N2Africa Podcaster no. 34

November and December 2015

Introduction

Welcome to the last Podcaster of 2015. While this is a busy time for everyone, it is also a time to take some rest, to reflect on the past year and to make plans for the coming year. For N2Africa, the coming year is particularly important as the United Nations have launched the 2016 International Year of Pulses – celebrating the benefits of legumes (UN link and FAO link).

For N2Africa the most important event will be the

Pan-African Grain Legume & World Cowpea Conference

Pan-African Grain Legume and World Cowpea Conference - http://gl2016conf.iita.org to be held in Livingstone, Zambia from 28th February to the 4th of March 2016. N2Africa will have a large presence at the conference and we have submitted a host of abstracts for presentation. We will have our annual planning at the other side of the Victoria Falls in Zimbabwe after the conference.

In this issue of the Podcaster we highlight our N2Africa Learning Loops 2.0 – through use of tablets for data collection we are now able to generate automatic statistical summaries and reports! We report on women's training events from Borno State, Nigeria and highlight recent journal articles that have been published, along with a series of news items.

A very special thank you to Greta van den Brand who is leaving N2Africa at the end of 2015. Greta has worked behind the scenes in data analysis and reporting. We will sorely miss her superb ability to distill short highly-readable reports from hundreds of pages of text, her diligence and accuracy in her work and her willing and helpful attitude. No matter what the pressure, she always responds with a big smile. We wish Greta and partner a fair wind on their travels through Latin America and hope to see her back in the N2Africa team in future.

On behalf of the N2Africa team I wish you a peaceful and relaxing holiday and we'll be in touch again in the New Year of the Pulse!

Ken Giller

N2Africa Learning loops 2.0. – faster data flows with tablets

This year, N2Africa has invested in improving the flow of research data from field to data analysis. In all core countries, project staff and implementing partners received hands-on training on the use of electronic data collection forms. The new tools have been received with much enthusiasm and most data collection is now done using tablet devices. This has allowed data from the different field trials to be collected, processed and compiled much more quickly than was possible using paper forms.

The advantages of using tablets extend beyond the fact that data does not need to be transferred from paper to an electronic form. The fact that the tablet-based forms come preloaded with information on locations, crops and treat-

Field training on the use of tablets in Nigeria

ments means that the data is much more uniform, removing the need for time-consuming editing of information. The built-in GPS device and camera also provide great benefits in the field.

Of course, faster delivery also means that the handling of data needs to keep pace. This requires an automated system for compiling, formatting and sharing data. We have worked hard to set up such a system in Wageningen, and are currently able to automatically compile all data uploaded from the tablets into our database and to make the information available to everyone on the N2Africa Intranet.

To showcase the power of our new data infrastructure we present some preliminary analysis of data that was uploaded during 2015. The data was processed and analysed automatically, with minimal need for specific cleaning or editing. Figure 1-2 shows results from climbing bean diagnostic trials that took place in season 2015A in Uganda. The main aim was to compare the effect of different nutrient treatments in different localities.

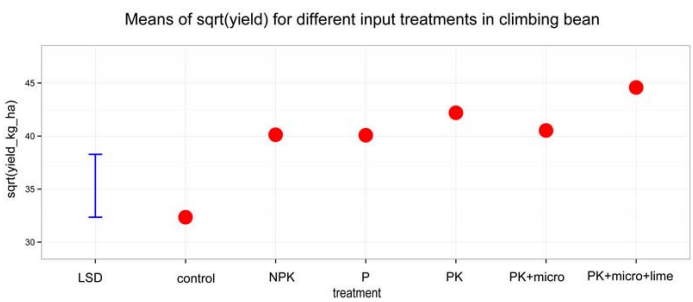


Figure 1. Graph showing (square root transformed) yields for different treatments in a climbing bean diagnostic trial in Uganda

