N2Africa Kenya Country Annual Report 2015

Working through partners to advance BNF technologies in Kenya

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N2Africa

Putting nitrogen fixation to work for smallholder farmers in Africa

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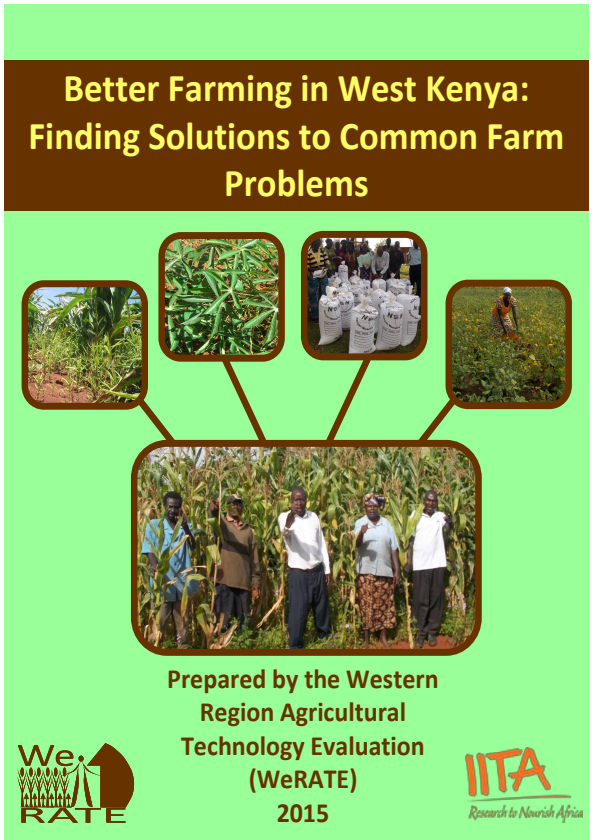
Table of contents

Introduction

This report covers the Kenya Country activities of the N2Africa Project undertaken from January through November 2015. These activities mainly revolve around Biological Nitrogen Fixation (BNF) technology tests and outreach through the WeRATE Agricultural Clearinghouse, marketing and value addition to soyabean led by AWE and inoculant quality assurance led by the University of Nairobi MIRCEN *(Activities 1.3, 1.6 and 2.5)*. It summarizes our strategy meetings, technology testing, training of farmers, technology dissemination events, monitoring and evaluation, and the establishment and operations of the N2Africa One Stop Shops. The format of this report is in general compliance with the template distributed by the N2Africa Leadership Team and is organized by the five N2Africa Phase 2 Objectives and their component Milestone tasks.

1. Farmer Training

WeRATE through its farm liaison team conducted a number of training actions. This training was based on needs assessment and gaps identified. On-farm training was adopted to ensure that farmers understand the concepts rather than the formal "class room approach" *(Activity 1.8)*. The specific training conducted included importance of nitrogen to crops, legume crops and nitrogen fixation, inoculation and inoculants, data collection and reporting, value addition and marketing, input chain and operations of One Stop Shops. In total, 26 WeRATE group representatives, 50 Master Farmers and 12,560 farmers received training in 2015. Group leaders and N2Africa Master Farmers are instrumental in undertaking grassroots training. IITA has also continued assisting WeRATE in the development and printing of farmer friendly extension materials where each group has received more than 250 copies of our "Better Farming" manual. County agricultural officers, KARLO (Kenya Agriculture Research and Livestock officers) and commercial input suppliers have also positively assisted in technology dissemination. WeRATE popularized its dissemination strategy through publication of an in-depth case study. Publication highlights follow.



- 4000 Booklets on "Better Farming in West Kenya: Finding solutions to common problems". Published in both English and Swahili, 28 pages with many photos, tables and figures, copies distributed during field days, additional copies were made available to WeRATE members at the August Clearinghouse meeting.
- Participated in the Humidtropics Innovation Platform Case Study: 15 pages, accepted for publication, advance copies were made available at the August Clearinghouse meeting. The study was prepared by Paul L. Woomer, Ms. Welissa Mulei and Ms. Celister Kaleha.
- Participated in the Integrated Systems Conference (paper on Legume Integration accepted)

