No. 12
Dec, 2015

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Sustained yields, improved livelihoods

COMBRO II PROJECT

Quality & Yield

Supporting smallholder farmers' decisions on top quality commercial products

IN THIS ISSUE

A word from the project leader

Dear Reader,

As a regular reader of the COMPRO-II newsletter, no doubt that you will be interested in anoverview of our key achievements for the participatory demonstration trials in the six project countries i.e. Ethiopia, Ghana, Kenya, Nigeria, Tanzania, and Uganda. Therefore, the project team has decided to put together this special issue on dissemination.

In this issue, you will learn more about the progress of the dissemination activities in each the project countries and the country-specific major outcomes. For instance, farmer testimonies in Ghana and Kenya demonstrated the satisfaction of farmers with the improved crop productivity as a result of the COMPRO-II interventions. In addition to improved food production (food security), farmers have also improved nutrition by formulation of nutritious recipes including legume crops such as soybean as found in Western Kenya (nutrition security). On average, farmers have found that applying rhizobium inoculants to legume crops, particularly soybean, was profitable. Consequently, selected farmers have started adopting improved legume technologies on their own farm at scale, not only to improve food and nutrition security, but also generate additional incomes as crops like soybean are also considered cash crops. For instance, there are many cases of farmers going beyond demonstration in Ethiopia, Kenya, and Uganda. To ensure sustainability and scalability, the project has also engaged key stakeholders at the grassroots in the dissemination activities including district administrators (policy makers), agro-dealers, extension agents, farmer organizations, and product proponents (private sector) among others as shown in Tanzania. I invite you to read the various articles in this issue for more details.

> **"On average, farmers have found that applying rhizobium inoculants to legume crops, particularly soybean, was profitable."**

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In the previous issue, you have read more about the project success in terms of improving the regulatory framework for the technologies of interest to ensure that farmers are less exposed to poor quality agricultural inputs through a customer-paid quality control mechanism. In the next issue, we will inform you more about the quality control process including quality standards, standard operating procedures (SOPs), and efficacy testing for agricultural inputs of importance in integrated soil fertility management (e.g. bio-fertilizers) and integrated pest management (e.g. bio-pesticides). It is worth mentioning that the positive project achievements are mainly a result of effective partnership. I would like to take this opportunity to thank all the project partners in the six project countries for their invaluable contribution to the project success. For this specific issue, allow me to thank Getahun Mitiku of the Ethiopian Institute of Agricultural Research, Robert Abaidoo of Kwame Nkrumah University of Science and Technology in Ghana, Paul Seward of Farm Input Promotions – Africa in Kenya, Innocent Okuku of Notore Chemical Industries in Nigeria, MbetteMshindoMsollaof African Fertilizer and Agribusiness Partnership in Tanzania, and Christopher Kyeswa of Africa 2000 Network – Uganda. They have effectively facilitated the implementation of the dissemination activities in the respective project countries. We also thank you as a regular reader of the COMPRO-II newsletter and we hope to get your feedback or inquiry about the various project aspects interesting to you. Finally, as of January 2016 COMPRO-II will reduce its direct contribution to the participatory demonstration trials, but will continue to engage the private sector for improved availability of the agricultural inputs of interest in the project mandate areas and awareness creation to trigger an increase in the technology adoption for food security and livelihood.

Dr. Cargele Masso

COMPROII Project Leader

Kenya: Simultaneous promotion of soybean alongside key food crops helps farmers to achieve food and nutrition security in Western Kenya.

Within the framework of the COMPRO II project, Farm Input Promitions – Africa (FIPS-Africa) has been disseminating the Biofix rhizobium inoculant on improved soybean varieties (SB3, SB19) through its networks of Village-based Advisors (VBAs) in Siaya, Busia, Bungoma, Kakamega, Vihiga and Kisii Counties in the western region of Kenya. Figure 1 shows the location of the VBAs. Biofix helps soybean plants to fix Nitrogen and improve crop growth and yields.

