

USDA Request for Expressions of Interest
2017 Borlaug Fellowship Program for
Africa: Plant Health

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

**FISCAL YEAR 2017 NOTICE OF FUNDING OPPORTUNITY
for
Africa: Plant Health**

Application Deadline: June 16, 2017 @ 11:59 PM EDT

Email: BorlaugProposals@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-2017-AFRICA-PLANT HEALTH

This announcement is also being distributed through USDA's EzFedGrants system under the following Notice of Funding Opportunity (NOFO) numbers:

USDA-FAS-10777-0700-10.-17-0010

USDA-FAS-10777-0700-10.-17-0008

USDA-FAS-10777-0700-10.-17-0014

USDA-FAS-10777-0700-10.-17-0015

USDA-FAS-10777-0700-10.-17-0011

USDA-FAS-10777-0700-10.-17-0006

USDA-FAS-10777-0700-10.-17-0007

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**U.S. DEPARTMENT OF AGRICULTURE
FOREIGN AGRICULTURAL SERVICE
OFFICE OF CAPACITY BUILDING AND DEVELOPMENT
NORMAN E. BORLAUG INTERNATIONAL AGRICULTURAL SCIENCE AND TECHNOLOGY FELLOWSHIP
PROGRAM**

ISSUED BY: USDA Foreign Agricultural Service, Office of Capacity Building and Development

CATALOG OF FEDERAL DOMESTIC ASSISTANCE (CDFA) NUMBER: 10.777.

CDFA TITLE: Norman E. Borlaug International Agricultural Science and Technology Fellowship

NOTICE OF FUNDING OPPORTUNITY TITLE: Borlaug Fellowship Program 2017, Africa, Plant Health

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USDA-FAS-10777-0700-10.-17-0014

USDA-FAS-10777-0700-10.-17-0007

USDA-FAS-10777-0700-10.-17-0015

AUTHORIZING AND APPROPRIATION AUTHORITIES: The legislative authority for the Borlaug Fellowship Program is provided in 7 USC 3319j, Pub. L. 95-113, title XIV, §1473g, as added Pub. L. 110-234, title VII, §7139, May 22, 2008, 122 Stat. 1231, and Pub. L. 110-246, §4(a), Title VII, §7139, June 18, 2008, 122 Stat. 1664, 1992. Authority also comes from the National Agricultural Research, Extension, and Teaching Policy Act of 1977 enacted as Title XIV of the Food and Agriculture Act of 1977, 7 U.S.C. 3319(a), 7 U.S.C. 3318(b).

PROGRAM TYPE: New

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

PROGRAM OVERVIEW, OBJECTIVES, AND PRIORITIES

The United States Department of Agriculture's (USDA) Foreign Agricultural Service (FAS) announces the availability of funding through cost reimbursable agreements for 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 the fall of 2017; 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.

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Here is a summary of the applicant and a brief description of his or her research topic:

Fellow #1 (female); Kenya; *Use of genomics and bioinformatic tools to characterize the viruses causing Maize Lethal necrosis disease in Kenya.*

Fellow #2 (female); Burkina Faso; *Improve efficiency and profitability of fertilizer use within the framework of Integrated Soil Fertility Management practices for smallholder farmers.*

Fellow #3 (male); Burkina Faso; *Develop linear programming based decision support tool for fertilizer use in Burkina Faso.*

Fellow #4 (male); Morocco; *Investigation of biological control of citrus leaf miner.*

Fellow #5 (female); South Africa; *Use of single inbred and multi inbred lines to stabilize beneficial traits of entomopathogenic nematodes (EPNs) explored for biological control of insect pests.*

Fellow #6 (male); South Africa; *Determine the roles of phyto-hormones in the initiation and/or perpetuation of alternate bearing in citrus. The outcomes of his research will allow citrus produces to obtain more consistent yields from year to year.*

Fellow #7 (female); Kenya; *Determining the distribution of Maize chlorotic mottle virus within maize seed infected with isolates from Hawaii and East Africa for improvement of maize seed health testing and treatment.*

[Section VII](#) provides the Fellow's research 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.

FEDERAL AWARD INFORMATION

AVAILABLE FUNDING: Up to \$40,000 for each award

PROJECTED NUMBER OF AWARDS: Up to 7

PERIOD OF PERFORMANCE: 2 years

An extension to the period of performance may be permitted in certain circumstances. The awardee must request an extension at least 90 days prior to the end of the period of performance, including a justification to explain why the statement of work cannot be completed during the original period of performance.

PROJECTED PERIOD OF PERFORMANCE START DATES: between July 1, 2017 and January 1, 2018

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PROJECTED PERIOD OF PERFORMANCE END DATES: between June 30, 2019 and December 31, 2019

FUNDING INSTRUMENT: Cost Reimbursable Agreement

DEADLINE: Applications must be received by June 16, 2017 by 11:59 p.m. Eastern Daylight Time. Applications received after this deadline will not be considered for funding.

ELIGIBILITY CRITERIA

ELIGIBLE APPLICANTS: Public and state controlled institutions of higher education.

FAS will accept proposals 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.

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, as adopted by USDA through 2 CFR part 400.