2. BNF Technology Testing

WeRATE implements its activities through an inclusive, transparent and participatory research and dissemination approach. This approach ensures synergy, ownership and sustainability by participating, subscribing member groups. At the onset of each season, members are first introduced to candidate technologies, results of the previous season are reviewed, then next-step field protocols reviewed and adjusted to suit subscriber's needs. Once member participation is solicited, agreements are then signed that formalizes the partnership. This activity is conducted during a planning meeting workshop. It is normally undertaken one month prior to the start of each growing season to enable partners and other stakeholders to provide feedback and make necessary adjustments to the protocols. These planning workshops were conducted from 18 to 20 February 2015 at the Maseno Hotel (long rains, see Appendix 1 for participants) and 26 to 28 August 2015 at ARDAP Guest House (short rains) that were attended by 40 and 44 participants, drawn from 26 dues-paying WeRATE members, respectively, as well as representatives of farm input supply companies, Agricultural Extension Officers from county government, CGIAR Humidtropics partners and other selected resource persons *(Activity 2.1)*. The planning was conducted within the larger WeRATE Agricultural Clearinghouse where farmer groups and local NGOs subscribe to test technologies on offer from the CRP Humidtropics Program. N2Africa and Humidtropics activities by WeRATE were recently summarized in an article accepted for publication by the Humidtropics innovation platform case study "WeRATE operations in West Kenya" by P.L Woomer, Welissa Mulei and Celister Kaleha (14 pp, in press).

During 2015, 25 WeRATE members were introduced to Biological Nitrogen Fixation (BNF) tests. These tests evaluate the rate of applied Sympal fertilizer and compare it to starter nitrogen application in a six-management field test *(Activity 2.3)*. These managements included no fertilizer, Sympal applied at 62, 125 and 250 kilograms per hectare and new fertilizer blend similar to Sympal but containing 10% nitrogen (the latter intended for bean growers) using soyabean cv Squire. Results from these long rains technology tests are reported later in this report.

Various sets of data generated by WeRATE members were submitted for data entry, analysis and sharing. The data forms range from field layout and sketches, nodule score, disease and pest score as well as yield determination and were compiled and entered by Ms. Welissa Mulei. Monitoring and Evaluation forms that cover media events, field days, technology preferences, input distribution, training, and list of participants were also completed and sent to the M&E Specialist. The farm liaison team led by Mr. Wycliff Waswa conducted regular field visits to guide farmers on data collection. WeRATE member groups returned data through email, SMS and tablets as well as hard copies. Data

Table 1. WeRATE N2Africa Technology Test results for the Long Rains 2015: Effects of Sympal application rate (0 to 250 kg/ha) and starter nitrogen (± 12.5 kg N/ha)

Crop Management		no fertilizer	low application	standard application	standard + starter N	higher application	Very high application
Fertilizer P	kg/ha	0	6.25	12.5	12.5	18.7	25
Fertilizer N	kg/ha	0	0	0	12.5	0	0
Total Sympal	kg/ha	0	62.5	125	125	187	250
Fertilizer cost	$/ha	0	$46	$91	$104	$137	$183
Root nodules	no ± sem	11 ± 1.4	16 ± 1.6	22 ± 2.6	23 ± 2.0	22 ± 2.1	26 ± 2.5
Total nodules	x 106/ha	3.4	5.2	7.1	7.3	7.3	7.7
Crown nodulation	% ± sem	56 ± 20	42 ± 8	63 ± 9	73 ± 7	74 ± 6	72 ± 7
Red nodulation	% ± sem	45 ± 7	63 ± 7	74 ± 7	75 ± 8	77 ± 7	74 ± 8
Total red nodules	x 106/ha	1.5	3.3	5.3	5.4	5.6	5.7
Fertilizer AE	kg/kg P±N	na	46	51	26	33	20

collection for long rains was completed and analyses performed. The short rains data set is being collected and the diagnostic trials are currently at early-podding. WeRATE shares the synthesized data during planning meetings, mid- and end-season evaluations and with individual groups. Twelve field days are scheduled between 4 and 18 December 2015.

During the 2015 Long Rains, WeRATE conducted 26 field tests in West Kenya in conjunction with the N2Africa Project and the Humidtropics Program. These tests examined MEA's Sympal fertilizer blend and compared it to starter nitrogen application in a six best-practice trial. These managements include no fertilizer, Sympal applied at 62, 125, and 250 per ha and a new fertilizer blend similar to Sympal but containing 10% nitrogen using soyabean cv Squire at 444,000 plants per ha. All managements receive BIOFIX legume inoculant. These nutrient addition rates, and their cost per ha appear in Table 1. Economic returns to these managements appears in Table 2.

Table 2. Economic analysis of the long rains on-farm field tests.

