instruments as defined in this section.

4. Other Direct Costs:
Other Direct Costs are those anticipated charges not included in other budget categories, including materials and supplies, lab fees, publication costs, reasonable consultant fees, computer services, sub-awards (the level of detail required for the sub-award budget is the same as the recipient organization), equipment rental, facility rental, conferences and meetings, speaker fees, honorariums.
5. **Indirect Costs:**
Indirect Costs may not exceed 10% of direct costs.

6. **Tax Withholding:**
Borlaug Fellows (as trainees, *not* students) are considered EXEMPT INDIVIDUALS under the IRS Substantial Presence Test for tax purposes. The exemption falls under one or both of the following categories: either the [Foreign Government-Related Individuals](#) standard or the [Closer Connection Exception](#). Tax treaties might also exist between the U.S. and the Fellow’s home country. The only requirement is to complete [IRS Form 8843](#) (Sections 1 and 2). No taxes should be withheld from Borlaug Fellows since they are exempt.

**Unallowable Costs:**
General purpose equipment (no particular scientific, technical, or programmatic purpose) and scientific equipment exceeding $5,000 or more; entertainment; capital improvements; thank you gifts, and other expenses not directly related to the project are not allowed.

**E. OTHER SUBMISSION REQUIREMENTS**
All applications must be submitted electronically as indicated above.

**Section V: Application Review Information**

All proposals are carefully reviewed by USDA/FAS Program Officers and other FAS staff against the criteria listed below, including others who are experts in a particular field, as appropriate.

**A. REVIEW CRITERIA**

- **Technical Expertise and Experience (40 points):** Mentor must have appropriate technical background to provide the desired, advanced training. If necessary, other appropriate collaborating scientists should be identified to meet any of the objectives which the mentor cannot address. Mentor’s experience and knowledge of relevant agricultural conditions within the Fellow’s country or a similar location will be considered as appropriate. The trainer’s experience with international training and adult-education will also be considered.

- **Overall Program (35 points):** The overall program plan and design should be relevant to the Fellow’s objectives background. The program plan should be thorough, well thought out, and will achieve the desired post-program deliverables. Relevant agricultural practices within the region of the university will be considered as appropriate. Relevant university resources should be identified. Additional resources/organizations should be identified as appropriate. Site visits and meetings should be meaningful to the content of the program, if included.

- **Budget (25 points):** The proposed budget should be appropriate for the length of the program. The budget should include appropriate cost savings where available.
B. REVIEW AND SELECTION PROCESS
Other factors may also be taken into consideration such as regional diversity and MSI status in the review process. After review by appropriate offices, it is expected that all applicants will be notified within 2 months after the closing date for applications.

Section VI: Award Administration Information

A. AWARD NOTICES
Applicants should expect to be contacted by program staff for clarification and additional discussion on any budget related issues before final determination of successful applicants. Any notification by the program office regarding the selection of an institution is not an authorization to begin performance. No pre-award costs can be charged. The notice of award signed by the Deputy Administrator of USDA/FAS/OCBD is the authorizing document. This document will be sent by electronic mail to the university. Both parties must sign this document before the agreement is in force. Unsuccessful applicants will be notified of the status of their application by email.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS
Certifications regarding debarment Suspension, Drug Free Workplace, Felony Conviction and Tax Delinquent Status, and other national administrative assurances and policies are required. The cooperator must adhere to administrative requirements, cost principles, and audit requirements as contained in 2 CFR Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards.

C. REPORTING REQUIREMENTS:
Primary Investigators are required to submit mid-term and final Fellow’s performance reports on the U.S. portion of the Borlaug Fellowship. A final mentor’s visit report including a final evaluation should be submitted no later than 30 days after the completion of the mentor visit.

- Financial reports will use SF-425.
- Progress Reports will use SF-PPR.
- Invoices will use SF-270.

Section VII: Agency Contact
Applicants can direct questions or request help before the deadline for submission of the application for these funding opportunities via the contact information below:

- General Borlaug Program inquiries: BorlaugFellowships@fas.usda.gov
- Borlaug Africa: Karen Uetrecht, 202-690-3359 or Karen.Uetrecht@fas.usda.gov
- Borlaug Asia and Latin America: Tim Sheehan, 202-690-1940 or Tim.Sheehan@fas.usda.gov
Section VIII: Other Information

The USDA Borlaug Fellowship Program began in 2004. More than 700 fellowships have been supported to date. Additional program information is available at http://www.fas.usda.gov/programs/borlaug-fellowship-program.

Related Requests for Expressions of interest will be distributed by region including: Asia, Eastern Europe, Latin America, North Africa, East/ Sub-Saharan Africa. This will be posted on the NIFA listerv.

