DRY GRAIN PULSES CRSP WORKPLAN
FY 12 – October 1, 2011 to September 30, 2012

Project Title: PIII-MSU-4 - Impact Assessment of Bean/Cowpea and Dry Grain Pulses CRSP Investments in Research, Institutional Capacity Building and Technology Dissemination in Africa, Latin America and the U.S.

Lead U.S. Principal Investigator and University:
Mywish K. Maredia, Michigan State University

Collaborating Host Country and U.S. PIs and Institutions:
Richard Bernsten and Eric Crawford, Michigan State University; HC and U.S. collaborators to be identified

I. Project Problem Statement and Justification:

Impact assessment is essential for evaluating publicly-funded research, capacity building and outreach programs and planning future research. Organizations that implement these programs should be accountable for showing results, demonstrating impacts, and assessing the cost-effectiveness of their implementation strategies. It is therefore essential to document outputs, outcomes and impacts of public investments in research for development (R4D) activities. Anecdotal data and qualitative information are important in communicating impact to policymakers and the public, but must be augmented with empirical data, and sound and rigorous analysis.

Methods have been developed to quantify economic impacts of agricultural research investments (e.g., Alston et al., 1998, Masters et al., 1996, Walker et al., 2008). The CRSP must make use of the best methods available in all fields, including impact assessment. The method of economic assessment is relatively well established because it can make use of secondary data collected in most countries (e.g., commodity prices, interest rates and crop production statistics). Assessment of other types of impact is less standardized and is currently the focus of methodological research by researchers and organizations active in agricultural R4D (for example, see the workplan and reports by the CGIAR Science Council's Standing Panel on Impact Assessment at www.sciencecouncil.cgiar.org).

Impact assessments are widely recognized to perform two functions--accountability and learning. Greater accountability (and strategic validation) is seen as a prerequisite for continued support for development assistance. Better learning is crucial for improving the effectiveness of development projects and ensuring that the lessons from experience – both positive and negative – are heeded. Accountability and strategic validation has long been core concerns for **ex-post impact assessments** and learning has been primarily a concern of **impact evaluation**.[1] The primary focus of this project over the next three years will be on ex post impact assessment. However, attention will be also devoted by the project PI to find (and fund, if budget allows) opportunities to include impact evaluation as part of CRSP projects to be implemented in Phase 2 and 3.

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[1] Although in the evaluation profession, the terms impact assessment and impact evaluation are used synonymously, in this project we make a nuanced distinction between ex post impact assessment and impact evaluation based on the timing of when they are conducted, the scale at which they occur and the motivation for doing an assessment (Maredia 2009).

II. Planned Project Activities in the Workplan Period

Objective 1: Conduct ex post impact assessment of Bean/Cowpea and Dry Grain Pulses CRSP Investments in Research, Institutional Capacity Building and Technology Dissemination in Africa, Latin America and the U.S.

    Collaborators: This will be the core activity of the Lead PI and Co-PIs and will be conducted in collaboration with graduate students and U.S. and HC PIs of CRSP projects (PII-UCR-1, PII-UPR-1, PII-MSU-1)

    Approaches and Methods:

In FY 12, the project team will focus on completing the West Africa impact assessment study on cowpea improvement research, the meta-analysis of ex post impact assessments of CRSP research and complete impact briefs based on all the documented impacts to enable the Dry Grain Pulses CRSP to "tell a story" of effective contributions of CRSP's research efforts to developmental impacts and institutional capacity building. The activities to be completed in FY12 include:

1a. Benefits of genetic improvement of cowpea in Senegal and West Africa. Due to delays in initiating the field survey in Senegal, the data analysis and a full report documenting the impacts of cowpea research in West Africa is anticipated to be completed in FY 12. Over the past 20 years, due to collaborative efforts of CRSP researchers, several varieties of cowpeas with resistance to biotic and abiotic stresses have been released in Senegal and other countries in West Africa (i.e., Burkina Faso). Although a few studies in the past have documented the impact stories in Senegal, the evidence is still spotty when it comes to West Africa as a region. Thus, a study was initiated in early FY 11 to update and document the adoption of improved cowpea varieties in Senegal and Burkina Faso where the Bean/Cowpea and the Pulse CRSP have been active in the past 7-10 years. The goal is to document the adoption and benefits attributed to CRSP-NARS investments in cowpea improvement research. The budget for data collection and field activities related to the adoption study ($32,054) is included in the FY 12 PII-UCR-1 project workplan/budget under ISRA and INERA.

