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## N2Africa Podcaster no. 4

January 2011

This month we highlight some emerging results from East and Central Africa. It's great to see some concrete outputs starting to show up which repay the enthusiasm and hard work put in by our partners and staff on the ground. We also introduce some of the new national staff who are working in various countries, and projects of students working within N2Africa. Read on!

Ken Giller

### **Inoculation increases farmers' soybean yields in East and Central Africa**

Working with farmers to evaluate the impact of inoculating soybean seeds with nitrogen fixing rhizobia was one of the first field tasks in East and Central Africa. Farmers in Kenya, Rwanda, and DR Congo observed exceptionally vigorous soybean plants with deep green leaves and prolific nodulation on plants growing in some plots inoculated with rhizobia which translated into large increases in yield.

In South Kivu province of DR Congo, trials were in farmers fields in four action sites with contrasting soil fertility namely; Bughore (infertile), Ikoma, Iboma and Mumosho (moderately fertile) to test the response of commonly grown non-promiscuous soybean variety PK6, to the application of phosphorus (P) at a rate of 30 kg/ha, and soybean inoculant (containing rhizobial strain USDA 110). Relative to the control (no P and no inoculum applied), grain yields in moderately fertile soils increased from an average of 0.8 t/ha to 1.5 t/ha with the application of inoculant and further to 2 t/ha with combined application of P and inoculant (Figure 1 and Table 1). Application of P alone increased grain yield but not significantly. Under no P limitation, application of inoculants increased yield to the tune of 100 kg/ha (15%) to about 1.4 t/ha (176%) (Table 1), indicating the "power" of inoculants in driving soybean yields. Lack of clear response to P and inoculation in the degraded soils of Bughore provide challenges to our research team. Trials will be conducted on these "problem soils" during 2011 to address this so that these farm families may also have productive soybean fields. This is extremely important because degraded soils occupy about 50% of the arable land in South Kivu.

In western Kenya two trials were established in each of the three mandate areas; the Lake basin (1125-1200 m.a.s.l., receiving 400-500 mm of rain in growing season); the Midlands (1200-1250 m.a.s.l., receiving 600-800 mm of rain in the growing season) and the Upper Midlands (1250-1400 m.a.s.l., receiving 900-1100 mm of rain in the growing season) to determine the response of five improved soybean varieties to rhizobium inoculation with P fertilizer applied. The varieties used include one which can only nodulate with specific rhizobia strains (variety EAI 3600) and the rest are promiscuous (nodulate with several rhizobia strains). There were grain yield increases with inoculation of specific and promiscuous soybean varieties (Figure 1) in the range of 27 – 1000 kg/ha (2-100%) in all mandate areas. Moreover, the results show that some promiscuous soybean varieties (e.g. TGx 140-2F and TGx1895-33) respond little to inoculation, but will require adequate supply of P. In the first season we have noted wide variation in soybean performance within and between the mandate areas. There was a wide range in grain yields (Table 2) indicating presence of special niches for soybean production in different zones. The experiments have been repeated in the short rains, the season considered best for grain legumes. The reasons for poor yields on some fields are not clear and will be investigated in 2011.

The reported data were collected on plots measuring 9 m<sup>2</sup> in partnership with farmers. This plot size is about 20 times less than the area currently planted with legumes by smallholders in Kenya. In our trials, the best performing treatments gave yield increase of 1-1.5 kg per plot, and this was highly acknowledged by farmers. "From this small plot I have an extra gologolo" (a local unit measure in



Western Kenya of about 1-2 kg), with this technology replicated in my farm I will have 20 more gologolo, where can I get these quality seeds and Inoculant?” remarked Mrs Rose Otee from Teso District during trial evaluation. Such remarks are taken seriously and addressed through our dissemination campaigns.

