

N2Africa

June 2012 Interim Report

Wageningen University and Research Center

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1. Executive Summary

Since 2009 N2Africa has worked in eight sub-Saharan countries with considerable success in legume technology identification and evaluation, dissemination of these technologies, capacity building, and creation of effective partnerships along the legume value chains. Building on this experience, in January 2012 N2Africa started to develop activities in Liberia, Sierra Leone and the Kivu provinces in DRC with the help of the HGBF. Entirely new partnerships have been established in Liberia and Sierra Leone, whereas in DRC, we could build on already existing structures from the Bill & Melinda Gates funded project. However, both target areas in DRC are different from those in the pre-existing project and activities on the ground had to start from scratch also in these regions.

In all three countries, the first season is used to screen varieties and evaluate impacts of different management practises in agronomy trials and to multiply seeds. The second season will be used to start up dissemination of technologies. Meanwhile, capacity building is an on-going component of the project. Capital investments in vehicles, motorcycles, research and office equipment, etc., have been made as originally planned. Positions for the project have all been filled, except for the postdoc in DRC who has been recruited but has not started work for the project yet.

In DRC, where the first growing season has already ended, excellent soybean yields and responses to inoculation appeared from the first sets of soybean variety and input trials established in the 2012B season in the Ruzizi plains in South-Kivu. Yields in North-Kivu were smaller, but nevertheless still satisfactory. In addition, two-season intercropping trials with soybean and maize or cassava have been established in South-Kivu. In Liberia and Sierra Leone the season started in May. However, trials were established in June due to (1) late planning of the field activities as the project structure first had to be established, (2) hold-ups at the Liberia airport with the ordered seed from Nigeria and (3) delays in obtaining P fertilizer in Sierra Leone. Agronomy trials included soybean variety, input and planting date trials, cowpea variety/input trials, groundnut variety/input trials (all including evaluation of P fertilizer, in case of soybean also evaluation of inoculation and in case of cowpea also evaluation of pest management) and system intercropping trials with cassava and groundnut, looking at different planting arrangements and different planting times. A baseline survey to establish the current role of legumes in farming systems in the action sites has been implemented in Sierra Leone and is on-going in Liberia. Moreover, a student from WUR is currently conducting a legume value chain analysis in Sierra Leone.

Besides delays in planting in Liberia and Sierra Leone, one of the major challenges, especially in Liberia, is the lack of human capacity to implement research activities and follow protocols and guidelines for field activities. Communication between field staff in Liberia and the project staff designing the field work (IITA, WUR) needs to improve, so better technical backstopping can be provided to the field staff. Planning of future activities will also be done more in advance. Insecurity and violence in North-Kivu poses a risk on the activities there. Field trials with groundnut and cowpea had to be abandoned and the situation remains highly precarious.

Although N2Africa started only six months ago in Sierra Leone, Liberia and North Kivu, and despite the challenges faced, field results so far are promising and give confidence in the technologies being tested and promoted. We are also pleased with the strong commitment to achieve the project's goals shown by the new project staff and many of our partners.

2. Goals and objectives

The goals and objectives as indicated in the project proposal are summarized below.

Specific objective 1. Establishment of partnerships [Sierra Leone, Liberia, North-Kivu]

- 1.1. Hold a stakeholder workshop to build collaboration, choose partners and develop action plans [Sierra Leone, Liberia, Kivu].
- 1.2. Establish project management structures
- 1.3. Report and recommend to the foundation, together with a roadmap and fully developed implementation plan [Sierra Leone, Liberia, North-Kivu].
- 1.4. Create strategic alliances for facilitating dissemination of legume and inoculant technologies in the mandate areas.

Specific objective 2. Baseline and M&E [Sierra Leone, Liberia, North-Kivu]

- 2.1. Prepare review and background of previous relevant agronomic, farming systems and market research [Sierra Leone, Liberia, Kivu].
- 2.2. Identify the project sites (e.g., districts, communities, villages, farmer groups) at different scales in the impact zones.
- 2.3. Quantify the current on-farm BNF in the target farming systems and its impact on livelihoods, income, and household nutrition
- 2.4. Evaluate the ex-ante impact of introduced legume and inoculant technologies on farmer's livelihoods and soil health across the mandate areas.

Specific objective 3. Enhancement of legume productivity [Sierra Leone, Liberia, Kivu]

- 3.1. Select best varieties of groundnut, cowpea, and soybean for high N₂-fixation capacity and adaptation to abiotic (low soil P, soil acidity) and biotic stresses (pests and diseases).
- 3.2. Identify best-fit agronomic practices (system design, need for amendments) for maximizing potential benefits of legume and inoculant technologies on increasing and stabilizing productivity.
- 3.3. Assess the need-to-inoculate for the target legumes and identify elite strains across the impact zones
- 3.4. Develop best practices to rehabilitate non-responsive soils.

Specific objective 4. Better legume input supplies [Sierra Leone, Liberia, North-Kivu, South-Kivu]

- 4.1. Develop community-based seed systems for groundnut, cowpea, and soybean to ensure sufficient availability of improved legume germplasm
- 4.2. Formulate improved inoculant products and develop cost-effective production and delivery methods, including standardized quality assurance procedures
- 4.3. Engage with the private sector to facilitate a sustainable supply of fertilizer and inoculants

Specific objective 5. Dissemination of legume technologies [Sierra Leone, Liberia, North-Kivu, South-Kivu]

- 5.1. Produce specific dissemination tools, including inoculant packets, adapted to the needs of farmer groups, agro-dealers, and development partners
- 5.2. Conduct collaborative legume and inoculant technology dissemination campaigns and create awareness in rural communities in all impact zones
- 5.3. Develop strategies for empowering women to benefit from the project products, with a focus on legume processing initiatives towards improved health and nutrition

Specific objective 6. Capacity building [Sierra Leone, Liberia, North-Kivu, South-Kivu]

- 6.1. Provide short-term, high level technical training for project scientific and technical staff in essential microbiological skills and BNF technologies
- 6.2. Support advanced training to MSc level of an elite young cadre of African scientists focused on topics filling identified knowledge gaps that are identified through competitive calls.
- 6.3. Conduct training workshops on legume and inoculant technologies for agro-dealers and officers of farmer associations and community-based organizations.