University indirect costs for cost reimbursable agreements are limited to 10% of direct costs in accordance with 7 USC 3319a. A cost share or cost match is not required. Management and Administration (M&A) Costs are not allowable. In addition to the above mentioned, all recipients are subject to the Federal Award's general terms and conditions, project narrative, and budget narrative, as well as the applicable authorization used to issue the Federal Award.

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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 semi-annual 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.

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Mentor Follow-up Visit

- The mentor visit is an essential and unique part of the Borlaug Fellowship Program. The reciprocal visit 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.
- The PI **must** consult with USDA/FAS **prior** to finalizing plans or purchasing plane tickets for the reciprocal visit. Mentor's travel information must be provided for emergency contact purposes and country clearance (if required by the FAS Overseas Office).
- 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, if feasible. 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 will include a private bedroom, private or shared bathroom, access to a laundry room, and access to a kitchen with pots, pans, and utensils.
- Basic necessities, such as sheets, towels, and cleaning supplies (if not already provided), will be provided for Fellow's use. The Fellow should not have to pay for these items.
- Lodging will 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.

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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. The PI must inform the Fellow and USDA/FAS immediately if this cannot be accommodated.

Emergency Health Insurance

- The host institution will 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 will not be required to purchase his or her 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

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- 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 **semi-annual** progress reports. The Principal Investigator or Mentor will use *Performance Progress Report (SF-PPR)* to submit semi-annual 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, and will not be paid until the required report has been received.

Financial Reporting

- Financial reports will follow the Uniform Administrative Requirements for Grants and Agreements, 2 CFR Part 200.
- 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 summary of expenses that aligns expense totals to the agreement's budget line items must be included.
- A detailed breakdown of expenses must be included with SF-270. Payment will not be processed without supporting documentation.
- A final invoice must be submitted within 90 days of the end of the period of performance for the agreement.
- 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 semi-annually and within 90 days of the end of the period of performance for the agreement.

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- An invoice cannot be paid if a financial report is past due, and it will not be paid until the required report has been received.

SECTION II: 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 as PDF or Word documents. No mailed or facsimile submissions will be accepted. Email address is BorlaugProposals@fas.usda.gov.

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 Primary Investigator.
- 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.
- Identify the expected skills or knowledge to be acquired by the Fellow at the end of the program
- Provide a program budget using *Standard Form -424A- Budget Information Non Construction Programs*, including a detailed budget worksheet (see page 12).
- Provide a budget narrative. 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 2017 is feasible, then the Fellowship may be extended one additional week, not to exceed 13 weeks, to ensure the Fellow receives up to 12 weeks of training.
 - If attending the World Food Prize, 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*](#).

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- Complete [AD-3031, Assurance Regarding Felony Conviction or Tax Delinquent Status for Corporate Applicants](#)
- Complete the Host University Administrative Checklist on university administrative policies
- **If not submitting applications through the ezFedGrants portal at <https://grants.fms.usda.gov>, Submit all application materials as attachments to a single email.**
 - The primary document submitted in response to this REI with all information requested should be titled *Statement of Work*.
 - 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.

C. UNIQUE ENTITY IDENTIFIER AND SYSTEM FOR AWARD MANAGEMENT (SAM)

All applicants are required to:

1. Be registered in SAM before submitting its application;
2. Provide a valid DUNS number in its application; and
3. Continue to maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency.

FAS may not make a Federal award to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time FAS is ready to make a Federal award, the Federal awarding agency may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

FAS is using ezFedGrants, which is an electronic grants management system. Applicant(s) with electronic access are to submit their applications electronically through: <https://grants.fmmi.usda.gov>. As stated above before you can apply, you must have a DUNS number, be registered in SAM, and have access to the ezFedGrants website.

Applicants are encouraged to register early. The registration process can take approximately four weeks to be completed. Therefore, registration should be done in sufficient time to ensure it does not impact your ability to meet required submission deadlines.

DUNS number. Instructions for obtaining a DUNS number can be found at the following website: <http://www.dnb.com/duns-number.html>. The DUNS number must be included in the data entry field labeled "Organizational DUNS" on the Standard Forms (SF)-424 forms submitted as part of this application.

System for Award Management. In addition to having a DUNS number, applicants applying electronically through ezFedGrants must register with SAM. Step-by-step instructions for registering with SAM can be found here: www.sam.gov. Failure to register with SAM will result in your application being rejected during the submissions process.

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D. ezFedGrants System Access and Electronic Signature

Level 2 eAuthentication. The next step in the registration process is to obtain a Level 2 eAuthentication account that will allow access to the ezFedGrants system. Instructions for getting a Level 2 eAuthentication account can be obtained by emailing GrantorHelpdesk@fas.usda.gov.

Requesting a role in ezFedGrants: After obtaining eAuthentication, users will need a role in the system. Descriptions of the roles available and instructions on how to request a role can be obtained by emailing GrantorHelpdesk@fas.usda.gov.

Electronic Signature. Applications submitted through ezFedGrants constitute a submission as electronically signed applications. When you submit the application through ezFedGrants, the name of your Signatory Official on file will be inserted into the signature line of the application.

If you experience difficulties accessing information or have any questions please email the Helpdesk at GrantorHelpdesk@fas.usda.gov.

