

**USDA Request for Expressions of Interest
2017 Borlaug Fellowship Program for
REGION: Eastern Europe-Eurasia**

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

**FISCAL YEAR 2017 REQUEST FOR EXPRESSIONS OF INTEREST
for
REGION: Eastern Europe-Eurasia: Ukraine, Turkey, Georgia**

Topics: Plant Breeding, Animal Health and Disease, Biotechnology

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

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-2017-Eurasia*

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

1. Ukraine 1: USDA-FAS-10777-0700-10.-17-0001
2. Ukraine 2: USDA-FAS-10777-0700-10.-17-0002
3. Turkey 1: USDA-FAS-10777-0700-10.-17-0003
4. Georgia 1: USDA-FAS-10777-0700-10.-17-0004

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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, Eastern Europe-Eurasia (Ukraine, Turkey, Georgia)

NOTICE OF FUNDING OPPORTUNITY NUMBERS: These announcements are also being distributed through USDA's EzFedGrants system under the following Notice of Funding Opportunity (NOFO) numbers:

1. Ukraine 1: USDA-FAS-10777-0700-10.-17-0001
2. Ukraine 2: USDA-FAS-10777-0700-10.-17-0002
3. Turkey 1: USDA-FAS-10777-0700-10.-17-0003
4. Georgia 1: USDA-FAS-10777-0700-10.-17-0004

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

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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:

Fellow #	Country	Topic
Male	Ukraine1	Study the sour cherry S-locus alleles for breeding new high-yield self-compatible varieties and fruit production, clarify the S-locus alleles in the most important and promising self-incompatible and partially self-compatible cultivars
Male	Ukraine2	Risk analysis, epidemiology and diagnostic methods of Johne's disease (cattle para tuberculosis) in Ukraine.
Male	Turkey 1	GMO technology from production to marketing with an emphasis on risk perception, assessment and management of GMOs. Exposure to methods of plant bio-fortification using GE.
Female	Georgia 1	Campylobacter risk analysis/assessment and surveillance/testing programs, laboratory diagnostic methods, HACCP systems used in poultry processing plants, and campylobacter resistance to antibiotics.

[Section VII](#) 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.

FEDERAL AWARD INFORMATION

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

PROJECTED NUMBER OF AWARDS: *four*, one award for each Borlaug Fellow listed in this notice.

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 Sub-award 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 (Non-procurement)
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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In addition to the above mentioned, all recipients/cooperators 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.

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).

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- 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 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 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, 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 quarterly 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

Program Manager Email: Edward.Gerard@fas.usda.gov

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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.

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.

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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.

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

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contained in 2 CFR Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards.

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) 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/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.

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

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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 Eastern Europe: Ed Gerard, (202) 690-1983 or Edward.Gerard@fas.usda.gov
- Borlaug Eastern Europe: Sintayehu Assefa, (202) 720-2200 or sintayehu.assefa@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 Fellows Proposals and Research Plans

Fellow #	Country	Topic
Male	Ukraine 1	Study the sour cherry S-locus alleles for breeding new high-yield self-compatible varieties and fruit production, clarify the S-locus alleles in the most important and promising self-incompatible and partially self-compatible cultivars
Male	Ukraine 2	Risk analysis, epidemiology and diagnostic methods of Johne’s disease (cattle para tuberculosis) in Ukraine.
Male	Turkey 1	GMO technology from production to marketing with an emphasis on risk perception, assessment and management of GMOs. Exposure to methods of plant bio-fortification using GE.
Female	Georgia 1	Campylobacter risk analysis/assessment and surveillance/testing programs, laboratory diagnostic methods, HACCP systems used in poultry processing plants, and campylobacter resistance to antibiotics.

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Fellow # 1: Ukraine, Junior Research Fellow at the Institute of Horticulture, National Academy of Agrarian Sciences of Ukraine (NAAS). BS in Biology, MS in Genetics, nearing completion of PhD in Molecular Genetics/Horticulture. Spent 3 months in Bordeaux, France doing research with French scholars on “sweet cherry genetic fingerprinting: methods and techniques (marker-assisted selection approaches for selecting sweet cherry varieties)” under the COST1104 program.