3. Results to date

In the following section, reporting on progress of the project is structured around the project objectives. General progress against project activities can also be viewed in the project work plan (Table 3), which includes a data table and activities. Indicators have not specifically been included in the work plan, but are set separately for each activity.

3.1. Establishment of partnerships

In all countries, activities are implemented through IITA. Table 1 shows the partners who are collaborating and the management structure for the three countries. In Sierra Leone, the agronomy campaigns and foundation seed multiplication are led by SLARI and IITA provides technical backstopping. Dissemination campaigns, on-farm trials and community-based seed multiplication are led by the NGOs, with technical backstopping from SLARI.

In Liberia, the agronomist oversees the activities from the farm liaison officer, an M&E specialist and the involved university. National research partner CARI leads the on-station agronomy trials and NGO VOSIEDA leads the on-farm trials and will be involved in dissemination in a later stage.

In DRC a post-doc (Christopher Ngosong) has been appointed who supervises the two agronomists. All are backstopped administratively by administration staff from the N2Africa office in Bukavu, South Kivu. A number of NGO partners implement the agronomy trials and will be involved in dissemination campaigns in the coming season.

Table 1. Project management structure and project partners in Sierra Leone, Liberia and North Kivu, DRC.

| | Sierra Leone | Liberia | DRC (North- and South-Kivu) |
|---|---|--|--|
| Country Rep. | Braima James (IITA) | Amare Tegbaru (IITA) | Christopher Ngosong (IITA) |
| National project staff | SLARI team, Michael Johnny (FLO) | Franklin Henries (agronomist), Zargba Gaye (FLO) | Despines Bamuleke (Ruzizi plains, South Kivu) Jumaine Mkangya (North-Kivu) |
| National research partners / Universities | SLARI, Fourah Bay College | CARI, Cuttington University | Catholic University of Bukavu, 2 MSc students |
| NGO partners | World Vision International, Welt Hunger Hilfe | VOSIEDA | Caritas/CDC Kiringye, ILPCI, Women for Women (Ruzizi plains) and Centre de Développement de Rutshuru, Association des Jeunes Cultivateurs et Eleveurs de Kinyandonyi, Association des cultivateurs et Eleveurs du Kivu, Buuma Innovation Plate-form, Musanganya Innovation Plate-form, Maendeleo Innovation Plate-form (North-Kivu). |
| Private sector partners | Sierra Leone Agric. | WIENCO | |

In March 2012, project orientation and planning workshops were held in Sierra Leone and Liberia. In Sierra Leone, the workshop was hosted by the Sierra Leone Agricultural Research Institute (SLARI) in Freetown. In Liberia the workshop was hosted by IITA in the Monrovia office. In both countries, participants represented organizations responsible for agricultural research and degree-related training, technology dissemination and private sector companies such as producers of fortified baby food products, producers of poultry feed and agro-dealers. Since no N2Africa activities had taken place before in these countries, besides planning N2Africa activities, the workshop was used to introduce the project and allow possible partners to get to know each other. SLARI in Sierra Leone and IITA in Liberia followed up with partners after the workshop and continued to plan N2Africa activities in Liberia. In DRC, planning workshops were held in Bukavu in March. Planning for the 2013A season is currently on-going in DRC.

3.2. Baseline and M&E

Background

Before the workshops and planning of project activities, background reports about Sierra Leone, Liberia and the Kivu provinces in DRC were written based on available literature and past research. After the workshops, additional information acquired from local research staff was added to these reports.

Project sites

During the workshops in Liberia and Sierra Leone the countries' potentials, agro-ecological zones, common agricultural practices and local preferences were discussed to agree on target regions and to determine which legumes to work with in what kind of systems. Action sites were more precisely defined during later meetings. Criteria for project sites were: (1) productivity (minimized risk for failure), (2) market access, and (3) presence of dissemination partners. In Sierra Leone, IITA and SLARI selected 12 Chiefdoms in 5 districts of Eastern (Kenema district), Northern (Kambia and Port-Loko districts) and Southern (Bo and Moyamba districts) provinces as project field operation areas for the first year (Figure 1). These chiefdoms are nearly all in wooded Savannah agro-ecologies where grain legumes have good agronomic potential.

For Liberia, it was agreed during the workshop in March 2012 to start activities in Bong and Lofa Counties. Legumes are traditionally grown in these two counties, and the presence of partners and relatively good accessibility make these counties the most suitable to start with. In 2013, the project can extend to Nimba and Grand Bassa Counties.

In DR Congo, it was decided to expand to the Ruzizi plains in South-Kivu and to the Rutshuru axis and Masisi axis in North-Kivu, based on advice from the DRC N2Africa team, and on the dense population in these areas in need of opportunities. Those areas have a good agro-ecological and market potential for legume production. In the Ruzizi plains seven action sites have been chosen. In North Kivu, eight sites have been chosen (five along the Rutshuru axis and three along the Masisi axis).