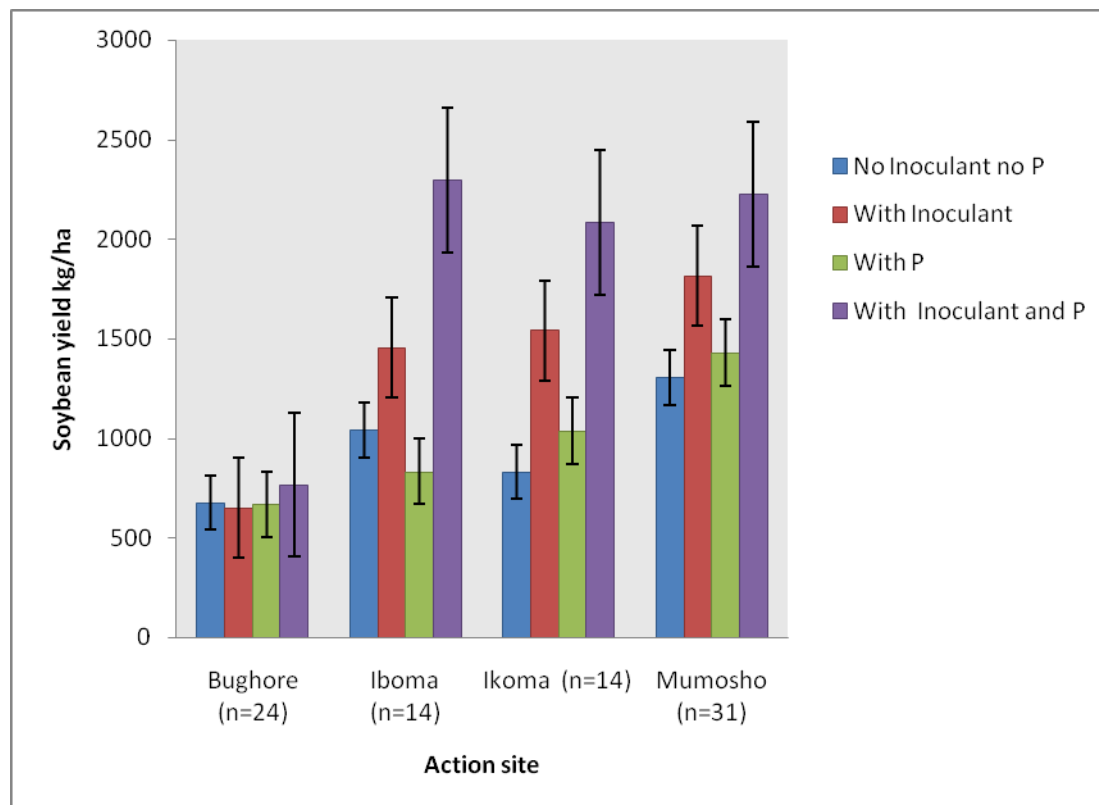


Figure 1: Grain yield response of soybean to inoculant and P fertiliser in different action sites in South Kivu, DR Congo (n = nr of sub-sites)

Table 1. Effect of Rhizobium inoculation on soybean grain yield as recoded at different action sites in South Kivu, DR- Congo.

Action site	Grain yield kg /ha		Increase when inoculant was used
	No Inoculant With P	With Inoculant and P	
Bughore	668	767	15
Iboma	833	2296	176
Ikoma	1038	2083	101
Mumosho	1431	2226	56



**Table 2. Grain yield of different soybean varieties as affected by rhizobia inoculation in the different mandate areas of Western Kenya (Data in parenthesis are ranges)**