Section IX: Borlaug Fellow Proposal and Research Plan

<table>
<thead>
<tr>
<th>Fellow Number</th>
<th>Country</th>
<th>Gender</th>
<th>Fellowship Length (Weeks)</th>
<th>Research Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zambia</td>
<td>Female</td>
<td>8</td>
<td>Food Safety: Development of food safety control system for Zambia.</td>
</tr>
<tr>
<td>2</td>
<td>Egypt</td>
<td>Female</td>
<td>12</td>
<td>Food Safety: Development of food safety, food control, and microbiological hazards of meet.</td>
</tr>
<tr>
<td>3</td>
<td>Vietnam</td>
<td>Female</td>
<td>12</td>
<td>Food Safety: Improving analytical skills, methods of control antibiotics, mycotoxins, and growth promotants residues in feedstuff and products of animal origin using advanced techniques. (LC MS/MS and GC)</td>
</tr>
<tr>
<td>4</td>
<td>Tanzania</td>
<td>Female</td>
<td>8</td>
<td>Food Safety/Aflatoxin: Identify the fungal strains, the level of aflatoxins, and conduct an analysis of the contamination of groundnuts.</td>
</tr>
<tr>
<td>5</td>
<td>Egypt</td>
<td>Female</td>
<td>12</td>
<td>Food Safety Policy: Investigate the implementation of sequencing technologies, microbial research, molecular diagnosis and epidemiology to support the diagnosis and control of animal diseases diagnostic.</td>
</tr>
<tr>
<td>6</td>
<td>Malawi</td>
<td>Female</td>
<td>12</td>
<td>Food Safety/Aflatoxin: To evaluate aflatoxin contamination levels in groundnuts under different drying methods.</td>
</tr>
<tr>
<td>7</td>
<td>Rwanda</td>
<td>Female</td>
<td>12</td>
<td>Food Safety (Post Harvest Technology/Aflatoxin): Identify the prevalence of aflatoxin in wheat to determine genetic diversity of Aspergillus flavus and correlation of aflatoxin contamination to specific nutrient content of wheat for improved health and trade accessibility.</td>
</tr>
<tr>
<td>8</td>
<td>Rwanda</td>
<td>Male</td>
<td>8</td>
<td>Food Safety (Post harvest Technology/Aflatoxin): Evaluation of aflatoxin levels in maize flour products.</td>
</tr>
<tr>
<td>9</td>
<td>Mexico</td>
<td>Male</td>
<td>8</td>
<td>Food Processing: Research local vegetal species using different methods.</td>
</tr>
<tr>
<td>10</td>
<td>Ghana</td>
<td>Female</td>
<td>12</td>
<td>Food Processing: Research use of soybeans and peanuts in the preparation of complementary foods (weanimix) in Ghana with the goal of identifying strategies that will facilitate the production and consumption of nutritious and aflatoxin-safe weanimix.</td>
</tr>
</tbody>
</table>
**Fellow 1 - Zambia**

During my fellowship, I hope to gain an in-depth understanding of food safety and official controls in food. I particularly would like to learn how the United States Department of Agriculture functions with regard to food safety. I have been passionate about food safety since my days as student of veterinary medicine. However, as a Ministry, we still have challenges on executing food safety functions considering its multi-disciplinary nature and the fact that we have to collaborate with other stakeholders. I would like an opportunity to learn how the United States Department of Agriculture (USDA) food control system operates. Particularly, I would like to gain practical experience and more understanding of how the USDA collaborates with other stakeholders in the official food control.

My research interest being food safety and my scientific background of veterinary medicine fits in well with my program proposal. Learning how the USDA carry out their official food control will help to enlighten me on the risks and dangers that I may not be aware of at moment. This knowledge will help me contribute effectively to designing a national risk based approach to food safety control. As you may be aware, Zambia is at the moment in the process of re-organizing her food safety control system. As a Food Safety Focal Point, I have a role in this process.

As a National food safety officer, I am responsible for the National Food Control system especially with regard to food safety. Food safety is an important component of food security. Food security can be defined as the availability and access to nutritious and safe food. Therefore, my national responsibilities in food security are to ensure that the nation consumes food which is safe to prevent and minimize the health impact of consuming unsafe food. Zambia, being a developing country, the food control systems is not well developed. Therefore, my participation in this program will contribute to enhance agricultural productivity and food security in that I would acquire knowledge on how the system can be designed to suit our needs. I would pass on the knowledge gained to others especially extension officers who are on the ground working directly with the farmers. My responsibility also include farmer training. This would also give me an opportunity to share knowledge gained directly with the farmers on agricultural practices that promote safe production of agricultural products in general. Specifically, my participation would enhance livestock production and productivity among dairy farmers by designing effective Bovine Tuberculosis and Brucellosis Control programs as well as diary hygiene programs. I hope to gain practical experience on these systems. As you may be aware, a healthy cow will produce milk that is safe for human consumption. More safe production of milk will mean more money for the small scale farmer and an increased ability among these farmers to buy food that they do not grow thus promoting food security. All in all, my participation would also equip me with the necessary skills to contribute to the development of effective and sustainable food control systems thus contributing to high agriculture productivity and food security. My participation in the program would also enhance my competence in my work as a food safety monitoring officer in my country and the region as whole.
**Action Plan**

Week 1 - Activity: Orientation/Overview  
Week 2 - Activity: Learning the USDA food safety structure, organization activities, regulations and regulation.  
Outcome: Understanding the role of USDA in food safety and Inspections. Also how it works.  
Week 3 - Activity: USDA role in agro-processing and food quality  
Outcome: Understanding the regulation of agro-processing industry by the USDA  
Week 4 - Activity: Meat and Poultry Inspections, Monitoring Programs, Site visits  
Outcome: Understanding how the system works and what happens in terms of non-compliance  
Week 5 - Activity: Eggs and Milk Inspections, recalls, Monitoring programmes product certification  
Outcome: Understanding how the system works and what happens in terms of non-compliance  
Week 6 - Activity Risk Analysis, Research  
Outcome: Understanding how a risk based approach to food control works  
Week 7 - Activity: Control of food imports and export.  
Outcome: Practice experience of how imports and exports are regulated and monitored; Role of USDA in the regulation of imports and exports  
Week 8 - Activity: Wrap-up, presentation, etc.