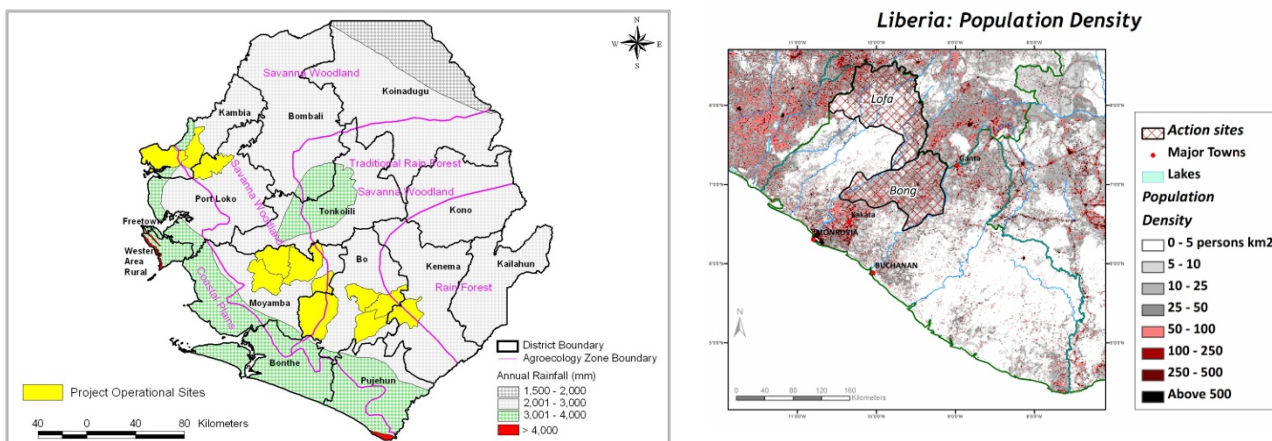


Figure 1. N2Africa operational areas in Sierra Leone (left) and Liberia (right).

Baseline survey

A baseline survey has been implemented in Sierra Leone and is on-going in Liberia to rapidly characterise the socio-economic situation of farm households in the N2Africa regions and to evaluate current legume management practices. The Wageningen N2Africa team provided specific guidelines for site and household selection.

In Sierra Leone, eight sites with clear agro-ecological potential and known market access were identified and in total, 800 households are currently surveyed. In Liberia, however, agro-ecological potential for legume or market potential was often not clear and only 200 households have been identified for the baseline survey (50 per site). We are currently in contact with Liberia about increasing the number of households to 400. In DR Congo, the baseline survey for the Ruzizi plain and North Kivu will be implemented in in the 2013A season, probably in conjunction with a DFID-funded research project on extension approaches. This collaboration will help us to extend the work of the project as well as to use project resources and farmers’ time efficiently.

3.3. Enhancement of legume productivity

With a set of agronomic trials in the first year, we begin with the selection of best varieties of groundnut, cowpea, and soybean for high N₂-fixation capacity and adaptation to abiotic (low soil P, soil acidity) and biotic stresses (pests and diseases). Further, we identify best-fit agronomic practices (system design, need for amendments) for maximizing potential benefits of legume and inoculant technologies on increasing and stabilizing productivity and assess the need-to-inoculate for the target legumes and identify elite strains across the impact zones. In all countries, similar guidelines have been provided for data collection from the trials to allow cross-comparison and synthesis.

Although developing best practices to rehabilitate non-responsive soils cannot yet be achieved in year 1, collecting soil samples will provide information about the soil status in different locations. This information will be used to explain variability in crop performance, in combination with recorded biotic stresses and rainfall data.

The following section first focuses on the planned agronomic activities in Liberia and Sierra Leone and the progress of the implementation of the trials. In DR Congo, the first season (2012B) has already ended and some results of the soybean variety trials are demonstrated.

Liberia & Sierra Leone

During the workshop in March it was decided that N2Africa will work with groundnut, cowpea and soybean in Liberia and Sierra Leone. In the first year different varieties of these legumes and their responses to inputs and management (P fertilizer, pest control, planting date and inoculation in soybean) are evaluated in agronomy trials across various sites in Sierra Leone and Liberia, both on-station and on farmers' fields. The set-up for various trials was made during the workshops. After the workshops they were further developed into trial protocols. In total, three soybean trials, two cowpea trials, two groundnut trials and two cassava-groundnut intercropping trials have been developed.

In the first set of soybean trials, four soybean varieties (TGx1904-2E, TGx1951-4F, TGx1448-2E, TGx1955-4F) and the effects of P fertilizer and inoculation on crop performance are tested on-station. In the second set, the effects of P fertilizer and inoculation are evaluated on-farm for two varieties (TGx1904-2E, TGx1448-2E). Because soybean is a new crop in the area and there is no experience yet regarding optimal planting times, four different planting dates are evaluated on-station for varieties TGx1904-2E, TGx1448-2E with the third set.

Both on-station and on-farm, two improved groundnut varieties (Samnut 22, Samnut 23) and the local variety (JL24) are evaluated with and without P fertilizer. On-station five improved cowpea varieties (IT99K-573-1-1, IT99K-537-2-1, IT89KD-288, IT89KD-391, IT97K-277-2) and the local one (tabae) are evaluated for both the effects of P fertilizer and pest control with May and September planting. The same trial is also implemented on-farm.

Besides the regular agronomy trials, there are two sets of cassava-groundnut intercropping trials (on-farm); one that evaluates planting time and one that evaluates planting arrangements. In the planting date trials we evaluate one medium and one early maturing groundnut variety in an intercropping system with cassava. Planting times of groundnut vary to evaluate whether it is possible to have groundnut available on the market in a time it is normally not (with traditional planting in May). In the planting arrangement trials the effect of spacing of the cassava on cassava-groundnut intercropping systems is evaluated using medium maturing Samnut 22 and two varieties of cassava, one erect (SLICASS 6) and one branching (SLICASS 1). We also evaluate the effect of NPK fertilizer.