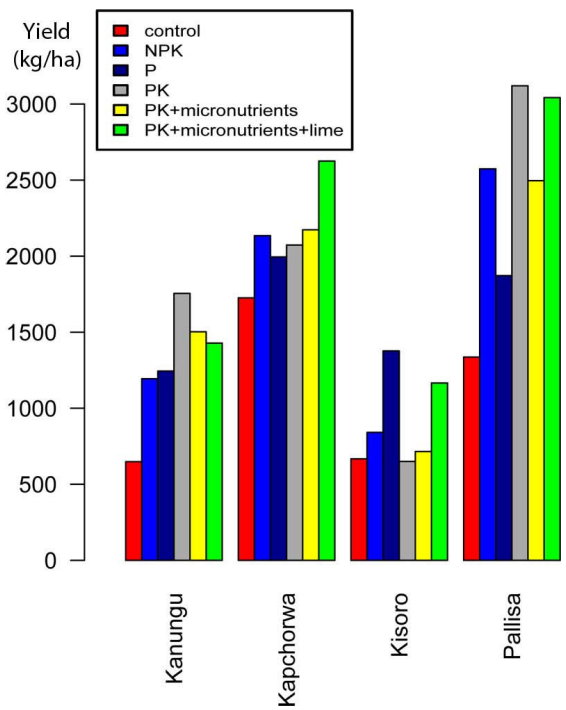


Figure 2. Graph showing mean yields for different treatments per district in the same diagnostic trial

Figure 2 shows the average yields (square root transformed) for the different treatments, together with the least significant difference. It is clear that the application of phosphorus increases yield and that there is relatively little evidence for an overall response to N, K, micronutrients or lime. A breakdown per district (Figure 2) shows that yields vary strongly among locations. The variations in treatment responses observed in this figure are not statistically significant.

The map in Figure 3 shows the ability to map the trial locations exactly by using the tablet's built-in GPS. The information that this precise mapping provides can provide a very useful complement to the soil analyses that are also taking place. The usefulness of the camera is also evident from Figure 4, which shows how pictures can help in detecting problems in the field mid-season.

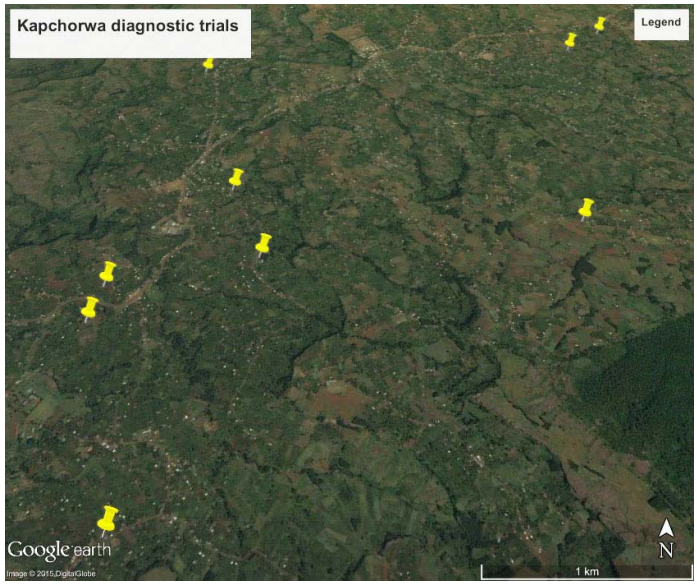


Figure 3. Map showing the GPS readings for a subset of the Ugandan bean diagnostic trials

Figure 4. The N2Africa plot (left) and the farmer's plot (right) in a Cowpea adaptation trial in Ghana photographed using the tablet

In all, the use of tablets has been proven to be a success. We have received data from all countries, and are looking forward to receiving more soon. All uploaded data should be available for analysis within a couple of days of receipt. We are currently focused on making sure that the quality and ease of use of this data improves, and that also the data from M&E forms becomes accessible through the intranet.

Joost van Heerwaarden & Marcel Lubbers

Borno's women increasingly benefit from legume production.

In 2015 all partners and households engaged in N2Africa activities paid deliberate attention to address gender inequity in Borno State, Nigeria. Training of women on processing and utilization of soyabean was thought to be a important way to do this. The objectives of the training were to sensitize the women on the nutritional value of soyabean, build their capacity on soyabean processing and utilization into various products, empower the women economically through soyabean processing at micro level for income generation and to create awareness on the effect of nutrition on infant and young child as well as on infections and diseases. The training events attracted 660 women. Among the attendants were women soyabean farmers, women members of community based organizations (CBOs), wives of CBO members as well as non-members within the communities. Although the training was designed for women, men were also interested. 120 men watched and observed keenly how the processing went, and at the end took part in the tasting of the processed products.

Hundreds of women participated in the soyabean processing training

Soya stick meat

Women prepare soyabean food products

Soya akara

Recipes for soya milk, soya cheese, soya stick meat, soya scramble, soya akara, tom brown and vegetable soup were developed through practical demonstration during the training. Participant's opinions at the training and on the products processed were very impressive. They all appreciated the management of IITA and N2Africa for providing them with such training at the right time to their communities. They also promised to extend such training to other surrounding communities that were not reached by N2Africa to help improve the health status of those communities.