Research Proposal

Study the sour cherry S-locus alleles for breeding new high-yield self-compatible varieties and fruit production, clarify the S-locus alleles in the most important and promising self-incompatible and partially self-compatible cultivars

NOTE: *The fellow intends to bring Cherry DNA from 50-60 cultivars and 20 landraces from Ukraine to the host university to work on during the program. He transported aliquots of extracted cherry DNA in small 'eppendorf' tubes to France for work in a lab there in 2016. The host university is responsible for working with the fellow to determine what type of DNA samples to bring and for obtaining all U.S. government permits for the importation of DNA samples to the U.S.*

1. The goal(s) of the research proposal:-

The goal of my research is to conduct identification of S-locus alleles in the most important self-incompatible and especially partially and self-compatible sour cherry varieties which is valuable for breeding and fruit production.

2. Specific objectives to achieve the goal:-

- Collect samples of self-compatible (SI), partially self-compatible (pSC) and self-compatible (SC) sour cherry varieties unexplored till now
- Conduct identification of known S-locus alleles in studied accessions
- Cloning and sequencing fragments of S-RNase and SFB genes supposed to be new one with subsequent alignment and analysis
- Studying S-locus alleles in SC/SI sour cherry varieties, which are progeny of interspecific crosses (hybrids of *P. cerasus*, *P. fruticosa*, *P. avium* and *P. maakii*, *P. pensylvanica*, *P. canescens*) and have importance for breeding of new resistant varieties
- Characterize the sour cherry varieties' S-locus genotypes and SI/SC phenotypes with subsequent assess of their potential to breed new self-compatible varieties.

3. Background information about the research:-

Self-incompatibility (SI) is a genetic mechanism that prevents self-fertilization (inbreeding) by enabling the pistil to reject self-pollen. Fertilization of rosaceous fruit tree species governed by gametophytic SI,

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which has a major effect on commercial fruit production by regulating fruit set proportion. The GSI systems are homomorphic type, which means that there are no morphological differences in the structure of flowers; the recognition of the genetically related individual based on the interaction between pollen- and pistil-expressed genes. It controlled by a single multi-allelic locus, called the S-locus. A female determinant gene encodes glycoprotein with ribonuclease (S-RNase) activity in the pistils, and the male determinant gene expresses a specific F-box protein only in pollen. Cultivars sharing different S-alleles must be interplanted in orchards; therefore information on the S-genotypes is necessary for commercial fruit growing and breeding. Breakdowns in the pollen or pistil genes resulted in self-compatible genotypes (Makovics-Zsohár & Halász, 2016). Scientific achievements are primarily limited to diploid species like peach, almond and sweet cherry, while information is hardly available for polyploid species despite the fact that polyploidy is a prominent feature of plant genomes. It had an important role in evolution but complex genome structure makes understanding difficult (Dufresne et al. 2014). Currently only for 20 sour cherry varieties it is present data about their S-genotypes which was studied in the Michigan State University (USA) and Kyoto University (Japan) (Tsukamoto, 2010; Sebolt, 2009; Tsukamoto, 2008; Tsukamoto, 2008b; Hauck, 2006; Tsukamoto, 2006; Yamane, 2001). The list of studied sour cherry varieties with knowing S-genotypes is limited and consists mainly of varieties originating from Hungary and USA. Currently it is continuing the studying of S-alleles in 25 new sour cherry varieties in the Julius Kühn-Institut in Dresden-Pillnitz (Germany). In the last one, it is studying varieties mainly of German origin. It remains unstudied the most important SI, pSC and SC cultivars originating from Eastern Europe (in particular Ukraine etc).

4. What to accomplish during the fellowship, how research interests and scientific background relate to the goals of the proposal and how will working with a mentor in the U.S. help to achieve the research goals?

I expect to conduct during my fellowship identification of S-locus alleles in the SI, pSC and SC sour cherry cultivars mainly of Ukrainian origin, including breed varieties and landraces. In the study will be engaged varieties with known S-alleles as controls and possibly some varieties of interspecific origin. If we find supposed new S-alleles, we will hold cloning, sequencing and describing new one. The results of this research will applied in the selection of best parent varieties for breeding of self-compatible varieties. It will be propose the best combinations of sour cherry cultivars for planning plantations and getting higher yield.

In my home institute, I deal with systematizing of genetic resources, DNA-fingerprinting and marker-assisted selection (MAS) of apple and sweet cherry cultivars. The aims of my last researches and PhD was to study of sweet cherry S-haplotypes, allelic variants of PavCNR12 gene related with fruit weight and conducting of microsatellite fingerprinting. Currently, publications of these articles are ongoing. Team of Prof. Amy Iezzoni at the Michigan State University is leading in the field of research such kind. Mentor(s) from U.S. have big experience in this field and can help with recommendations during the work and discuss obtained results. Additionally I (and my home institute) hope to make our collaboration continuous and publish joint articles.