DRC

In the Ruzizi plains in South-Kivu, soybean variety, input and system intercropping trials have been established in the 2012B season. In the variety trials, five soybean varieties (SB24, SC Squire, SC Saga, SC 823-6-16 and Imperial) are evaluated in combination with evaluation of inoculation and P

fertilizer. Besides the soybean varieties' biomass yield and grain yield, their tolerance against rust and their BNF potential under different soil conditions are evaluated. In the input trials, the response of soybean (SB24) to inoculation, and to adding P, K, S and Mg are evaluated. In these trials, four types of nutrient inputs are used: TSP, TSP/KCl, SYMPAL and manure. Sympal is a fertilizer blend developed in Kenya by N2Africa specifically for legumes which supplies Mg and S in addition to P.

With the system trials, in which soybean is intercropped with maize or cassava, we evaluate (1) the contribution of early maturing and dual purpose soybean varieties to soil fertility improvements from which maize and cassava can profit and (2) the alternative agronomic practices (varying planting arrangements) on maize, cassava and soybean yield. This trial was established in February 2012 and continues in September 2012. In the 2013 long rains season the cassava will be harvested.

In North Kivu, two types of soybean trials (variety and input) have been established on both axes in the 2012B season. In the soybean variety trials four improved varieties (SB24, TGx1987-64F, TGx1987-20F, PK6) and one local variety (Imperial) have been evaluated, with and without P and with and without rhizobium inoculation. For the soybean input trial, one variety (SB24) has been evaluated with use of different fertilizers (TSP, TSP+KCl, Sympal and organic manure) and inoculation with rhizobia. However, insufficient replication compromised the conclusions that can be drawn which will be corrected for in future. Variety trials on cowpea and groundnut were also established, but had to be abandoned due to severe insecurity in the trial sites.

Table 2 indicates the trials implemented in Liberia, Sierra Leone and DRC. Because the Liberia team was not very experienced with establishing trials, they received assistance from a Nigerian IITA field technician during planting. Yet, fewer trials were established than originally planned.

Table 2. Overview of the trials established in DRC 2012B, Sierra Leone and Liberia.

| Country/region | Crop | Trial | Number of trials |
|----------------------|--------------------------|---------------------------|-----------------------|
| DRC | | | |
| <i>Ruzizi Plains</i> | Soybean | Input | 7 |
| | | Variety | 3 |
| | | Intercropping (cassava) | 7 |
| <i>North-Kivu</i> | Soybean | Input | 5 |
| | | Variety | 4 |
| Sierra Leone | Cowpea | Variety on-station | 3 |
| | | Variety on-farm | Planting in September |
| | Groundnut | Variety on-station | 3 |
| | | Variety on-farm | 9 |
| | Soybean | Variety/input on-station | 3 |
| | | Planting date on-station | 3 |
| | | Variety/input on-farm | 9 |
| | Cassava-groundnut | Intercrop spacing on-farm | 8 |
| Cassava-groundnut | Intercrop timing on-farm | 8 | |
| Liberia | Cowpea | Variety on-station | 1 |
| | | Variety on-farm | Planting in September |
| | Groundnut | Variety on-station | 1 |

| | | |
|-------------------|---------------------------|---|
| | Variety on-farm | 4 |
| Soybean | Variety/input on-station | 1 |
| | Planting date on-station | 1 |
| | Variety/input on-farm | 4 |
| Cassava-groundnut | Intercrop spacing on-farm | 1 |
| Cassava-groundnut | Intercrop timing on-farm | 0 |

In the Ruzizi plains in DRC, in general, soybean grain yields were very good (Figure 2). SC Saga yielded slightly less than the other varieties, SB24 was among the better performing varieties. In two out of three sites, responses to inoculation were strong among all varieties, increasing grain yields from 1500-2300 to 2500-3000 kg/ha. Responses to P fertiliser were less clear.