Extracted from the Borno State Annual report 2015 by Greta van den Brand and approved by Nkeki Kamai

N2Africa publication: Understanding variability in soybean yield and response to P-fertilizer and rhizobium inoculants on farmers' fields in northern Nigeria

In N2Africa we are reaching thousands of farmers in each country over the course of the project. Through collection of data among these farmers, we can get an impression of how well the legume technologies that we offer work in different areas, on different types of soils and for different types of farmers. With data from dissemination trials of farmers in Nigeria in phase I, collected by extension officers and dissemination partners (Sasakawa Global 2000, KADP, KNARDA, Federal University of Technology, Minna), we evaluated the results of widespread testing of promiscuous soyabean varieties in northern Nigeria. We were interested in the response of these varieties to SSP fertilizer and rhizobial inoculants under the wide diversity of farmers' fields and management practices. We wanted to understand the effects of the different variables in the (G_L x G_R) x E x M relationship (where G_L is the legume genotype, G_R the rhizobium strain(s) nodulating the legume, E the biophysical environment and M the agronomic management) on soyabean yields and the response to input application. We also evaluated the consequences of variability in yield for the distribution of economic benefits of input application. Finally, we explored the ability to predict soyabean yields and response to inputs for targeting of technologies among a new group of farmers in different areas or new seasons. This study was recently published in Field Crops Research. Below the abstract of the paper with the most interesting results.

Soyabean yields could benefit from the use of improved varieties, phosphate-fertilizer and rhizobium inoculants. In this study we evaluated the results of widespread testing of promiscuous soyabean varieties with four treatments: no inputs (control); SSP fertilizer (P); inoculants (I) and SSP plus inoculants (P+I) among smallholder farmers in northern Nigeria in 2011 and 2012. We observed a strong response to both P and I, which significantly increased grain yields by 452 and 447 kg ha^{-1} respectively. The additive effect of P+I (777 kg ha^{-1}) resulted in the best average yields (Table 1).

Table 1: Average soyabean grain yields (kg ha^{-1}) for control (no inputs), P, I and P+I treatments in on farm try-outs in northern Nigeria, 2011 and 2012. P = 20 kg P ha^{-1} applied as SSP fertilizer; I = seed inoculated with Bradyrhizobium japonicum. LSDs were calculated based on the transformed yield data (values between brackets).

	N	Control	P	I	P+I
Soyabean yield	145	968 (31.1)	1420 (37.7)	1415 (37.6)	1745 (41.8)
Max LSD			(1.0)		

Source: Ronner et al., 2015

Variability in yield among farms was large, which had implications for the benefits for individual farmers (Figures 1A&B). Moreover, although the yield response to P and I was similar, I was more profitable due to its low cost