5. How will a Borlaug Fellowship contribute to enhanced agricultural productivity economic development, and/or food security in the country?

This Fellowship can help us to implement into our practice modern achievements in the field of biotechnology and genetics. Our lab is only one in Ukraine were we conducting DNA-fingerprinting and

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implementing the MAS approaches in breeding of horticulture crops. It is well known that breeding of new varieties have a key importance to enhance agricultural productivity. Traditional breeding process is very capital intensive, but applying molecular methods accelerate breeding of new varieties, enhancing productivity, saving time and money. Since the gametophytic self-incompatibility system as far as knowing of sour cherry S-locus alleles have direct influence on the crop set and importance for commercial fruit growing and breeding.

Action plan for 12-week fellowship period

Week 1: Arriving and accommodation; university and laboratory orientations and staff introduction. Discuss the detailed work plan with local supervisor. Incorporating in the study some additional samples of sour cherry cultivars or landraces and final preparation of samples set. Amount of studied samples should discuss. If it is absent, ordering oligonucleotide primers and/or endonucleases, GTG agarose, cloning kit etc.

Week 2: Testing the methods. Conduct PCRs, restriction of PCR products to obtain CAPS-markers (for some alleles) and separation on horizontal agarose gel electrophoresis. Operating analysis of obtained raw data.

Week 3 & 4: The same like in week 2.

Week 5: Summing and discussing of the interim results. Making decision about unresolved cases and repeating the study of samples with unclear results.

Week 6: If we find supposed new S-alleles (S_x) or absence of alleles, we will try consensus primers to get these alleles (It depends on samples amount in the set and origin of these varieties). Conduct cloning using plasmid vector; sequencing and alignment analysis of new alleles.

Week 7, 8 & 9: The same like in Week 6.

Week 10: If we find supposed new S-alleles, we will develop allele-specific primers, CAPS- and/or dCAPS markers for distinctive detection of these alleles and testing will continue.

Week 11: The same like in Week 10.

Week 12: Summing and discussing of the results; proposing the possible combinations of sour cherry cultivars for planning plantations and breeding crosses. And planning publishing articles jointly and discussing possible future collaboration.

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Fellow # 2: Ukraine, Junior Researcher at the National Scientific Center, “Institute of Experimental and Clinical Veterinary Medicine”. MS in Veterinary Medicine.

Research Proposal

Risk analysis, epidemiology and diagnostic methods of Johne’s disease (cattle para- tuberculosis) in Ukraine.

1. The goal(s) of the research proposal:-

- Study modern methods of diagnosis of tuberculosis and para-tuberculosis in farm animals and in the wild reservoirs; analysis and risk assessment.

- Get more information, academic experience, expand my knowledge and improve my practical skills on modern techniques and new developments related to my scientific work during my fellowship program in the United States.

2. Specific objectives to achieve the goal:-

Getting a new data, analysis of the results in the sector of advanced basic and applied research and forecasting risks are very important. This leads to the progress in the improvement of diagnostic tools and the development of new drugs, vaccines, measures against TB and JD. In the future, I will apply the knowledge received within the training program by the US in the following areas:

- Development and improvement of methods for diagnosis and prevention of tuberculosis and para-tuberculosis in animals by creating new and improving existing diagnostic products.

- Development the system of treating measures for TB in animals.

- Prevention of transboundary drift of MAP pathogens to Ukraine.
- Estimation, analysis and risk management on infectious diseases of animals in Ukraine tuberculosis, para-tuberculosis).

3. Background information about the research:-

Tuberculosis is one of the major causes of morbidity and mortality worldwide. The World Health Organization (WHO) declared TB a global threat. In Ukraine, there were 35304 cases of human TB in 2015. The mortality rate in this case is 11,000 people per 10, 0000 populations. The number of cases caused by multidrug-resistant Mycobacterium strains (MDR-TB) was estimated as 12 000 cases in 2015. Among the reported cases of tuberculosis, estimated proportion of new cases is 25.0%, while the cases that were treated before - 58.0%. The number of TB cases caused by multidrug-resistant strains and the number of allocated strains of Mycobacterium tuberculosis increases in Ukraine. As a result, there is a spreading of TB infection as long as treatment is extremely difficult.

