

N2Africa Podcaster no. 45

April & May 2017

Introduction

I'm writing this introduction from meetings in Berlin – the Think20 Dialogue on Global Solutions associated with the G20 Germany 2017 – see [link](#) – and the Leadership Council of the UN Sustainable Development Solutions Network – see [link](#). Although very important at the political and policy level, these high level summits seem far from the reality of life in rural Africa, although a major focus of these initiatives is addressing inequality.



The opening of the T20 summit on Global Solutions in Berlin

Last week I was in a remote part of the South-East Lowveld of Zimbabwe, discussing the problems faced by smallholder farmers in a drought-prone area on the edge of the Gonarezhou National Park. A major issue faced is crop damage from elephant and other animals from the park, which we explored together with local leaders through playing a game “Kulayijana” – see [link](#). I led a small group looking at opportunities and constraints in crop and livestock production. Women farmers identified nyemba (cowpea) as an opportunity - and when I asked about the major issues faced – the first and foremost was the lack of markets for their produce. This reaffirmed to me the importance of N2Africa through which we address all aspects of the food system from input provision, production and consumption to markets through a systems approach.

We have revised the N2Africa website

With so many articles and reports, extension materials and student theses emerging from N2Africa we realised that it was necessary to make it easier to find our outputs. For this reason we have revised the N2Outputs

A woman business in Rwanda

This story highlights the testimony of Mukakayonde Claudine, a woman from Mareba Sector, Rango Cell, Bugesera District. She is 47 years old, married to Manassé and they have six children. Her life has changed due to N2Africa project.

Before the start of N2Africa project in her area, she was



Playing the game Kulayijana with local leaders and other stakeholders in Malipati, Zimbabwe

As part of understanding how our partners perceive N2Africa on the ground we are actively collecting their own impressions: this edition and future Podcasters will carry a selection of stories from the field. Often the term ‘success stories’ has been invoked – but in reporting our stakeholders’ experiences we have avoided these terms. It is as important to understand the problems and barriers encountered as well as to celebrate success – and we leave it to you to read and assess for yourself whether the stories represent success or just steps on the way to a more sustainable future. In addition to these articles on the actions and impressions of stakeholders we present a series of news items and results from N2Africa students who worked in Ethiopia, Kenya, Nigeria and Tanzania, and a report on an inspiring visit to Farm Radio International together with several other projects funded by the Bill & Melinda Gates Foundation. I hope you will enjoy reading this Podcaster and please do send in your own articles and news for future issues.

Ken Giller

tab with clearer categories. If you have problems finding the information you need, or if you have suggestions for improvement of the website, please help us by contacting N2Africa.office@wur.nl.

producing soyabean but with no plan for development. She was mixing all crops together and the yield was always very low. She had no knowledge of an agricultural practice that could lead to increased soyabean yield. However, she knew that soyabean can improve the nutrition of her children.

Her story is told in French and summarized in English.

Je m'appelle MUKAKAYONDE Claudine, du secteur Mareba, cellule Rango, district de Bugesera. Je suis âgée de 47 ans, mariée et mère de 6 enfants.

Avant d'être partenaire du projet N2Africa, j'étais productrice de soja mais sans aucun objectif de développement. Je pratiquais cette culture de façon désordonnée en mélangeant n'importe comment haricot, soja, maïs et manioc. De ce fait, la production de soja était dérisoire mais je savais qu'en nourrissant mes enfants avec du soja, ils ne pouvaient pas avoir de kwashiorkor.

Avec l'arrivée du projet N2Africa en 2010, j'ai été sélectionnée parmi les premiers partenaires et je me suis engagée comme Master Farmer. J'ai été désignée pour participer à la dissémination de nouvelles technologies sur le soja et le haricot notamment: effet du rhizobium associé du DAP sur le soja; effet de l'association matière organique, engrais NPK et le rhizobium sur le haricot; association du haricot nain et du manioc; rotation du soja et le maïs.



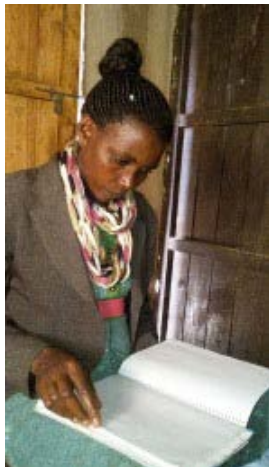
Claudine et son mari Manassé

Ces technologies ont entraîné une augmentation de rendements de façon que là où je produisais 30 kg, la production est passée à 270 kg. Le projet nous a aidés à faire une comparaison technico économique entre différentes légumineuses (soja, haricot, arachide, vigne, petit pois, pois cajan) et le soja s'est montré meilleur et il peut subir plusieurs transformations.

Cependant, cette augmentation de la production de soja devenait problématique car le soja était utilisé seulement au niveau domestique. Il fallait trouver un marché pour le soja ou le transformer en d'autres produits beaucoup plus consommables et plus vendables.