FAS may not make a Federal award to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time the FAS is ready to make a Federal award, FAS may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

E. SUBMISSION DEADLINES AND TIMES

Submit all application materials in a single email. Include all application information that is not a specific form in a single PDF document. The following forms are required: SF-424, SF-424A, AD-3030, and AD-3031. The primary document submitted in response to this NOFO with all information requested should be titled *Statement of Work*.

Funding opportunities will be distributed through ezFedGrants and advertised via the USDA/NIFA listserv. All proposals must be submitted through the ezFedGrants portal at <https://grants.fms.usda.gov> or to the email address below with all required forms. Proposals not submitted by the stated deadline will not be accepted. Borlaug Fellowship Program Proposal Email: BorlaugProposals@fas.usda.gov

F. 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. No more than 20% of the requested funds may be allocated toward salaries, consultant fees, fringe benefits, or the combination thereof. Only individuals that hold positions at eligible U.S. institutions should be listed in this category.

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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.

G. OTHER SUBMISSION REQUIREMENTS

All applications must be submitted electronically as indicated above.

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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.

Host University Policies	YES	NO
Will the mentor listed in the proposal be present for the majority of the fellowship?		
Will the mentor be able to spend time meeting with fellow individually each week?		
Will the university be able to provide per diem within the first week of the Fellow's arrival?		
Will the university be able to provide fully furnished lodging with kitchen facilities?		
Does the university withhold federal tax on the participants' per diem and housing? * If so, you must list this expense as a separate line item on the budget.		

*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#

SF-424 Category	Line Items	Rate	Days	Subtotal
Fellow's Logistical Expenses				
TRAVEL/Housing	1. Lodging			
TRAVEL	2. Meals and Incidentals			
OTHER	3. Federal Tax			
TRAVEL	4. Medical Insurance			
TRAVEL	6. Local Transportation			
TRAVEL	7. Airfare - International			
TRAVEL	8. Airfare - Domestic (If Applicable)			
			Subtotal	
Fellow's Professional Development				
TRAVEL	1. Field Tours			
SUPPLIES	2. Educational Materials and IT Expenses			
SUPPLIES	3. Shipping Materials			
			Subtotal	
Host Institution Fees				
PERSONNEL	1. Training Coordinator (Salary)			
FRINGE BENEFITS	1.b. Training Coordinator (Fringe Benefits)			
PERSONNEL	2. Mentor Fee			
FRINGE BENEFITS	2.b. Mentor (Fringe Benefits)			
SUPPLIES	3. Laboratory Expenses			
			Subtotal	
World Food Prize Symposium (Oct. 2017; If Applicable)				
TRAVEL	1. Domestic Transportation			
TRAVEL	2. Lodging			
OTHER	3. Conference Fee			
			Subtotal	
Mentor Follow up Activity (5-10 Days)				
TRAVEL	1. Mentor Airfare – International			
TRAVEL	2. Mentor Domestic In-Country Travel (If Applicable)			
TRAVEL	3. Lodging			
TRAVEL	4. Meals & Incidentals			
SUPPLIES	5. Supplies for Trainings/Workshops			
			Subtotal	
			Total Program Costs	
INDIRECT			Indirect Costs/Overhead (10%)	
			Total Request	

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Section III: 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, and it should help achieve the desired post-program deliverables and the Fellow's research goals and objectives. 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. Salary and fringe benefits expenses should not be excessive.

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 IV: 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.

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All successful applicants for all cost reimbursable agreements are required to comply with Standard Administrative Terms and Conditions , which are available online at:

https://www.fas.usda.gov/grants/general_terms_and_conditions/default.asp

The applicable Standard Administrative Terms and Conditions will be for the last year specified at that URL, unless the application is to continue an award first awarded in an earlier year. In that event, the terms and conditions that apply will be those in effect for the year in which the award was originally made.

Before accepting the award the ezFedGrants GMO should carefully read the award package for instructions on administering the grant award and the terms and conditions associated with responsibilities under Federal Awards. Recipients must accept all conditions in this NOFO as well as any Special Terms and Conditions in the Notice of Award to receive an award under this program.

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.

Progress Reports

- The Principal Investigator or Mentor will submit **semi-annual** progress reports. The Principal Investigator or Mentor will use *Performance Progress Report (SF-PPR)*.
- 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/claim cannot be paid if a progress report is past due, and will not be paid until the required report has been received.**

Close Out Reporting Requirements. Within 90 days after the end of the period of performance, or after an amendment has been issued to close out a grant, whichever comes first, recipients must submit a final FFR and final progress report detailing all accomplishments and a qualitative summary of the impact of those accomplishments throughout the period of performance.

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After these reports have been reviewed and approved by *Program Division*, a close-out notice will be completed to close out the grant. The notice will indicate the period of performance as closed, list any remaining funds that will be de-obligated, and address the requirement of maintaining the grant records for three years from the date of the final FFR.

The recipient is responsible for returning any funds that have been drawn down but remain as unliquidated on recipient financial records.

Section V: 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:

- Borlaug Fellowship Proposals General Email: BorlaugProposals@fas.usda.gov
- Borlaug Africa: Karen Uetrecht, (202) 690-3359 or Karen.Uetrecht@fas.usda.gov

Section VI: Other Information

The USDA Borlaug Fellowship Program began in 2004. More than 750 Fellows from 64 countries have been trained 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 and topic including: Asia, Eastern Europe, Latin America, North Africa, East/ Sub-Saharan Africa. This will be posted on the NIFA listserv.