Mandate Area	Treatment	Soybean variety				
		Namsoy 4m	EAI 3600	TGx 1740-2F	TGx 1835-10E	TGx 1895-33F
Lake basin	Not inoculated	1056 (645-1912)	608 (109-2064)	1115 (178-2357)	1020 (210-2052)	771 (144-1088)
	Inoculated	1471 (459-3431)	807 (125-1545)	1132 (525-2054)	1391 (402-2603)	705 (441-1052)
	Yield increase Kg/ha	415	199	27	371	-
Midlands	Not inoculated	926 (695-2023)	817 (295-1120)	1169 (523-1590)	1212 (266-1799)	1541 (123-3146)
	Inoculated	1266 (622-2601)	1326 (713-1850)	1292 (867-2011)	1270 (760-1869)	1885 (1601-2307)
	Yield increase Kg/ha	340	509	123	68	344
Upper midlands	Not inoculated	996 (845-1138)	966 (801-1165)	1232 (1206-1255)	962 (889-1077)	1150 (886-1525)
	Inoculated	2275 (1370-3933)	1206 (1039-1359)	1295 (1245-1350)	1583 (1516-1624)	1235 (1194-1300)
	Yield increase Kg/ha	1379	310	63	621	85

Freddy Baijukya

### Partners of N2Africa in Rwanda

Activities of N2Africa project were initiated in Rwanda since February 2010. At the beginning, 3 partners were involved in field activities mainly on dissemination of technologies in 5 districts of the country which constitute the mandate zones of the project. To date, 6 partners are on board in the execution of almost all the 5 objectives of the project. The table below gives detailed information about these partners.

Table: N2Africa partners from Rwanda and their area of intervention

Name of institution	Area of intervention	Mandate zone	Action sites	Partnership initiated since	Number of households under supervision
Institut des Sciences Agronomiques du Rwanda (ISAR)	Baseline survey, agronomy, Rhizobiology	All the 5 districts	All the 13 sectors from the 5 districts	August 2010	Non applicable
Conseil Consultatif des Femmes (COCOF)	Dissemination of technologies	Kamonyi district	3 administrative sectors	February 2010	300 households, and 6 farmer groups
Developpement Rural Durable (DRD)	Dissemination of technologies	Burera and Gakenke districts	4 administrative sectors	February 2010	600 households, and 5 farmer



					groups
CARITAS	Dissemination of technologies	Bugesera district	3 administrative sectors	October 2010	300 households, and 6 farmer groups
Eglise Presbyterienne au Rwanda(EPR)	Dissemination of technologies	Kayonza district	3 administrative sectors	October 2010	300 households
Medicus mundi	Dissemination of technology	Kamonyi district	1 administrative sector	October 2010	50 households

Those partners who joined in October 2011, were introduced to replace one partner (Imbaraga) who did not fulfill its responsibility properly.

Besides the dissemination activity, capacity building of partners was initiated late in the year. To date 2 students have been sponsored by the project to start Msc courses, namely Mukankubana Domitila and Tabaro Alfred, both from ISAR. The PhD student is still in the process of recruitment. Training sessions for 165 master farmers from all mandate zones have started last August, and all still going on.

Speciose Kantengwa

### **Activities for N2Africa in the DRC from February 2010 until February 2011 (prepared by Yves Irengé, Administrator BNF/RDC)**

N2Africa project activities were initiated in February 2010.

#### **Staff**

Three local staff members have been appointed for the N2Africa project:

- Jean-Marie Sanginga, in charge of agronomy
- Dieudonne Masumbu, in charge of disseminations
- Yves Irengé, administrator

#### **Partners**

Three main partners have been engaged in the project: DIOBASS, PAD and SARCAF

The partners started activities at seven locations (Table below). In the first season (A season) of 2011, an expansion of activities to 5 new locations will take place. The partners started with 35-52 households, which grew to 507-751 per partner in the first season of 2011. All partners reached more households than originally planned. The aim is that each partner will cover at least 1200 households in the second season (season B) in 2011.



Table 1: N2Africa partners in the DRC and the locations targeted by the project.