Le projet N2Africa a répondu à notre préoccupation et en 2013, j'ai été intégrée dans un groupe de 24 femmes qui ont suivi une formation sur les techniques de valorisation du soja à Muhanga. Au cours de cette formation, j'ai appris comment faire du TOFFU, du lait de soja, des boulettes, du « thé » de soja, etc.

Après cette formation, je me suis mise au travail en utilisant du matériel local comme le mortier (Isekuru) et le pilon (Umuhini) et j'ai pu produire moi-même du lait, du TOFFU, des boulettes-beignets. Etant dans un coin un peu reculé (Nyamigina), j'ai déplacé mon business pour approcher mes clients à Ruhuha-Rango. Comme je ne pouvais pas satisfaire la demande, N2Africa m'est venu en aide en m'accordant une machine électrique pour piler le soja.



Claudine tient la comptabilité de son business



Machine servant à piler le soja



L'Unité de transformation du soja de Claudine. Ici il s'agit de la table de moulage et la cuisine. Elle emploie de la main d'œuvre salariée.



Aujourd'hui, je suis devenue un fournisseur de sous-produits à base de soja, reconnu au niveau de tout le District de Bugesera. Mon business m'a permis de quitter la catégorie 1 d'UBUDEHE (Catégorisation socio-économiques de la population au Rwanda) pour être maintenant dans la catégorie 3.

J'ambitionne d'élargir mon business et dépasser les limites du District de Bugesera et acquérir la certification de mes produits par le Rwanda Standards Board (RSB). Je compte appeler les autres femmes qui ont participé avec moi à la formation de Muhanga pour intégrer mon business et peuvent devenir des actionnaires dans une compagnie que je compte mettre en place. Je me vois en 2020, Présidente directrice (PDG) d'une usine de transformation du soja en différents produits.

Je remercie le projet N2Africa qui m'a permis de faire un pas dans la vie et spécialement KANTENGWA Speciose, les agents de la Caritas: BYAMUNGU Felix et NYIRABARUHIJE Véronique qui n'ont ménager aucun effort pour m'orienter dans mes initiatives. Je remercie vivement le Président de la République du Rwanda, Paul KAGAME, car, sans sa politique de promotion de la femme, je ne serai pas ce que je suis pour le moment.

When N2Africa project started in her area in 2010, she was selected as participant, benefited from trainings and subsequently became a Master Farmer. Her involvement in the dissemination of new technologies on soyabean and bean (such as use of inoculum, organic and inorganic fertilisers, spacing, intercropping and rotation) led to increased soyabean yield of her plot from 30 kg to 270 kg.

Since the yield of soyabean was increasing, but only consumed locally, there was a need for external market and also value addition to produce diversified products. This was a challenge for her. Thankfully, the N2Africa project organized a training in Muhanga District on soyabean processing which Claudine attended together with other women.

Claudine learnt how to produce soyabean milk, tofu and meatball-donuts which she operationalized using locally available materials soon after the training. Since her business was growing, she moved from her remote area to Ruhuha-Rango where her customers were most based. N2Africa project supported Claudine with an electric soyabean grinding machine to enable her meet the increasing demand for her products .

Currently, Claudine is a distributor of soyabean based products in the District of Bugesera. Her business has made her move from the very poor category (Type I) to the medium category (Type III) of Ubudehe typology. She plans to expand her business beyond Bugesera District and also to get a certification license for her products from the Rwanda Standards Board. Claudine also plans to invite other women that participated in the Muhanga training with her to become shareholders in a company she plans to launch soon. Her dream is to become a CEO of her own soyabean processing plant in 2020.

Claudine is grateful to N2Africa project, Madam KANTENGWA Speciose, Caritas staff: BYAMUNGU Felix and Madam NYIRABARUHIJE Véronique for their guidance to achieve her goals. She also thanks the president of the

republic of Rwanda, Paul KAGAME for his policy on gender promotion without which she would not be who she is today. MUKAKAYONDE Claudine, Rango, Rwanda.

Knowledge to reach greater heights in Rwanda

“Before N2Africa started working with us in TWIZERANE farmer’s association, we used to grow crops in a traditional way, no use of improved crop varieties, or fertilizer. The crop yield was always low because of ignorance. After interacting with N2Africa technologies in 2010, I saw the difference between improved technologies and the traditional method of cropping, especially inoculation of soyabean coupled with the use of DAP and planting in row, which significantly increased

our production of bush bean and soyabean crops”. This was remarked by Mr. Celestine who is part of a farmer group of 25 farmers called TWIZERANE. TWIZERANE started to work with N2Africa in 2010, when they hosted two agronomic trials showcasing varieties and other inputs. Until this time, Celestine’s group was only able to grow crops using traditional methods. The scope of activities they would engage in was limited as a result of knowledge deficits.