Tuberculosis, dangerous infectious diseases, represents a great threat to animal and human health. Epizootic process is stationary among cattle over last 100 years in Ukraine. The ineffectiveness of anti-TB

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measures caused by imperfect methods of differential diagnosis, by high polymorphism of mycobacteria tuberculosis and by resistant of pathogen to available disinfectants.

The disease has a significant economic impact on livestock industry. Those are loss of productivity, under-receiving of products (milk, meat, and genetic material), compelled slaughtering of reacting to tuberculin animals and additional comprehensive diagnostic tests and veterinary-sanitary measures on TB-positive farms. Thus during fifty years (the period from 1960 to 2010) the total actual economic loss from tuberculosis was estimated as 8446364178.2 UAH. From 1991 to 2010 this amount was 918483214.2 UAH.

Tuberculosis in cattle (Bovine tuberculosis) – is a chronic multispecies infectious disease (mostly cattle), which is caused by *Mycobacterium bovis*. Transmission of the pathogen to the human body is a threat to society.

Diagnosis of TB infection in animals plays a leading role in the anti-epizootic measures. The important factor is to detect latent carriers of the disease and animals that excreting bacteria from their body, as well as the causative agent in animal products (meat, milk) and the genetic material (semen).

Wild animals play a special role in the support of stationary epizootic process of bovine TB as an alternative source of pathogen in the wild nature.

This diversity of *M. bovis* sources makes recovery efficiency more difficult for TB positive farms and administrative territories and prevents the elimination of infection. Therefore, the constant epizootic monitoring, analysis and evaluation of new data, the improvement of laboratory diagnostics in modern conditions, new developments in veterinary practice are very important to speeding up and well-timed diagnosis of TB in agricultural and wild animals.

There is a risk of reducing the effectiveness and informative data of bacteriologic examination on TB. It is connected to evolutionary variability, resistance of pathogen to the drugs, reorganization of livestock industry.

Paratuberculosis (Johne disease, JD) – is a chronic intestinal disease caused by *Mycobacterium avium* subsp. *paratuberculosis* (MAP). Disease is characterized by the slow development of productive granulomatous enteritis, by the disorder of the gastrointestinal tract, by the progressive exhaustion, weight loss and death of animals. JD has a long latency period. Paratuberculosis treatment in most cases is inefficient and economically unfounded. Johne disease belongs to the highly dangerous diseases, subjected to the mandatory registration.

Nowadays Ukraine is negative on bovine para-tuberculosis. But there is a high probability of entry JD pathogen into our country in the accordance to the expansion of international relations of Ukraine. The main conditions for the spread of para-tuberculosis in Ukraine are susceptible livestock ruminants and lack of diagnostic methods and control measures for the spread of JD. There is a high risk of entering the MAP to Ukraine. It is caused by the import of animals, animal products (meat, milk, and cheese) and genetic material (semen). But it has to be noted that any of diagnostic tests cannot be conducted at the farm conditions and there is no any control for the imported cattle from abroad. Basing on this we can talk about the unknown situation of para-tuberculosis in Ukraine.

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These data indicate the urgency of the task of improving the diagnostic methods, the need to develop diagnostic products for monitoring research and control of the epizootic situation on tuberculosis and para-tuberculosis on the farms in Ukraine.

Thus, the use of risk analysis system regarding infectious animal diseases is necessary for effective implementation of anti-epizootic and preventive measures and control of diseases common for people and animal in Ukraine.

4. What to accomplish during the fellowship, how research interests and scientific background relate to the goals of the proposal and how will working with a mentor in the U.S. help to achieve the research goals?

I'm planning to work in close cooperation with a mentor from the United States. Our joint work will bring success and progress in the training program.

5. How will a Borlaug Fellowship contribute to enhanced agricultural productivity economic development, and/or food security in the country?

Borlaug Fellowship program contributes to increase agricultural productivity, economic development, and food security through the using of new knowledge and implementations in the veterinary science and practice in my country.

Action plan for 12-week fellowship period

Study systems for monitoring researches and predicting disease while diagnosis of TB and JD.

Study the systems of analysis, evaluation and risk management for diseases.

Study international standards and implement them into the practice.

Study the national strategy used in the United States to eradicate of tuberculosis, paratuberculosis.