Crop Management	total cost	gross return	net return	benefit: cost RATIO	labor days per ha
	-------- $/ha --------				
no inputs	201	651	450	3.23	44
63 kg/ha sympal	249	801	552	3.21	44
125 kg/ha sympal	297	983	686	3.31	44
125 kg/ha sympal w/starter N	316	994	678	3.14	46
187 kg/ha sympal	341	1021	680	2.99	44
250 kg/ha sympal	385	960	575	2.49	44

Fertilizers increased the number of root nodules from 11 to a maximum 26 per plant, the latter equivalent 7.7 million nodules per ha. Fertilizer also improved crown nodulation (+18%) and the proportion of root nodules with red interiors (+32%). When nodule numbers, red nodules and plant stands (data not presented) are considered, the number of effective soyabean nodules increased by a maximum 4.2 million per ha. Grain yield increased by 0.7 t per ha with non-fertilized soyabeans producing 1.2 t per ha and the best managements (125 and 187 kg/ha Sympal) producing similar yields. Starter N (+12.5 kg N) resulted in only slightly greater yields (+20 kg per ha). The total value of

WeRATE team displays trophy at ASK show (ranked 1st Best Agro-based processing category

Climbing bean demonstration by N2Africa at the ASK show in Kakamega

soyabeans (at US $600 per ton) ranged between $651 (no fertilizer) to $1021 (187 kg/ha Sympal) per ha (Table 1). When fertilizer costs are considered (Table 2, Appendix 2), the net returns range from $450 (no fertilizer) to $686 (standard rate). The fertilizer Agronomic Efficiency (AE) examines the ratio of grain yield increase resulting from applied fertilizers. This value is highest at lower addition rates and decreases as applied nutrients are used less efficiently. In these trials, a maximum of 51 kg soyabean grain resulted from addition of one kg Sympal at a rate of 125 kg per ha. The following conclusions were reached:

1. The previously recommended rate of Sympal at 125 kg per ha (= one 50 kg bag per acre) performed best, and this starter recommendation should be retained.
2. Starter N in conjunction with Sympal increased nodule number and yield, but there was no economic benefit from this addition of 12.5 kg N due to its added cost (+ $13 per ha).
3. Nodule number, crown nodulation and nodule effectiveness in inoculated soyabean (BIOFIX at 10 g per kg seed) respond to the first dose of Sympal but plateau at 125 kg per ha. Starter N increases nodulation at 125 kg Sympal.
4. The greatest economic return ($686 per ha = KES 69,286) is achieved at the previously recommended rate of Sympal, but starter N proves useful in less fertile soils as well.

3. Field days and media events

Field days are one of the key entry points in technology sharing and dissemination. During the long rains season, 11 field days and county events were conducted and 5537 farmers reached (52% women). Farmers and other stakeholders selected Biofix in conjunction with a new fertilizer blend (10:23:23) from Mea Ltd. and the current best-practice Biofix inoculant and Sympal fertilizer at the rate of 125 kg per hectare widely acknowledged as the preferred managements. At least 12 field days are planned for this short rains season as well *(Activities 2.4 and 2.5).*

In addition, WeRATE participated in Agriculture Society of Kenya 2015 show in Kakamega. The show ran from 17-20 June 2015 and provided an excellent platform to inform farmers about the latest agricultural technologies developed and tested by WeRATE. WeRATE set up an example One Stop Shop and sold over 600 kg of soyabean seed, 200 kg of Sympal and 600 packets of BIOFIX. Soymilk, yoghurt, soy snacks, and protein fortified flour were also sold. The exhibit was viewed by 1,242 registered adults (56% of which were women) and over 2500 school children, dignitaries and judges. At the end of the show, WeRATE was ranked 1st in category of Best Agro-based Processing Exhibit and 2nd Best NGO Category among numerous competitors from government, research and non-governmental organizations, the private sector and others that were represented. Articles and photos were posted on the N2Africa Podcaster and the Humidtropics Newsletter.

The visiting delegation keen on soybean management at the MFAGRO demonstration in Vihiga

Visitors briefed by WeRATE team on projects undertaken in Western Kenya

WeRATE also hosted a delegation of 25 visitors consisting of academics, researchers, interns, farmers and youth on May 9, 2015, including Prof. Pedro Sanchez, the "father" of modern tropical soil science. The delegation originated from China, USA (Cornell University) and University of Nairobi and visited MFAGRO, a WeRATE member in Vihiga County. The objective of the visit was exposure to WeRATE projects in Western Kenya and a chance to discuss technology transfer with farmers (including Dick Morgan Ongai, the "farmer on the ground"). The visit provided an excellent opportunity for information sharing and one-to-one interaction between farmers and scholars. The opportunity greatly motivated and encouraged participating farmers.