Name of institution	Sites where has been worked from the start	Sites that will be worked on from season A in 2011	Number of households
DIOBASS	Bughore, Burhinyi	Bughore, Burhinyi, Nyangezi, Mushinga	Started with 51, now 751
PAD	Kalehe, Birava, Mulamba	Kalehe, Birava, Walungu, Murhesa	Started with 52, now 722
SARCAF	Ikoma, Bwirembe	Ikoma, Bwirembe, Mumosho, Cagombe	Started with 35, now 507

### Research trials

In the first season of 2010, 33 input and variety trials with beans and soybean have been implemented. In the second season of 2010, 33 trials were conducted. In addition, seed multiplication sites have been established for soybean (1.5 ha), common bean (1.5 ha) and climbing bean (0.5 ha).

### Schooling and visits

Many courses have been realised to train staff and partners in technical matter, participatory approaches, inoculum use, interview techniques, etc. In these courses, 481 women participated. 400 households have been interviewed for the broad baseline survey at 13 locations. Also, 48 farms have been characterised in detail.

### Students and trainees

Currently, 20 students are engaged in the N2Africa project. 11 of them work on the agronomical aspects (IR2 AGRONOMIE), and 9 on dissemination aspects (G3 DEVELOPPEMENT RURAL).and at the end of the academic year we expect to receive 11 theses and 9 internship reports

### Other matters

The project is well known among the regional authorities. Moreover, the documentaries realised by Ken Giller have led to a radio broadcasting on Radio Maendeleo, where the local N2Africa team explains the advantages of legumes for the rural people in the DRC in general and in particular the advantages and challenges of biological nitrogen fixation.

Yves Irengé, Administrator BNF/RDC

### Trying to understand how farmers grow beans in Rwanda

My focus is on climbing beans from Northern Rwanda and their potentials to fix biological nitrogen. I am conducting a ten month MSc research project with Plant Production Systems (Wageningen University) and CIAT-TSBF, in two N2Africa mandate areas. I just completed four months of data collection, during which I quantified in detail farmers management and their perceptions on beans for their livelihood and farming system.

First results show, that the well-documented governmental typology of households, called 'Ubudehe', is ideal to differentiate different farm types in rural Rwanda. The strategies and productivity of these farm types will be tested. Availability and quality of stakes were perceived by farmers as the crucial resource to increase climbing bean productivity as well as access to organic manure. Whereas farmers in the humid North invest in intensification, with short duration, high yielding crops, farmers from dry Bugesera rely more on perennial crops and livestock. The heterogeneity within the sites and within one farm will be further explored in the analysis. This work contributes to the N2Africa baseline and gives opportunity to analyse niches for interventions.

Thanks to the good cooperation among the N2Africa partners in Rwanda, my study was very well facilitated especially the work with the rural farmers in the North.

Moritz Reckling



Farmer Mumyakabaya Joseph with Moritz Reckling, in front of his climbing bean field in Northern Rwanda

## **N2Africa West Africa hub holds laboratory training in rhizobiology skills**

The N2Africa West Africa Hub recently held a two-week training course on basic rhizobiology skills at the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria.

The programme was designed for laboratory technicians and postgraduate students that are involved in activities of the N2Africa project to enhance their knowledge and skills in the isolation, identification, characterisation and storage of rhizobia, as well as mobilising these organisms for inoculant production and inoculation for enhanced nitrogen fixation.

Six participants (2 women and 4 men) from Ghana and Nigeria attended the training during which various discussions and material presentations were given by experts and practitioners in rhizobiology and biotechnology.

Training modules were designed to be a mix of theoretical, interactive and practical sessions, with trainees given hands-on training on various laboratory, greenhouse and field techniques.

Participants had discussions and exchanged experiences on issues regarding rhizobiology, inoculant production and quality control, laboratory-based PCR methods, and nitrogen fixation and quantification. Materials provided to participants included a training resource manual, PowerPoint presentations, relevant literature and sample technical papers on biological nitrogen fixation (BNF) both in printed and electronic copies.