Get theoretical and practical knowledge in the following areas of work:

- Isolation of Mycobacterium tuberculosis and MAP from biological material during cultural study and the cultivation of mycobacteria in a liquid and solid selective nutrient media.
- The use of a differential nutrient media.
- The methods of identification and differentiation of Mycobacterium tuberculosis, MAP and nontuberculous mycobacteria.
- Methodological approaches to the identification of multi-resistant forms of tuberculosis and methods of selection and identification of biological properties for ultra-small forms and L-forms of Mycobacteria.
- The use of BACTEC system in the diagnostic of tuberculosis.

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- Serological methods for diagnostic of tuberculosis and paratuberculosis.

- The use of ELISA test kits for diagnostic of TB and JD.
- The use of γ -interferon test to identify infected animals at the early stages of the infection.

- The isolation of protein fractions of *M. bovis* and *M. paratuberculosis* out of the bacterial mass and determination of their specificity with the aim of producing the diagnostic agents (allergens, antigens).

- Molecular-genetic methods of TB and JD study: PCR, spoligotyping, genotyping and phylogenetic analysis.

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Fellow # 3: Georgia, Head of Risk Assessment Division at the Scientific Research Center of Agriculture, Ministry of Agriculture. MS in biology, professional certificate in food security and beginning of PhD in public health. The fellow will not be available until January 2018

Research Proposal

Campylobacter risk analysis/assessment and surveillance/testing programs, laboratory diagnostic methods, HACCP systems used in poultry processing plants, and campylobacter resistance to antibiotics.

1. The goal(s) of the research proposal:-

The goal of my proposed project is to obtain U.S. advanced methodologies and professional skills of Campylobacter laboratory research tools; learn more about its strains and molecular genetic varieties; handle tools and equipment for the research.

2. Specific objectives to achieve the goal:-

I would like to access most current study material on the issue, learn from experts and establish networks with American food safety risk assessment institutions for further cooperation. In addition, I would like to visit appropriate institutions to learn about campylobacter risk assessment approaches; the work conducted by these institutions in order to eliminate the risk and their recommendations developed to risk managers and industry. I am very interested in visiting industry sites for observing the measures conducted by the poultry farms and processing plants for detecting and decreasing campylobacter threat during the production stage and learn more about internal risk assessment and HACCP systems operations.

3. Background information about the research:-

Campylobacter pathogen has never been studied in Georgia, while the hypothesis is that it might be the cause of (more than 50%) of unspecified diarrheas in our country. The pathogenesis of *C. jejuni* in broiler chickens is still poorly understood despite the importance of poultry meat as a source of infection in humans.

Recently Georgia has signed the association agreement between Europe called Deep and Comprehensive Free Trade Agreement (DCFTA). One of the objectives of the agreement is to facilitate trade of commodities covered by sanitary and phytosanitary measures (SPS) between the Parties, whilst safeguarding human life or health. In the area, the main regulation is the Georgian law "Food/Feed Safety, Veterinary and Plant protection Code" based on the (EC) No 178/2002 principals. According to that principals "in order to achieve the general objective of a high level of protection of human health and life food law shall be based on risk analysis. "Risk assessment shall be based on the available scientific evidence and undertaken in an independent, objective and transparent manner".

In 2006 implementing the law, risk assessment activity became a responsibility of the Ministry of Agriculture of Georgia (MOA). In 2011 it was transferred to the National Food Agency (NFA). During this period (2006-2014) very little was done to fulfill the function. In 2014, when the Scientific Research

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Center of Agriculture was established, the risk assessment function was assigned to its Risk Assessment Service and the implementation became possible.

In 2015 the Risk Assessment Division got the initiative from the National Food Agency of assessing a risk of *Campylobacter* in poultry for Georgian consumers. But, a lack of local statistical information on *Campylobacter* occurrence in food and its characterization prevented the work. We, the risk assessors recommended the risk managers and the Ministry of Agriculture to prepare a legal base for carrying out proper research and laboratory testing in order to gather the sufficient data for the risk assessment purposes.

My PhD scientific supervisor Dr. Paata Imnadze, is a professor at the Faculty of Medicine, Tbilisi State University and the Science Director of National Center for Disease Control and Public Health (NCDC). This circumstance gave me the perfect opportunity to conduct my experiments at the Richard Lugar Center for Public Health Research in Tbilisi, which is the most advanced laboratory in the country.