1b. Meta-analysis study. The project plans to conduct a meta-analysis of the documented impacts of the Bean/Cowpea and Dry Grain Pulses CRSPs in FY 12. The study will present a comprehensive summary of outputs, outcomes and impacts realized from past investments by the Pulse CRSP (and predecessor Bean/Cowpea CRSP). This summary will include global contribution of CRSP to genetic improvement of common bean and cowpea (including the U.S., LAC and SSA), contributions of CRSP investments in food science research, and documented outputs and impacts of other types of research such as IPM, grain storage technologies, nutrition and policy research.

For those research activities where documented impacts include estimation of economic benefits, the study will conduct a meta-benefit-costs analysis. Meta-benefit-cost-analysis can be defined as an aggregate benefit-cost analysis to identify generalized patterns from case observations (Maredia and Raitzer, 2006 and 2010). Just as the traditional meta-analysis approach, this method attempts to assemble as broad a pool of cases as possible from which to draw inferences and derive generalizable results. However, unlike the more common approach to meta-analysis, which typically uses statistical analysis techniques (e.g., regression) of pooled data, the meta-B-C-analysis is a simple aggregation of benefits and costs derived from case studies (i.e., published or completed ex post impact assessments of CRSP research) and applying the general framework of benefit-cost analysis to estimate the rates of return across a portfolio.

Such an approach is warranted due to the fact that each of the impact studies measures a separate but partial aspect of the response of a dependent variable (economic benefits) to a shared exogenous variable (total investment). The proposed meta-B-C-study will help 'tell the impact story' of the bean/cowpea and the Dry Grain Pulses CRSP in a comprehensive manner and will help identify areas of research that have had greatest impact and those that have had modest impacts or turned out to be 'dry holes.' This will be an analysis of the global program and should provide valuable information for the Final Technical Report of the Dry Grain Pulses CRSP and preliminary results may be useful to USAID as it decides on a five-year extension of the program through 2017.

Objective 2: Investigate opportunities to integrate baseline data collection and impact evaluation strategies as part of the CRSP project design

Collaborators:
This activity will be conducted in collaboration with graduate students, a post doc to be hired and Phase II and Phase III CRSP project PIs as noted for each study

Approaches and Methods:
In FY 12, the impact assessment project team will collaborate with the following CRSP project teams to conduct baseline assessment, design impact evaluations as part of CRSP projects implemented on a pilot scale, or conduct in-depth case studies to better understand sustainable models of dissemination of agricultural technologies (which is a critical element in the impact pathway to achieve developmental impacts).

2a. Baseline assessment of the economic effects of pest problems on cowpea growing areas in Burkina Faso. This will be a joint activity with the UIUC-INERA PII-UIUC-1 project team. To address the field insect pest problems like legume pod borer, bruchids, and pod sucking bugs for which conventional breeding has not been effective, the PII-UIUC-1 project is developing alternative strategies for control of these insect pests, in order to reduce the levels of pesticides used on cowpea crops. One of the strategies being explored by the project team is to implement a comprehensive bio-control program. This research is expected to generate following long-term impacts on cowpea growers in the region: 1) Health and environmental benefits from the reduction in the use (and misuse) of pesticides. 2) Economic benefits resulting from increased productivity (due to reduction in crop losses) and increased profitability (due to reduction in input costs) to cowpea growers in the region. The realization of these impacts of the bio-control research being conducted by the PI-UIUC-1 project, critically depends on the following realities—1) the movement and spread of bio-control agents in relation to where the pest population is present; and 2) the pest control strategies practiced by farmers to control the pests in the absence of bio-control agents.