**Fellow 2 - Egypt**

To study about microbiological hazards in meat for:  
1. Minimize the likelihood of food poisoning bacteria contaminating meat and associated products.  
2. Avoid physical and chemical contamination of meat.  
3. Reduce the potential for growth of food poisoning bacteria on meat and associated products.  
4. Minimize the potential for cross contamination of ready to eat foods by food poisoning bacteria on eat during further processing in the kitchen.  
5. Focus on the identification and control of microbiological, as well as chemical and physical food safety hazards during production.  
6. Focus on control measures that can reduce the contamination of meat from microbiological hazards as salmonella, E.coli and campylobacter during production.  
7. Conscientious implementation of HACCP principles by plant operators their commitment to food safety, improves employee.  
8. Awareness of their role in protecting consumers and emphasize management's responsibility for the safe production of meat.  
9. Food legislation including general rules for hygiene and control, food labeling, food additive, food packaging and genetically modified food.  
10. Manage international relation with third countries, and international organization concerning food safety, animal health, animal welfare, animal nutrition and plant health.  
11. Study risk analysis related to microbiological hazards in meat
12. Explain the principles, objectives and key elements of framework pertaining to food safety and role of other international organization (e.g.: Codex, WTO, OIE, FAO, FVO ) Pertaining to food safety.

**Action Plan**

- Method of inspection of meat and meat products and how can apply the hygienic management in markets and restaurants.
- Study about ideal requirement in Codex Alimentarius for meat borne pathogens.
- Methods for implementation of ISO 22000 for food safety and food control in meat and its products.

**Fellow 3 – Vietnam**

There are numbers of issues still being remained in animal husbandry sector in Vietnam:
- Many antibiotics including forbidden ones such as Chloramphenicol and Furazolidon are commonly used for sub-therapeutic purposes. The attractiveness for the prevention of diseases and growth promoting properties of these agents encourage pig producers to use them as additives in the feed regardless the side effects of antibiotic resistance and undesirable residues in meat.
- Bio-security and animal hygiene practice in smallholders are not appropriately applied. Consequently the farms are susceptible to diseases which in turn lead to increased use of antibiotics.
- Growth hormones, especially the agonist group, bring about tangible benefits to the feed millers, pig producers and middle man (slaughtering persons) because of improving growth and lean meat, good body shape as well as meat color. These chemicals are sometimes used with little regard to the risk of residues in meat to the consumers. The survey conducted by the Institute of Agricultural Science of Southern Vietnam in 2006 showed that more than 10% in 428 pig feed samples was positive with beta-agonists.
- The contamination of pesticides and fungus in feed ingredients during harvest and storage caused mycotoxins formation.
- Limitations in analytical skills and methods make difficulties for the control of these substances in the feed and their residues in meat, milk, feces and urine. In addition, the lack of standardized test methods for detecting antibiotic and growth promotant is a serious challenge for timely control of these contaminations.

Effective detection of chemical residues present in stock feed and products of animal origin is required in order to provide consumers with food products that comply with criteria for residues. Currently, rapid test methods (Elisa, quickest kit) for detecting some growth promotants are available in Vietnam. However, the results produced by these methods are still inconsistent and low reliability. It is proposed therefore to develop confirmation instrumental procedures for these compounds in animal feed and meat. Analysis method development, verification and validation using LC MS/MS and GC MS/MS systems is the promising solution for these problems.
The central importance of the program is the training of IASVN fellow. Firstly, the fellow will be trained at the U.S. Lab in LC MS/MS and GC MS/MS methods selection, verification and validation to detect pesticides, growth promotants, mycotoxins and antibiotics residues. Data analysis, Measurement Uncertainty of Test Results will also be conducted in training program. Then, the training results will be applied at IASVN Lab with Agilent 6430 LC MS/MS and Agilent 7000B GC MS/MS systems.

4. Program Objectives:
- Enhancing laboratory capacity in analysis of chemical residues in feedstuff and products of animal origin using advanced techniques.
- Vietnamese laboratory technicians will obtain adequate knowledge on requirements for the testing and calibration of the laboratories to comply with European Commission and ISO 17025 regulations.
- Appropriate analysis methods will contribute to safe meat production and consequently improve public health. Pig smallholders will benefit from more income from sustainability of production. The community as a whole will benefit from improvement in employment, income and reduction cost of health care.

Action Plan

Week 1-2: Visit U.S. Lab to learn about the Laboratory management and quality assurance systems.
Week 3-5: Learning about the way to develop a confirmation method for chemicals, contaminants and pesticides in food and feed using LCMSMS:
- How to select a method to analyze.
- Instrumental method development and optimization (finding appropriate MRM parameters: quantification and qualification ions, CV, CE).
- How to verify the selected method, sample analysis.
- How to design a validation method, how to define validation parameters such as: Quantification limits (LOQ), precision, repeatability, accuracy, recovery, robustness and uncertainty of test results, etc.
Week 6-9: Learning about method development for pesticides tests using GCMSMS:
- Instrumental method development and optimization (finding appropriate MRM parameters: quantification and qualification ions, electron energy, source temp., transfer line GC interface temp.).
- How to make a right choice among different sample preparation ways (SPE, QuEChERS method).
- Method Validation.
Week 10-12: The fellow will conduct method validation for new assays independently under U.S mentor supervision.

