SYNERGIZING FERTILIZER MICRO-DOSING AND INDIGENOUS VEGETABLE PRODUCTION TO ENHANCE FOOD AND ECONOMIC SECURITY OF WEST AFRICA FARMERS (Project # 107983)

International Scientific and Impact Advisory Board (ISIAB) Board Meeting

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Sun Beach Hotel, Cotonou, BENIN REPUBLIC

Synthesis Report by ISIAB

by:

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DAY 1

1. **General overview of project progress over the (Prof. Adebooye)**

The presentation given by the Regional Project Coordinator (Professor Clement Adebooye) was succinct and well received by the Board members. The board commended the Regional Project Coordinator and the team for being on track in terms of key project deliverables and for the timely submission of both technical and financial reports to IDRC (with no adverse queries so far) and looked forward to getting specific details from the individual presentations that would be forthcoming in the course of the day. The board acknowledged the excellent achievements made by the project in the first year of implementation including facilitating the adoption of fertilizer microdosing by farmers. An overview of the External Reviewer's comments on the second technical report submitted to IDRC provided useful background to the project team as well to the Board and set the tone for the day's agenda for all participants.

2. **Baseline studies (Dr. Baco/ Prof. Anyawale)**

The baseline studies aimed at describing and quantifying as much as possible, the current practices of vegetable production, processing marketing and consumption in the 2 focus countries. The studies undoubtedly were quite comprehensive and captured highly valuable information across the entire vegetable value chain. Although a standard survey instrument was used for the study, it was understood that this was later customized at the country level. The software package used for the data analysis was also found to be different for each country (i.e., CS Pro for Benin and ODK for Nigeria). Consistent with the comments of the external reviewer of the second technical report, the Board was of the strong opinion that the report will have benefited much from a synthesis of key information that show the similarities and difference across the 2 project countries as opposed to having separate reports that sometime reported on different variables. For future presentations and reports, it was suggested that the socioeconomic teams from the 2 project focus countries collaborate to develop a common structure for both presentation and reporting.

Sampling framework: The sample size from Nigeria was about 5 times higher than for Benin, which is understood to be a reflection of different farmer populations in the 2 countries, hence pooling of data for analysis would not have been an ideal option in spite of the different software used by the socioeconomic teams in the project focus countries. The presentation would very much benefit from a more detailed description of the sampling stratification and representativeness of the respondents drawn for each of the value chain actors (i.e., producers, traders and consumers) with respect to the population of farmers in the various States/Departments as well as the gender balance based on anticipated target gender groupings prior to the survey.

Results: In both Benin and Nigeria, it was noted that there was still a high percentage of seeds sourced from the informal sector, mostly through farmer saved seeds. The results are not surprising and consistent with most other studies on indigenous vegetable seed systems. Critical to probe in future impact studies is the seed replacement rate at the different project impact sites. How long (i.e., number of years or number of seasons) do farmers recycle seeds after purchase?

Under the section on value addition, it is recommended that the presenters in the future and also for reporting purposes, make a clear distinction between value addition for the fresh produce using non-invasive approaches (pre-cooling, sorting, cleaning, grading and standardization as well as packaging) and product transformation/processing using invasive approaches such as chopping, drying, blanching etc.) as these reflect different market segments and consumer choices.

The description on how food security was measured by way of specific indicators needs to be well articulated as this is a major deliverable of the project. Responses from the presenters indicate that data has been collected for various indicators including frequency of consumption, diet diversity and recall accounts on periods of food shortage within a reference year. It is recommended that this be made more explicit with an indicator such as the *dietary diversity score* being more applicable in the context of indigenous vegetables.