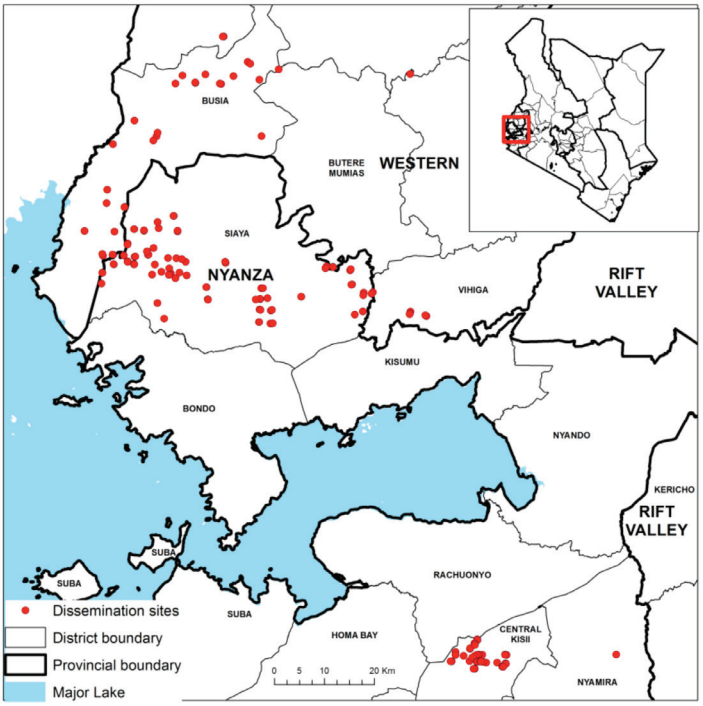
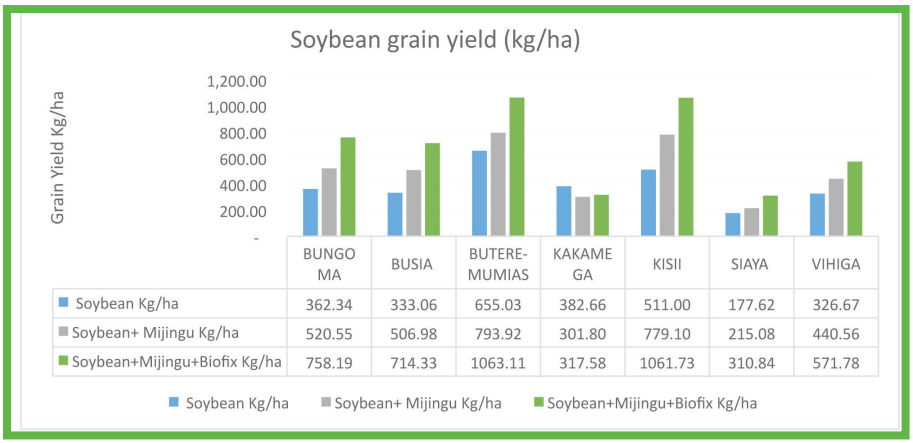


Figure 1 Locations of village-based Advisors (VBAs) affiliated to FIPS-Africa. On average, each VBA builds the capacity of 300 smallholder farmers to adopt good agricultural practices to improve food security and livelihood VBAs follow Mother and Baby demonstration protocols. Measurement of yields from the Mother demonstrations from the second season of 2013 showed that Biofix inoculant increased soybean yields by on average 75%. Yield increases of greater than 30% were observed for all the counties except Kakamega **(Figure 2).**



	BUNGOMA	BUSIA	BUTERE-MUMIAS	KAKAMEGA	KISII	SIAYA	VIHIGA
Soybean Kg/ha	362.34	333.06	655.03	382.66	511.00	177.62	326.67
Soybean+ Mijingu Kg/ha	520.55	506.98	793.92	301.80	779.10	215.08	440.56
Soybean+Mijingu+Biofix Kg/ha	758.19	714.33	1063.11	317.58	1061.73	310.84	571.78

Figure 2 *Soybean response to biofix with/out Mijingu across 7 counties in Western Kenya*

Use of Biofix was found to be economically attractive, with value cost ratios greater than 2 in Bungoma, Busia, Butere-Mumias, Kisii and Vihiga counties. Biofix is promoted using FIPS-Africa's small pack methodology whereby all farmers in a Village are given the opportunity to experiment with a 100 g pack of soybean seed inoculated with Biofix on small plots on their own farms in a low risk way. FIPS-Africa's 170 VBAs have disseminated small seed (inoculated with Biofix) packs to more than 53,769 farmers since the start of the

KENYA

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project. The approach is catalysing the adoption of soybean cultivation. Farmers are saving the seeds from their small plot harvests to grow the crop over large areas **(Figure 3).**

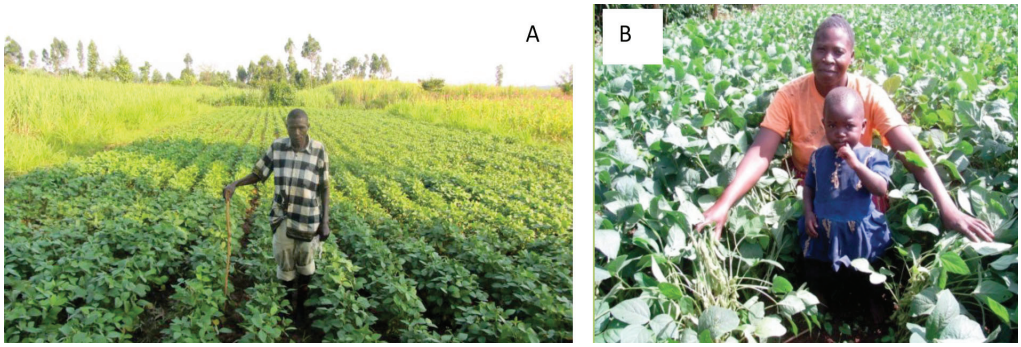


Figure 3 *Farmers growing soybean over larger areas in Bungoma (A) and Siaya (B) Counties.*

In Khuyala village in Siaya County (Figure 3B), Zainabu Avangi is now growing soybean over half an acre. She initially received 100 g of seed from her VBA in 2012. She expects to harvest at least 6 bags (i.e. 90 kg) of soybeans. She is planning to sell 5 bags and keep 1 bag for food and seed for the next season.

However, soybean is still a new crop in the region, and is still regarded as a cash, rather than a food, crop. For this reason, in addition to soybean, VBAs simultaneously promote improved varieties of a range of food crops like cassava, maize, and finger millet among others (Figure 4) to achieve food security.

