



N2Africa training and extension materials

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With contributions from Charlotte Schilt

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N2Africa

**Putting nitrogen fixation to work
for smallholder farmers in Africa**



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Table of contents

Short summary	4
Keywords.....	4
1. Introduction.....	4
2. Overview of Dissemination tools developed under N2Africa	5
3. Dissemination tools per topic	13
3.1 Biological nitrogen fixation and grain legume enterprise.....	13
3.2 Technical trainings and protocols.....	15
3.3 Rhizobium inoculation	16
3.4 Agricultural management practices for legumes	17
3.5 Post-harvest handling, processing and marketing of legumes.....	21
References	23
List of project reports	24
Partners involved in the N2Africa project.....	28

Table of tables

Table 1: Overview of N2Africa Dissemination tools	6
Table 2: N2Africa Dissemination tools on Biological nitrogen fixation and grain legume enterprise	13
Table 3: N2Africa Dissemination tools on Technical trainings and protocols	15
Table 4: N2Africa Dissemination tools on Rhizobium inoculation.....	16
Table 5: N2Africa Dissemination tools on Agricultural management practices for legumes	17
Table 6: N2Africa Dissemination tools on Post-harvest handling, processing and marketing of legumes	21



Short summary

This report provides an overview of the different training and extension materials that have been developed in the N2Africa project about legumes (from production to marketing) and biological nitrogen fixation. First, an overview of all materials is given, followed by sub-sections with the available materials on Biological nitrogen fixation and grain legume enterprise, Technical trainings and protocols, Rhizobium inoculation, Agricultural management practices for legumes and Post-harvest handling, processing and marketing of legumes.

Keywords

Dissemination, training, extension, legume, biological nitrogen fixation

1. Introduction

Under the N2Africa project, a wide range of training and extension materials about legumes (from production to marketing) and biological nitrogen fixation has been developed. Most of these materials have been adjusted to the relevant context in the different N2Africa countries, or translated into local languages.

In the first phase of the project (2010-2013), many of the written/illustrated extension materials were based on the booklet, "Biological Nitrogen Fixation (BNF) and Grain Legume Enterprise: Guidelines for N2Africa Master (or Lead) Farmers (Woomer, 2010). Three different versions (in English) of this booklet were developed, one each for East and Central Africa (EAC), Southern Africa and West Africa (Turner, 2011). Since then, many additional materials have been developed, e.g. related to rhizobia strain isolation and characterization, processing and value addition of legumes, or simplified instructions on the application of rhizobial inoculants.

As part of the second phase (2014-2018), a lot of attention was drawn to synthesizing lessons learned from the first phase and presenting this information in easy-to-use leaflets and posters for farmers and extension officers. A major partner in this development was the African Soil Health Consortium (ASHC). A joint effort was undertaken to ensure that the information presented was consistent and in line with information provided by other projects. A general booklet on Biological Nitrogen Fixation was complemented with country-specific information on good agronomic practices for the different legumes.

This report first provides an overview table of all materials developed under the project with a brief description, followed by the available information sorted per topic.



2. Overview of Dissemination tools developed under N2Africa

A total of 58 dissemination tools have been developed as part of the N2Africa project between 2010 and 2018 (Table 1). Most of the tools developed as part of phase I comprise of training materials for Training of Trainers and Lead Farmers. Sections in these training materials mostly cover biological nitrogen fixation, inoculation, general agronomy and enterprise development. These materials are available in different languages. Other materials zoom in on specific topics such as integrated pest management, protocols for rhizobiology, nodulation scoring or processing and post-harvest handling of legumes. Especially for Zimbabwe a wide range of topics is covered in separate materials, such as on inoculation, production practices for the different legumes, moisture conservation, and post-harvest handling, enterprise development and marketing for legumes. Also, the extension approach practiced in the first phase of N2Africa was captured in the manual: "Participatory research extension approach: N2Africa extension method". In cooperation with CIALCA and the Belgium Directorate-General for Development Cooperation (DGDC), a manual on establishing a business plans for an agricultural enterprise was provided.

The materials developed in cooperation with ASHC mainly deal with good agronomic management practices for relevant legumes in each of the countries. The leaflets cover topics from land preparation to sowing and fertilizer application, inoculation, crop management (weeding, pest and disease management), harvesting, storage and marketing. Emphasis was placed on using the knowledge gained through research carried out in N2Africa and knowledge available among project partners. All leaflets have attractive pictures to clarify the instructions. The general leaflet "Biological nitrogen fixation in grain legumes" deals with nitrogen, nutrient cycles on the farm, biological nitrogen fixation and management practices conducive to nitrogen fixation. It also has a section on how to set up an experiment testing different treatments in the field. Again, plenty of pictures and diagrams were used to support the text. Two posters were developed for specific practices: the inoculation with different types of inoculants (Legumefix, Biofix), and guidelines for the staking of climbing beans.