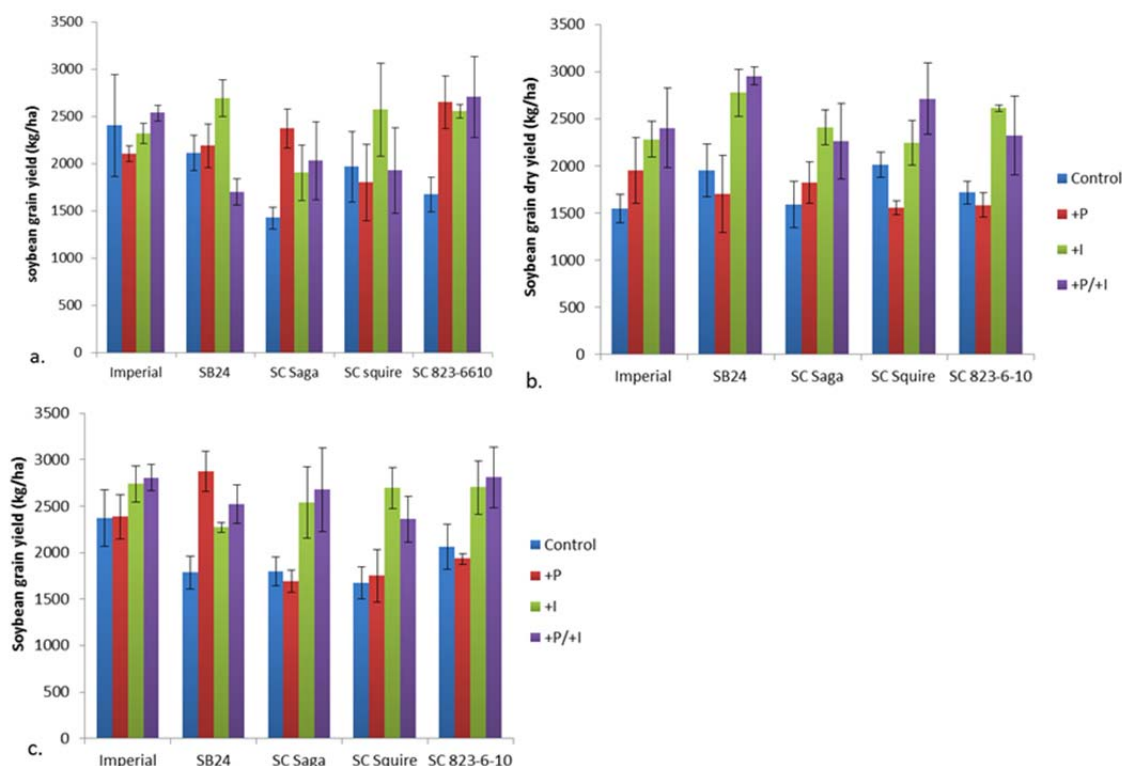


Figure 2. Results of soybean variety trials of the 2012A season in the Ruzizi plains, DRC. Yields are dry grain yields. There are three replicates per site. (a) site: Kamanyola, GPS: S02 53.8226 E29 00.089 930m Planting: 01-03-2012, Harvest: 28-05-2012 (b) site: Kiringye GPS: S02 53.832 E29 00 910m Planting: 09-03-2012, Harvest: 31-05-2012 (c) Site: Sange GPS: missing Planting: 28-02-2012, Harvest: 25-05 / 01-06-2012

In North-Kivu, soybean yields differed strongly between the two sites. The largest yields were obtained in Ajecedeki (Figure 3). There, most varieties showed clear responses to the combination of inoculation and P fertilizer. Imperial, TGx1987-20F and TGx1987-64F were among the better performing varieties.

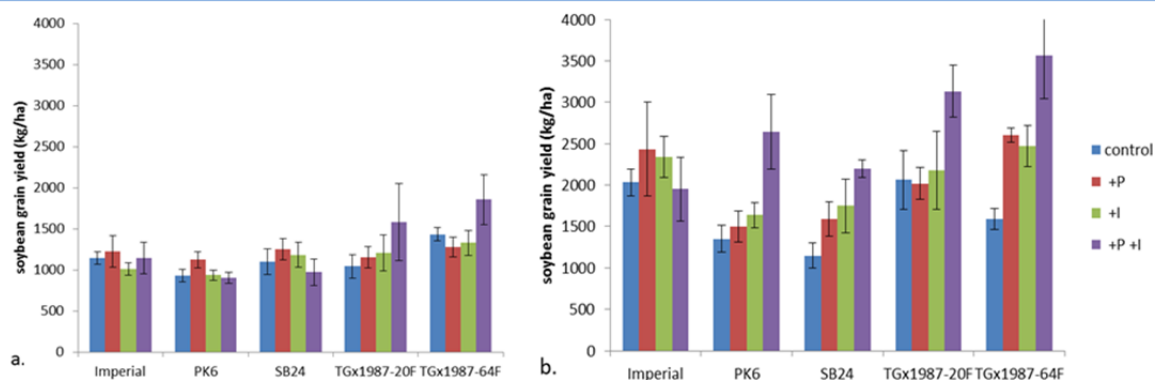


Figure 3. Results of soybean variety trials of the 2012A season in North-Kivu, DRC. Soybean yields are dry grain yields. There are three replicates per site. (a) site: Cederu. GPS: missing, planting: 22-02-2012, harvest: 14-06-2012 (PK6 and SB24) and 22-06-2012 (Imperial, TGx1987-20F and TGx1987-64F). (b) site: Ajedeceki, GPS: S29,45704 E1,06282 1114m, planting: 22-02-2012, harvest: 05-06-2012 (PK6 and SB24) and 21-06-2012 (Imperial, TGx1987-20F and TGx1987-64F).

3.4. Better legume input supplies

In Sierra Leone and Liberia, no legume seed of different varieties other than the local ones were available. Therefore, improved seeds of five cowpea varieties (IT99K-573-1-1, IT99K-537-2-1, IT89KD-288, IT89KD-391, IT97K-277-2), six groundnut varieties (ICGV-15 96855, Samnut 21, Samnut 10, Samnut 11, Samnut 22, Samnut 23; some in small quantities seed multiplication) and four soybean varieties (TGx1904-2E, TGx1951-4F, TGx1448-2E, TGx1955-4F) were sent from IITA Nigeria to Liberia and Sierra Leone. Currently, seed is being multiplied by the national research partners to ensure sufficient quantities of good quality seed for next year's dissemination activities. In Sierra Leone, two varieties of groundnut (Samnut 23 and Samnut 23) and two varieties of soybean (TGx1904-6F and TGx1448-2E) are also being multiplied by Sierra Leone Agric, the local private sector partner. The groundnut Samnut 22 and Samnut 23 are also multiplied by farmer outgrowers. Next year, the NGOs will start community based seed multiplication to initiate a sustainable supply of improved legume seed on a local basis.

In DRC partners multiply seed every season to ensure sufficient quantities of seed for the next season. Community based seed multiplication will start in the coming season (2013A).

Inoculant for the current season in Sierra Leone and Liberia was imported from Legumefix, UK. The responses of soybean to inoculation first need to be evaluated before it is worthwhile to engage with the private sector to evaluate different production and delivery methods.

Mineral fertilizers other than NPK (15:15:15) are not widely available in Sierra Leone. However, P fertilizer could be acquired through Liberia. The project will look into the possibilities of strengthening the agro-dealer network and increasing the availability of P-fertilizer. This is also valuable for Liberia and DRC, where P fertilizer is available, but the agro-dealer network is weak and fertilizer prices are high. A student from WUR is currently conducting a legume value chain analysis in Sierra Leone. This study will also provide important information on key partners in the private sector and on options to strengthen the value chain.

3.5. Dissemination of legume technologies

Detailed dissemination plans have been developed for dissemination of bush bean and soybean technology packages (in combination with maize or cassava in case of intercropping) to 2100 farmers in North-Kivu and 3000 farmers in the Ruzizi plains in the coming season. In Liberia and Sierra Leone dissemination activities will start in 2013 and implementation plans will be made during the second half of this year. A set of N2Africa Monitoring and Evaluation tools already exists. These will be revised and used to monitor dissemination activities in the project.