Mr. Celestine was selected by his group members to become the master farmer (lead farmer) and was trained by the N2Africa project to assist other farmers in BNF technologies. This included participation in study tours organized by the project. *“I attended several training sessions organized by N2Africa around BNF, including a study tour to Western Kenya to visit farmers growing soyabean for collective marketing. From there, I changed my perception of agriculture and moved away from subsistence to professional agriculture. My group TWIZERANE started a community based seed production activity. I started selling bean and soyabean seeds of new improved varieties-SB 24 for soyabeans and RWR2245 for bush beans (produced by the group) to other farmers. As there was no input selling store in our community (Musenyi), I introduced mineral fertilizer (DAP) and pesticides, because farmers were asking for them and advice on how to use them. Since I was trained on agronomic practices, I was capable to help them”.*

Celestine’s aim was to become a certified agro-dealer in his sector of Musenyi, providing access to inputs to his fellow farmers. As a lead farmer, he made it his responsibility to acquire the certification for input distribution. This was consciously set as a goal as it was a major hindrance to the use of any of the inputs introduced in the sector to farmers. To achieve these targets, Celestine filled an application with the Ministry of Agriculture (MINAGRO) in 2014 to obtain a certificate of permission to sell inputs. Relying on the knowledge acquired from working with N2Africa, he also took part in a training organized by the National Agro Dealers Network to become an authorized Agro Dealer.



Mr. Gashirabake Celestine holding his certificate



Mr Gashirabake Celestine in front of his shop

With this certification, Celestine could now widen his scope of work and even had bargaining power with financial institutions. He applied for and received a loan from SACCO of 1 million RwF and with his savings of 1 million RwF, he started a real business. His bag (50 kg) of DAP increased to 5 bags (250 kg) of DAP and 2 bags (100 kg) of Urea per season. In 2016, he sold 11 tons of fertilizers (DAP and Urea) and seeds (2 tons of soyabean, 1 ton of maize and 1.5 ton of bean). This season, he is expecting to reach 15 tons. Celestine also sells soyabean inoculants, PICS bags, vegetable seeds, agriculture tools, and pesticides. This initiative has provided access to above inputs and its timeliness on seasonal basis to farmers in Musenyi sector. A total of about six thousand (6000) farmers are served on seasonal basis.

"In addition to becoming an agro dealer, the training on linking farmers to market organized in 2012 by N2Africa, I learnt how to calculate interest/benefits". From there, I started selling my produce to market at a good price. The group TWIZERANE used to produce for home consumption, share what we produce. Illustration: we used to produce 80 -100 kg of bean per 0.2 hectares (terrace) and share it among the 25 members. With improved technologies introduced by N2Africa, we moved from 100 to 400 kg for same land area of bean produced.

On learning, *"I will advise other Agro Dealers to acquire technical knowledge on fertilizers and agronomic practices in order to advise customers on how to use inputs they are buying, extension messages to accompany inputs bought"*. He also iterated that the awareness created in the community through the exposure with N2Africa technologies made sales of fertilizers and seeds more demand driven, this made sales of inputs easy.

Mr Celestine: *"My next step will be to open another shop in the next cell (community) to help farmers from that village because they walk long distance to come to my current shop. Buy a motorbike to facilitate moving around to provide technical advice to other farmers. Extend the current shop to have a separate space for storing fertilizers and seeds and add other items like safety equipment. Also collect soyabean grain from farmers and sell to Soyco Mt Meru Company"*.

Story by Mr. Celestine, Agro Dealer in Musenyi Community in Rwanda

Farmers' stories from D.R. Congo

When farmers are empowered with knowledge on N2Africa technologies, this information can be disseminated to others. One of the strategies to disseminate research results of N2Africa at scale in South Kivu, Eastern DRC, has been the training of students of agriculture high

schools in the N2Africa action sites. The trained students in turn train households in their villages. This article contains the stories of three farmers about how they learned about N2Africa's technologies and the impact on their livelihoods.

Appoline Mapendo

"I am married and mother of 13 kids. I am living in Cibinda localite Miti near Kahuzi Biega park, one of N2Africa project beneficiaries since 2014. I received seeds of cassava, seeds of maize and beans. We were deprived of new technologies because our place is very far and the roads not accessible. Our agronomic practices were very archaic. The N2Africa project brought to us new technologies, namely planting on line and a cassava-legumes intercropping system.

I am now expert in the technique of intercropping cassava, maize and beans with recommended spacing: either 1 m x 1 m or 2 m x 0.5 m. These crops are the most important in my village which is why we were very interested of these technologies. From less than an hectare, we obtained 400 kg of beans, 1 ton of cassava and 1 ton of maize. From my cassava harvested I obtained a 500 US dollar benefit and with this I bought a cow and four goats and presently that cow has given me one calf."