Cooperation with several of the Tanzanian Agriculture Research Institutes (TARI) and the Rwanda Agriculture Board (RAB) led to the publication of a number of leaflets in local languages. In Uganda, N2Africa and the National Agricultural Research Organisation (NARO) co-produced a number of posters and leaflets for climbing beans - from varieties to pest and disease management, post-harvest handling and a training guide for a cost-benefit analysis of climbing bean cultivation. In Borno, a handbook for the processing of legumes was developed in cooperation with the Borno State Agricultural Development Programme (BOSADP).



Table 1: Overview of N2Africa Dissemination tools

Number	Title	Country	Topic	Partners	Target audience
1	Value addition to grain legume processing of cowpea, groundnut, and soybean to smallholder farmers in Borno State	Nigeria	Soybean, cowpea and groundnut processing	BOSADP	Development practitioners, extension staff, farmers
2	Technology brief for Soybean production in Tanzania	Tanzania	Soybean, biological nitrogen fixation, inoculation, agronomy, post-harvest handling, marketing	ASHC, TARI, AFAP, Ilogix, FRI	Development practitioners, extension staff, farmers
3	Technology brief for common bean northern Tanzania	Tanzania	Common bean, agronomy, post-harvest handling, marketing	ASHC, TARI, AFAP, Ilogix, FRI	Development practitioners, extension staff, farmers
4	Ongeza mavuno ya karanga kwa kutumia mbinu bora za kilimo	Tanzania	Groundnut, general agronomy	TARI Makutupora	Extension officers, farmers
5	Lima kunde kwa lishe na kipato Zaidi	Tanzania	Cowpea, general agronomy	TARI Ilonga	Extension officers, farmers
6	Better soybean through good agricultural practices: Tanzania	Tanzania	Soybean, general agronomy	ASHC, TARI Uyole	Extension officers, farmers
7	Better beans through good agricultural practices: Northern Tanzania	Tanzania	Common bean, general agronomy	ASHC, TARI Selian	Extension officers, farmers
8	Better beans through good agricultural practices: Southern Highlands Tanzania	Tanzania	Common bean, general agronomy	ASHC, TARI Selian	Extension officers, farmers
9	Better groundnut through good agricultural practices: Tanzania	Tanzania	Soybean, general agronomy	ASHC, TARI Naliendele	Extension officers, farmers



Number	Title	Country	Topic	Partners	Target audience
10	Twongere umusaruro wa soya dukoresha inyongeramusaruro ya Rizobiyumu / Increase soyabean productivity through the use of Rhizobium	Rwanda	Soybean, general agronomy, biological nitrogen fixation, inoculation	RAB	Extension officers, farmers
11	Pictorial Budget Toolkit Climbing Bean - Trainers Guide	Uganda	Training guide for cost-benefit analysis of climbing beans	NARO	Training of trainers and lead farmers
12	Twongere umusaruro w'ibishyimbo dukoresha inyongeramusaruro ya Rizobiyumu / Increase bean productivity through the use of Rhizobium	Rwanda	Common bean, general agronomy, biological nitrogen fixation, inoculation,	RAB	Extension officers, farmers
13	Cards for budgeting climbing beans - material costs	Uganda	Cards belonging to training guide for cost-benefit analysis of climbing beans	NARO	Training of trainers and lead farmers
14	Amoko meza ya soya yera mu Rwanda / Best varieties of Soyabean in Rwanda	Rwanda	Soybean varieties, products	RAB	Extension officers, farmers
15	Cards for budgeting - labour costs	Uganda	Cards belonging to training guide for cost-benefit analysis of climbing beans	NARO	Training of trainers and lead farmers
16	Take home flyer Climbing Bean with varieties	Uganda	Climbing bean varieties, nutritional value, seed quality, storage	NARO	Farmers
17	Major Pests and Diseases of Climbing Bean	Uganda	Climbing bean pests and diseases	NARO	Extension officers, farmers
18	Twongere umusaruro wa soya Dukurikiza amabwirizwa duhabwa / Increase soyabean productivity through following technical advice given	Rwanda	Soybean, general agronomy	RAB	Extension officers, farmers
19	Post Harvest Handling Steps - Climbing bean	Uganda	Climbing bean, post-harvest handling	NARO	Extension officers, farmers