Figure 4 Dissemination of improved varieites of cassava (A), maize (B), and finger millet (C) alongside improved soybean technologies in Western Kenya

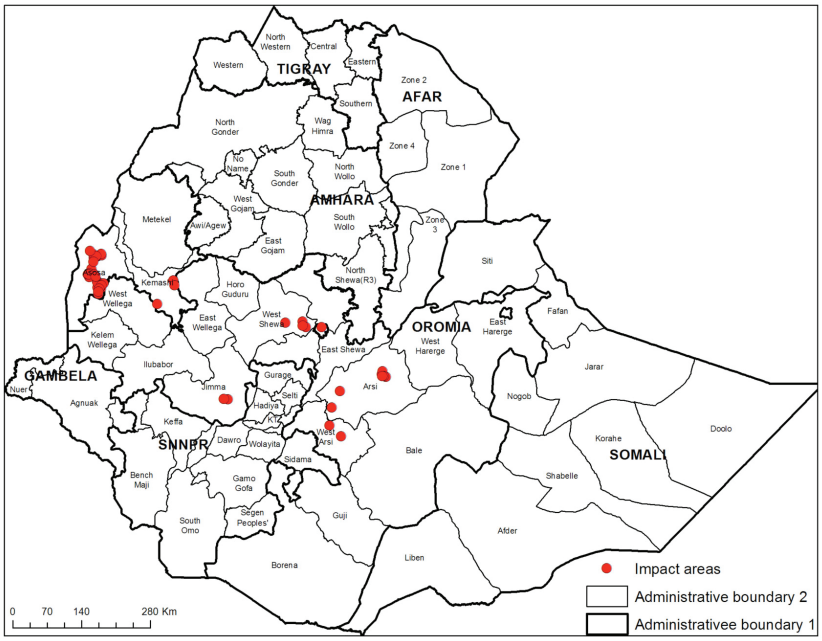
Farmers are taking mixtures of dried grains and tubers to the 'posho' mill to produce a flour for making a nutritious 'Uji' - Porridge (Figure 5). They are making it from a wide range of ingredients including maize, finger millet, soybean, and cassava. As a result, they have started to use increasing amounts of soybean to improve nutrition.

Figure 5 *A participating farmer in Western Kenya holding a bucket of the nutritious 'Uji' for her own consumption*

Ethiopia: Building local capacity for smallholder farmers' access to legume inoculants

ETHIOPIA

COMPRO-II has been disseminating legume inoculant technologies in Ethiopia since early 2014 with a particular focus on faba bean and soybean rhizobial inoculants. The late start, as activities should have started in 2012, was due to delay in determining the legume inoculants to disseminate and consequently confirmation of



dissemination partners. In Ethiopia, the project opted to dissemination locally manufactured formulations as they presented a comparative advantage for both quality and field performance. The inoculants are mainly formulated by the Holeta Agricultural Research Center of the Ethiopian Institute of Agricultural Research (EIAR), the National Soil Testing Center (NSTC) of the Ministry of Agriculture and Natural Resources, and the recently established private sector company Menagesha Biotech Industry PLC. The products are scaled up after quality verification and efficacy assessment in the agro-ecological zones of interest. This update of the dissemination activities in Ethiopia mainly focus on the activities in 2015, but Figure 1 shows the location of the main participatory demonstration sites of the technologies in 2014; the map does not include the trials established by farmers themselves after learning about the technologies at the demonstration sites.

Figure 1 *Location of the participatory demonstration sites in Ethiopia (2014)*

Before each dissemination campaign of bio-fertilizer products, theoretical and practical trainings have been provided to model farmers, developmental agents and agricultural experts on the use and application of bio-fertilizers. The trainings were organized at Jima, Pawe and Assosa for soybean bio-fertilizers and Arsi and Shewa zones for faba bean bio-fertilizers. In total 581 participants were trained, with the mission to train others later on. In general, participatory demonstration trials included (i) farmer practice, (ii) bio-fertilizer alone, (iii)

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bio-fertilizer used in conjunction with phosphorus (P) fertilizer, and P fertilizer alone, to optimize the learning potential of the farmers from the trials. The demonstration trials were also superimposed on adaptation trials of selected faba bean varieties i.e. Gebelcho, Gora, Achalu, Dosha, Moti, Tumsa, Welkie and Dagaga at major faba bean growing areas in the country. In addition to participatory demonstration sites, selected farmers in the project areas have purchased bio-fertilizers from Menagesha Biotech Industry PLC and National Soil Testing Center and they have started utilizing the technology on their own, going beyond demonstration. Continuous capacity building of the farmer organizations and the public private partnership for the development of legume inoculants may improve farmer adoption of legume technologies to increase crop productivity.

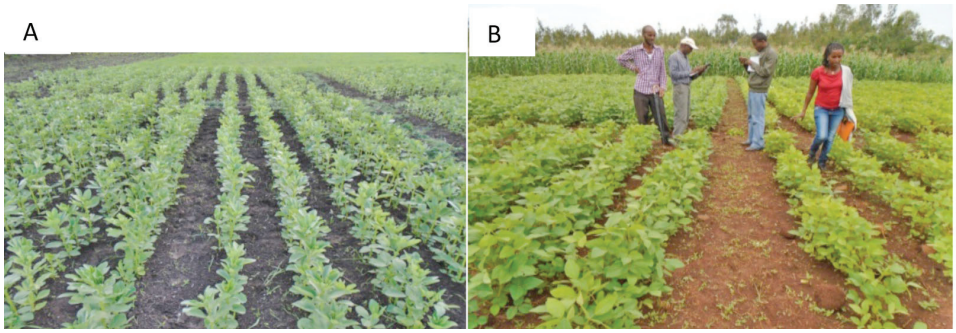

Figure 2 Partial view of demonstration trials of a faba bean bio-fertilizer in South West Shewa (A) and a soybean bio-fertilizer in Jima zone (B) in the 2015 growing season. In B, in the third position from the left, is Getahun Mitiku the project principal investigator in Ethiopia (EIAR).