3.6. Capacity building

In Liberia, a partnership with the Cuttington University has been formed. This university will take up the supervision of two students that can follow a MSc program funded by N2Africa. At the moment, all necessary documentation is being finalized. Two MSc students are already enrolled in DRC through the Catholic University of Bukavu. In Sierra Leone, MOUs for post-graduate training are being arranged with Fourah Bay College/University of Sierra Leone.

Capacity building in the form of training of project staff is an on-going element of the project. In Liberia for example, IITA and CARI staff and partners from VOSIEDA have been assisted and trained in trial establishment by a field technician from Nigeria. Also in Sierra Leone, the close collaboration with SLARI for the implementation of a range of research activities will lead to significant capacity building at the national partner.

4. Challenges Encountered

Challenges in DR Congo were partly technical, partly with regards to NGO partners and partly due to insecurity in North-Kivu. The DRC team had trouble taking accurate GPS and weight records in both the Ruzizi plains and North-Kivu, due to inadequate equipment. GPS units and scales have been ordered. In North Kivu many local partner organizations are based on humanitarian aid, and not necessarily agriculture. The proposed solution from the DRC team is to stress the 'self-care' component of the project more, to provide a better fit between the N2Africa program and the humanitarian programs of the NGOs. The capacity building of the NGOs will be important for equipping them to deal with agricultural development once the situation has stabilised.

A major challenge particular to North Kivu is the current insecurity in the intervention areas. N2Africa staff keeps track of the local situation and in case activities cannot continue or technology transfer is severely hindered by the insecurity, we will consider alternatives.

In Liberia, trials were established late because the seed arrived late due to delays at the airport. Trial establishment had to be postponed one month, and it was decided to only plant cowpea in September, the second suitable planting period for cowpea in the season.

As often found in countries emerging from conflict, there is a general lack of human capacity in Liberia. In contrast with Sierra Leone, the position of the national research institute in Liberia is weak and no other strong research partners are present. Research capacity was poor in Liberia even before the war, unlike in Sierra Leone, whose Fourah Bay College is the oldest University in West

Africa. Our activities in Liberia demand more attention for capacity building to strengthen capacity of the local staff and partners to undertake project activities. However, this demands more time than available in a 2-year project and to cover the gaps, more technical backstopping will be provided by senior project scientists than in Sierra Leone and DR Congo.

Although technical assistance from Nigeria was provided during trial establishment in Liberia, fewer trials were established than originally agreed. In addition, the baseline survey was originally not implemented according to the protocols provided by WU. However, this has been rectified at a later stage. Overall, this suggests a need for closer communication between the field staff in Liberia and N2Africa scientists. Another challenge faced in Liberia was the partnership with the University of Liberia, who agreed to lead desk review about past legume research activities and initiate the MSc program. However, this university resigned from the project. At the moment, Cuttington University has agreed to take over and documents are being finalized.

Challenges in Sierra Leone were more of a logistical and biophysical nature. Also here, planting was delayed, mainly due to unavailability of SSP fertilizer, which had to be bought in Liberia. The very high rainfall associated with late planting apparently caused poor establishment of the Samnut groundnut varieties. In addition, the late establishment of trials caused a disinterest in the groundnut-cassava intercrop trials in a few areas, because farmers were already busy with other farm activities in their own farms at the time of establishment. Therefore it is important that next season planting is done early. Other challenges were related to pest damage in cowpea plots and defoliation of soybean leaves by beetles. SLARI will require IITA assistance on recording pests and disease severity, especially for soybean, which is a new crop in the country. As in Liberia, the small number of NGOs currently involved might pose a challenge on next year's dissemination activities and we propose that also Sierra Leone will include one or more additional NGO in the second half of this year.

Besides staying up to date with activities in countries, especially challenging for the WUR team was to acquire relevant information about past research in Liberia, Sierra Leone and DR Congo. This proved to be difficult partly because little research had been done, and results from previous research had been lost in the past wars. On the other hand more information appears to be available in Sierra Leone than we originally thought and we are in the process of acquiring reports.

5. Lessons Learned

- Overall, the start-up of the project was smooth.
- In DR Congo, the preliminary results from the soybean trials are promising. Local project staff and members of farmers associations have seen, in some locations for the first time, how inoculation with rhizobium can substantially increase yields.
- In Liberia, plans for implementation of activities need to be monitored more closely, so assistance can be given where needed.
- In general, the delays in planting – for both Sierra Leone and Liberia – might have been avoided by an earlier kick off of the project in those countries. Coming activities will be planned well in time.

- Given that the project has started only half a year ago, we do not have any learning products in the form of publications.

6. Work plan

Based on the project objectives, key activities were determined and developed into a work plan together with partners at the start of the project (see Table 3). Specifically for the coming months, we will work on revision of the Monitoring and Evaluation tools, which will be used first in the dissemination campaigns in DRC. For both North and South Kivu, detailed implementation plans are being made for dissemination. In addition, the agronomy trials will be repeated. In Liberia and Sierra Leone, data will be collected from the agronomy trials and the baseline survey data will soon be entered and analysed in the second half of this year.