Number	Title	Country	Topic	Partners	Target audience
20	Biological Nitrogen Fixation ne Nzira dze Kutengeswa Kwe Bhinzi: Bhuku ReVatungamiriri vevarimi Muchirongwa Che N2Africa MuZimbabwe	Zimbabwe	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
21	Better groundnut for farmers in Nigeria	Nigeria	Groundnut, general agronomy	ASHC	Extension
22	Better cowpea for farmers in Nigeria	Nigeria	Cowpea, general agronomy	ASHC	Extension
23	Better soybean for farmers in Nigeria	Nigeria	Soybean, general agronomy	ASHC	Extension
24	Como inocular a soja: uso do inoculante legume Fix	Mozambique	Inoculation, soybean	CLUSA, ASHC	Training of trainers and lead farmers
25	Better soybean through good agricultural practices: Zimbabwe	Zimbabwe	Soybean, general agronomy	ASHC	Extension
26	Better soybean through good agricultural practices: Rwanda	Rwanda	Soybean, general agronomy	ASHC	Extension
27	Better cowpea through good agricultural practices: Zimbabwe	Zimbabwe	Cowpea, general agronomy	ASHC	Extension
28	Better beans through good agricultural practices: Rwanda	Rwanda	Common bean, general agronomy	ASHC	Extension
29	Biological nitrogen fixation in grain legumes	All countries	Biological nitrogen fixation		Training of trainers and lead farmers
30	Better cowpea through good agricultural practices: Zimbabwe	Zimbabwe	Cowpea, general agronomy	ASHC	Extension
31	Better groundnut through good agricultural practices: Zimbabwe	Zimbabwe	Groundnut, general agronomy	ASHC	Extension
32	Better sugar bean through good agricultural practices: Zimbabwe	Zimbabwe	Common bean, general agronomy	ASHC	Extension
33	Better beans through good agricultural practices: Ethiopia	Ethiopia	Common bean, general agronomy	ASHC	Extension



Number	Title	Country	Topic	Partners	Target audience
34	Better soybean through good agricultural practices: Ethiopia	Ethiopia	Soybean, general agronomy	ASHC	Extension
35	Banco e Inoculante	Mozambique	Seed bank, inoculation, soybean	USAID	Extension
36	How to inoculate soybean: using Legume Fix	All countries	Inoculation, soybean	ASHC	Extension
37	Staking climbing beans	All countries	Climbing bean, staking	ASHC	Extension, Lead farmers
38	Biological Nitrogen Fixation and Grain Legume Enterprise (in French)	DRC	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
39	Practical Steps to Inoculant Application – Slurry Method (Poster)	Ghana	Inoculation	KNUST	Training of trainers and lead farmers
40	Legume inoculation technology manual	Ghana	Inoculation	KNUST	Extension
41	Establishing a Business Plan for an Agricultural Enterprise: A Trainers Guide Manual 3	All countries	Enterprise development	CIALCA, DGDC	Technical training
42	Participatory research extension approach: N2Africa extension method	All countries	Participatory research and extension methods		Extension
43	A Ranking System for Legume Root Nodules. N2Africa Training Report	All countries	Nodulation scoring		Technical training
44	Farmers' handbook for agricultural marketing: Manual for Trainers	All countries	Marketing		Training of trainers and lead farmers
45	An Extension Manual for N2Africa Master Farmers (poster)	All countries	Extension, inoculation		Training of trainers and lead farmers
46	Biological Nitrogen Fixation and Grain Legume Enterprise: Guidelines for N2Africa Lead Farmers	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
47	Agro-Dealer Training Manual Zimbabwe 2012-2013 Season	Zimbabwe	Biological nitrogen fixation, inoculation		Technical training



Number	Title	Country	Topic	Partners	Target audience
48	A revised manual for rhizobium methods and standard protocols	All countries	Rhizobiology		Technicians, students
49	Master Farmer Training in Biological Nitrogen Fixation and Grain Legume Enterprise - Presentations plus practical	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
50	Farmers' handbook for agricultural marketing	Zimbabwe	Marketing		Farmers
51	Lead farmer guidelines for southern Africa	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
52	Moisture Conservation in Arable Lands	Zimbabwe	Moisture conservation		Extension
53	Inoculation of Legumes - Zimbabwe	Zimbabwe	Inoculation		Extension
54	Legume Production Notes : Soyabean, Sugar bean, Cowpea and Groundnut	Zimbabwe	General agronomy, inoculation, processing		Extension
55	Post-Harvest Handling Guidelines for Legumes	Zimbabwe	Post-harvest handling of legumes		Extension
56	Farming as a Business - Zimbabwe	Zimbabwe	Enterprise development		Extension
57	Master Farmer Guidelines (simplified) - BNF and Legume enterprise Chichewa	Malawi	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
58	Mbinu bora za kuongeza uzalishaji wa Soya, mahindi na Mtama	All countries	General agronomy, soybean		Extension
59	Legume inoculant technology and quality control procedures: Workshop manual	All countries	Inoculant production, quality control	Murdoch University	Laboratory technicians
60	Mince and Press soya milk	All countries	Processing, soybean		Farmers
61	Seed Inoculation: Master Farmer Training Practical	All countries	Inoculation		Training of trainers and lead farmers