Mr Patrick Ofori, a trainee from Ghana, thanked on behalf of other participants the organisers of the course. He expressed satisfaction with the quality of training, saying the course had substantially enriched their knowledge and enhanced their skills in rhizobiology. He said the training was properly aligned with the skill set needed for project activities and was of the opinion that the workshop achieved its stated objectives and that they would be able to carry out the skills learnt during the course.

The closing ceremony was presided over by IITA's Director of Tubers and Root Crops Improvement Programme, Dr Robert Asiedu, who represented the Deputy Director (R4D), Dr Paula Bramel. He commended N2Africa for organising the course and enjoined the beneficiaries to make good use of





the skills learnt during the training. Certificates of attendance were presented to the trainees during the occasion.

Abdullahi Bala

### More staff have joined the N2Africa team in West Africa

The rank of the N2Africa team continues to swell following recent recruitments in the West African Hub. Since November 2010, three staff have joined the project in Nigeria and one in Ghana.

The staff in Nigeria are Fatima Hussein, Esther Chinedu and Joseph Abikoye. Mrs Fatima Hussein is the Administrative Assistant for the West Africa Hub in Nigeria. She holds a postgraduate diploma in Public Administration from Ahmadu Bello University, Zaria, and is an Associate member of the Nigerian Institute of Management. She had previously served as Confidential Secretary with the Nigerian National Petroleum Corporation and as the Personal Assistant to the Managing Director/CEO, Kaduna Investment Company. Fatima is married with children and her hobby includes reading and writing. Mrs Esther Chinedu joins the project as the Farm Liaison Officer for Nigeria. She holds a diploma in Agricultural Technology from the Plateau State College of Agriculture and comes with a 12-year experience as a research technician with IITA, working in cowpea breeding, and carrying out farm liaison activities under different projects. Esther is married with children. Mr Joseph Abikoye joins the project as a Research Supervisor and comes with over 15 years of experience. He holds a postgraduate diploma in Agriculture from the Federal University of Technology, Akure, and has been in the services of IITA since 1993 where he worked as research technician in the Grain



Legume Improvement programme and soybean breeding.

On the photo:

New staff from N2Africa in Nigeria. From left to right: Fatima Hussein, Joseph Abikoye and Esther Chinedu

Mr. Joseph is married with children. Mr Akley Korbla Edwin is Ghana's Farm Liaison Officer and is based at the Savannah Agricultural Research Institute (SARI) in Nyankpala, Tamale. He holds a bachelors degree in Agricultural Technology from the University for Development Studies, Tamale, Ghana. He had previously worked as an Agricultural Extension Officer with the Ministry of Food and Agriculture (MoFA), as a sales customer advisor at Barclays Bank (Ghana) Limited, Accra, and as Agriculture Science Tutor at Pentecost Senior High School Koforidua, Ghana. Edwin is married.

Abdullahi Bala

### N2Africa kicks-off planting season in Malawi

IITA scientists and partners working under the N2Africa project in Malawi launched the 2010-2011 planting season on 17 November in Bwalo II Village in T.A. Mtemambalame in Lilongwe District.

During the event, farmers were given seeds of improved varieties of soybean, groundnut, bean and cowpea for the planting season. Based on individual demands, farmers were offered inoculants for those that selected inoculation as their constraint; and TSP fertilizer for those that selected fertilizers as their constraint.



The event also created more awareness on the activities of the N2Africa project—a project that aims to put nitrogen fixation to work for small-scale farmers in Africa.

Scientists at the occasion demonstrated the methodology of inoculating legume seeds with Rhizobium. There was also an exhibition of cowpea and soybean dishes by men and women farmers trained by the N2Africa project.

In his welcome address, the Project Leader for N2Africa, Dr Kenton Dashiell, underscored the benefits of N2Africa project.

Ken Dashiell



From now on the Podcaster will come out each month – and we look forward to receiving news and contributions – particularly from partners. Please send in contributions by the third week of each month. Contact address for this newsletter is: [N2Africa.office@wur.nl](mailto:N2Africa.office@wur.nl)