ETHIOPIA

Tanzania: Mobilizing key stakeholders to increase the probability of bio-fertilizers uptake

TANZANIA

In Tanzania we only had one season of participatory demonstration trials, but we have achieved a lot in terms of network establishment to increase awareness creation. Our interaction with the N2Africa initiative was also significant, particularly in terms of stakeholders' trainings(Figure 1). Our dissemination activities covered the period of July 2014 to June 2015. The delay was mainly due to the regulatory requirements for the registration of the products of interest (e.g. legumefix and biofix) and the identification of a suitable dissemination partner [i.e. African Fertilizer Agribusiness partnership (AFAP)], whereas the early termination of the dissemination activitieswas a result of project adjustment.

Figure 1 Collaborative effort of COMPRO-II and N2Africa to train key stakeholders in improved legume technologies to increase the probability of technology uptake. In the right corner of the photo are Dr Frederic Baijukya (N2Africa) and Dr Andrew Msolla (AFAP) on behalf of COMPRO-II during a training session. The dissemination activities were implemented in Mbeya, Morogoro, Ruvuma, and Tanga regions (Figure 2). The participatory dissemination trials were also used for training of farmers in the regions for awareness creation to increase the understanding of the technologies during the growing season and at harvest (Figure 3). The crops of interest were soybean in Morogoro, Ruvuma, and Tanga, and common beans in Morogoro, Tanga, and Mbeya. The bio-fertilizers tested were nitrosua for common bean, biofix and legumefix for soybean. Biofix and legumefix have been recently registered in Tanzania (2014);they are manufactured by MEA Ltd and Legume Technology Inc respectively.

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Figure 2 *Location of the main participatory demonstration trials in Tanzania*

Figure 3 *Farmers' participation in field days during the growing season [common bean in Mbeya (A)] and at harvest [Soybean in Ruvuma (B)]*

During field days, farmers requested more information on the availability and access to bio-fertilizers and markets for additional crops. This demonstrated the importance of engaging the private sector (e.g. agro-dealers and product proponents) and extension agents. These key stakeholders were invited by AFAP to facilitate the interaction with farmers during training sessions and field days. Representatives of agricultural research institutes (ARI) such as ARI Uyole were also involved in the field days to clarify issues related to soil fertility and legume technologies. To ensure common understanding of improved legume technologies and integrated soil fertility management (ISFM), stakeholders were trained including regional, district, and village agricultural officers, hub and rural agro-dealers, village based advisors, as well as farmers and output buyers in the four project regions. This was mainly meant to ensure sustainability in the long run, particularly the engagement of district administration (Figure 4).

Figure 4 *Meeting with Namtumbo District Executive Director in Ruvuma region*

The network mentioned above was developed in less than a year. There is a need to sustain it through further group trainings to upgrade the skills as new knowledge is generated, but also for continuous teambuilding. To ensure that the achievements of the project could be improved and scaled up, COMPRO-II will collaborate with a similar initiative funded by the International Development Research Council of Canada under the Canadian International Food security Research Funds. The new initiative is led by CABI, AFAP, and Farm Radio International. It is worth mentioning that CABI and AFAP were already partners of the International Institute of Tropical Agriculture (IITA) in the COMPRO-II project.

Uganda: Going beyond participatory demonstration trials

Dissemination activities in Uganda started in 2013 under the responsibility of A2N-Uganda in collaboration with Farm Input Promotions – Africa (FIPS-Africa). However since 2014 A2N-Uganda has been solely responsible for dissemination activities, with some technical support from Makerere University,Uganda. The activities have been conducted mainly in Eastern Uganda (Figure 1). The focus has been on soybean and Mak-bio-fixer, which is a rhizobium inoculant formulated by Makerere University. The stakeholders are supported by a team of trained Community Based Advisors (CBFs); for instance in 2015 approximately 60 CBFs received a refresher training in appropriate use of improved legume technologies.

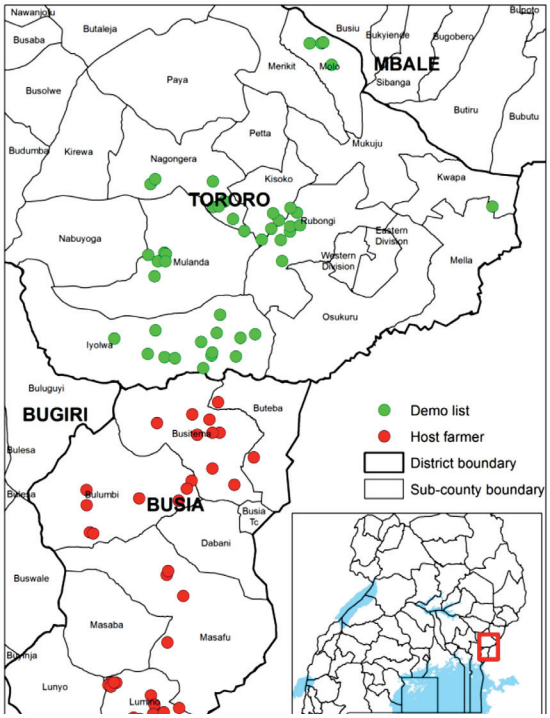

Figure 1 Location of the demonstration trials in East Uganda for the 2013&2014 seasons