Number	Title	Country	Topic	Partners	Target audience
62	Uogezaji Naitrojeni Kibaologia na Biashara ya Mazao ya Legumi: Maelezo ya Wakulima Wakuu wa N2Africa	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
63	Kuweka Natrogeni Kibaologia (Swahili Nitrogen Cycle)	All countries	Nitrogen cycle		Training of trainers and lead farmers
64	Biological Nitrogen Fixation and Grain Legume Enterprise: Guidelines for N2Africa Master Farmers	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
65	Inoculant application instruction in Swahili	All countries	Inoculation		Extension
66	Mwongozo wa Mafunzo ya Usindikaji wa Nafaka za Jamii Kunde: Ongezeko la Thamani kwa Maharagwe, Kunde, Karanga na Soya kwa Wakulima Wadogo Barani Afrika	All countries	Processing, post-harvest handling		Extension
67	Grain legume processing presentation in Kiswahili	All countries	Processing, post-harvest handling		Extension
68	Soybean varieties with photo references	All countries	Soybean varieties		Extension
69	Grain Legume Processing Handbook: Value addition to bean, cowpea, groundnut and soyabean by small-scale African farmers	All countries	Processing, post-harvest handling		Extension
70	Best practices to maintain high yields and grain quality of soyabean, English and Kiswahili version	Kenya	General agronomy, post-harvest handling		Extension
71	Best practices to maintain high yields and grain quality of soybean	Kenya	General agronomy, post-harvest handling		Extension
72	Integrated pest management for N2Africa legume crops	All countries	Pest management		Extension
73	An Extension Manual for N2Africa Master Farmers: booklet cover	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers



Number	Title	Country	Topic	Partners	Target audience
74	Swahili: Biological Nitrogen Fixation and Grain Legume Enterprise: Guidelines for N2Africa Master Farmers	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
75	Master Farmer Training Modules	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
76	How to grow soybean	All countries	General agronomy, soybean	ASHC	Training of trainers and lead farmers
77	Rhizobia Strain Isolation and Characterisation Protocol	All countries	Rhizobia Strain Isolation and Characterisation		Technicians, students



3. Dissemination tools per topic

3.1 Biological nitrogen fixation and grain legume enterprise

The booklet on Biological Nitrogen Fixation and Grain Legume Enterprise has been developed for different countries, and in different languages. Topics covered go from the formation of farmer groups to explanations about nitrogen cycles, biological nitrogen fixation and the legume-rhizobium symbioses, management practices for the N2Africa target legumes, seed inoculation, on-farm technology testing, seed production, post-harvest handling, and grain legume marketing strategies. The booklet is fairly detailed, and is therefore targeted to the training of trainers and lead farmers – not the average farmer. The booklet “Biological nitrogen fixation in grain legumes” is a simplified and updated version, developed in the second phase of the project.

Table 2: N2Africa Dissemination tools on Biological nitrogen fixation and grain legume enterprise

Number	Title	Country	Topic	Partners	Target audience
20	Biological Nitrogen Fixation ne Nzira dze Kutengeswa Kwe Bhinzi: Bhuku ReVatungamiriri vevarimi Muchirongwa Che N2Africa MuZimbabwe	Zimbabwe	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
29	Biological nitrogen fixation in grain legumes	All countries	Biological nitrogen fixation		Training of trainers and lead farmers
38	Biological Nitrogen Fixation and Grain Legume Enterprise (in French)	DRC	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
45	An Extension Manual for N2Africa Master Farmers (poster)	All countries	Extension, inoculation		Training of trainers and lead farmers
46	Biological Nitrogen Fixation and Grain Legume Enterprise: Guidelines for N2Africa Lead Farmers	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
49	Master Farmer Training in Biological Nitrogen Fixation and Grain Legume Enterprise - Presentations plus practical	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
51	Lead farmer guidelines for southern Africa	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers



Number	Title	Country	Topic	Partners	Target audience
57	Master Farmer Guidelines (simplified) - BNF and Legume enterprise Chichewa	Malawi	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
62	Ugezaji Naitrojeni Kibaologia na Biashara ya Mazao ya Legumi: Maelezo ya Wakulima Wakuu wa N2Africa	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
63	Kuweka Natrogeni Kibaologia (Swahili Nitrogen Cycle)	All countries	Nitrogen cycle		Training of trainers and lead farmers
64	Biological Nitrogen Fixation and Grain Legume Enterprise: Guidelines for N2Africa Master Farmers	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
73	An Extension Manual for N2Africa Master Farmers: booklet cover	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
74	Swahili: Biological Nitrogen Fixation and Grain Legume Enterprise: Guidelines for N2Africa Master Farmers	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers
75	Master Farmer Training Modules	All countries	Biological nitrogen fixation, inoculation, general agronomy, enterprise development		Training of trainers and lead farmers