Appoline Mapendo (lady on the right)



Déogratias Bulonza

Déogratias Bulonza

"I am a 22-year-old bachelor student at Biosadec University in agriculture and a teacher of agriculture techniques at Mushiguri high school. I have been in contact with N2Africa since September 2015. We were not aware of the soyabean inoculation techniques before our contact with the technician of this project through our school, which is located in a research center Inera / Mulungu. We have also been trained on best agronomic practices by N2Africa/IITA through the Catholic Church. This included learning about planting soyabean in lines, inoculant application, ISFM techniques and so on. We also received training on value chains and soyabean and cassava processing. Since, I have decided to involve in agribusiness with some of my students. We started with a small plot but now we have reached 1 hectare and I'm hoping to cover up to 10 hectares in a few years and we are producing for the market."

Josephine Nabandi M'Mironyi

"I am married and I have 11 children, I have a high school diploma in Mathematics & Physics. I live in Kajeje, a town on the edge of the Kahuzi-Biega National Park; I started working with the N2Africa project in 2010. The practiced technologies included bio-fortified climbing beans, growing climbing beans on the maize stalks after maize harvest, and the cultivation and processing of soyabean: the most important acquired technique was the use of inoculant which is called 'atmospheric fertilizer' by farmers).

Currently, I have a field of 2 ha. From a business perspective, my choice focused on soyabean, beans and maize. From my farm I harvest about 1 ton of beans and 700 to 800 kilos of soyabeans per season. In addition to N2Africa's agricultural practices, we have learned to store our products and sell them when the market price is good. Agriculture has become a true business enterprise that allows me to meet my needs and has transformed my life. I am able to make my own seed stock for the following season. I improved and enriched the diet and the nutritional status of members of my household. I am also able to meet the current needs of my household (health care, clothing, school fees for children of primary school to university). In addition, I have greatly improved my house: from mud huts with thatched roofs to the modern house. I also bought a plot in town (Bukavu). My children who are staying and attending courses at the University will no longer be faced with rent problems.



Josephine Nabandi M'Mironyi

Increasing legumes harvest with inoculant: The story of AISL, Malawi

New agricultural technologies help to innovate and modernize agricultural production in the light of climate change and soil degradation. Research has confirmed that the addition of inoculant to soyabean can boost yields with at least 40 % to 50 % with all other factors kept equal. Another benefit of inoculation is that it stimulates a high grain protein content (up to 40%). This is a great story for Africa with many of its countries depending on agriculture. The effect of inoculants on soyabean yields is the magical story that every farmer would like to hear.

One of N2Africa's targets is to develop improved inoculant products and cost-effective production and delivery methods. A large challenge is to ensure availability as well as affordability. Previously, in Malawi, the Government Department of Agricultural Research Services (DARS) was producing inoculant sachets named 'Soy', accessible to a limited number of farmers who would come to the research station to purchase. Inoculants were also often imported from Kenya or even from as far as Brazil. The director of IITA Southern Africa, Dr. David Chikoye, has good news for the region: *"We can no longer import inoculant from far, as inoculant can now be accessible within the region"*.

N2Africa lobbied for the private sector and agro-dealers as partners, to map a way of producing affordable inoculant in Malawi. Mr. Fredrick Kawalewale, the managing director of Agro-Input Suppliers Limited (AISL), took up the challenge to scale up the production of inoculants and he invested in lab equipment. In pilot year 2014 in Malawi, AISL already produced ten times as many inoculant sachets as DARS.

Mr. Kawalewale remarked: *"When we came, we improved the packaging, handling and we invested in the cold chain, in solar driven coolers for proper storage of Nitrofix inoculant. From 20,000 sachets of 50 grams, now we have moved to 280,000 sachets meaning we have managed to reach over 95,000 farmers. This all has happened within a space of three years. We are envisaging that we should reach 1,000,000 sachets which will translate to about 350,000 farmers"*.

To produce the inoculant, Mr. Kawalewale set up a very good high standard laboratory that ensures quality, excellent packaging, testing and good delivery to farmers. He is currently constructing bigger facilities with robust laboratory equipment to increase production of inoculant which would cater for the whole of southern Africa and later conquer the world. AISL is also coming up with inoculants for beans and groundnuts. All these products are aimed at ensuring that farmers like Natalia Matiasi have something to smile about when it is harvesting time:

Ms. Matiasi is a soyabean lead farmer in her community. She applied inoculant to her soyabean seed before planting and she planted in double rows to increase yields. Ms. Matiasi observed that the application of inoculant on improved soyabean varieties led to greener leaves, longer stems and a larger number of pods compared to soyabeans without inoculant. The inoculated roots had a lot of nodules, meaning that they were highly able to return nitrogen to the soil. She also compared her harvest of maize in the following year and observed that maize yields had increased with less application of inorganic fertilizer on the field where there had been inoculated soyabean.