In addition to my PhD study, I am the head of newly established food safety Risk Assessment Service at the Scientific Research Center of Agriculture, MOA Georgia. In 2009-2010 I used to be the Head of Food safety, Veterinary and Plant Protection Service in Georgia. My working experience at the implementing, administrative agency convinced me in the needs and importance of Risk Analysis for the food safety and veterinary official control and surveillance activities.

4. What to accomplish during the fellowship, how research interests and scientific background relate to the goals of the proposal and how will working with a mentor in the U.S. help to achieve the research goals?

From the program I expect to obtain the necessary knowledge and professional skills to continue *Campylobacter* research work and the experiments at the Richard Lugar Center for Public Health Research in Tbilisi, which is the most advanced laboratory in the country. My research at the laboratory expands the laboratory's field of work and creates material for the gene bank of this institution. I will study correlation between food contamination and campylobacterioses in the country, antibacterial resistance and genetic variety. My research will be the first study of *Campylobacter* carried out in Georgia.

The laboratory research results and the statistical data will serve as bases for the hazard identification and risk assessment. The Risk Assessment Division at SRCA proceeds with the *Campylobacter* risk assessment case and provides risk management recommendation to policy makers and implementing agencies.

5. How will a Borlaug Fellowship contribute to enhanced agricultural productivity economic development, and/or food security in the country?

The Risk Assessment Unit was created recently. My visit to United State's food safety risk assessment institutions will establish relations between the institutions and support the cooperation. Capacity building and institutional development of the Risk Assessment Division in order to fulfill their function in compliance with international standards are the objectives of SRCA and MOA drafted at the Agriculture Strategy action plan 2015-2020.

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Action plan for 12-week fellowship period

Week 1 - Biosafety training for work in a BSL 2 laboratory: The biosafety training will be needed to learn how to handle bacterial cultures and how to work with biosafety cabinets. The training will provide the working experience in the BSL 2 environment, including the knowledge of biosafety procedures while handling bacterial infectious agents.

Weeks 2, 3 – Isolation and working with Campylobacter cultures: The applicant will learn how to isolate Campylobacter cultures from food samples, this will include techniques used for the treatment of food samples, medium preparation, culture incubation conditions (appropriate temperature controls for growing the cultures on a selective medium).

Week 4 - Identification of the Campylobacter species: Culture-based techniques for isolation and detection of Campylobacter from foods will be used following the guidelines of International Standards Organization. ISO 10272-1:20063 define the procedures for detection while ISO 10272-2:20064 specify the procedure for enumeration.

Week 5 - DNA extraction from Campylobacter cultures: The DNA extraction procedures will include the incubation of Campylobacter cultures on the selective medium, followed by the DNA extraction steps (proteolysis, etc.), which will be performed using special DNA extraction kit(s).

Week 6 – PCR procedures to amplify genetic loci of Campylobacter: I expect to learn how to work with the National Center for Biotechnology Information database. DNA sequences of different loci of Campylobacter species will be obtained from the database and will be aligned using the program Clustal X. Conservative regions will be selected for designing the primers manually. The primers will be designed to amplify different genes/loci of Campylobacter. Alternatively, the primers will be designed using programs for the primer design (e.g. Primer Quest). Annealing temperatures for the manually designed primers will be determined using PCR. Different reaction mixtures of PCR reagents will be tested for the optimized amplification of the target genes/loci. After the PCR procedures, the agarose gel electrophoresis of the amplified PCR products will be performed, which will be followed by the staining of a gel with the ethidium bromide and the visualization of the amplified products under the UV light.

Weeks 7, 8, 9 - Pulsed Field Gel Electrophoresis (PFGE) of Campylobacter jejuni; The PFGE experiments will involve the following procedures:

- a. The glowing of Campylobacter cultures onto Trypticase Soy Agar with 5 % defibrinated sheep blood (TSA-SB)
- b. Making and casting plugs;
- c. Lysis of cells in the agarose plugs;
- d. Washing of the agarose plugs after cell lysis;
- e. Restriction digestion of DNA in the agarose plugs;
- f. Casting of an agarose gel;
- g. Loading restricted plug slices into the wells;
- h. Staining and documentation of the agarose gel.
- i. Scanning the agarose gel;

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j. Gelnormalization procedures;

k. Identification of the DNA patterns on the agarose geland cluster analysis using the UPGMA algorithm.

Weeks 10, 11 - Visiting poultry farms: I would like to become familiar with the internal measures and hazard analysis systems regarding bio safety and particularly Campilobacter; Laboratory testing methodologies and detection methods; risk management measures and tools; HACCP system for poultry farms and processing plants.