3.2 Technical trainings and protocols

N2Africa in Uganda developed, together with NARO, a training manual for the performance of a cost-benefit analysis of climbing bean cultivation. This analysis is meant to help farmers' decision making. The training manual comes with pictorial cards that help the budgeting of material and labour costs for different activities. At the start of N2Africa phase I, a manual was developed with guidelines for the participatory research and extension approach applied in N2Africa. It deals with the situation analysis, the role of farmer groups and lead farmers, different types of field trials and the participatory monitoring and evaluation of these trials. Also, a practical ranking system for the classification of root nodules was provided. A training manual on biological nitrogen fixation and inoculation was developed specifically for agro-dealers. Two protocols about rhizobium methods and strain isolation and characterization were produced as information to technicians and students working on rhizobiology, as well as a manual on the technology of legume inoculants and appropriate quality control.

Table 3: N2Africa Dissemination tools on Technical trainings and protocols

Number	Title	Country	Topic	Partners	Target audience
11	Pictorial Budget Toolkit Climbing Bean - Trainers Guide	Uganda	Training guide for cost-benefit analysis of climbing beans	NARO	Training of trainers and lead farmers
13	Cards for budgeting climbing beans - material costs	Uganda	Cards belonging to training guide for cost-benefit analysis of climbing beans	NARO	Training of trainers and lead farmers
15	Cards for budgeting - labour costs	Uganda	Cards belonging to training guide for cost-benefit analysis of climbing beans	NARO	Training of trainers and lead farmers
42	Participatory research extension approach: N2Africa extension method	All countries	Participatory research and extension methods		Extension
43	A Ranking System for Legume Root Nodules. N2Africa Training Report	All countries	Nodulation scoring		Technical training
47	Agro-Dealer Training Manual Zimbabwe 2012-2013 Season	Zimbabwe	Biological nitrogen fixation, inoculation		Technical training
48	A revised manual for rhizobium methods and standard protocols	All countries	Rhizobiology		Technicians, students
59	Legume inoculant technology and quality control procedures: Workshop manual	All countries	Inoculant production, quality control	Murdoch University	Laboratory technicians
82	Rhizobia Strain Isolation and Characterisation Protocol	All countries	Rhizobia Strain Isolation and Characterisation		Technicians, students



3.3 Rhizobium inoculation

A number of different leaflets and posters have been developed on the practical application of rhizobium inoculant to seeds, using different types of inoculants. These are mainly targeted to Lead farmers. The “Legume inoculation technology manual” and “Seed Inoculation: Master Farmer Training Practical” are more extensive manuals for extension officers.

Table 4: N2Africa Dissemination tools on Rhizobium inoculation

Number	Title	Country	Topic	Partners	Target audience
24	Como inocular a soja: uso do inoculante legume Fix	Mozambique	Inoculation, soybean	CLUSA, ASHC	Training of trainers and lead farmers
35	Banco e Inoculante	Mozambique	Seed bank, inoculation, soybean	USAID	Extension
36	How to inoculate soybean: using Legume Fix	All countries	Inoculation, soybean	ASHC	Extension
39	Practical Steps to Inoculant Application – Slurry Method (Poster)	Ghana	Inoculation	KNUST	Training of trainers and lead farmers
40	Legume inoculation technology manual	Ghana	Inoculation	KNUST	Extension
53	Inoculation of Legumes - Zimbabwe	Zimbabwe	Inoculation		Extension
61	Seed Inoculation: Master Farmer Training Practical	All countries	Inoculation		Training of trainers and lead farmers
65	Inoculant application instruction in Swahili	All countries	Inoculation		Extension



3.4 Agricultural management practices for legumes

For each of the N2Africa target legumes (except chickpea and faba bean in Ethiopia), extension leaflets were developed in partnership with ASHC and based on request of the countries. Some of the leaflets for soybean were translated in Kiswahili. In Tanzania, Rwanda and Uganda, materials were developed in partnership with national agricultural institutes. For instance, leaflets in local languages for soybean, common bean and cowpea, posters with information about varieties for climbing bean and soybean, and pest and disease management for climbing beans. Also, general manuals for moisture conservation and integrated pest management in legumes are available.