Ms. Matiasi explained: *"This time, access to inoculant was easier than other years. We accessed it from our local agro-dealer at a price of MK1000.00 (US\$1.4) and applied it to at least 2 ha of land, which proves how economical planting soyabean is compared to my previous tobacco farming. I am now able to send my children to school from soyabean farming."*

Just like every visionary farmer, Ms. Matiasi hopes she will be able to send her children to high school and college from the farming of soyabean. She also plans to renovate her house and buy land. She said that over 400 farmers visited her field in the last planting season to appreciate her farming practices. Some of them have already started planting inoculated soyabean and are under her supervision. N2Africa is supporting her with information about soyabean and legume farming and marketing strategies.



Mr. Kawalewale sitting in his inoculant production lab



"I will harvest more this year" Proud soyabean farmer, Natalia Matiasi showing her harvest for 2016/17 season

The coordinator of N2Africa in Malawi, Mr. Lloyd Phiphira, is proud to see that N2Africa's vision is materializing and thinks Malawi is a model of impact that has been achieved with partnership with private sector and government. He comments: "N2Africa is proud of what AISL has achieved. Many of our targets have been met mainly through partnerships. We have seen the lives of farmers improving and this

was our goal. We are also happy to see the private sector blossoming and ready to sustain that which we dreamed of from phase one of the project."

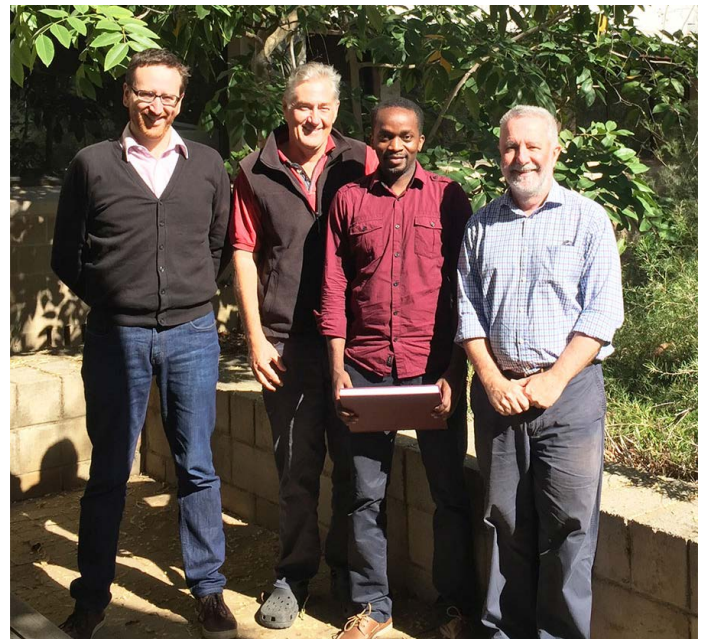
Emmanuel Mwale. Pictures: Emmanuel Mwale, ICT Officer, IITA Malawi

Bean-rhizobia symbiosis in Kenya - snippets from a PhD study funded by N2Africa

One strategy by the N2Africa project to enhance legume productivity in Africa was to select rhizobial strains with enhanced biological nitrogen fixation (BNF) efficiency from the various countries (as part of the $G_L \times G_R \times E \times M$ framework) for use as inoculants. In line with this goal, I isolated rhizobia from beans growing in several agro-ecologies in Kenya and first assessed their genetic diversity. Diversity studies not only identify rhizobial strains but also inform on the predominance of strains, their movement, and on the dynamics of genetic material exchange. Only a few studies had previously genetically characterized rhizobia that nodulate beans in Kenya (e.g. Anyango et al. Appl. Env. Microbiol. 61:4016-4021, 1995) and their limited scope strengthened the justification for a diversity assessment. My investigations revealed a considerable diversity at the strain level, while at the species level, at least five species of *Rhizobium* were found to nodulate beans in Kenya.

In addition to genetic diversity, I assessed the BNF efficiency of the strains. The strain commonly used to inoculate bean in Kenya, *R. tropici* CIAT 899, was isolated from Colombia and there is evidence that its mixed success in Kenya is sometimes due to poor adaptation to certain edaphic conditions. A time-tested approach for the discovery of adapted inoculants involves the selection of strains with enhanced BNF efficiency from the areas targeted for inoculation, or from climatically matched environments. To identify potential inoculant strains for the Kenyan bean inoculant industry, I assessed the effectiveness of Kenyan strains on Kenyan bean cultivars in controlled glasshouse conditions. Eleven of the strains tested had BNF efficiencies equal to that of CIAT 899 but will need to undergo field testing to ascertain their elite status further.