Special instruments need for research: LCMSMS and GCMSMS systems (Agilent Brand ones are the best if they are available).
Fellow 4 – Tanzania

While there are many technologies on mycotoxin control, their adoption so far has been very much lagging behind due to limited trained manpower and lack of experts on these mature technologies of detection and management of mycotoxins. Therefore, there is a critical need to strengthen the training capabilities of institutions involved in postharvest operations particularly on mycotoxin detection and management of grains.-To gain skills and knowledge on proper equipment operation and management (equipment used in mycotoxin detection and management)
- To obtain skills on methods and procedures for effective sample collection and handling
- To gain knowledge and skills on detection of mycotoxin contamination
- To gain skills on qualitative and quantitative analysis of mycotoxin and latest scientific developments
- To gain knowledge on sample analysis (Quantification of mycotoxin) laboratory procedure and familiarity with different software
- To gain experience on mycotoxin policies and regulation that are practiced in US
- The acquired knowledge and skills from the fellowship as mentioned above (general knowledge on mycotoxin, detection, analysis, management, policies and regulation) will enable me to be conversant and gain capability in this area and enhance effective delivery of my research objectives
- Also my Food Science and Technology background gives me a logical problem solving ability that I know will be useful in conducting my research. Also during my undergraduate and postgraduate studies I had a chance to do a course on Food chemistry and Analysis which is the prerequisite course in analysis.
- While I was working with USAID Feed the future processing and Consumption project I attended to a workshop on mycotoxin management and testing and work with maize and sunflower processors on implementation of Good Manufacturing Practice as an effort to control mycotoxin contamination. The research goals were set based on the following background and problem/gap

Action Plan

WEEK 1: Familiarity with training areas, laboratories and taking introduction courses on Mycotoxin detection and quantification. Outcome: Engagement with the training
WEEK 2: Familiarity with laboratory Equipment/facilities used in quantification and detection of mycotoxin. Outcome: Skills and knowledge gained on equipment operation and management
WEEK 3: Familiarization and training on different protocols and methods for qualitative and quantitative analysis of aflatoxins samples Outcome: Knowledge and skills gained on latest scientific developments and reproduce it in Tanzania to help in Mycotoxin Management and testing.
WEEK 4: To learn on methods and procedures on effective sample collection and handling. Outcome: Skills gained on sample handling and collection
WEEK 5: Sample analysis (Quantification of mycotoxin) laboratory procedure. Outcome: Knowledge gained on mycotoxin quantification and analysis
WEEK 6: Comparison of different quantification and detection methods based on cost and applicability in Tanzania. Outcome: Knowledge and skills gained on effective method for mycotoxin quantification and detection based on cost and accuracy that can be used in Tanzania
WEEK 7: Organizing and analysis of data obtained and familiarity with different software. Outcome: Knowledge gained in data analysis and interpretation
WEEK 8: Report writing on activities conducted, experience gained from training and way forward.

Fellow 5 - Malawi

This fellowship will help in enhancing the agriculture productivity by improving the diagnostic capabilities by enhancing disease surveillance, detection, and response efforts. It also highlights the differences between isolates to discriminate between closely related strains. It enables tracking the evolution of isolates in a disease outbreak; traces animal-to-animal transmission; and identifies point sources of disease outbreaks. It proves useful tool in identifying factors that may contribute to the emergence, virulence, or spread of pathogens, as well as in speeding diagnostic tool and vaccine development. Science, technology, mathematics and informatics have been working together for development of new technologies and models which are able to obtain in a very short time the full genome of the virus without previous knowledge of the genome itself. However, this modern technology has not been tested but for only a few viruses. Their potential to assist in the control and eradication of animal diseases in the world need to be further investigated. This is a unique opportunity to make research in one of the most developing fields at the moment whilst fighting at the same time at the front line against human and animal diseases, poverty and social differences. The use of HTS is considered more cheaply compared to that with single gene done by capillary sequencing. Managing the use of single gene or whole genome needs to be studied and highlighted putting in mind that this work will be modified for routine work at AHRI. As AHRI is the national animal diseases diagnostic laboratory, so this work will reflect on the Egyptian Agriculture strategy concerning animal health and production (Disease diagnosis and control). Also, it will indirectly affect human, animal, ecosystem relationship.

Action Plan

The research objective is to compare the full genome sequencing of some important animal viral diseases using capillary and next generation sequencing techniques. It also may adapt to zoonotic bacteria as TB, Coxiella burnetii or Brucella but for sequencing some important genes with capillary sequencing with HTS.

Plan for Viral diseases sequence comparison (FMDV)

Week 1: Orientation with the lab and Biosafety training concerning FMDV and Risk assessment. Outcome: Good knowledge and details on virus handling
Week 2 - 3: Capillary Sequencing of Full capsid and defining of SOPs and data analysis with some important bioinformatics training and the use of the related software to accomplish the phylogenetic tree.

Week 4: Capillary Sequencing of the rest of genome
Outcome: Nearly full sequence analysis of FMDV with the ability to phylogeny isolates.

Week 5 - 6: Next generation sequencing Techniques, selection of method and acting.
Outcome: Doing NGS

Week 8 - 11: Detailed data analysis and applications of NGS data in De Novo sequencing, re-sequencing and metagenomics.
Outcome: Good analysis of full genome data.

Week 12: Establishing network with the lab and writing proposal for sustainable cooperation.
Outcome: Network and Collaborative project.

The need for reference strains for doing the techniques, the availability of SOPs and database to perform the required bioinformatics work.