Table 5: N2Africa Dissemination tools on Agricultural management practices for legumes

Number	Title	Country	Topic	Partners	Target audience
3	Common bean Technology brief for common bean northern Tanzania	Tanzania	Common bean, agronomy, post-harvest handling, marketing	ASHC, TARI, AFAP, Ilogix, FRI	Development practitioners, extension staff, farmers
7	Better beans through good agricultural practices: Northern Tanzania	Tanzania	Common bean, general agronomy	ASHC, TARI Selian	Extension officers, farmers
8	Better beans through good agricultural practices: Southern Highlands Tanzania	Tanzania	Common bean, general agronomy	ASHC, TARI Selian	Extension officers, farmers
12	Twongere umusaruro w'lbishyimbo dukoresha inyongeramusaruro ya Rizobiyumu / Increase bean productivity through the use of Rhizobium	Rwanda	Common bean, general agronomy, biological nitrogen fixation, inoculation,	RAB	Extension officers, farmers
16	Take home flyer Climbing Bean with varieties	Uganda	Climbing bean varieties, nutritional value, seed quality, storage	NARO	Farmers
17	Major Pests and Diseases of Climbing Bean	Uganda	Climbing bean pests and diseases	NARO	Extension officers, farmers
28	Better beans through good agricultural practices: Rwanda	Rwanda	Common bean, general agronomy	ASHC	Extension



Number	Title	Country	Topic	Partners	Target audience
32	Better sugar bean through good agricultural practices: Zimbabwe	Zimbabwe	Common bean, general agronomy	ASHC	Extension
33	Better beans through good agricultural practices: Ethiopia	Ethiopia	Common bean, general agronomy	ASHC	Extension
37	Staking climbing beans	All countries	Climbing bean, staking	ASHC	Extension, Lead farmers
	Cowpea				
5	Lima kunde kwa lishe na kipato Zaidi	Tanzania	Cowpea, general agronomy	TARI Ilonga	Extension officers, farmers
22	Better cowpea for farmers in Nigeria	Nigeria	Cowpea, general agronomy	ASHC	Extension
27	Better cowpea through good agricultural practices: Zimbabwe	Zimbabwe	Cowpea, general agronomy	ASHC	Extension
30	Better cowpea through good agricultural practices: Zimbabwe	Zimbabwe	Cowpea, general agronomy	ASHC	Extension
	Groundnut				
4	Ongeza mavuno ya karanga kwa kutumia mbinu bora za kilimo	Tanzania	Groundnut, general agronomy	TARI Makutupora	Extension officers, farmers
9	Better groundnut through good agricultural practices: Tanzania	Tanzania	Soybean, general agronomy	ASHC, TARI Uyole	Extension officers, farmers
21	Better groundnut for farmers in Nigeria	Nigeria	Groundnut, general agronomy	ASHC	Extension
31	Better groundnut through good agricultural practices: Zimbabwe	Zimbabwe	Groundnut, general agronomy	ASHC	Extension



Number	Title	Country	Topic	Partners	Target audience
	<i>Soybean</i>				
2	Technology brief for Soybean production in Tanzania	Tanzania	Soybean, biological nitrogen fixation, inoculation, agronomy, post-harvest handling, marketing	ASHC, TARI, AFAP, Ilogix, FRI	Development practitioners, extension staff, farmers
6	Better soybean through good agricultural practices: Tanzania	Tanzania	Soybean, general agronomy	ASHC, TARI Uyole	Extension officers, farmers
10	Twongere umusaruro wa soya dukoresha inyongeramusaruro ya Rizobiyumu / Increase soybean productivity through the use of Rhizobium	Rwanda	Soybean, general agronomy, biological nitrogen fixation, inoculation	RAB	Extension officers, farmers
14	Amoko meza ya soya yera mu Rwanda / Best varieties of Soybean in Rwanda	Rwanda	Soybean varieties, products	RAB	Extension officers, farmers
18	Twongere umusaruro wa soya Dukurikiza amabwirizwa duhabwa / Increase soybean productivity through following technical advice given	Rwanda	Soybean, general agronomy	RAB	Extension officers, farmers
23	Better soybean for farmers in Nigeria	Nigeria	Soybean, general agronomy	ASHC	Extension
25	Better soybean through good agricultural practices: Zimbabwe	Zimbabwe	Soybean, general agronomy	ASHC	Extension
26	Better soybean through good agricultural practices: Rwanda	Rwanda	Soybean, general agronomy	ASHC	Extension
34	Better soybean through good agricultural practices: Ethiopia	Ethiopia	Soybean, general agronomy	ASHC	Extension
58	Mbinu bora za kuongeza uzalishaji wa Soya, mahindi na Mtama	All countries	General agronomy, soybean		Extension
68	Soybean varieties with photo references	All countries	Soybean varieties		Extension