Week 12 - visiting Risk Assessment Institutions: In addition, I would like to meet the people involved in food safety risk assessment process, particularly working with biological hazards including Campylobacter and establish relationships for farther cooperation; learn general approaches of Campylobacter risk assessment, sources of information and main methodologies, rends and current activities of the institutions.

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Fellow # 4, Turkey, Assistant Professor at the Izmir University of Economics. BA in Molecular Biology & Genetics, MA in Biotechnology and PhD in Biology (plant molecular nutrition)

Research Proposal

GMO technology from production to marketing with an emphasis on risk perception, assessment and management of GMOs. Exposure to methods of plant bio-fortification using GE.

1. The goal (s) of the research proposal:-

- Examine examples of bio-fortified crops in order to provide better nutrition for human consumption.
- Obtain training on how to assess risks in order to bring a staple GM crop to the Turkish market.

2. Specific objectives to achieve the goal:-

- Investigate biofortified crops.
- Focus more on the theory and questions such as how GM risk analysis are performed, which legislation rules apply and what kind of risk assessment tests should GM food has to pass to enter the market.
- Learn about Crispr technique (gene manipulation technique) which offers advantages in both legal authorization and production costs.
- Learn other classical methods as well.

3. Background information about the research:-

In Turkey, public opposition to Genetically Modified (GM) food is among the highest in Europe. Public concerns on GM foods are not based on evidence, but instead common presumptions such as 'GM food causes cancer'. Unfortunately, especially, medical doctors and other 'experts' propagate these fears on media, mostly to gain popularity. Turkish academia does not denounce these claims efficiently, maybe due to disorganization and lack of determination. Consequently, Turkish Academy of Sciences (TUBITAK) is rather silent on the issue.

My research interest is on micronutrients, which are essential for human health but usually lacking in human diets. Among those, insufficient intake of iron (Fe), which is called iron deficiency, is the most widespread worldwide. Since humans cannot synthesize inorganic mineral Fe, they have to take it from their diet. However, especially in poor regions of the world, people depend on staple crops (Wheat, maize, rice, cassava etc.) which are poor Fe sources. Increasing micronutrient concentration and bioavailability in edible parts of staple crops is called biofortification and considered to be the most sustainable approach to fight malnutrition worldwide.

Increasing micronutrient concentrations of plants is often considered to be not enough to address human malnutrition, since not only concentration, but also its bioavailability is of importance. In this

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regard, anti-GMO campaigns argue that biofortified crops would not be effective to combat micronutrient malnutrition. To develop a broader understanding of risk analysis of biofortified crops, I would be very happy to see the problem and solution from a perspective of a medical doctor working on human nutrition. In summary, I would like to develop an understanding of how GMOs are tested and assessed in risk analysis and associated legislative issues. Such an understanding can be developed by having theoretical lectures from experts from various disciplines, visiting GMO testing facilities and consulting to legislative authorities.

4. What to accomplish during the fellowship, how research interests and scientific background relate to the goals of the proposal and how will working with a mentor in the U.S. help to achieve the research goals?

My background in plant molecular biology fits well with my aims. During my PhD studies I focused on Fe homeostasis in plants. I started my PhD performing a forward genetic screening of mutants of model plant *Arabidopsis thaliana* under low Fe-regime, to search for genes conferring Fe-deficiency tolerance to the plant. This approach led to the identification of trace metal transport processes of plants when confronted to low-Fe stress. According to the results, when plants feel low Fe, they activate mechanisms to take more Fe from the soil, but these mechanisms do not work properly if a transporter protein, MTP8 (Metal tolerance protein 8), does not sequester excess of heavy metals which usually accompany Fe uptake.

The study revealed the interference of heavy metals during Fe retrieval from the soil. In addition to MTP8's role in the root upon Fe deficiency, a distinct role for MTP8 was also proposed in the seed. MTP8 is developmentally involved in micronutrient acquisition and localization in developing and imbibed seeds. Analysis of metal localization in seeds revealed that MTP8 determined localization of Fe in the abaxial side of the seed organs, abaxial side of the cotyledons and outer cell layers of hypocotyl of the embryo. The results of the study have been submitted to *Journal of Plant Physiology*. A protein called Vacuolar Iron Transporter (VIT1) VIT1 has recently been used for biofortifying cassava with Fe in USA by a team including Dr. Anderson from Donald Danforth Plant Science Center, St. Louis, USA and Dr. Grusak from USDA-ARS, Baylor College of Medicine, Houston, USA. With its Fe transport ability and seed specific expression, MTP8 greatly resembles to VIT1 and may provide an alternative tool for micronutrient biofortification of staple crops.