To estimate the long term benefits of this type of research requires three types of data/information: 1) a better understanding of the pest population (that are targeted by this research) in terms of its spatial distribution, 2) tracking the movement and spread of bio-control agents over time, and 3) the change in farmers' pest control practices and/or productivity outcomes as a result of the introduction of bio-control agents in the environment. The PI-UIUC-1 project has collected (and collecting) data towards the first two types of information that will be useful to conduct an ex post impact assessment of this CRSP project in the future. For example, they have collected pre-release (i.e., baseline) and post-release data (i.e., after the introduction of biological control agents) on the abundance of insect pests in cowpea growing areas on wild legumes. They have also conducted controlled experiments to assess the efficacy of viral-based sprays (e.g., using neem oils) on *M. vitrata* populations and its effects on cowpea yields in test plots. They are also using the tools of genomics to characterize not only the pest populations, but also helps determine the location and

migrations of endemic pest populations and those of the introduced beneficial biologicals.

As part of this project's workplan, we plan to collect baseline data towards the third type of information that will be needed to assess the impact of bio-control research after several years of cumulative efforts by the UIUC-INERA team in Burkina Faso. In collaboration with an economist and PI-UIUC-1 project team at INERA, we plan to conduct a baseline survey of cowpea producers in two provinces of Burkina Faso which are targeted for the deployment of bio-control agents. The households to be included in the baseline survey will be selected based on a stratified random sampling method. The plan is to collect baseline data from 560 households from 56 villages across the north and central parts of Burkina Faso. A detailed survey instrument will be developed by the MSU and INERA socio-economist team with input from the PI-UIUC-1 project team members. The instrument will include questions related to household and farm characteristics, village level characteristics, cowpea production practices (including pest control strategies) and outcome indicators, detailed input cost data to estimate the farm-level budgets, and farmers' perception on pest problems and its effects on yield and input use.

The data will be analyzed jointly by the INERA and MSU team and results will be documented in a baseline report to be submitted to the Management Office. The data and analysis of this baseline assessment will serve as the 'before' scenario which can be compared with an 'after' scenario where the same households could be re-visited after 4-5 years to conduct an ex-post impact assessment of bio-control research in Burkina Faso. The budget for data collection and field activities related to the planned survey is included in the FY12 PII-UIUC-1 project workplan/budget under INERA ($18,128).

2b. Impact evaluation to test the effectiveness and impacts of methods of extension to disseminate materials for IPM of cowpea pests

Over the past few years, the PII-UIUC-1 project team has developed several extension materials using audio, video and print media. In FY 12, the project plans to pilot deployment strategies to disseminate these materials to several villages in each host country through several methods of extension such as farmer field schools, extension presentations, video viewing clubs, cell-phones, etc. These activities will be undertaken in partnerships with NGOs and other government organizations. This pilot scale activity offers an opportunity to design the deployment strategy to address some policy relevant impact questions such as the effectiveness of different extension models to disseminate the IPM messages developed by the CRSP project.

In collaboration with the PII-UIUC-1 project team, we plan to address some policy relevant questions by integrating impact evaluation as part of the design of the deployment strategy and collect appropriate farm-level data to capture the effects of the extension messages and methods used to deploy them on changes in farmers' knowledge, perceptions and behavior. The plan is to explore a randomized control trial (RCT) design in one country—Burkina Faso, whereby villages that will receive the extension interventions through different methods (the 'treatment') will be randomly selected from a larger pool of villages that all meet certain criteria in terms of importance of cowpea, geographic locations, etc.. To achieve statistical robustness, the goal is to have a minimum of 20 villages in each treatment group.