Number	Title	Country	Topic	Partners	Target audience	
70	Best practices to maintain high yields and grain quality of soyabean, English and Kiswahili version	Kenya	General agronomy, post-harvest handling	ASHC	Extension	
71	Best practices to maintain high yields and grain quality of soybean	Kenya	General agronomy, post-harvest handling		Extension	
77	How to grow soybean	All countries	General agronomy, soybean		Training of trainers and lead farmers	
All legumes						
52	Moisture Conservation in Arable Lands	Zimbabwe	Moisture conservation		Extension	
54	Legume Production Notes : Soyabean, Sugar bean, Cowpea and Groundnut	Zimbabwe	General agronomy, inoculation, processing		Extension	
72	Integrated pest management for N2Africa legume crops	All countries	Pest management		Extension	



3.5 Post-harvest handling, processing and marketing of legumes

Different training guides, farmers' handbooks and posters are available about quality aspects of post-harvest handling, the processing of legumes into different products (e.g. snacks, soybean milk, sauce), and the marketing of legumes. Two training guides specifically deal with 'farming as a business', and the development of business plans for agricultural enterprises.

Table 6: N2Africa Dissemination tools on Post-harvest handling, processing and marketing of legumes

Number	Title	Country	Topic	Partners	Target audience
1	Value addition to grain legume processing of cowpea, groundnut, and soybean to smallholder farmers in Borno State	Nigeria	Soybean, cowpea and groundnut processing	BOSADP	Development practitioners, extension staff, farmers
19	Post Harvest Handling Steps - Climbing bean	Uganda	Climbing bean, post-harvest handling	NARO	Extension officers, farmers
41	Establishing a Business Plan for an Agricultural Enterprise: A Trainers Guide Manual 3	All countries	Enterprise development	CIALCA, DGDC	Technical training
44	Farmers' handbook for agricultural marketing: Manual for Trainers	All countries	Marketing		Training of trainers and lead farmers
50	Farmers' handbook for agricultural marketing	Zimbabwe	Marketing		Farmers
55	Post-Harvest Handling Guidelines for Legumes	Zimbabwe	Post-harvest handling of legumes		Extension
56	Farming as a Business - Zimbabwe	Zimbabwe	Enterprise development		Extension
60	Mince and Press soya milk	All countries	Processing, soybean		Farmers
66	Mwongozo wa Mafunzo ya Usindikaji wa Nafaka za Jamii Kunde: Ongezeko la Thamani kwa Maharagwe, Kunde, Karanga na Soya kwa Wakulima Wadogo Barani Afrika	All countries	Processing, post-harvest handling		Extension
67	Grain legume processing presentation in Kiswahili	All countries	Processing, post-harvest handling		Extension



Number	Title	Country	Topic	Partners	Target audience
69	Grain Legume Processing Handbook: Value addition to bean, cowpea, groundnut and soyabean by small-scale African farmers	All countries	Processing, post-harvest handling		Extension



References

Turner, A. (2011), Dissemination Tools Produced, www.N2Africa.org, 17 pp.

Woomer, P.L. (2010), Biological Nitrogen Fixation and Grain Legume Enterprise: Guidelines for N2Africa Master Farmers. Tropical Soil Biology and Fertility Institute of the International Centre for Tropical Agriculture, Nairobi, 17 pp.



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 soyabean, common bean, cowpea, and groundnut varieties with proven high BNF potential and sufficient seed availability in target impact zones of N2Africa Project
10. Project launching 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 seeds 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 seeds 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
45. Number of extension events organized per season per country
46. N2Africa narrative reports Month 30
47. Background information on agronomy, farming systems and ongoing projects on grain legumes in Uganda
48. Opportunities for N2Africa in Tanzania
49. Background information on agronomy, farming systems and ongoing projects on grain legumes in Ethiopia
50. Special events on the role of legumes in household nutrition and value-added processing
51. Value chain analyses of grain legumes in N2Africa: Kenya, Rwanda, eastern DRC, Ghana, Nigeria, Mozambique, Malawi, and Zimbabwe
52. Background information on agronomy, farming systems and ongoing projects on grain legumes in Tanzania
53. Nutritional benefits of legume consumption at household level in rural sub-Saharan Africa: Literature study
54. N2Africa project progress report month 42
55. Market analysis of inoculant production and use
56. Soyabean, common bean, cowpea, and groundnut varieties with high Biological Nitrogen Fixation potential identified in N2Africa impact zones
57. A N2Africa universal logo representing inoculant quality assurance
58. M&E workstream report
59. Improving legume inoculants and developing strategic alliances for their advancement
60. Rhizobium collection, testing and the identification of candidate elite strains
61. Evaluation of the progress made towards achieving the Vision of Success in N2Africa
62. Policy recommendation related to inoculant regulation and cross-border trade
63. Satellite sites and activities in the impact zones of the N2Africa project
64. Linking communities to legume processing initiatives
65. Special events on the role of legumes in household nutrition and value-added processing