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Section VII: Borlaug Fellow Proposal and Research Plan

No.	Country	Proposal
Fellow #1 USDA-FAS-10777-0700-10.-17-0010	Kenya	Use of genomics and bioinformatic tools to characterize the viruses causing Maize Lethal necrosis disease in Kenya.
Fellow #2 USDA-FAS-10777-0700-10.-17-0011	Burkina Faso	Improve efficiency and profitability of fertilizer use within the framework of Integrated Soil Fertility Management practices for smallholder farmers.
Fellow #3 USDA-FAS-10777-0700-10.-17-0008	Burkina Faso	Develop linear programming based decision support tool for fertilizer use in Burkina Faso.
Fellow #4 USDA-FAS-10777-0700-10.-17-0006	Morocco	Investigation of biological control of citrus leaf miner.
Fellow #5 USDA-FAS-10777-0700-10.-17-0014	South Africa	Use of single inbred and multi inbred lines to stabilize beneficial traits of entomopathogenic nematodes (EPNs) explored for biological control of insect pests.
Fellow #6 USDA-FAS-10777-0700-10.-17-0007	South Africa	Determine the roles of phyto-hormones in the initiation and/or perpetuation of alternate bearing in citrus. The outcomes of his research will allow citrus produces to obtain more consistent yields from year to year.
Fellow #7 USDA-FAS-10777-0700-10.-17-0015	Kenya	Determining the distribution of Maize chlorotic mottle virus within maize seed infected with isolates from Hawaii and East Africa for improvement of maize seed health testing and treatment.

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Fellow #1 (female); Kenya; brief proposal description – Use of genomics and bioinformatic tools to characterize the viruses causing Maize Lethal necrosis disease in Kenya.

Proposal:

The goal of my research is to use Science, Technology and Innovations (STI) approaches within the maize value chain, to attain food and nutrition security through sustainable and intensified control of viruses causing Maize lethal necrosis disease (MLND) for improved livelihoods.

The objectives will be 1: To analyze and package previously generated sequencing data on viruses associated with MLND into farmer friendly toolkits using current genomic and bioinformatics' tools. 2: To confirm synergy on new viruses associated with MLND using greenhouse assays.

I propose through Borlaug fellowship to analyze fully the existing genomics data generated through a collaborative effort between KALRO and Biosciences East and Central Africa (BeCA) at ILRI-Hub. Such data would be a useful resource for plant pathologists and breeders who are seeking resistant genes to use in their conventional breeding approaches, or to incorporate in maize transformation programs (using RNAi approaches). Again, understanding the different viruses in farmers' fields will help in devising management options for MLND in farmer's fields in Kenya and relate with the East Africa isolates. The data can also be digitized into user-friendly management options tools for farmers, especially if linked with climatic data, which is very important due to the rising changes in weather patterns (aWHERE, USA). Such would reveal site specific location details of the current MLND trends in Kenya, predictions maps for future distribution of MLND viruses would be published, and consequently a significant reduction of the MLND disease and an increased agricultural productivity in crop yields is foreseen. Working with a mentor in the USA will lead to accelerated analysis of the existing information due to their enhanced bioinformatics capacity and availability of softwares in most USA labs. Dr Redinbaugh's lab, Ohio State University, USA has in the past been very instrumental as collaborators with KALRO in various aspects of MLND investigations. The mentoring will lead to enhanced feedback, increased development of communication tools for stakeholders, networking with other scientists, enhanced leadership skills acquired through working with world known scientists, and increased ability to learn and work with different cultures and backgrounds.

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Action Plan:

Week 1-5: Objective 1: Analyze and package Next-generation sequencing data of viruses causing maize lethal necrosis using genomic tools.

The Activity 1.1: Construct Phylogenies; annotations, gene editing

Activity 1.2: Sequence alignments; identify functional orthologs

Activity 1.3: map out Single Nucleotide Polymorphisms (SNPs).

Week 6-9: Objective 2: Confirmation of synergy of viruses causing MLND using Lab and green house assays (at KALRO).

Activity 2.1: Conventional PCR (test primers for SCMV/MCMV/MDMV).;

Activity 2.2: confirm the synergy between MCMV/MDMV.;

Activity 2.3: Real time- (PCR) (MCMV/MDMV).;

Activity 2.4: Publication.

Week 7-12: Objective 3: To develop and implement a communication strategy for dissemination of information pertaining to diseases and pests affecting maize.;

Activity 3.1: To develop efficient communication tools for management of MLND using online web portals, digital databases and mobile applications

Activity 3.2: Conduct MLND project information sharing through strategic pathways

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Fellow #2 (female); Burkina Faso; brief proposal description – Improve efficiency and profitability of fertilizer use within the framework of Integrated Soil Fertility Management practices for smallholder farmers.