The plan for this project team would be to help design the deployment strategy based on RCT methodology, develop survey instruments to collect data from a subset of randomly selected farmers from the treatment villages (i.e., 10 farmers per village), and analyze the data to derive policy lessons. An advantage of a randomized experiment such as this is that the observed difference in the outcome variables between the treatment and control groups can be attributed to the treatment variable (i.e., the extension method). The results of this pilot study will generate data/information on

the treatment effects (i.e., what is the effect of the extension messages in terms of outcomes) and also help identify the most cost-effective methods to scale-up methods of delivering 'knowledge-based technologies' beyond the pilot scale. The survey instrument will also include questions to identify the 'content' of delivery mechanisms that farmers value and demand the most. This will be useful to researchers as they try to develop and package a diversity of messages in the most effective delivery method.

The cost of this study is estimated to be around $20,000. Half of the cost ($10,000) of doing this activity is included in the FY12 PII-UIUC-1 project workplan/budget under INERA and the other half is requested as supplemental funding in a joint proposal submitted to the Management Office.

2c. Benefit/Cost (B/C) analysis of the bean-based nutrition intervention in Tanzania

The PIII-MSU-3 project team from MSU and SUA is conducting feeding trials to determine if eating beans will improve the immune status of children that are not being treated with antiretroviral drugs. The trial includes subjects between the age of 2-15 years that are infected with HIV and are divided into two groups—those receiving a bean-maize supplement and those receiving a fish-maize supplement. The hypothesis being tested by this experiment is that the children and adolescents eating a bean-maize supplement will maintain higher CD4 % than HIV infected 2 to 15 year old children and adolescents eating a fish-maize supplement. As part of this study, the research team is collecting and analyzing blood samples for CD4, CD8, CD3 and total lymphocyte counts. The team is also collaborating with a SUA economist to determine the relative costs of three dietary treatments compared to HAARV drug treatment.

In FY 12, we plan to collaborate with the MSU-SUA team to explore the possibility using some of the data already collected and/or to be collected to conduct a benefit-cost analysis of the alternative treatments to enhance the nutritional status of HIV infected children and adolescents. Such an analysis will help address questions that most policy makers are interested, such as: how do alternative treatment approaches rank in terms of costs and benefits to the children/adolescents infected with HIV?

As a first step, this project team will hold discussions with the PIII-MSU-3 team to explore the feasibility of doing this analysis. The main question to be addressed at this stage is whether the data collected by the study provides enough information to convert the measurements of outcomes (e.g., CD% in blood stream) into indicators of benefits or 'well-being.' If deemed feasible and of mutual interest, the next step for this project team will be to identify the indicators of benefits, estimating these benefits for the experimental groups receiving alternative supplements, and researching on how those indicators can be converted into a monetary value to include in a benefit/cost analysis. On the cost side, this team will work closely with the SUA economist to collect detailed data to value all the costs involved in providing different treatments to experimental subjects. HAARV drug treatment may be included as one of the alternatives in the Cost/benefit analysis, if there are similar data available on both the benefit and cost side. Looking ahead, the results of this economic benefit/cost analysis will be useful in communicating the results of this important research to policy makers on the nutritional benefits of eating beans and the cost-effectiveness of different approaches to guide them in designing programs targeted towards HIV infected children and adolescents.

2d. Case study of the bean seed multiplication and distribution system in Central America

A major theme focused by the Pulse CRSP is to reduce bean and cowpea production costs and risks for enhanced profitability and competitiveness. One of the most important outputs of research that contributes to this thematic goal is improved varieties with traits that reduce production costs (varieties resistant to biotic stresses such as pests and diseases) and risks (e.g., varieties resistant to

abiotic stresses such as drought and cold). About half of the phase II and III projects currently being funded by the Pulse CRSP will be generating outputs that will be incorporated in improved genetic planting materials—i.e., seed. The impact pathway to realize the impact of this line of research (i.e., genetic improvement using either conventional methods or modern tools of molecular biology) depends critically on the system that delivers these improved materials from researchers' experimental fields and laboratories to farmers' fields. In the absence of an effective and well-functioning seed multiplication and distribution system that links the technology suppliers (i.e., researchers) with the demanders (i.e., farmers), investments in research will not lead to any adoption outcomes and thus will not generate the impacts envisioned for such investments.