I also carried out rhizobia competition studies. Soils used to grow beans in Kenya, and indeed most parts of Africa, have high densities of indigenous rhizobia (e.g. Amijee & Giller. Afr. Crop Sci. J. 6(2):159-169, 1998) that hinder responses to inoculation. Therefore, unless the issue of competition



Dr George Mwenda (second from right) with PhD supervisors (all from the Centre for Rhizobium Studies at Murdoch University, Perth, Australia). Supervisors from left to right are Dr Jason Terpolilli, Prof. John Howieson, and Dr Graham O'Hara.

is addressed, achieving inoculation response in beans is likely to continue being problematic. One solution to the competition problem is to screen rhizobia for competitiveness and use the most competitive as inoculants. Hence, I used marker genes, which enable nodule occupancy to be visualized after a staining step, to evaluate the competitiveness of >40 Kenyan strains against a reference, CIAT 899. Results indicated mixed competitiveness against CIAT 899, with both highly competitive and highly uncompetitive strains identified. These results present at least two opportunities. The first and more obvious opportunity is for the use of the competitive strains as inoculants. The second is for targeting of areas in which to inoculate beans. This latter prospect was further supported by my observations that seed-applied CIAT 899 occupied most of the nodules in soils containing up to 10^6 cells (g^{-1} of soil) of the highly uncompetitive strains. Signifying, in areas where the highly uncompetitive rhizobial genotypes are prevalent, responses to inoculation are likely to be achieved. Other interventions such as increasing inoculation dosage did not enhance the inoculant's nodule occupancy in soils with high rhizobial densities. For more on my research, see my thesis: <http://researchrepository.murdoch.edu.au/id/eprint/36067/>

Lastly, let me take this opportunity to thank N2Africa for funding my PhD (in partnership with Murdoch University) and my supervisors (see photo) for their great academic support. My PhD degree was conferred recently. I look forward to my continued contribution to the BNF research.

George Mwenda, Centre for Rhizobium Studies, Murdoch University, Perth, Australia



Double stained nodules after inoculation with CIAT 899-gusA (blue) and NAK 104-pGM1 (magenta). Photo was also published in [Podcaster 32](#)

Application of phosphorus fertilizer and rhizobium inoculation improves grain and haulm nutritional values of selected grain legumes in the mixed crop-livestock production system of Ethiopia

Grain legumes are the second largest cultivated crops in Ethiopia next to cereals in terms of total production volume yield and area coverage. A similar scenario is reported for annual crop residue production from grain legumes. But both grain and haulm production from grain legumes are below their potential and need to be improved through different approach like developing new varieties and adhering to better agronomic practices to exploit the genetic potential of the plants. Enhancing nitrogen fixation efficiency of grain legumes by inoculation of seeds with effective rhizobium strains and application of phosphorus fertilizers is a possible, thus increasing plant available nutrient (nitrogen and phosphorus) improving yield and quality of the crops.

To this end, a study was conducted to evaluate effects of rhizobium inoculation and P fertilizer on yield and quality of grain and haulms of N2Africa-Ethiopia target legume crops (Faba bean, chickpea, haricot bean and soyabean) in the mixed farming system of Ethiopia during the main cropping season of 2015. To attain the proposed objectives of the study, yield data and, grain and haulm samples were collected from demonstration plots established on-farm using these four grain legumes. The crops were subjected to four soil fertility treatments (inoculation + P fertilizer (+P+I), inoculation alone (-P+I), P fertilization alone (+P-I) and control i.e. no inoculation and no fertilizer (-P-I)). Then samples were analyzed for nutritional value parameters at Animal Nutrition Laboratory of ILRI, Addis Abeba campus, Ethiopia. NIRS predication was employed for analysis of the intended nutritional value variables.

The study showed that both grain and haulm DM yield of all studied crops, except chickpea haulm yield were improved due to the application of the soil fertility treatments (Figure 2). Improvement achieved with combined application of the two inputs (rhizobium inoculants and P fertilizer) was more

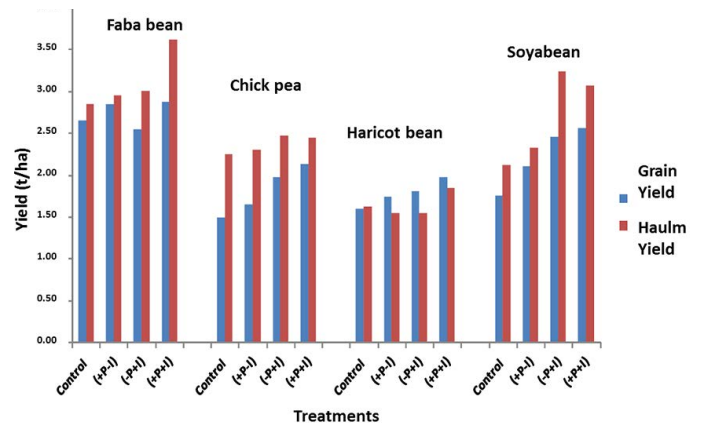


Figure 2. Grain and haulm dry matter yield (t/ha) responses of grain legumes to rhizobium inoculation and/or P fertilizer during main cropping season of 2015