4. Legume Marketing and Processing

Marketing and legume processing activities are led by a private company specializing in soyabeans, Annapolis Wonder Enterprises (AWE) as guided by *Activity 2.8*. Opportunities for collective marketing and value addition for smallholder farmer associations were identified in the period between January 2015 and November 2015. The activities undertaken were provision of marketing support, assist in factory product design and packaging, support to One Stop Shops and conducting of a legume marketing and processing workshop. All 26 members of the WeRATE Platform were involved in these activities whose emphasis was mainly on soyabean marketing, product development & packaging and stocking of production inputs for soyabean. Of these members, 80% of them actively engaged in commercial soyabean production while the remaining 20% produce soyabean for improved household nutrition. This section summarizes a detailed report by Ms. Josephine Ongoma (12 pages) submitted in November 2015 by AWE that covers both the 2014-2015 short rains and the 2015 Long rains (see Tables 3 and 4).

Table 4: Selected features of soybean production, collation, pricing, buying and selling based upon the April 2015 questionnaire.

27	number of WeRATE partners
80%	of WeRATE Partners engaged in commercial soybean production
224	tons surplus soybean yield in the year 2014 long and short rains
188	tons soybean grain sold through aggregation centers to large scale buyers and processors
30	tons soybean sold through collection centers to local processors and as seed to new farmers
6	tons soybean sold directly by farmers at the farm gate to local consumers.
254	tons soybean, projected surplus yield 2015 long rains
42/-	lowest aggregation-center –gate asking price per kg of soybean
130/-	highest aggregation-center-gate asking price per kg of soybean
75/-	highest aggregation-center-gate price paid per kg of soybean in 2014
38/-	lowest factory gate price offered by a large scale processor in Nakuru
50/-	highest factory gate price offered by large scale processors in Nairobi and Thika

Table 3. Projected supply of soybeans at WeRATE collection points following the 2015 long rains growing season.

Soyabean variety	Projected Yield 2015 Long rains
SB 19	218,100 kg
SC Squire	32,400 kg
SB 25	1200 kg
SC Salama	1,800 kg
Total	253,500 kg

Following the long rains, WeRATE farmers bulked and collectively marketed over 253 tons of soyabeans worth over $130,000 (not including sales and consumption by individual households). These bulking centers are in direct communication with buyers who transport soyabeans from members' sites and offer cash on the spot, but too often groups do not have formal contractual arrangements with these buyers guarantying subsequent sales. Furthermore, there is a threat of flooding the soyabean market, and a possible drop in prices following the recent entry to commercial soyabean production by large-scale farmers of the North Rift Valley and rice farmers in Nyanza. A two-day workshop held in April 2015 identified and reinforced marketing channels and processing opportunities *(Activities 3.2 and 3.6)*. The marketing and processing training offered to WeRATE partners raised opportunities for additional top-end sales and value addition, and forged mutually-beneficial cooperation. For example, 24,000 branded Kinako Soy Flour packages for holding 250 grams and 10,000 branded labels of soy beverage were produced and distributed for use by WeRATE members in soyabean processing plants in Migori, Bungoma and adjacent counties. In support of this processing opportunity, the Center Director of the Kenya Industrial Research and Development Institute Western Region authorized WeRATE partners to run their soyabean processing facilities, opening a market for an additional 45 tons of soyabeans to WeRATE farmers *(Activity 2.5)*.

5. Operations of the One Stop Shops

Five new one-stop shops were established in 2015 in addition to the existing eight bringing the total to 13 shops (or 50% of WeRATE members). The five groups submitted business plans, vetting has been done and awards are ongoing. The One Stop Shops are strategically placed to market farm inputs and distribute information on grain legumes so that new discoveries and products are rapidly available across the West Kenya farming community *(Activities 2.6 and 2.7)*. The products include BIOFIX legume inoculants, Sympal fertilizer, a fertilizer blend resulting in healthy growth of legumes containing (PK + Ca, Mg, S & Zn in the ratios of 0-23-16-10-4-1-trace, quality legume seed and information on marketing and value addition. The groups were assisted with initial capital and guidelines to develop business plans by WeRATE officers, groups were also trained on entrepreneur skills, input chain supply, market appraisal, contractual agreements, recordkeeping and financial reporting. An exchange visit between more experienced One Stop Shop keepers and new groups is planned for next season. The marketing arm encouraged the use of soyabean processing facilities of KIRDI to produce and stock their shops with branded KEBS certified Kinako Soy**.** In response, four of these organizations processed and stocked their shops with 1,500 packets of Kinako Soy but this must be done carefully as food products and production inputs cannot be sold in the same location (or at least in adjacent shelves of small shops).