In most cases, the prospect of earning 'profits' serves as a strong incentive for the private sector to fill in the gap between the supply and demand of technology. The elements on the demand side that increase the prospects of earning profits are—the size and predictability of the demand for new seeds every year. In a developing country setting, in the case of self-pollinated crops such as beans and cowpeas (and most other pulses), these elements on the demand side (size and predictability of demand for seed) are not at the level to induce private sector investment in the seed system. This means that the sustainability of a seed multiplication and distribution system has to depend on players that are not solely motivated by profits but by a greater public good.

Many models of seed multiplication and distribution system have been tried that are based on a combination of private, NGO and public sector partners playing niche roles in filling the gap between technology supply and demand. Examples of some of the models used to fill this gap include systems based on farmer cooperatives, strengthening networks of village-based agro-dealers, promoting farmer operated seed enterprises, supporting farmer associations or CIALs, providing incentives to private seed companies to expand their product lines, etc. Some of these models are also being used by the Pulse CRSP in its 'Bean Technology Dissemination' project currently being implemented (through an Associate Award) in four countries in Central America (i.e., Honduras, Haiti, Guatemala and Nicaragua). Among these models, the model being used in Nicaragua is the most novel and unique, which is based on the concept of community managed and operated seed banks or "*bancos comunitarios de semilla.*" The seed bank model operates on the principles of self-help, whereby community members come together to produce seeds to meet their own current needs, save seeds for future seed security, and sell excess seeds to generate revenues to cover production costs. The national bean research program (INTA) through its network of regional offices plays an important role in supplying the basic seed stocks of improved varieties to community seed banks and provide technical assistance to ensure that the seeds produced by the seed bank meet some minimum quality standards as planting materials. In Honduras, the model being used is based on CIALs (or farmer associations) taking up the role of seed multiplication and distribution, in Guatemala, the model is based on the public sector playing a major role throughout the seed value chain, and in Haiti, the project is trying to use a dual approach based on private sector selling the seeds through retail outlets and the public sector distributing the seeds to resource poor farmers.

This seed dissemination project implemented in four countries in Central America offers a good opportunity to do an in-depth analysis of the unique features of different models for seed multiplication and distribution so as to identify principles of sustainability present/absent from these different models and derive implications and lessons for broader applicability to other countries where Pulse CRSP is involved. As part of the bean technology dissemination project, the lead PI of this project will be assisting in setting up a performance monitoring system to track data/information on quantities of seeds produced and distributed throughout the seed value chain. To complement that effort, this project plans to undertake a research study focused on identifying "elements of sustainability of the bean seed system' using a case study approach. In FY12, the project team will initiate an in-depth case study of the economics of the seed bank model in Nicaragua. The work will involve key informant interviews with people involved in different aspects of the seed value chain,

collecting critical information throughout the seed system to be able to estimate the costs of seed multiplication and distribution, use the data on quantity of seeds produced through the BTD project to assess the size and scale of potential benefits, and conduct a few randomly selected farmer interviews to get their perceptions on the cost and benefits of the seed banks in their communities. The plan is to collect this data at least for Nicaragua in FY 12. The analysis will be completed and/or extended to other countries in subsequent years either through CRSP support in the extension phase or through the BTD project support under the project performance monitoring plan.

Objective 3: Build institutional capacity and develop human resources in the area of impact assessment research

Collaborators:
None

Approaches and Methods:
Although this project does not include a host-country partner as in other CRSP projects, it does address the objective of institutional capacity building and human resource development through following methods:
a. Field activities under objective 1 will include collaboration with HC PIs and partners. For example, data collection and information gathering activities for the ex post impact studies will involve host country PIs/collaborators in the planning and conduct of field activities as much as possible.
b. Activities under objective 2 will be conducted in close collaboration with the U.S. and HC PIs from existing and new CRSP projects. The discussion and exchange of information envisaged in these activities will hopefully increase awareness and influence the outlook of CRSP scientists towards impact assessment research and its importance. This may contribute to enhancing the impact culture within the host country partner organizations.
c. The activities planned under this project will involve several graduate students in the planning and conduct of field research and write-up of research results. These students will be recruited from within the Department of Agricultural, Food and Resource Economics at MSU. Some students identified for engagement in this research opportunity who will continue under this project in FY 12 include:
   1. Byron Reyes
   2. David DeYoung
   3. Ben Megan

III. Contribution of Project to Target USAID Performance Indicators:

This project does not involve any host country based research and outreach activities. Hence it is not relevant to Target USAID Performance Indicators.