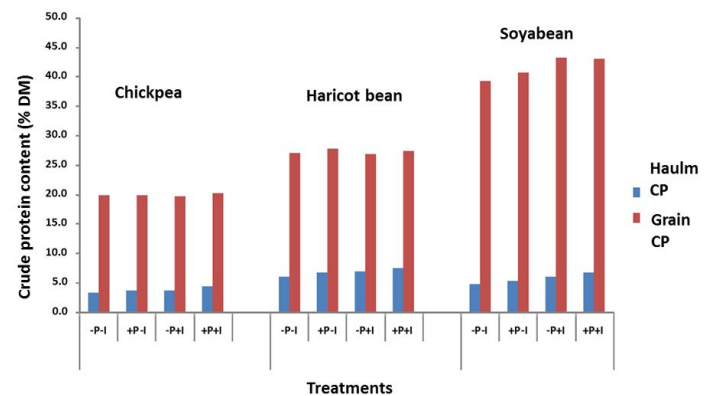


Figure 3. Effects of rhizobium inoculation and phosphorus fertilizer on grain and haulm crude protein contents of grain legumes during main cropping season of 2015

prominent than that obtained for separate applications of the inputs in most cases. Similarly, the soil fertility treatments have resulted in significant improvement of nutritional values of both grain and haulm of the grain legumes. Increased grain and haulm crude protein contents of all the crops were evident with the applications of the soil fertility treatments except chickpea grain (Figure 3). The current findings show the possibility of simultaneous improvement of both grain and haulm yields of the legumes in the mixed farming system where both products are important for the smallholder farmers. However, variability was observed among crop types in their responses to separate and combined application of the two inputs and also across locations.

For more information see the MSc thesis “Effects of phosphorus fertilizer and inoculation on yield and nutritive values of grain and haulm of selected grain legumes in mixed crop-livestock production system of Ethiopia”

Sisay Belete, Adugna Tolera, Melkamu Bezabih, Birhan Abdulkadir and Endalkachew Wolde-meskel

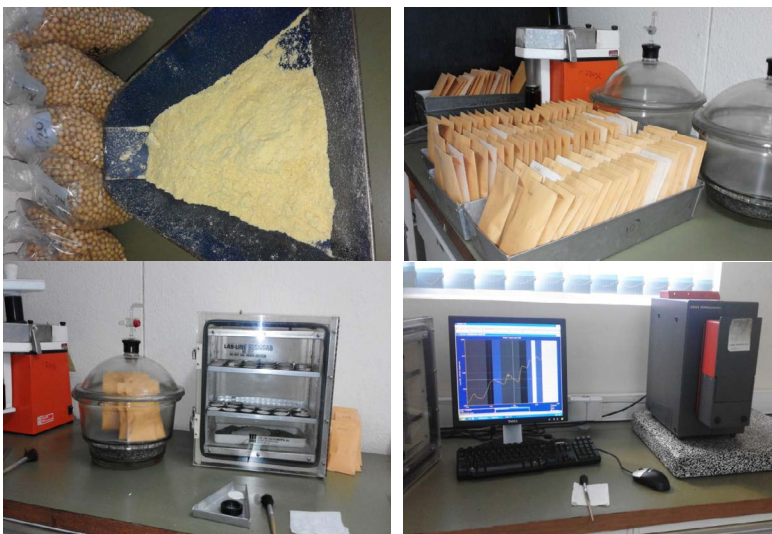


Figure 1. Sample processing and analysis for quality parameters at Animal Nutrition Laboratory of ILRI, Addis Abeba, Ethiopia

Light and nutrient capture by common bean and maize in the Northern Highlands of Tanzania

Beans and maize are important food and cash crops for farmers in the Northern highlands of Tanzania. They are often intercropped to achieve efficient land use, to avoid risk and to improve soil fertility. Farmers commonly alternate the rows of maize and beans one-by-one – or moja-moja in Swahili. The practice of planting maize and beans in a two-by-two (mbili-mbili in Swahili) alternating rows design has been introduced relatively recently (Figure 1). These cropping designs are referred to as moja and mbili cropping designs (Figure 2). The mbili design had been introduced from Kenya and was proposed as a method to improve light availability for beans.

The aim of my MSc thesis study was to further explore these two intercropping designs in Tanzania, in terms of resource capture. There was a special interest in light availability for beans (Figure 3), the proportions of nitrogen fixed by beans in the different cropping designs, and the differences between local and improved varieties of beans and maize.



Figure 3. Light interception measurements above and below the canopy



Figure 1. Mbili-mbili maize and beans



Figure 2. Intercropped maize and bean at a demonstration trial

During the second rainy season of 2016, the moja and mbili intercropping designs with maize and beans were included for the first time on six N2Africa demonstration trials in the Kilimanjaro Region. Each of those trials consisted of six plots with various combinations of crop varieties, cropping design and input use. The available treatments are depicted in Figure 4. The setup of the demonstration trials was not ideal for comparing sole and intercropped designs, because there were no plots available with sole-cropped local maize or with a moja-intercropped improved varieties.