Overall, the results presented were very comprehensive and the socioeconomic teams in both 2 countries are highly commended for timely finalizing the study results and reporting as this is usually a challenging for most projects. As per earlier recommendation, a synthesis report on selected variables for the 2 countries in the form of an addendum would enrich the next technical report due on September 19, 2016 while addressing the external reviewer's comments of the second technical report. A critical assessment of the baseline data in the context of complete farming systems will be valuable to give insights into the opportunity and challenges for the adoption of project interventions. It is also suggested that the team outlines specific implications of the study findings for the proposed interventions of the project. For example, the team in Benin reports that there is a high lack of awareness of project beneficiaries in postharvest management. What are the specific implications of this for the project's communication team? It is also prudent for the socioeconomic team to ascertain the impact assessment intervention design. It presupposes that the team will use either a mixed method of control (counterfactuals) and treatment groups or a randomized control trial. In the case of the latter, it will be good to know the extent to whichow has this been captured in the baseline sample? What specific impact assessment sampling design will be used at the endline? This need to be well articulated. There is also the need to better integrate gender baseline analysis with the broader project baseline results. The gender analysis strategy should also cover the needs role of the youth in indigenous vegetable production.

2. **Agronomy (Prof. Oyedele / Prof. Akponike)**

A similar field experimental protocol was used making results easily comparable across the 2 countries. The regional project coordinator also confirmed that the 2 countries submitted a single synthesized report for this section of the submitted report. This is highly commendable. The agronomic trials have a good balance on nutrient management, including mineral and organic fertilizers, rate of application, as well as timing and application of application which will be a good basis for developing effective nutrient management recommendations.

Benin

Some highlights of the presentation form the Benin team indicated practices experimented with on the field such as the hill placement/dibbling of fertilizer application approach and the observation of optimal rates of 20-40kg/ha urea-N for Amaranthus and 60kg/ka Urea-N for Ocimum. Further observed was the high volatisation effect for the dry season planting, which potentially led to high losses of nitrogen. With respect to application mode the team was of the view that hill placement or dibbling of fertilizer was time consuming and drudgery for farmers as compared to the use of strip application of fertilizer. In order not to discourage farmers and to encourage wide-scale adoption of microdising, the strip fertilizer application approach is preferred in order to reduce drudgery. Foliar application was also considered and produce results comparable to strip or hill placement.

Nigeria

The agronomic result from Nigeria revealed interesting findings, especially with respect to seasonal planting and location. It was found that vegetable planting in the savannah location during the rainy season performed better with fertilizer application, while during the dry season the rain forest performed better in terms of vegetable yield. However, within the same season there was no significant difference in yield between the 40 and 60kg fertilizer application and whereas, greenness generally increased with increased Nitrogen application, vegetables planted in the savannah location were greener than those planted in the forest location. One of the innovations being tested by the Nigerian team includes the use of a fabricated hand device (micro-dosing application tool), both for transplanting and drilling of holes for fertilizer application (dibbling). It is envisaged that this will go a long way to reduce drudgery. In addition, a capillary suface-irrigation device adopted from the Benin team is being tested in the savannah location for its usefulness to reduce water wastage and encourage precision in fertilizer application.

3. **Food science (Prof. Taiwo / Dr. Sossa)**

Both teams (Nigeria and Benin) made excellent presentations of their activities and findings particularly on value additions to indigenous leafy vegetable in terms of affordability, availability, diversity, and good source of micronutrients. Pertinent to the presentation is the emphasis on value addition due to short shelf life and high perishability of the leafy vegetable products. The objective of teams was to document consumption forms of focus vegetables, indigenous processing and preservation techniques of leafy vegetable in both Nigeria and Benin. The following are the outputs of the different teams.

Benin

The survey studies show a greater percentage (25.6%) of the respondents use storage in buckets with water spraying for storing vegetables compared to other indigenous methods. The team is presently developing a sun drier device (bearing in mind the need for affordability and associability of the device and retention of colour) for preserving vegetable. With respect to value addition products such as petits cailloux, syrup and polyphenol extracts are being produced while various tests on their nutrient contents are ongoing with their Canadian counterparts.