Proposal: The goal of research is to improve efficiency and profitability in fertilizer use in Burkina Faso within the framework of Integrated Soil Fertility Management (ISFM) practices under smallholder farming systems

The specific research objectives are:

- Formulate new fertilizer recommendations base on soil type and crop.
- Adapt fertilizer recommendation the financial situation of farmer
- Adopt new technology of fertilizer application (micro-dosing, Fertilizer deep placement, integration of various organic matters) by farmers to increase nutrient efficiency
- Characterize farmer soil fertility with quick soil test method to guide farmer in their fertilizer choice
- Optimizing fertilizer application and nutrient uptake by plant by using model (Solver)
- Improved access to information and communication materials for extension

By the end of this fellowship I am expected to be skill in soils characterization (biophysical and special soil characterization), modeling and decision support tools for fertilize recommendations. My research interests are based on capacity building on new and rapid soil characterization, basis for modeling, Geographic Information System (GIS). Working with other specialist and technicians in US will certainly allow me to be well skill and increase my competences for formulating and testing new fertilizer recommendations. Also, I have achieved serious scientific background with my job and studies in soil science and agronomy since teen years. This knowledge is solid basis and guide for proposal writing to address farmer agricultural problems. Working with a mentor in US with certainly guide me in the research of information and specialists in various area related to soil fertility. Agriculture in US is very well developed and working with a mentor will also help me learn about US experience in agriculture.

Action Plan:

Week 1

Introduction to the University and Staff: The outcome of this activity is to know the university commodities and to get attached with resource persons.

Week 2 to week 11

Literature review: This activity is to take and gather information about US experience in agriculture, look for basis for models and different models that can help in decision taking for farmers. The material needs for this activity are library, books, papers.... The outcome of this activity is to enhance my knowledge in agriculture and have tools and skills to achieve the goals of the proposal and also guide the research.

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Week 3 to week 6

Laboratory work: During the fellowship it will be essential for me to learn new, rapid and easy way of characterizing soil (biophysical and chemical). This activity is one of key point that helps me to achieve the goals of y proposal. The materials needed for laboratory work will be products for analysis

Week 7

Field visit of farm: this activity is to see what farmers are doing in terms of integrated soil fertility management. The outcome of this activity is to have experience and share experiences.

Week 8 to week 10

Learning models and co- conception of models adapted to our realities: By Working with specialists I will able be to know minimum data set for models building and how to adapt models to our conditions. The outcome of this activity is the conception or co-conception of models

Week 11 to week 12

Redaction and assessment of the final proposal with US mentor

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Fellow #3 (male); Burkina Faso; Develop linear programming based decision support tool for fertilizer use in Burkina Faso.

Proposal:

The Goal of my research is to propose a linear programming based decision tool for fertilizer recommendation in Burkina Faso.

During the fellowship, I intend to respond to the Burkina Faso-Borlaug priority area of developing “innovative techniques and/or technology to enhance agricultural production”. Specifically, I will update the Excel fertilizer optimization tool produced in the framework of the OFRA Project for four AEZs of Burkina Faso and submit journal articles reporting results of recent research on fertilizer use for maize and sorghum in Burkina Faso. I have a good background on linear programming and I assist to coordinate the OFRA (Optimizing Fertilizer Recommendations in Africa) in Burkina Faso. I also intend to improve are Extension training resources for advising farmers on fertilizer use.

Weekly Action Plan:

Output 1: The Excel Fertilizer optimization tool is updated

Week 1: university and laboratory orientations and staff introductions

Week 2: Data analysis using genstat and Statistix 10 (OFRA project data and legacy data)

Week 3: update of the Excel fertilizer optimization tool for the different agro-ecological zones of Burkina Faso

Week 4: adaptation /development of an Extension training procedure and materials with the support of the mentor

Output 2: Two scientific articles are written

Week 5 to week 12: Write two scientific papers

Weeks 10 and 11: Review of the articles by the mentor

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Fellow #4 (male); Morocco; Investigation of biological control of citrus leaf miner.

Proposal:

The goal of my research is to reduce the usage of pesticides and to develop a simple and efficient citrus Integrated Pest Management (IPM) program against the citrus leafminer (CLM) based on biological approaches, most developed in USA to apply it in Moroccan conditions

The specific research objectives are to develop a simple, accurate and efficient monitoring method of the CLM by identification and assessment parasitoids and predators in the field to be explored as a biological control, also by introduction of trapping methods and mating disruption as tools of decision making and fight. All this methods allow us to reduce the usage of pesticides for better preservation of beneficial insects.

As a researcher in Health Plant in the Oriental region in Morocco, especially in the irrigated area of Moulouya, my research interests are directed primarily towards the most widely grown crop in this region, which is the sector citrus with 15 % of national production. The area harvested in 2014-2015 of citrus in this irrigated area is about 16 482 ha (Orange) and 11 937 ha (clementine). This area is attacked by several pests that cause significant damage on the citrus production. More than 30 phytophagous arthropods and snail species have been reported on citrus orchards in Morocco. The key pests around which control strategies pivot are : Mediterranean fruit fly, citrus red mite, California red scale, aphids and citrus leafminer on young plantations. This research will focus on the last pest mentioned, the citrus leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera:Gracilariidae), is an important pest in nurseries and in young and mature citrus trees in many parts of the world, including Morocco. Larvae of the citrus leafminer form serpentine mines in the newly developing leaves preventing them from expanding fully. This reduces the plant ability to photosynthesize resulting in stunted growth and negative impact on fruit production particularly of young trees. Feeding damage by leafminer larvae also exposes plants to the infection by the pathogens responsible to cause citrus canker a devastating disease of citrus present in several regions with significant potential to spread. In our conditions, CLM management relies primarily on chemical control. The sole reliance on the chemical control negatively impacts predators, parasitoids and pathogens which provide control of several pests of citrus and of several other fruits and vegetables including other species of leafminers. Chemical control also reduces environment quality thus negatively impacting human health. For sustainable and economical crop production including citrus tools and investigations are warranted for the development and implementation of Integrated Pest Management. This approach integrates multiple methods of pest control to minimize the sole reliance on chemicals and their negative effects.