While in 2013 and 2014 the focus was on participatory demonstration trials, in 2015 farmers were encouraged to go beyond demos; we have however continued with the participatory demonstration trials in new villages. A strong buy-in has been observed among individual farmers, farmer organizations and other local associations including smallholder farmers (Table 1). One farmer in Namaingofor instance has started growing soybean at large scale, not only for food security, but also for income generation (Figure 2).

Table 1 *Buyers of Mak-Bio-Fixer for the period between June-October 2015 based on Makerere university soil science laboratory records*

Buyer	Number of packets of Rhizorbium bought			Totals
1st time	2nd time	3rd time		
Omar Farm	200	100	200	500
Kazungu	17			17
Kamwaakka	20	10		30
Twezimbe group	40			40
Alikonyiinvestiment	15			15
Facom	35			35
Kasenge Volunteers	10	5		15
Joel	5			5
ShoronAkur	5			5
Lwasa	3			3

UGANDA

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Gubya	2			2
Musajjaawaza	25			25
KADIFA	2			2
NAMBAFU	5			5
Matovu	3			3
Mugabe	5			5
KibogaKyankwazi	25			25
Ewanyi	25			25
Payamar	10			10
Isur	06			06
World vision	210			210
N2 Africa	200			200
A2N Uganda	1100			1100
Total	**1968**	**115**	**200**	**2283**

Figure 2 *A commercial soy demonstration garden by Rev.Okumu James of Buswale Sub County, Namaingo district*

In the project effort to build the capacity of university students for the succession plan, sustainability and scalability, selected students from Makerere University have been trained at trial and farm sites for the field practical course. This exercise not only improved their understanding of improved legume technologies, but also allowed them to interact with farmers (Figure 3). Such interaction strengthens their ability to contribute to the extension services in the future.

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Figure 3 Students of Makerere University discussing with MrsOkumu of Buswale Sub County, Namaingo districtthe improved soybean technologies including rhizobium inoculant and P fertilizer in a field practical course

As observed in the other countries such as Nigeria, spatial variability of soybean response to Mak-Bio-Fixer and triple superphosphate was also found in Uganda (Figure 4). Responses were low in Busia compared to Namutumba, Tororo, and Namaingo regardless of the treatments. The project has started testing ISFM interventions to try to improve the responses. Additional inputs being tested include compost and a multiple nutrient source i.e. Sympal (N:P:K0:23:15+10CaO+4S+1MgO) to determine which combination could further improve the performance of Mak-Bio-Fixer in soybean production in East Uganda.

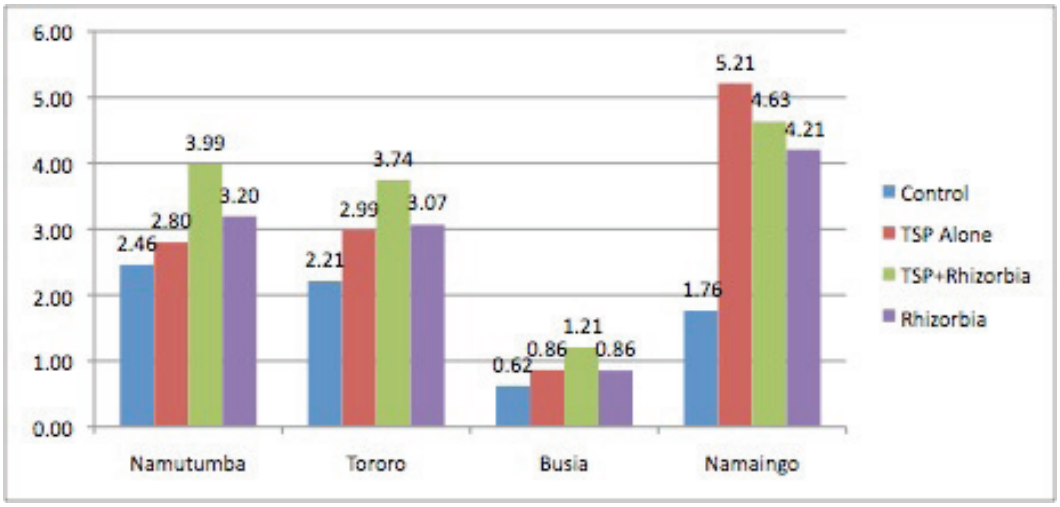

Figure 4 *Average yields per district in East Uganda (kg/25 m2)*

NIGERIA

Nigeria: Spatial variability of soybean responses in participatory demonstration trials – need for continuous investigation into integrated soil fertility management

In Nigeria, the participatory demonstration trials started at the beginning of COMPRO-II in 2012, under the collaborative work between Notore Chemical Industries (Notore) and Farm Inputs Promotions-Africa (FIPS-Africa). Since 2013, Notore started independently conducting the participatory demonstration trials and awareness creation. Notore is a private sector company involved in facilitating farmers' access to improved agricultural technologies including seeds and fertilizers. The company has shown significant interest in legume inoculants such as legumefix and nodumax; they are analyzing the market and participating in awareness creation before they can start commercializing the products at large scale not only in Nigeria, but also in other West Africa countries such as Ghana.