**Fellow 6 - Malawi**

By the end of the fellowship I hope to gain adequate skills and understanding of Aflatoxin. Aflatoxin is an issue that has been there since ages but little is known by Malawians. Not much research has been done and emerging researchers like me have little knowledge of the Aflatoxin, meaning I grew up and finished college without hearing anything to do with Aflatoxin hence this fellowship will be an eye opener to me and many people who have little or no idea of Aflatoxin. Aflatoxin is a threat to the country’s economy and health hence through this fellowship I hope to gain more understanding and share with the farmers and other scientist at national level on how the Aflatoxin levels may be reduced to the minimum allowable range. I have been running trials both on-station and in farmer’s field for common bean and soybean. There has never been a proper handling of the crop to minimize Aflatoxin contamination. I never had idea to share with the farmers on Aflatoxin because I never had training on this and little did I know that the contamination can happen at any stage right from the field to storage. My interest as a researcher (Breeder) is on breeding for resistance to Aflatoxin but since Aflatoxin is a complicated trait with many factors associated with it the immediate control is to work with farmers on other preventative measures including the post-harvest handling. Breeding for resistance is a permanent solution but to have a variety released takes minimum of ten years in addition, the resistant variety will need to be handled in a manner that the levels of contamination remain minimum, hence need for proper post-harvest handling sensitization. My few months that I have worked with ICRISAT I have realized that there are many risks associated with Aflatoxin and that the whole country is at risk because there are less or no findings to bring awareness on the effects of Aflatoxin. One of my current responsibilities is to analyze different grain samples
using ELISA. I do the analysis without prior knowledge on how the samples were handled. In my proposal I plan to do the same Aflatoxin analysis but with a prior background on the handling of samples through proper drying. My research will not only help farmers, researchers too will benefit on how we should handle trials after harvest. A country which has produced enough harvest of any crop (cereal or oil crop like groundnut) but contaminated it means the country is insecure because contamination by fungi does not only reduce its quality but also nutritional value. These outbreaks of contamination cause a lot of concern because they worsen the food security and health of the people. The Malawi government depends on Agriculture, if the produce are affected in one way or the other with the fungi then the product may be rejected for export and if it is consumed locally that will mean cause health risks and more money going to the health sector. If farmers (producers) may know effects of Aflatoxin and how they may be controlled then the can produce crops with minimum contamination (within the acceptable range) and increase export potential of the produce and reduce health risks. However little is documented and disseminated on Aflatoxin risks, management and control of the fungi. There is no documented evidence of risks associated with postharvest handling. Participation in this fellowship will be a stepping stone, through the finding farmers will know the risks associated with different drying methods and how best drying should be done to avoid Aflatoxin contamination. Proper post-harvest handling will put the country on a safer side because this will reduce health problems which come due to contamination, the country will also be secure enough because the produced crop will be a free-contaminated crop, safe to consume and export. Through this project’s findings, my country Malawi will have some ideas on how to be food secure with Aflatoxin free food.

Action Plan

Week Activity/Outcome
Week 1 - 2 Theory: Introduction to Aflatoxin; Wider knowledge of Aflatoxin, Understanding Aflatoxin, its effects, Pros and cons of detection methods control and determination method. Week 3: Introduction to laboratory work Lab safety and handling of pipette Week 4 - 5: Preparation of stock solutions and Understanding Aflatoxin detection methods mock Aflatoxin determination in the Lab using different methods Week 6: Collection and labeling of samples Proper storage of samples after collection Week 7: Extraction of samples for analysis Extraction technique Proper storage of samples for analysis Week 8 – 9: Aflatoxin determination using Determination of Aflatoxin levels ELISA or HPLC or TLC Week 10 – 11: Calculation, interpretation of results Interpretation of results and proper write up and write-up Week 12: Dissemination of results (posters, scientific presentation) Proper dissemination of laboratory results
**Fellow 7 - Rwanda**

I am currently a Food Scientist, conducting my research at [institution] in Rwanda, a sub-Saharan African country, with more than 90% of GDP based on agriculture faces many challenges in food security and food safety and is short of enough qualified and experienced scientists in food science and technology to address the challenges of food safety and nutritional security having a big impact on population health and even international trade. My main duties are to develop and implement projects research to enhance food security and poverty reduction along with publications of results from the implemented projects. To fulfill my duties with excellence, I need to update my knowledge, stay in touch with other researchers from other different research institutions and have access to world class research facilities. I am interested in mycotoxin mitigation and management and I have been a national coordinator of a successfully implemented project entitled Mycotoxin contamination in Rwanda: quantifying the problem in maize and cassava in households and markets, and sensitization of targeted stakeholders based on a cost-benefit analysis. This project, financed by United State Agency for International Development (USAID) and led by International Institute for tropical Agriculture (IITA), exposed me to main challenges in Rwanda and outside caused by mycotoxins.

In Rwanda, wheat production is increasing potentially with 4.6 - fold (24,633tons /2007 to 114,075tons / 2011), annual growth of 33.2%. Average yield: 2.1T/3 Tons / ha Rwanda is ranked among 12 countries with the highest projected average mean yield for rain fed spring wheat production worldwide and first in Africa and recorded the first annual growth both in production and yield in the region in 2010. While aflatoxin-control measures are implemented in developed and international markets, many of the one billion people who live on less than $1 per day rely on their own agricultural production for food, which may contain harmful levels of aflatoxin. This population is mainly located in developing countries, especially in sub-Saharan countries among which Rwanda is a member. Therefore, to ensure food quality and safety of wheat there is a need to reduce post-harvest losses and the prevalence of aflatoxin for improved health and trade accessibility.