Pest management in Moroccan orchards relies primarily on chemical control. However, the implementation of IPM is slowly taking place. Some alternative methods have been developed already by means of research. In this sense, biological control is in progress and alternative methods to chemical control. Through this Borlaug Fellowship we hope to introduce this IPM program most practiced in USA in our Moroccan conditions by simple and efficient tools that can be practiced and employed by farmers themselves, to fight the CLM that caused higher significant damage for young tree under 5 years.

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Weekly Research Plan:

- * Proposed time: 1 week.
- * Activities type: Initial visit.
- * Purposes: Introduction of host institution and development of the research proposal with mentor.
- * Work plan: Familiarization with training areas, laboratory facilities and presentation of the research proposal.

- * Proposed time: 4 to 5 weeks.
- * Activities type: Biological control.
- * Purposes: Identification and assessment of the parasitoids and predators in the field.
- * Work plan: Monitoring of the beneficial insects presents in field, with study of their predation and parasitism behavior on CLM.

- * Proposed time: 4 to 5 weeks.
- * Activities type: Chemical ecology.
- * Purposes: Practice of trapping methods and mating disruption.
- * Work plan: Study of the effectiveness of the mass trapping by a sex pheromone trap and the mating disruption against CLM.

- * Proposed time: 1 week.
- * Activities type: Resume.
- * Purposes: Abstract of the IPM program studied.
- * Work plan: Discussion of the study results and programming for the next collaboration work that will be done in Morocco.

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Fellow #5 (female); South Africa; Use of single inbred and multi inbred lines to stabilize beneficial traits of entomopathogenic nematodes (EPNs) explored for biological control of insect pests.

Proposal:

The goal of my research is to use of single inbred and multi inbred lines to stabilize beneficial traits of entomopathogenic nematodes (EPNs) explored for biological control of insect pests.

My objectives are:

- To establish 95% homozygous inbred lines using the single inbred and multi inbred techniques and conduct bioassay from direct selected populations assessing the tolerance characters.
- Using a model EPN strain (*Heterorhabditis bacteriophora*), learn hybridization and direct selection techniques for strain improvement.
- Compare environmental tolerance and stability of population from the two inbred line approaches, directed selection procedure, and hybridization procedure.
- Generation of peer reviewed publications on the use of single inbred vs. multi inbred lines approaches and studying generated lines for pH tolerance.

To be accomplished: One of the major problems with short-term preservation (currently the only option to preserve a national collection at Agricultural Research Council-Small Grain Institute (ARC-SGI in South Africa) is loss of beneficial traits. Prof. Shapiro-Ilan from the USDA Fruit and Tree Nut Research Unit is a renowned specialist and has already published on single inbred lines to stabilize beneficial traits. This training is focused on achieving the following objectives:

- To establish 95% homozygous inbred lines using the single inbred and multi inbred techniques and conduct bioassay from direct selected populations assessing the tolerance characters prioritizing pH as it has not been done before.
- Using a model EPN strain (*Heterorhabditis bacteriophora*), learn hybridization and direct selection techniques for strain improvement.
- Compare environmental tolerance and stability of population from the two inbred line approaches, directed selection procedure, and hybridization procedure.
- Generation of peer reviewed publications on the use of single inbred vs. multi inbred lines approaches and studying generated lines for pH tolerance.

Moreover, this training present an opportunity to preserve beneficial traits of new indigenous species already discovered in South Africa and equip the trainee with advance techniques in EPNs research to develop them as biopesticides for environmentally-sound and climate-smart agriculture in South Africa.

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Action Plan:

- Week 1. Settling in, orientation to laboratory and facility, initial nematode culture establishment.
- Week 2. Establishment of monoxenic culture of *Heterorhabditis bacteriophora* (this species will be used as the model nematode and the newly learned procedures will then be applied to indigenous strains once I am in South Africa).
- Week 3. Initiation of inbred line procedures using two approaches for comparison: single inbred line approach on solid culture vs. multiple line approach in liquid culture.
- Week 4. Complete generations 1 & 2 toward establishment of inbred lines. Learn hybridization techniques for strain improvement. Inbred lines will be generated while under selection pressure for improved environmental tolerance (success will be determined in bioassays procedures after homozygous lines are established).
- Week 5. Complete generations 3 & 4 toward establishment of inbred lines. Implement hybridization techniques for strain improvement (environmental tolerance). Conduct bioassay testing assessing the tolerance characters.
- Week 6. Complete generations 4 & 6 toward establishment of inbred lines. Learn directed selection techniques for strain improvement (environmental tolerance).
- Week 7. Complete generation 7 toward establishment of inbred lines; lines are now 95% homozygous. Reproduce lines in a model host. Conduct bioassay from direct selected populations assessing the tolerance characters.
- Week 8. Prepare bioassays to compare environmental tolerance and stability of population from the two inbred line approaches, directed selection procedure, and hybridization procedure.
- Week 9. Implement bioassay on environmental tolerance.
- Week 10. Repeat bioassay on environmental tolerance.
- Week 11. Assess and analyze bioassay results.
- Week 12. Wrap-up, prepare seminar, outline manuscript for publication.