Figure 1 shows the locations of the main participatory demonstration trials conducted from 2012 – 2014 in Benue, Kaduna, Kano, and Niger States. Farmers' trials using the inputs tested at the demonstration trials following onsite training and awareness creation (video campaigns) are not included in the map. Results obtained during this period have not only shown significant yield increases, but also huge spatial variability (Figure 2). In 2015, the project started testing various interventions of Integrated Soil Fertility Management (ISFM) including interaction of organic manure, phosphorus (P) fertilizer, and rhizobium inoculant to try to reduce the yield gap across regions and sites. The results will be published in the next issues of the project newsletter.

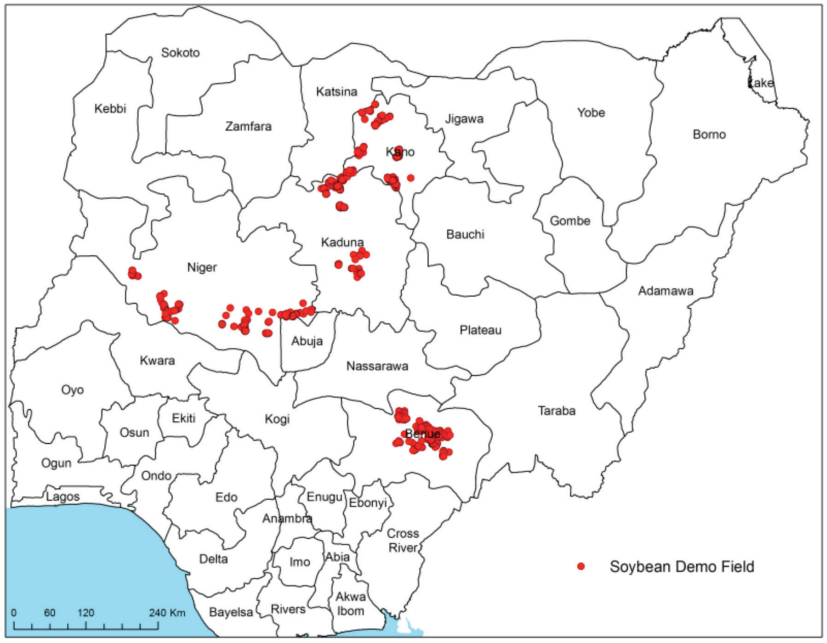

Figure 1 *Location of the participatory demonstration trials in Nigeria (2012-2014)*

In 2015, the dissemination campaigns continue under the supervision of the Village Promoters (VPs) of Notore to increase the awareness creation and the understanding of the know-how to effectively use inoculants in legume-crop production. The cycle of the participatory demonstration trials commences with the establishment of the demonstrations trials together

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with farmers (Figure 3) and ends with the harvesting of the demonstration trials (Figure 4) including comparing the yields from all the sub plots containing improved technologies with those containing traditional practices. As shown in figure 4, the training involves all sectors of the community including adult men, women and youths.

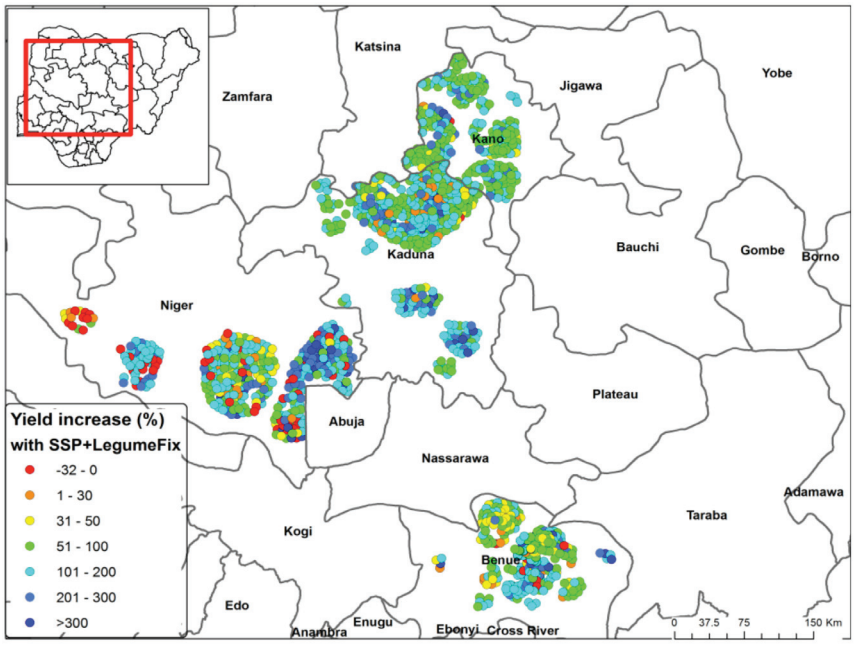

Figure 2 *Spatial variability of soybean response to a combination of legumefix* ***(a rhizobium inoculant)*** *and simple superphosphate (SSP)*