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66. Media events in the N2Africa project
 67. Launching N2Africa Phase II – Report Uganda
 68. Review of conditioning factors and constraints to legume adoption and their management in Phase II of N2Africa
 69. Report on the milestones in the Supplementary N2Africa grant
 70. N2Africa Phase II Launching in Tanzania
 71. N2Africa Phase II 6 months report
 72. Involvement of women in at least 50% of all farmer-related activities
 73. N2Africa Final Report of the First Phase: 2009-2013
 74. Managing factors that affect the adoption of grain legumes in Uganda in the N2Africa project
 75. Managing factors that affect the adoption of grain legumes in Ethiopia in the N2Africa project
 76. Managing factors that affect the adoption of grain legumes in Tanzania in the N2Africa project
 77. N2Africa Action Areas in Ethiopia, Ghana, Nigeria, Tanzania, and Uganda in 2014
 78. N2Africa Annual Report Phase II Year 1
 79. N2Africa: taking stock and moving forward. Workshop report
 80. N2Africa Kenya Country report 2015
 81. N2Africa Annual Report 2015
 82. Value Chain Analysis of Grain Legumes in Borno State, Nigeria
 83. Baseline report Borno State
 84. N2Africa Annual Report 2015 DR Congo
 85. N2Africa Annual Report 2015 Rwanda
 86. N2Africa Annual Report 2015 Malawi
 87. Contract Sprayer in Borno State, Nigeria
 88. N2Africa Baseline Report II Ethiopia, Tanzania, Uganda, version 2.1
 89. N2Africa rhizobial isolates in Kenya
 90. N2Africa Early Impact Survey, Rwanda
 91. N2Africa Early Impact Survey, Ghana
 92. Tracing seed diffusion from introduced legume seeds through N2Africa demonstration trials and seed-input packages
 93. The role of legumes in sustainable intensification – priority areas for research in northern Ghana
 94. The role of legumes in sustainable intensification – priority areas for research in western Kenya
 95. N2Africa Early Impact Survey, Phase I
 96. Legumes in sustainable intensification – case study report PROIntensAfrica
 97. N2Africa Annual Report 2016
 98. OSSOM Launch and Planning Meeting for the west Kenya Long Rains 2017
 99. Tailoring and adaptation in N2Africa demonstration trials
 100. N2Africa Project DR Congo Exit Strategy



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101. N2Africa Project Kenya Exit Strategy
 102. N2Africa Project Malawi Exit Strategy
 103. N2Africa Project Mozambique Exit Strategy
 104. N2Africa Project Rwanda Exit Strategy
 105. N2Africa Project Zimbabwe Exit Strategy
 106. N2Africa Annual Report 2017
 107. N2Africa review of policies relating to legume intensification in the N2Africa countries
 108. Stakeholder Consultations report
 109. Dissemination survey Tanzania
 110. Climbing bean x highland banana intercropping in the Ugandan highlands
 111. N2Africa Annual Report 2018
 112. N2Africa Annual Report 2018 Ethiopia
 113. N2Africa Annual Report 2018 Ghana
 114. N2Africa Annual Report 2018 Nigeria, Borno State
 115. N2Africa Annual Report 2018 Tanzania
 116. N2Africa Annual Report 2018 Uganda
 117. N2Africa training and extension materials



Partners involved in the N2Africa project



AZN



PRODUZIDO EM MOÇAMBIQUE



AGENCY FOR SUSTAINABLE RURAL TRANSFORMATION



AGINSBA



Growing Africa's Agriculture



From Seed to the Market



Bayero University Kano (BUK)



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Agribusiness & Rural Dev't Solutions



Caritas Rwanda



Improving livelihoods



Centro Internacional de Agricultura Tropical



CONCERN UNIVERSAL



GHANA



CATHOLIC RELIEF SERVICES



Diobass



Self-Helping Livelihoods



Eglise Presbyterienne Rwanda



Ethiopian Institute of Agricultural Research



Cooperative Agency (CA) Ethiopia



GeAgrofia



Research to Nourish Africa



INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE



Omani Agricultural Research Institute



Jay Fortunes



Kwame Nkrumah University of Science and Technology



AKF



For sustained livelihoods



MAKERERE UNIVERSITY



MENAGESHA BIOTECH



Karlheinz Böhm's Äthiopienhilfe



University of Nairobi MIRCEN



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RWANDA AGRICULTURE BOARD



Resource Projects-Kenya



SARCAF



Sasakawa Global: 2000



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wocan Women Organized for Change in Agriculture and MSE



World Vision