If I am granted the opportunity to carry out 12 weeks of project research at Borlaug Fellowship, I believe that, upon this program completion, I will be more confident, more competitive and more productive in my research area. As the knowledge gained will be of genuine importance, it will be shared widely and the benefits will be useful to all different stakeholders involved in agriculture sectors. Firstly, the partnership between my institution and Normal E. Borlaug Fellowship will be strengthened and opened for further collaboration in different agriculture research area. Secondly, awareness of mycotoxins occurrence and prevalence will be created using different means of sharing; media, training, teaching and publication to sensitize all those concerned for mycotoxin mitigation and management. Thirdly, post-harvest losses will be reduced in grain to ensure food security and safety for improved health and trade accessibility.
### Action Plan

- **Week 1**: Registration, Laboratory induction, Samples preparation, materials and equipment preparation. Equipment/materials: All material, reagents and equipment to be used during 12 weeks shall be discussed, prepared and available; accuracy and precise weighing machine, blender
- **Week 2**: Mycology culturing of fungi and molecular barcoding of fungi identification. Equipment/materials: nonselective media, tubes, petri dishes
- **Week 3**: Mycology culturing of fungi and molecular barcoding of fungi identification. Equipment/materials: nonselective media, tubes, petri dishes
- **Week 4**: Presentation of progress, Aflatoxin analysis using the following analytical assay: Enzyme-Linked Immunosorbent Assay (ELISA), Immunocapture Fluorimetric Assay (IFA/VICAM). Equipment/materials: Shaking incubator, antigen, antibody, buffer, microplate reader, buffer, Florometer vicam series, fluorometer calibration standards, cuvettes rack, aflatest developer solution/Vicam, pipette, syringe
- **Week 5 activity**: data analysis, Aflatoxin analysis using Ultra Performance Liquid Chromatography (UPLC), report writing. Equipment/materials: UPLC, machine Reagent for UPLC
- **Week 6**: Nutritional content analysis of wheat using Gas Chromatography mass spectroscopy (GC-MS), data analysis and report writing. Equipment/materials: Gas chromatography machine coupled with mass spectrometry, reagents
- **Week 7**: Progress Laboratory results presentation, results interpretation. Equipment/materials: computer
- **Week 8**: Genotyping. Equipment/materials: SSR markers
- **Week 9**: Genotyping. Equipment/materials: SSR markers
- **Week 10**: Data analysis. Equipment/materials: software and computer
- **Week 11**: Report writing and compilation.
- **Week 12**: Report writing, compilation and presentation. Equipment/materials: software and computer

By the end of twelve weeks, I am expecting to have the following outputs:

1. Levels of occurrence of aflatoxin contamination in wheat collected from Rwanda will be identified
2. Major fungus infecting wheat will be established
3. Nutrition content of wheat collected and its correlation to aflatoxin contamination will be determined.
4. Genetic variation of A. flavus from wheat will be identified.
5. Produced report describing the results

### Fellow 8 - Rwanda

Mycotoxins are toxic secondary metabolites which are produced by certain molds growing on foods and feeds. The most common mycotoxins are aflatoxins. The most common aflatoxins producing molds are Aspergillus flavus, Aspergillus nomius and Aspergillus parasiticus. These molds affect different staple foods, mainly cereals and legumes like maize, groundnuts, rice; and
cassava. Conditions that facilitate proliferation of these molds include: pre-harvest high temperature and drought stress, moist weather during harvesting, inadequate drying, poor storage conditions of these crops. Aflatoxins are highly hepatocarcinogenic. This means that in synergy with Hepatitis B Virus they cause liver cancer when continuously consumed. They also impair growth and development of children, Suppress immune system, Impedes uptake and utilization of micronutrients. Rwanda being a tropical country, it is highly prone to infestation of its yield by aflatoxins producing molds. Northwestern region of the country is particularly a high risk zone. This is mainly due to high annual precipitation level and low temperatures due to high altitudes in these regions. These conditions make harvesting particularly difficult as the rain persists all year long. It also makes it difficult for drying since temperatures are low; humidity in the atmosphere is very high. For farmers in this region it is difficult to reach the standard moisture content of 13.5% required by the Rwanda Bureau of Standards. Most of the maize harvest is usually sold on the local market and the remaining is supplied to local processors, mainly maize mills that produce maize flour and by products of milling are sold to farmers as animal feeds. With raw materials that don’t fulfill the standard requirements for moisture content, there is high risk of infestation by aflatoxins producing molds. This aflatoxin if present in the grain, it can be transferred to the final product, and find its self in the food chain. Little research has been done to evaluate the prevalence of this mycotoxin in processed products and especially the byproducts of maize mills which are used as animal feeds. This is what made us think of carrying out this research. The objective would be to evaluate the prevalence of aflatoxins in maize mill products in the northwestern region of Rwanda. This fellowship can help me to understand how to test cereal products for presence of aflatoxin and how to prevent this mycotoxin to infest agriculture produce. I will analyze the status of aflatoxin level in different products of maize mills in the region of Musanze districts. In facts the small scale factories produce maize flour which is consumed by humans in schools, hospitals and households. They also produce maize bran and other byproducts that are used as animal feeds. The presence of aflatoxins in maize grains used to produce these products will obviously induce its presence in the final products intended for consumption. This is why there is need to evaluate the level and prevalence of this mycotoxin in these food products in order to prevent people from consuming contaminated products. The fellowship will also help me to increase my knowledge in postharvest handling of different crops. In fact i teach crop production and postharvest handling in the university. I also regularly meet farmers in different training workshops to teach them about how to handle their produce. Further knowledge in postharvest technology can be of great help for me and for my carrier. Thus, this fellowship will contribute to enhancing food safety and food security where by results from my research will be disseminated to farmers, traders, processors and other actors in the maize value chain and will help them to improve their practices. Acquired knowledge will also help me to easily train them in new post-harvest handling techniques of their produce which will help to prevent the proliferation of aflatoxin in maize products.