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Fellow #6 (male); South Africa; Determine the roles of phyto-hormones in the initiation and/or perpetuation of alternate bearing in citrus. The outcomes of his research will allow citrus produces to obtain more consistent yields from year to year.

Proposal:

The goal of my research is to determine the roles of phyto-hormones in the initiation and/or perpetuation of alternate bearing in citrus (Citrus spp.).

The main objectives to achieve my research goal are:

- To gain access to a specialist researcher and laboratory in the USA to acquire the associated training and skills to understand, conduct, and interpret results of a molecular technique for the extraction and quantification of phyto-hormone-like substances from citrus tissues;

- To measure phyto-hormone-like substances as influenced by cultural practices and environmental conditions;

- To develop and integrate results into a crop model which could potentially be used to identify an opportune timing of a horticultural manipulation technique to obtain a consistent yield;

- To use the training to develop a repeatable protocol at my home institution to enable any future research projects and training of students on the roles of phyto-hormones in citrus and other horticultural crops

The fellowship provides the opportunity to quantify the role for phyto-hormones in alternate bearing of mandarins. Infrastructure or knowledgeable individuals are not available in South Africa to assist in achieving this goal. If I am successful in receiving the fellowship opportunity, I will be guided and trained by a specialist and thereby acquire the training to understand, conduct, and interpret results of a molecular technique for the extraction and quantification of phyto-hormonelike substances from citrus tissues. I hope to use the training to develop a repeatable protocol at my home institution to enable any future research projects and training of students on the roles of phyto-hormones in citrus and other horticultural crops. This visit will also afford the opportunity to establish a possible international research collaboration network.

Action Plan:

Week 1:

The first week of my Fellowship will consist of an orientation of the university and laboratory facilities, getting the necessary administrative requirements in place (registration, etc.), and introducing myself to staff, students and other personnel.

Week 2-4:

From the second to fourth weeks of my fellowship, my main activities will consist of theoretical training and familiarization of important nomenclature, concepts and principals of real time quantitative PCR (RT-qPCR) to measure gene expression of key genes regulating the synthesis, catabolism, import and

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export of hormones that have been implicated in alternate bearing of citrus. During this period I will first familiarize myself with, and receive special training on important equipment, reagents and procedures applicable to the analytical procedure, as well as the functioning and general protocols of the laboratory.

Week 5-6:

If my mentor is happy with my progress up until that stage, I will spend most of my time during the fifth week of the fellowship in planning and preparing the experiments and procedures of sampling, preparation, extraction and quantification of fresh tissue. During this stage we will also order any required reagents, and book equipment and lab space.

Week 7-9

From week seven to nine, my fellowship will consist of the collection of fresh samples and the in-depth training of all the important procedures in the various steps of the protocol under the guidance of my various mentors. Most of the time will be spent in the laboratory and will comprise of the physical conducting of RT-qPCR to measure gene expression of key genes, namely auxins, cytokinins and gibberellins, as well as any substrates and enzymes regulating their synthesis, catabolism, import and export. As part of the training and in addition to RT-qPCR, a subset of samples will have to be sent to the National Research Council, Plant Biotechnology Institute Plant hormone analysis lab in Saskatoon, Canada, to determine the actual endogenous hormone content of the specific samples and correlate it with the measured gene expression of key genes regulating the synthesis, catabolism, import and export of hormones.

Week 10-11:

From week ten to eleven, I will visit Dr. Sue Abrams, the director of the plant hormone analysis lab in Saskatoon, Canada, to explain my research background and objectives, and receive training on their protocol for the analysis of the leaf phyto-hormone content.

Week 12:

During week twelve I will return to my mentors in Riverside, California to reflect on my fellowship; sort and organize data, results and findings; and compile a detailed report on my training and experiences.

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Fellow #7 (female); Kenya; Determining the distribution of Maize chlorotic mottle virus within maize seed infected with isolates from Hawaii and East Africa for improvement of maize seed health testing and treatment.

Proposal:

My goal for the research proposal is to understand the distribution of Maize chlorotic mottle Virus (MCMV) within infected maize seed

Specific research objectives are:

- a) To determine the localization of MCMV - Hawaii Isolate in infected maize seed
- b) To determine the localization of MCMV -East African isolate in infected maize seed
- c) To determine the distribution of MCMV in maize seed obtained from MLN-infected plants
- d) To compare the distribution of MCMV in immature seeds vis-à-vis in mature seeds

Through this fellowship, I hope to determine the location of MCMV, Hawaii (HI) and East African (EA) isolates, in infected maize seed parts by using three methods. Tissue blot and Dot blot immunoassay; and Immunosorbent electron microscopy (ISEM), using maize seed harvested from maize plants inoculated with MCMV HI and EA isolates, and with dual combinations of MCMV and SCMV or MDMV. I propose to use the three methods, to determine the differences in results, of the methods. Tissue blot immunoassay involves separation of the seed parts (testa, embryo and endosperm) and using this whole seed parts for detection of MCMV using antibodies on a nitrocellulose membrane. Dot immunoassay involves manually separating the seed parts, and crushing the parts before using them as in Tissue blot assay. This two assays can be used where specialized electron microscopes are not available, in my home country. Immunosorbent electron microscopy is a more sensitive method. Using ISEM will increase my expertise in scientific techniques.