Table 3. Workplan including activities and planning, revised during the workshops. Some of the activities have been completed already, others are pending and others still have to start on the proposed date.

| Objectives | Activities | Planning Liberia/Sierra Leone | Planning DRC |
|--|---|--------------------------------------|-----------------|
| <i>Objective 1 – Establishment of partnerships</i> | | | |
| 1.2 Stakeholder workshop to build collaboration, choose partners and develop action plans. | Stakeholder workshop | done | done |
| | Develop final implementation plan | done | done |
| 1.3 Report and recommend to foundation. Including roadmap and fully developed implementation plan. | Prepare report for the foundation | June 2012 | June 2012 |
| 1.4 Create strategic alliances for facilitating dissemination of legume and inoculant technologies. | -input from supply partners that were not at the meeting? -district officers should be invited to the project activities -make sub-agreements with partners | ongoing | ongoing |
| <i>Objective 2 – Baseline and M&E</i> | | | |
| 2.1 Review of literature of agronomic aspects, farming systems and market research. | -partners provide information -WUR prepares review and background | done | done |
| 2.2 Establish project management structures | Falls partly under 1.2 & 1.4 | | |
| | Appoint N2Africa staff (agronomist, farm liaison officer, admin support) | done | done |
| | Develop project indicators and M&E tools | August 2012 | August 2012 |
| 2.3 Identify the project sites at different scales in the impact zones. | Select projects sites and consult growth potential maps (exist for various crops at the Sierra Leone level) | done | done |
| | Choose villages: pending discussion with the NGOs | done, but revision needed in Liberia | done |
| 2.4 Quantify current on-farm BNF in the target farming systems and its impacts on livelihoods, income and household nutrition. | Refine baseline questionnaire | done | done |
| | Conduct interviews for baseline study | ongoing | September 2012 |
| | Detailed characterizations (this could be an Msc project) incl. BNF assessments | To be discussed | To be discussed |
| | Baseline data analysed and report available | Dec 2012 | February 2012 |

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|---|---|------------------------------|---|
| 2.5 Evaluate the ex-ante impact of introduced legume and inoculants technologies of farmer's livelihoods and soil health across the mandate areas. | Evaluate the ex-ante impact using baseline data, data from detailed characterizations and secondary data. | Oct 2012 – July 2013 | Oct 2012 – July 2013 |
| <i>Objective 3 – Enhancement of legume productivity</i> | | | |
| General: order seed of improved groundnut, cowpea and soybean varieties for use in Liberia and Sierra Leone from Nigeria | | done | |
| 3.1 Select best varieties of groundnut, cowpea and soybean for high N ₂ fixing capacity and adaptation to abiotic and biotic stresses. | Prepare protocols for trials | done | done |
| | Implement agronomic trials | done for 2012, again in 2013 | done for 2012B again in 2013A, 2013 A and 2013B |
| 3.2 Identify best-fit agronomic practices for maximizing potential benefits of legume and inoculants technologies on increasing and stabilizing productivity. | Prepare protocols for trials | done | done |
| | Implement agronomic trials | done for 2012, again in 2013 | done for 2012B again in 2013A, 2013 A and 2013B |
| 3.3 Assess the need to inoculate for the target legumes and identify elite strains across the impact zones. | Prepare protocols for trials | April 2012 | |
| | Implement agronomic trials | done for 2012, again in 2013 | done for 2012B again in 2013A, 2013 A and 2013B |
| 3.4 Develop best practices to rehabilitate non-responsive soils. | Start after we have an idea about the non-responsive soils | 2013 | 2013 |
| <i>Objective 4 – Better legume input supplies</i> | | | |
| 4.1 Develop community-based seed systems for groundnut, cowpea and soybean to ensure sufficient availability of improved legume germplasm. | Community and station based seed multiplication (to use for dissemination in 2013) | 2013 | From 2013A |
| | Develop protocols for community-based and station based seed multiplication | End 2012 | April 2012 |
| | Evaluate planting vs. harvesting time and impact on grain quality (seed viability, moisture content) | 2012 | |
| 4.2 Formulate improved inoculants products and develop cost-effective production and delivery methods, including standardized quality assurance procedures. | Import a limited set of inoculants for evaluation with soybean | done | done |
| | Investigate alternative supplies of inoculants + regulations and engage with private sector | 2013 | 2013 |

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|--|---|--------------------------------------|-------------|
| | Develop quality assurance protocols | 2013 | 2013 |
| 4.3 Engage with the private sector to facilitate a sustainable supply of fertilizer and inoculants. | Identify relevant stakeholders in private sector , expose them to potential positive effects | 2012 | 2012 |
| | Smallholder commercialisation program at Govt. level, including delivery of inputs to Agricultural Business centres (ABCs – agro-dealers); upgrading ABCs to business units | 2013 | 2013 |
| <i>Objective 5 – Dissemination of legume technologies</i> | | | |
| 5.1 Produce specific dissemination tools, including inoculant packets, adapted to the needs of farmer groups, agro-dealers, and development partners. | Adapt existing dissemination protocols | 2013 | July 2012 |
| | Develop dissemination packages | 2013 | August 2012 |
| 5.2 Conduct collaborative legume and inoculant technology dissemination campaigns and create awareness in rural communities in all impact zones. | Field days | From May 2012 | From 2013A |
| | Media events (radio, leaflets) | From May 2012 | From 2013A |
| 5.3 Develop strategies for empowering women to benefit from the project products, with a focus on legume processing initiatives towards improved health and nutrition. | | | |
| | Engage women in dissemination campaigns, e.g. soybean processing and transformation(NGOs) | Second half of 2012 | From 2013A |
| <i>Objective 6 – Capacity building</i> | | | |
| 6.1 Provide short-term, high level technical training for project scientific and technical staff in essential microbiological skills and BNF technologies. | SLARI and Njala University staff participate in microbiology training sessions | 2012 | On-going |
| 6.2 Support advanced training to MSc level of an elite young cadre of African scientists focused on topics filling identified knowledge gaps. | Select Msc students in Liberia and Sierra Leone for Msc studies + identify topics | May 2012 onwards | On-going |
| 6.3 Conduct training workshops on legume and inoculant technologies for agro-dealers and officers of farmer associations and community-based organizations. | Training of trainers | 2012 | From 2013A |
| | Training of farmers | 2012 (when material is present)-2013 | From 2013A |

7. Budget Summary

Table 4 summarizes the deployment of the total year 1 budget during the period January-June 2012 for Sierra Leone, Liberia, DRC, WUR and IITA combined. In Liberia and Sierra Leone, original budgets as included in the project proposal were revised by the country teams. Revisions were approved by the foundation since overall operational costs were decreased, and resources allocated to field-level program interventions were increased. The total budget remained equal for both countries.