Action Plan

- **Week 1 & 2: Literature review and study area delimitation.** At the end of the first two weeks, a clear review of literature shall be available. This review should include the theoretical knowledge about the
topic, previous research work done on a similar topic, research gaps in the topic. There shall also be a clear overview of the area to be covered by the research showing the geographic delimitation and sampling area.

- Week 3: meeting stakeholders and approval of objectives, methodology and expected results. During this period, stakeholders will be briefed about the research. They include: farmers grouped in cooperatives, fellow researchers, and government institutions. At the end of the week there will be agreements between different stakeholders and the researcher on objectives and expected results of the research. Research methodology will also be available.

- Week 4–6: Sampling and analysis of samples. During this week samples will be collected from different areas as approved in previous weeks. These samples will be brought to the laboratory for analysis. Samples shall be taken in triplicates in a specified interval between samples. At the end of this period, laboratory results of different samples shall be available.

- Week 7: Data analysis and interpretation. During this week, all gathered data shall be analyzed and interpreted in order to be able to draw conclusions and recommendations.

- Week 8: Meeting stakeholders for information sharing. During the 8 week, a conference shall be organized where different stakeholders concerned by the area of research will be invited. Results will be presented to them for them to criticize them and enrich them.

- Week 9–10: Results dissemination. The following period will be designated to results dissemination. Different training workshops will be organized in order to transmit the research results to all beneficiaries.

**Fellow 9 - Mexico**

I’m interested in improving my capabilities to give added value to local vegetal species using different methods, and learn more about the social methods to translate this technical activity into a language clearer for the people that live in the rural communities. I really hope to learn these methods from leader researchers, and how they have been capable to spread these new technologies for the people that live every day with this natural resources, generating social results as elevation of local knowledge and innovation. I have been working in the rural environment for four years, as an entrepreneur and also, as a researcher and I have understood that it’s a very high need not just make innovations in the processing technics but also, democratize this knowledge. Beside this, I found two objectives of the fellowship so related to my research interests. First, one of the reasons of this program is the creation -and growth- of networking in order to get a closer work in the topics taken into a count in this program, especially because I’m member of the researchers group in my university, and it would be an opportunity for my peers and students. This is a superlative need in order to improve the scientifically development in the rural development and also, the sharing of experiences, which is an important and satisfactory activity as a researcher. The second thing is the principal focus of the program in the adding value to the raw agricultural commodities, especially non-traditional food, which is the area where I have been working even before of my master, and which I used for my thesis and current research. I belong to one of the most biodiverse regions of my country, and we haven’t been capable of promote and achieve its sustainable utilization. After this, I would like to mention how my participation will contribute to the agricultural
productivity in my country. As I mentioned before, I have been working in agro industrial activities with one of the few social enterprises in the south of Mexico, and even when we are working in one of the most marginalized regions of my state, we have had good results. For that reason, I argue the importance of improve the development of new methodologies of addition value in local species, including in all moment the rural regions, especially those that have a high level of vulnerability and also, integrate one of the most marginalized groups: the rural women. I have experience working with them and I have seen the results obtained when the scientifically work is linked permanently with them, allowing their direct participation in the creation of new ways for process local vegetal species. So, if I improve my capability and knowledge about the addition value in non-traditional food, beside of my emphatic relationship with them, I think that the results obtained could be not just better, but also replicable in different regions of my country, obviously taking into account the social and cultural differences which are elementary for sustainable projects.

**Action Plan**

- **Week 1:** Introduction and presentation given to the institution that will receive me.
- **Week 2:** Evaluation and choice of three vegetal and representative species in the region where the institution is located in order to create alternative ways of give value added to them.
- **Week 3:** Work focus to apply innovative methodologies to give added value to the vegetal species chosen.
- **Week 4:** Work focused on apply innovative methodologies to give added value to the vegetal species chosen.
- **Week 5:** Background of the activities done and the results obtained.
- **Week 6:** Creation of the proposal of the Manual of Alternative Value Added according to the vegetal species located in the local region of the southeast of Mexico and to the social conditions (such as high level of rural population and marginalized areas).
- **Week 7:** Background of the proposal of the Manual with local researchers and local enterprises.
- **Week 8:** Compilation of the results obtained and the opinions of the local researchers for the development of the Manual, which will continue working with the next stage of this fellowship, when the American researcher comes to my university.