5. How will a Borlaug Fellowship contribute to enhanced agricultural productivity economic development, and/or food security in the country?

Completion of the fellowship program successfully is expected to contribute to food security in my home country, by speeding up development of micronutrient-biofortified crops, such as wheat, maize and rice. Micronutrient malnutrition is of great concern, in which every one out of three Turkish women are iron deficient. Turkish authorities try to address the problem by several approaches; such as breeding programs to develop wheat varieties with higher Fe concentration or delivering Fe supplements. Wheat is the far most important staple crop of Turkey, however offering low levels of essential micronutrients such as Fe. As an alternative/ complementary approach, Turkish authorities may consider adoption of micronutrient-biofortified GM wheat. However, bringing GM wheat to Turkish market requires facing strong public opposition. In order to successfully deal with it, the necessary skills and expertise are expected to be gained with my participation to the program.

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In case of successful completion of the proposal, I am planning to share my newly gained knowledge in both academia and public. For the academy, I plan to share expertise at my current university by opening an elective course on risk assessment of GMOs. For the public, I am planning to organize debates, conferences and show up in media. Completion of the program successfully will provide courage and self-confidence to me, to face a horde of anti- GMO groups.

Action plan for 12-week fellowship period:-

Week 1: Research activity: Orientation, training in ethics of biotechnology

Expected outcome: Lecture on understanding the current discussions on ethics of biotechnology

Week 2: Research activity: Lecture on risk assessment of GMO

Expected outcome: Discussion of different views on risk assessment such as precautionary principle and have understanding of the limitations of GMO detection.

Week 3: Research activity: Lecture on overview of risk management and communication

Expected outcome: Develop strategies on talking to public when the topic is GMO and having understanding of the concept of risk.

Week 4: Research activity: Lecture on overview of GM food. Discussing human micronutrient deficiencies and how biofortification of crops can alleviate it, ideally, with a human nutritionist. Examples of how they approached to the problem, what their limitations are, how the effect of biofortified food on human nutrition can be tested.

Expected outcome: Have discussion on micronutrient deficiencies, how they are addressed and what are the criteria to assess effect of the solutions from the point of view of a human nutritionist and learn how to establish a collaboration and network to assess performance of biofortified food in international level.

Week 5: Research activity: Visiting a lab that studies biofortification. Learning the overview of their project, discuss for collaboration possibilities for the future.

Expected outcome: Build international collaboration on production and marketing of biofortified crops.

Week 6: Research activity: Visiting GMO producing labs, companies, meeting producers.

Expected outcome: Have the understanding of problems and advancements in GMO development, mass production and marketing. Learning success stories such as Bt corn.

Week 7, 8: Research activity: Visiting labs and companies that conduct risk analysis procedures. Visit experts on the field to learn about GMO policies.

Expected outcome: Obtain a skill to detect GMOs in lab environment, and understand how their risk analysis should be conducted. Be able to differentiate GMO policies in Europe, US and other parts of the World. Have the understanding of how reliable detection tests are.

Week 9, 10: Research activity: Visit frontier scientists and NGOs to discuss GMOs. Get training in debating GMO and popular science writing.

Expected outcome: Obtain the understanding of concerns of anti-GMO movements and analyze their arguments. Obtain skills how to write about GMOs so that it reaches to the widest audience.

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Proposed meetings (if possible):

- Donald Danforth Plant Science Center: Biofortified cassava HarvestPlus-Biofortified crops-Genomic vs agronomic biofortification
- Baylor College of Medicine: Micronutrient-biofortified crops from a perspective of a medical doctor
- Biotechnology Industry Association - Economics of GMOs and hybrid seeds.
- Make discussion with concerned bodies about USDA-Risk assessment tools and about Turkey's biosafety law in comparison to the U.S. laws and the future of GMOs in relation to responding to the challenges such as global warming.
- Environmental Protection Agency: Environmental effects of agricultural chemicals and how GMO can alleviate chemical use.
- Monsanto headquarters: Risk management, perception and communication and future of GMO in Turkey and Europe.
- FDA: Risk analysis and approval procedures of GMOs
- Farmers' associations: How GM farming impacted their income and agricultural practice especially regarding to chemical use.