Since we are only halfway the year and budgets were designed on a yearly basis, logically only part of the budgets has been used so far. Overall, budget lines that typically refer to the actual start-up of the project such as supplies and capital equipment have been used more than other budget lines such as salaries. However, in Sierra Leone the project vehicle and motorbikes were purchased in July and therefore not yet included in this half year budget reporting. In DRC, the largest part of the budget for field level program interventions is still reserved for dissemination activities in the 2013A season, which will start in September. Also in Liberia and Sierra Leone, part of that same budget line is reserved for another set of trials and seed multiplication that will take place in September. Because most of the salaries have been paid from March onwards or later, only a small part of the money for salaries has been used up to June.

As expected, about half of most budget lines at WUR have been used, except for contracted services and other direct costs. None of the countries, nor WUR or IITA has overrun a budget line.

Table 4. Budget summary January-June 2012.

| Budget | Year 1 (US\$) | Reported Jan-June year 1 (US\$) | Year Variance % | Year 2 (US\$) | Reported year 2 (US\$) | Year Variance % |
|--|---------------|---------------------------------|-----------------|---------------|------------------------|-----------------|
| Personnel/Salaries & Benefits | 187557 | 31122 | 83% | 196004 | | |
| Salaries & Benefits | 111718 | 33430 | 70% | 116684 | | |
| Consultants | 12000 | 0 | 100% | 12000 | | |
| Supplies & Services | 34500 | 26414 | 23% | 29500 | | |
| Equipment / Materials and Equipment | 191813 | 53912 | 72% | 22650 | | |
| Travel | 97647 | 33997 | 65% | 105504 | | |
| Training | 0 | 0 | | 0 | | |
| Workshop | 0 | 0 | | 0 | | |
| Operations (Field-level program interventions) | 227780 | 98108 | 57% | 268072 | | |
| Activity Cost | 0 | 0 | | 0 | | |
| Other direct costs | 46000 | 15285 | 67% | 46000 | | |
| Monitoring and Evaluation | 55000 | 10505 | 81% | 0 | | |
| Sub-grant to Partners | 0 | | | 0 | | |
| Contingency | 0 | | | 0 | | |
| Sub-total Direct Cost | 964014 | 302773 | 69% | 796414 | | |
| Indirect Cost | 91581 | 28763 | 69% | 75659 | | |
| Grant Total | 1055595 | 331537 | 69% | 872073 | | |

8. Other relevant project information

- Provide any other information that is relevant to this reporting period or the overall project.

List of project reports

1. N2Africa Steering Committee Terms of Reference
2. Policy on advanced training grants
3. Rhizobia Strain Isolation and Characterisation Protocol
4. Detailed country-by-country access plan for P and other agro-minerals
5. Workshop Report: Training of Master Trainers on Legume and Inoculant Technologies (Kisumu Hotel, Kisumu, Kenya-24-28 May 2010)
6. Plans for interaction with the Tropical Legumes II project (TLII) and for seed increase on a country-by-country basis
7. Implementation Plan for collaboration between N2Africa and the Soil Health and Market Access Programs of the Alliance for a Green Revolution in Africa (AGRA) plan
8. General approaches and country specific dissemination plans
9. Selected soybeans, common beans, cowpeas and groundnuts varieties with proven high BNF potential and sufficient seed availability in target impact zones of N2Africa Project
10. Project launch and workshop report
11. Advancing technical skills in rhizobiology: training report
12. Characterisation of the impact zones and mandate areas in the N2Africa project
13. Production and use of Rhizobial inoculants in Africa
18. Adaptive research in N2Africa impact zones: Principles, guidelines and implemented research campaigns
19. Quality assurance (QA) protocols based on African capacities and international existing standards developed
20. Collection and maintenance of elite rhizobial strains
21. MSc and PhD status report
22. Production of seed for local distribution by farming communities engaged in the project
23. A report documenting the involvement of women in at least 50% of all farmer-related activities
24. Participatory development of indicators for monitoring and evaluating progress with project activities and their impact
25. Suitable multi-purpose forage and tree legumes for intensive smallholder meat and dairy industries in East and Central Africa N2Africa mandate areas
26. A revised manual for rhizobium methods and standard protocols available on the project website
27. Update on Inoculant production by cooperating laboratories
28. Legume Seed Acquired for Dissemination in the Project Impact Zones
29. Advanced technical skills in rhizobiology: East and Central African, West African and South African Hub
30. Memoranda of Understanding are formalized with key partners along the legume value chains in the impact zones

31. Existing rhizobiology laboratories upgraded
32. N2Africa Baseline report
33. N2Africa Annual country reports 2011
34. Facilitating large-scale dissemination of Biological Nitrogen Fixation
35. Dissemination tools produced
36. Linking legume farmers to markets
37. The role of AGRA and other partners in the project defined and co-funding/financing options for scale-up of inoculum (banks, AGRA, industry) identified
38. Progress Towards Achieving the Vision of Success of N2Africa
39. Quantifying the impact of the N2Africa project on Biological Nitrogen Fixation
40. Training agro-dealers in accessing, managing and distributing information on inoculant use
41. Opportunities for N2Africa in Ethiopia
42. N2Africa Project Progress Report Month 30
43. Review & Planning meeting Zimbabwe
44. Howard G. Buffett Foundation – N2Africa June 2012 Interim Report