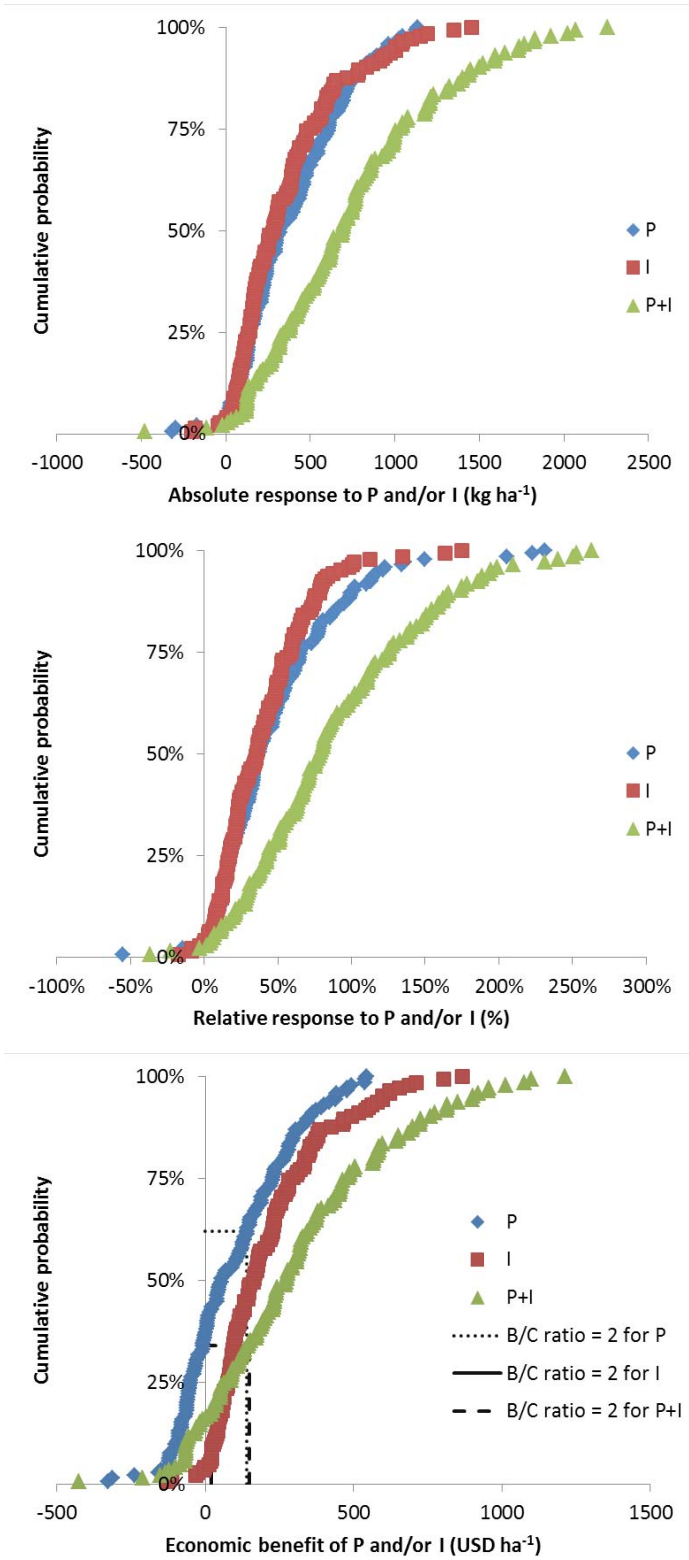


Figure 1. Cumulative probability of estimated absolute response (kg ha^{-1}) (A); relative response (%) (B) and economic benefits (additional yield minus relevant input costs, US$ ha^{-1}) (C) of P and/or I compared with control. Dashed lines in Fig. C represent a benefit/cost (B/C) ratio of 2 for the application of P and/or I. P = 20 kg P ha^{-1} applied as SSP fertilizer; I = seed inoculated with *Bradyrhizobium japonicum*. Source: adapted from Ronner et al., 2015.

(Figure 1C). Only 16% of the variability in control yields could be explained by plant establishment, days to first weeding, percentage sand and soil exchangeable magnesium. Between 42% and 61% of variability in response to P and/or I could be explained by variables including year, farm size, plant establishment, total rainfall and pH. The predictive value of these variables was limited, however, with cross-validation R^2 decreasing to about 15% for the prediction between Local Government Areas and 10% between years. Implications for future research include our conclusion that averages of performance of technologies tell little about the adoption potential for individual farmers. We also conclude that a strong agronomic and economic case exists for the use of inoculants with promiscuous soyabean, requiring efforts to improve the availability of good quality inoculants in Africa.

The full paper is accessible through: http://dx.doi.org/10.1016/j.fcr.2015.10.023.