Figure 3 *Establishment of a participatory demonstration trial at Mbatie in Benue State*

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Figure 4 *Farmers jointly harvesting of a participatory demonstration trial in Buruku, Benue* state

This year, over 260 VPs were trained and involved in the dissemination activities in the 4 States to improve their skills for effective support to smallholder farmers. Approximately 30,000 smallholder farmers were exposed to the demonstration sites for training and given inputs to try at their own farms. In addition to farmer directly testing the inputs, 278 video sessions (Figure 5) were organized to create the awareness of over 7,350 farmers about improved legume technologies including seeds, soybean inoculants, and P fertilizers among others to improve crop productivity, and consequently food security. The video viewing sessions are generally not implemented as a replacement for the participatory demonstration trials, but brings together both farmers who have attended participatory demonstrations and those who have not within the same community thereby enabling knowledge diffusion between the participants during the session and beyond.

Figure 4 *Examples of video viewing session to increase awareness of improved legume technologies such as seeds, inoculants and fertilizers among others.*

NIGERIA

Ghana: Mobilizing farmers for participatory demonstration trials despite climate change

GHANA

Similar to Ethiopia, participatory demonstration trials in Ghana were initiated since 2014 in Northern and Upper West regions (Figure 1). In Figure 1 the data points are limited to the main demonstration sites; they don't include comparative trials set up by farmers themselves after receiving trainings at the demonstration trials. Results of 2014 showed significant yield increase, although there was a spatial variability of crop responses (Figure 2). In 2014, the test crops were soybean and maize using various inputs. In both cases the common farmer practice was compared to the project recommendation. Although for both crops significant yield increases were observed, the technologies used in maize production were less profitable than the ones used for soybean (data not shown; submitted elsewhere for publication in a book chapter that will come out in 2016). In 2015, the project opted to focus mainly on soybean using inoculant formulation (i.e. nodumax) in conjunction with triple superphosphate (TSP), and at a less extent to groundnut. Nodumax is manufactured in West Africa (IITA-Ibadan, Nigeria), which ensures timely delivery of the inoculants for the target legume crops.

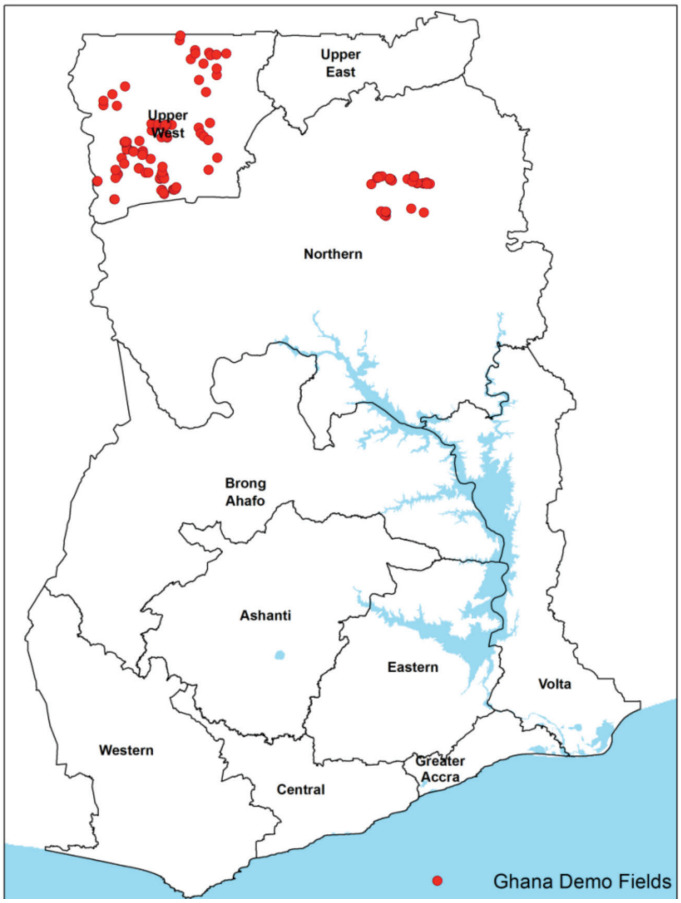

Figure 1 *Locations of the participatory demonstration trials in Ghana (2014).*

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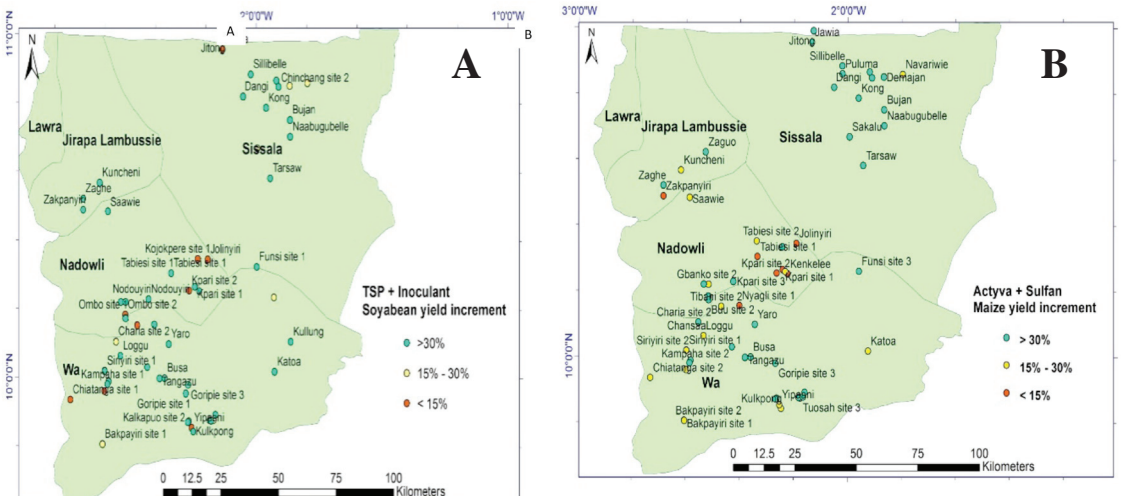