IV. Target Outputs:

Specific outputs to result from this project by the end of the project timeframe (November 1, 2009-September 30, 2012) include:
a. Completion of 3 theses (or dissertation papers) on impact assessment research
b. At least 4 Impact Briefs which can be more widely disseminated to convey the impact stories of USAID's investments in Dry Grain Pulses CRSP (and its predecessor Bean/Cowpea CRSP).
c. At least 3 manuscripts for publication in academic journals and presentations at professional meetings.

V. Engagement of USAID Field Mission(s)

The project activities in host countries will mainly involve data collection from farmers' fields, secondary sources, and information gathering through stakeholder interviews. No field research experiments are planned at this time in host countries. Data collection will be done in collaboration with CRSP HC partners in countries where CRSP is already engaged and where activities are occurring in concurrence with USAID country or field missions.

VI. Networking Activities with Stakeholders:

Field activities to be conducted in host countries will engage and involve appropriate stakeholders – research organizations, NGOs and private sector – in data collection and dissemination efforts.

VII. Leveraging of CRSP Resources:

The following opportunities will continue to be explored in FY 12: The International Initiative for Impact Evaluation (3ie) routinely issues RFPs to promote research in the area of impact evaluation of development interventions in developing countries. Opportunities will be sought to leverage funding from this organization to conduct 'impact evaluation' of a CRSP project in partnership with host country PIs and collaborators to promote objective 2 of this project.

Training/Capacity Building Workplan Format

Degree Training:
   None

Short-term Training:
   None

Equipment (costing >$5,000)**:**
   None

Dry Grain Pulses CRSP : THIRD PERIOD

P3-MSU-4: Impact Assessment

	10/01/11 - 09/29/12					
	MSU	**U.S. for Host Country**	**HC or U.S. Institution (1)**	**HC or U.S. Institution (2)**	**HC or U.S. Institution (3)**	**HC or U.S. Institution (4)**
Michigan State University	**0**	**0**	**0**	**0**	**0**	**0**
a. Personnel Cost						
Salaries (incl. GA stipend)	$33,728.13					
Fringe Benefit (for staff, excl GA)	$3,810.50					
b. Travel	$13,610.00					
c. Equipment ($5000 Plus)						
d. Supplies	$1,060.00					
e. Training (degree)						
Tuition/fees	$11,122.02					
Other costs (e.g. insurance)	$2,457.71					
f. Other						
g. Total Direct Cost	$65,788.36	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
h. Indirect Cost	$28,426.50					
i. Indirect Cost on Subcontracts (First $25000)						
j. Total Indirect Cost	$28,426.50	$0.00	$0.00	$0.00	$0.00	$0.00
Total	$94,214.85	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Grand Total	$94,215					

	Amount	Percentage
Total direct cost budgeted for U.S. institution(s)	$94,214.85	**100.00%**
Total direct cost budgeted for H.C institution(s)		

Cost Share	U.S. Institution	U.S. for Host Country	HC or U.S. Institution (1)	HC or U.S. Institution (2)	HC or U.S. Institution (3)	HC or U.S. Institution (4)	Total
In-kind	$0.00						$ -
Cash							$ -
Total	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Attribution to Capacity Building							
Percentage of effort	50.00%						50.00%
Amount corresponding to effort	$47,107.43	$0.00	$0.00	$0.00	$0.00	$0.00	$77,198.62

Name of PI & Institutional Affiliation: Mywish Maredia, Michigan State University