Nigeria

The Nigerian team had included in their objectives optimisation of polyphenol (PP) extraction/concentration/drying from vegetables, characterisation of extracted PPs, and the utilisation of PP in product development such as Nutraceutical uses, tablet, powder and slurry forms, preservatives in different food products etc. It was interesting to note that part of their objective was to explore potential licensing agreements with appropriate companies and explore the possibility of establishing start up companies based on the research results. Part of the methods tested for preserving the vegetables was drying in which the 50^{o}C was found as the most ideal temperature for crisp drying of vegetables. However, the issue of colour is very key in this process, as a change may not attract demand for the product. In terms of powder, *Ugu* powder had the greenest color followed by *Igbagba* and the least was *Tete*, while *Tete* lost its green colour during storage while the other 2 vegetables retained their green colour

Feedback for food science

There is need to have a benchmark of what proportions of producers are currently been directed/exposed to the drying method so that rate of adoption of the drying technology can be measured. Also there is the need to measure nutritional value of the vegetables in order to use them to increase awareness and consumption while it is necessary to make sure the teams develop affordable and sustainable technologies Particularly for the Nigerian team, how sustainable is the charcoal drying process and is it going to be environmental friendly? Lastly the teams are advised to do cost – effectiveness analysis of the proposed produce transformation technologies as well as an assessment of the nutrient content of vegetables following the various produce transformation technologies compared with fresh produce. There is also need to develop business models on the promotion and scaling-up of equipment that is under evaluation, such as the solar vegetables driers.

4. Communication

The project website www.microveg.org is very active and frequently updated. Project staff and students have also presented at several scholarly society meetings such as the 3rd All Africa Horticultural congress recently held in Ibadan (August 7-12, 2016), workshops and seminars. The communication team has been very instrumental in awareness creation targeted at several beneficiaries as per project deliverables via radio programming and community sensitization efforts. However, the Board similar to the external reviewer of the second technical report were of the opinion that it is critical for evaluate the effectiveness of the project's intervention dissemination approaches. One alternative could be the use of the standard **marketing communication AIDA** (**A**wareness, **I**nterest, **D**esire and **A**ction) model. Dr. Victor Afari-Sefa who suggested the use of the tool offered to share survey instruments and other related documentation with the team.

DAY 2

1. Video presentation

A documentary of the various field activities conducted in both countries was short by the repetitive of both countries. The documentary was quite exhaustive and educative particularly for the ISIAM members who needed to understand in details some aspect of the activities of the two teams. The research team was commended for the excellent documentation and asked if a

similar thing was done for the food science and agronomy aspects for which the answer was affirmative.

2. NGOs presentation on IPs and SDPs activities

The NGOs reports for both countries were quite impressive and presentations very rich. The scaling-up partners (NGOs) have been very much instrumental in scaling the technologies developed by the research institutions. For sustainability however, it would be very helpful if they could include business planning and entrepreneurship skills for the smooth running of the platforms beyond the project cycle. This will also help address the market linkages to benefit value chain actors participating in from the platform. In addition, the actors within the value chain should be allowed to the lead in most of the contacts market expansion and other linkages that might enhance the sustainability of the various innovation platforms.

3. Conclusion and final Impression of ISIAB

- ✓ The project has made a very good start and the progress to date is commendable. Success areas of note include completion of the baseline report and scaling of activities enabled by engagement with development partners.
- ✓ The project is well coordinated and operating effectively in a trans-disciplinary manner. Cooperation between project members across countries and institutions is also very good and commendable.
- ✓ Regional integration of project implementation requires strengthening. The agronomic component is well integrated, but other components such as socio-economics (e.g., baseline analysis and food science should be better integrated.
- ✓ The project M&E plan and impact assessment requires clarification in terms of indicators and how they are measured and tracked. M&E should facilitate continual exchange and feedback of information between research and scaling components of the project.
- ✓ Greater attention should be given to environmental sustainability of the project intervention approaches employed.
- ✓ Improving the contribution of the ISIAB:
    - Presentations don't provide sufficient time and level of detail to allow high level of input. The board request the management of the project to share project reports ahead of meeting to allow time to prepare adequately.
    - The project should consider preparing a set of discussion issues points for specific issues that require that attention of the ISIAB.
    - Interaction with students and other project partners and farmers at ISIAB meetings should also be considered for future meetings.