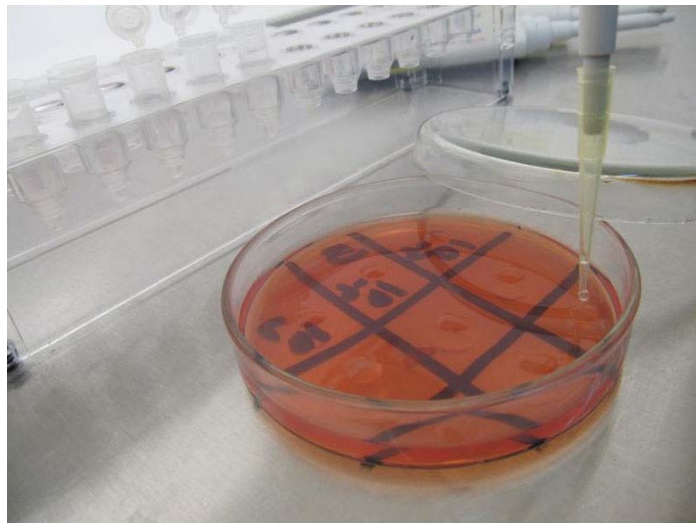
Esther Ronner

Publication on shelf-life of inoculants in the African Crop Science Journal

Isaac Balume was Masters student under N2Africa and conducted his study at the University of Nairobi from 2011 to 2013. He was based at the MIRCEN Laboratory University of Nairobi where he did research on quality control of inoculant used on bean and soybean in Eastern and Central Africa. This resulted in a research paper on "Shelf-life of legume inoculants in different carrier materials available in East Africa" that recently was published on line: http://www.ajol.info. Two carrier materials; Dry filter mud recovered as sludge from crushing of sugarcane and commercial available horticultural vermiculite, inoculated with both strains *Bradyrhizobium japonicum USDA 110* for soyabean (*Glycine max*) and *Rhizobium tropici CIAT 899* for common bean (*Phaseolus vulgaris*), were assessed for their shelf-life in two contrasting storage temperature refrigeration at 4°C and room temperature at 24°C in comparison to BIOFIX the commercial available rhizobia inoculant. After 165 days of monitoring viable population of rhizobia differed significantly between the carriers and rhizobia strains ($P<0.05$), we found that *Rhizobium tropici CIAT 899* prepared with filter mud carrier achieve a shelf- life of 135 days and *Bradyrhizobium japonicum USDA 110* contained over 10^9 cells g^{-1} for 105 days. Both of these results fall below the stated six months expiry period of BIOFIX. Replacing filter mud carrier with vermiculite, resulted in an inferior product; although, both more thorough sterilization and refrigerated storage, after 14 days curing stage improved the shelf-life of rhizobia in inoculant packet.

Therefore the results suggest that first the inoculant must be used during the growing season for which it was produced, and not carried over to the next, even when stored under refrigeration, second careful preparation of inoculants in laboratory through better sterilization of carrier material lead for increase rhizobia population for several days after injection.

Isaac Balume



Drop plate method for quality control of inoculant

Isaac conducting quality control assessment

N2Africa in the news

In September 2015 an expert group gathered in Oxford to discuss the elemental problems of the nitrogen crisis The John Innes Centre's Allan Downie reports on problems and progress in his blog post, referring to N2Africa (a.o.).

Reports and other output uploaded on the N2Africa website

MSc internship report by Servan Lenoir: Using the double pot technique to detect nutrient limitations for soybean growth (*Glycine max*) in Sierra Leonean soils (performed partly from a grant from the Howard G Buffett Foundation).

Material for extension in the series “Better legumes for farmers”:
The Nigeria soybean guide;
The Nigeria groundnut guide;
The Nigeria cowpea guide.

N2Africa flyer

Related newsletters

Introduction for newsletter DRC
In DRC N2Africa demonstrated soyabean technologies in the intercropped cassava-soyabean fields of partner Jenga II. Jenga II and N2Africa not only work on new technologies, such as inoculation of soyabean, but also on the commercialization of seeds and cassava cuttings of disease resistant varieties. If you want to read more about what happens in DRC and how to turn cassava and soyabean into delicious meals and snacks you can continue reading the bulletin (in French).

Further we received:
- The November newsletter from ASHC that includes a summary of 15 key lessons from their Phase 1;
- Also from ASHC: An update on the Maharage Bingwa (Champion Bean) campaign in Tanzania;
- The Advance December newsletter, on facilitating market linkages, development of competitive local rice industries, effects of bushfires and smallholder women farmers in agrucultural and rural development;
- The Soya ni Pesa Newsletter on the launch the Tanzania soybean development platform, hermetic storage and project updates.

Announcements

CDI course Making agriculture work for food and nutrition security 2016, Addis Ababa, Ethiopia, November 07-18

Despite the world-wide increase of food availability, there are still around one billion people undernourished. This is far above of the target of MDG 1. There is now substantial evidence that malnutrition has life-long negative impacts on productivity and income-generating potential of the population. The aim of the course is to contribute to improving nutrition by making agricultural development programmes more nutrition sensitive.

Centre for Development Innovation, Wageningen UR

Two more announcements with their posters on the next page.

XXVII Latin-American Rhizobiology Meeting (XXVII RELAR) 2016, Londrina, Brazil, June 06-09

The theme for this meeting is “Strengthening South-South Cooperation” and one of the goals is to increase the collaboration between countries of South America, The Caribbean, Africa and Oceania.

FSD Course 2016, Montpellier, France, July 12-16

Analysis and design of sustainable agricultural systems: concepts, methods and applications to mediterranean and tropical systems.

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