Figure 2 *Spatial variability of soybean and maize responses to selected inputs tested by the project*

For the 2015 season, the participatory demonstration trials were established by Kwame Nkrumah University of Science and Technology (KNUST) in partnership with Antika Limited, a private sector company in Upper West facilitating farmers' access to improved agricultural inputs. Agricultural extension agents involved in the demonstration trials were trained to ensure effectiveness. After adequate training, crop advisors were tasked to identify participating farmers in the various communities, with a target of 200 and 150 main demonstration trials in Upper West and Northern regions respectively to be used as learning site for interested farmers in the communities. Figure 3 shows the mobilization of participating farmers.

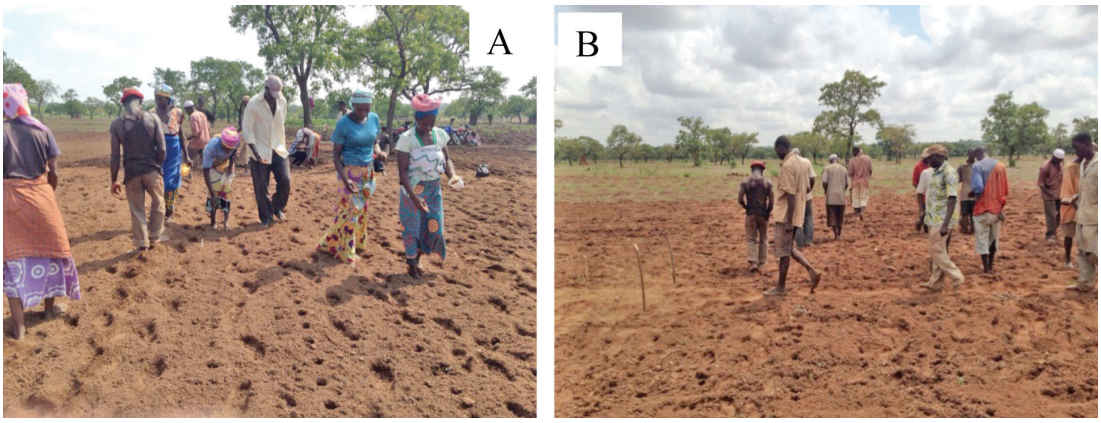

Figure 3 *Farmers planting demonstration trials at Savelugu (A) and Karaga (B) to compare the general farmers' practice to a combination of nodumax and TSP.*

Despite the strong mobilization of farmers, delays of rains in Upper West region forced the project to adjust the plan for 2015. The rains did not start on time for groundnut planting in the region; hence, in the 2015 season we only conducted soybean demonstration trials

GHANA

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in Upper west. However, in Northern region both soybean and groundnut were tested. The demonstration sites have also been used for training of interested smallholder farmers to increase understanding of the inoculant technology and its benefits compared to current common practices in the two regions. Early July, over 1650 farmers have already been registered for the training (i.e. 1320 male and 330 female). Farmers field day (Figure 4) and technology evaluation (Figure 5) were organized where participating farmers were asked to appraise the project recommendation and their practices. Majority of the farmers rated the inoculant technology in conjunction with triple superphosphate as the best technology in terms of plant growth, pod formation, number of pods, grain yield and quality of seeds.

Figure 4. *Farmers field day at one of COMPRO II Demo sites at Karaga in Northern region.*

Figure 5. *Farmers at a technology evaluation session at Nyeko in Northern region*

Continued from page 18

On average, 34 males and 43 females attended the evaluation technology per site. "I got 23 maxi bags of soybeans from 3 acres. This is an achievement because farmers from Nyeko get an average of 4 maxi bags per acre. We attributed this great achievement to the application of inoculants and adoption of best agronomic practices which were handed to us by the COMPRO II project. I intend to apply inoculants to more acres next season and also promote it among my friends" a testimony from Salifu Iddrisu, farmer from Nyeko in the Northern region. Continuous awareness creation and local availability of the inputs are expected to increase the adoption of legume inoculants; distribution network however still has to be improved. Similarly, there is a need to engage the private sector in awareness creation to prevent future discontinuation of the awareness creation given that the inoculant technology is quite new to the smallholder farmers in Upper West and Northern regions of Ghana.

GHANA

'Quality & Yield' is the newsletter of the COMPRO II project. It is a quarterly publication that highlights key activities and experiences of the project. 'Quality & Yield' is produced and Designed by CABI. We welcome
short and medium length articles by project partners. Send your comments and articles to
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COMPRO II is funded by the Bill & Melinda Gates Foundation.