My research interest is in addressing crop production challenges using biochemical and molecular biology techniques. From the background above, MCMV is new virus in the EA region. There is need to identify the extent to which maize seed is infected and contaminated with MCMV, which is the goal of my proposal, in order to minimize the introduction and spread of this virus. This data will be used to further explain the contamination and/or infection of seed by MCMV and used in determining seed treatment.

Action Plan:

Week 1:

Activity: Staff and Laboratory introductions, Safety training, and Training on use of equipment

Outcome: Familiarization with the laboratory

Week 2:

Activity: Familiarization with the Protocols for localization of viruses in seed. Extraction of RNA from grounded whole seed to confirm the presence of MCMV in the seed using ten seeds. Planting of seed grow-outs

Requirements: Seed infected with MCMV isolates form Hawaii and East Africa about 1000 seeds.

Acquisition of the seed will follow the stipulated requirements of transfer of seed with suspected infection. Laboratory reagents and equipment

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Outcome: Confirmation that the seeds have the virus –MCMV

Week 3:

Activity: Manual extraction of seed parts (testa, embryos and endosperm), prepared and used for Immunosorbent electron microscopy (ISEM). Experiment replicated three times, with samples having seed parts from batches of 10, 20 and 30 seeds.

Requirements: Seed infected with MCMV isolates. Laboratory reagents and equipment- Antisera of MCMV-Hi and ultracentrifuges

Outcome: MCMV-HI extracts, Electromicrographs of MCMV -HI from maize seed

Week 4:

Activity: Seed parts (testa, embryos and endosperm) manually extracted, prepared and used for Dot immunobinding assay and tissue immunoblot assay Harvesting of Grow-outs and detection of MCMV in roots, shoot parts using qRT-PCR

Requirements: Seed infected with MCMV isolates about 300seeds each. Laboratory reagents and equipment- Antisera of MCMV-Hi, qPCR MCMV primers and equipment

Outcome: Data on presence or absence of MCMV-HI in the seed and seedling parts

Week 5:

Activity: Seed parts (testa, embryos and endosperm) manually extracted, prepared and used for Immunosorbent electron microscopy (ISEM), Experiment replicated three times, with samples having seed parts from batches of 10, 20 and 30 seeds.

Requirements: Seed infected with MCMV-EA isolate. Laboratory reagents and equipment

Outcome: MCMV-EA extracts, Electromicrographs of MCMV -EA from infected maize seed

Week 6:

Activity: Seed parts (testa, embryos and endosperm) manually extracted, prepared and used for Dot immunobinding assay and tissue immunoblot assay

Requirements: Seed infected with MCMV-EA about 300seeds each. Laboratory reagents and equipment- Antisera of MCMV-Hi,

Outcome: Data on presence or absence of MCMV-EA from the three seed parts

Week 7:

Activity: Seed parts (testa, embryos and endosperm) manually extracted, prepared and used for Immunosorbent electron microscopy (ISEM); Experiment replicated three times, with samples having seed parts from batches of 10, 20 and 30 seeds.

Requirements: Seed infected with MLN. Laboratory reagents and equipment - Antisera for MCMV, SCMV and MDMV

Outcome: Electromicrographs of MCMV, SCMV and/or MDMV from infected maize seed

Week 8:

Activity: Seed parts (testa, embryos and endosperm) manually extracted, prepared and Dot immunobinding assay and tissue immunoblot assay

Requirements: Seed infected with MLN.. Laboratory reagents and equipment- Antisera for MCMV, SCMV and MDMV

Outcome: Presence and absence of MCMV, SCMV and/or MDMV data on nitrocellulose membrane

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Week 9:

Activity: Mature-Seed parts (testa, embryos and endosperm) manually extracted, prepared and used for ELISA and qPCR

Requirements: qPCR equipment, Laboratory reagents especially MCMV Primers

Outcome: MCMV-HI and MCMV –EA Presence and absence data for mature seed parts

Week 10:

Activity: Immature -Seed parts (testa, embryos and endosperm) manually extracted, prepared and used for ELISA and qPCR

Requirements: qPCR equipment, Laboratory reagents especially MCMV Primers

Outcome: MCMV-HI and MCMV –EA Presence and absence data for immature seed parts

Week 11:

Activity: Data analysis and Report writing

Requirements: Laptop/Desktop access and data analysis tools/software

Outcome: Report on the fellowship

Week 12:

Activity: Manuscript writing

Requirements: Laptop/Desktop access and data analysis tools/software

Outcome: Draft journal paper for further editing and revision for onward submission for publishing

NB: Any movement of seed will follow the requirements stipulated for movement of seed with suspected infection in USA and Kenya.