**Fellow 10 – Ghana**

The growth rate of fully breast-fed infants in developing countries is comparable with that of infants in developed countries during the first 4–6 months of life. However, infants in developing countries including Ghana commonly deviate from this satisfactory pattern of growth after this period. Lack of nutrient-dense complementary foods and frequent infections are the main factors accounting for this decline. As part of government’s efforts to improve the nutritional quality of complimentary foods, weanimix formulation was developed in 1987 by the Nutrition Division of the Ministry of Health and UNICEF, Ghana. Weanimix is composed of 10–15% soybeans, 10% peanuts and 75–80% maize and has been promoted in Ghana as an appropriate alternative to many traditional weaning foods, which have low energy and nutrient density, and have been implicated in the development of protein-energy malnutrition in infants. Weanimix promotion happened in an era when government was also promoting soybean production and utilization in human diets and animal feed. This promotion resulted in the availability of
centrally-processed weanimix at maternal and child clinics, shops, supermarkets, open markets and other outlets. Mothers were also trained to prepare weanimix at home using simple processing techniques. Despite these promotional efforts, some studies have indicated extremely low use of weanimix among mothers. Most mothers had seen weanimix being sold at growth monitoring clinics but they could not afford to buy it. Studies also found that even some mothers who have understood the weanimix concept often add only one legume and at varying proportions to maize-based complementary foods.

Furthermore, studies done in Togo, Benin and Gambia have shown a high chance of contaminating weanimix with aflatoxin due to the high level of aflatoxin detected in peanuts and maize. Peanuts in particular are predisposed to aflatoxin contamination at end-of-season drought with contamination increasing significantly during storage. Long-term exposure to low to moderate levels of aflatoxins through the consumption of contaminated food causes liver cancer and cirrhosis. Like infant malnutrition, aflatoxin has been implicated in growth retardation in children, immune suppression and increased susceptibility to infections such as malaria and HIV/AIDS. The need to reverse the trend of high infant malnutrition becomes even more urgent in light of these findings. Considering the importance of soybean and peanuts in improving the nutritional value of complementary foods and hence the health of children, this study seeks to identify policy strategies to facilitate the production and consumption of nutritious and safe weanimix to support healthy and active lives.

Objectives of the research
Weanimix has been promoted extensively in Ghana however there has not been any known current study that has assessed the extent which soybeans and peanuts are used in the formulation and preparation of complementary foods both at the household and commercial levels. This proposal seeks
1. To examine the extent to which soybeans and peanuts are being used in weanimix production,
2. To identify barriers that limits the appropriate use of soybeans and peanuts,
3. To assess the aflatoxin levels in sampled weaning foods, and
4. To assess the knowledge of mothers and commercial weanimix producers on aflatoxin contamination and control.
5. To disseminate the findings and recommendations through a seminar, policy briefs and other publications.

By achieving these objectives, it may be possible to identify strategies that may be incorporated into policies to promote and facilitate the adoption of high-protein and aflatoxin-safe weanimix that can enhance growth and development of infants and children in Ghana. This study will be conducted in Accra where soybeans and peanut are not produced in large quantities but are available in the open markets and Tamale where these legumes are produced in large quantities.

My research interests are food policy, consumer studies, and bridging research-policy gap. This research is of interest to me and will contribute to my personal and career goals because
1. Already, during my BSc and MPhil training I conducted research on soybean (i.e. processing soybeans for meat analogues and meat extensions and predicting lipid stability in soybean flour);
2. While working at the Ministry of Food and Agriculture, I was involved in training women in soybean processing and utilization;
3. As a member of the Partnership for Aflatoxin Control in Africa, I appreciate the detrimental effects of aflatoxin on human particularly children mainly through consumption of maize and peanut-based diets;
4. As a co-founder of EatSafe Ghana, an NGO, which aims to promote public health through safe and healthy food, I am responsible for ensuring that infants and children eat foods that will promote good health;
5. As a Research Scientist involved in science and technology policy, food policy and technology transfer studies, this study offers me an opportunity to develop my capacity to identify strategies and policy inputs that will facilitate the adoption of weanimix technology.
Food security is achieved when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Therefore, this project, which seeks to ensure access of infants and children to safe and nutritious complementary foods, will contribute to food security. Weanimix in particular has some advantages because it is nutritious (high protein- and energy-density) and its ingredients (i.e. maize, peanuts and soybeans) are produced in appreciable quantities and are readily available and affordable while technologies for producing weanimix has been simplified to encourage household and commercial production. Thus, by identifying and addressing barriers to the use of weanimix in complementary feeding, this project will particularly contribute to the food utilization component of food security, which has often been overlooked in several studies. The use of local ingredients in preparing weanimix and other foods will encourage local production, which will result in income improvements for farmers. This project also seeks to reduce aflatoxin contamination in ingredients used in weanimix preparation and hence will reduce food waist and increase the quantity of safe peanuts and maize availability for consumption.

Action Plan

Research objectives
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4. To assess the knowledge of mothers and commercial weanimix producers on aflatoxin contamination and control.
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Week 1-6: Travel to the USA for mentorship in conducting consumer research, data analysis, and communicating with policy makers.
Outcome: Gain the skills in consumer research capacity, data analysis, and skills for communicating research findings with policy makers developed.

Week 7: Identify and select growth monitoring centers in Accra and Tamale where mothers will be selected for interview. Identify commercial weanimix producers by sampling weanimix products in shops, markets and growth monitoring centers in Accra.
Outcome: Study sites identified

Week 8: Construct and pre-test questionnaire for interviewing mothers and commercial weanimix producers.

Week 9: Perform aflatoxin analysis on weanimix samples prepared at home and commercial processing sites.

Week 10 - 12: Finalize and submit research report. Write and submit policy briefs to relevant ministries.