Figure 4. Maize bean intercropping M is maize, B is bean

The moja design that was available (with local maize and bean varieties), represented the common intercropping practice in the region: no application of fertilizers and insecticides. Those inputs were used on all other plots, however. The moja design was almost an additive design compared to sole-cropped maize, but the spacing between maize rows was slightly wider in the moja-intercrop.

Relative yields of local maize were reduced by moja intercropping, compared to sole cropping. The increased total plant density sometimes compensated for the relatively poor performance. For the mbili intercrops, relative yields of the local and the improved bean and maize varieties were as expected based on the differences in plant densities of the intercrops and sole crops. Land equivalent ratios of the mbili designs were around 1 or slightly larger for most of the trials.

A larger fraction of photosynthetically active radiation (PAR) was available for beans (transmitted by the maize canopy) in the mbili intercrops than in the other designs.

Radio for channelling information

On the 30th of March 2017, N2Africa and a group of other Bill & Melinda Gates Foundation funded agronomy projects with a focus on maize, cassava, highland banana and legumes came together with Farm Radio International. All these partners met to share their knowledge and predictions about soils, crops and yields, and Farm Radio International aims to communicate this information to farmers at scale.



The Farm Radio International project helps African radio broadcasters to reach small-scale farmers in rural communities. Radio services are used to share knowledge and to give a voice to rural communities. During the meeting, the Farm Radio International team described their approaches and explained how they achieve interactions between broadcasters and farmers. A new “beep2vote” polling system had been developed which allows listeners to vote in a poll question by leaving a missed call ‘beep’ to a designated number, which is free for the caller. Radio and mobile phones are therefore great media to provide and gather information for and from farmers.

Ken Giller remarked about the meeting: “*It was important to see the work that is happening by the Legume Alliance and*

Estimates of the proportion of N fixed ranged a lot. Estimates were largest for moja-intercropped local beans compared to the other designs, but too few data were available for statistical testing. On all plots except one, more nitrogen was fixed than was removed through harvesting of bean seed.

Grain and stover yields of the improved maize variety dropped faster with an increasing disease severity than for local maize. However, for similar diseases scores, yields of the improved variety were still often similar or larger compared to local maize.

It is expected that alterations in the row spacing in the mbili design may improve its land equivalent ratio. A next step will be to monitor the development of the component crops throughout the whole cropping season.

My thesis report can be found on www.N2Africa.org.

Eva Thuijsman, Wageningen University & Research



the other projects that have been developed. These are not just passive information channels there are real opportunities to gather farmer data in these campaigns. I have seen the work on legumes at first hand in my role in N2Africa and also because I am project champion for the work that is happening here on legumes.”

This section was based on input from Duncan Sones in the [ASHC newsletter](#).



N2Africa publications

“Effectiveness of rhizobia strains isolated from South Kivu soils (Eastern D.R. Congo) on nodulation and growth of soybeans (*Glycine max*)”, written by Bintu Nabintu Ndusha, Nancy K. Karanja, Paul L. Woome, Jean Walangululu, Gustave N. Mushagalusa and Jean Marie Sanginga, has been published in the March, 2017 issue of African Journal of Soil Science.

Other N2Africa activities

As mentioned in the previous Podcaster Ken Giller presented N2Africa in a WUR talk. [The link to this WUR talk](#) is available on YouTube.

N2Africa in the news

IITA news: [Partnerships for perpetuity: N2Africa consolidates PPPs as plans for exit strategy progresses](#);

Related publications

Peter Goldsmith of the University of Illinois who coordinates the Soybean Innovation Lab sent us a [link to an article](#) that reports a new world record yield of 11.48 t/ha for soybean;

Duncan Sones shared ASHC's [Northern Ghana Soybean Technical Brief 2017](#).

Related newsletters

Tropical Legumes III: [Partnering for sustainable groundnut seed systems in Tanzania](#);

Soybean Innovation Lab Newsletters: [April 2017](#);

SAWBO Newsletter April 2017 shows [solar treatment of cowpea seeds against cowpea bruchids](#) in Burkina Faso (animation, in French);

ASHC Newsletter: [March 2017](#), news item [How do soybean farmers get information?](#) and blog [Film distribution for 'all the farming family'](#);

GALA blog: [Intra-household survey – Tanzania](#);

OFRA blogs: [Martin Macharia talks soil, data, blends and apps](#) and [Ghana: Fertilizer guidance draws in private sector](#);

SILT blog: [Scaling-up soybean: “Mother and baby” demos](#);

IITA News: [Southern Africa soybean breeders train on Breeding Management System](#);

Announcements

The West Africa Fertilizer Agribusiness Conference, Accra, Ghana, 10-12 July 2017, mentioned in the previous Podcaster now has a [link to his years' event](#).

The Podcaster is published six to eight times per year – we look forward to receiving news and contributions – particularly from partners. Please send in contributions well in time. Contact address for this newsletter is: N2Africa.office@wur.nl

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