6. Rhizobiology and Inoculant Quality Control

Collaboration with the University of Nairobi MIRCEN continues. The laboratory conducts characterization of its elite strains for bean and soyabean. Sequencing was performed on two bean strains that were shown to be *Rhizobium tropici* using 16S rRNA sequencing. Similar work was performed on soyabean rhizobia shown to be *Bradyrhizobium elkanii*. More information on this work appears in the recently completed M.Sc. thesis of Mr. Martin Koinage working under the supervision of Prof. Nancy Karanja.

Another study evaluated the effectiveness of Kenya's native rhizobia on pea (*Pisum sativum*). Pea is not one of N2Africa's target legumes but it has become an extremely important cash crop in the Central Highlands and Kenya's commercial inoculant producer requested assistance from MIRCEN in this regard. The rhizobia isolates were recovered from nodules of cultivated legume hosts *Pisum sativum* (snow pea, garden pea and snap peas) and *Vicia faba* (broad bean) in the high elevation Agro-Alphine zone of Mt. Kenya and The Aberdares Range. In all, 66 rhizobial isolates were added to the NAK isolate collection and tested for genetic compatibility and nitrogen fixing ability with snow pea cv. Oregon II (*Pisum sativum* L.) in three liter pots using sterile horticultural grade vermiculite and compared to a standard commercial strain USDA 3456. Based on an Effectiveness Index (Figure 1), rhizobia isolates were placed into two different categories: effective and ineffective with two strains performing very well and the 20 most effective strains scheduled for further testing under non-sterile growth conditions. The USDA standard performed poorly, accounting for MEA's difficulty in preparing a quality pea inoculant and its request to N2Africa.

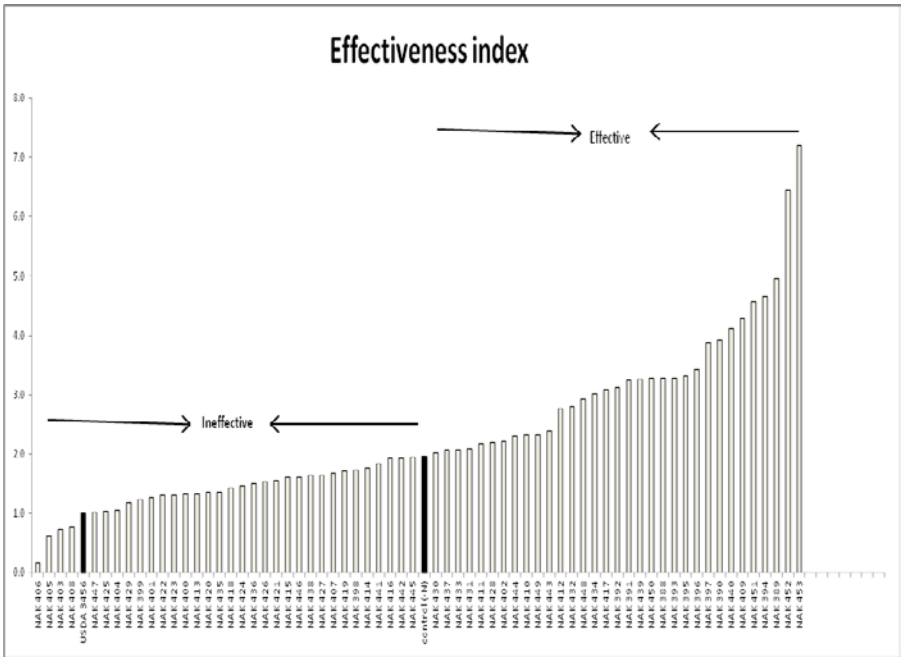


Figure 1. Effectiveness Index of indigenous rhizobia isolates on snow pea variety Oregon II grown in rhizobia-free vermiculite.

Table 5. Rhizobial populations and contaminants in BIOFIX legume inoculants measured from factory shelves and expired stock during 2015 (from UoN MIRCEN).

Brand	Test	Host	Count (n)	Age (days)	Rhizobia (g^{-1})	CV (%)	Contaminants (g^{-1})	CV (%)
BIOFIX	factory shelf	bean	8	46	4.61×10^9	63	3.45×10^7	86
BIOFIX	factory shelf	g'gram	3	93	5.65×10^9	10	1.82×10^7	37
BIOFIX	factory shelf	lucerne	4	69	6.15×10^9	20	1.61×10^7	115
BIOFIX	factory shelf	pea	4	92	3.36×10^9	27	2.56×10^7	55
BIOFIX	factory shelf	soy	22	55	4.39×10^9	45	2.48×10^7	62
BIOFIX	**factory shelf**	**overall**	**41**	**71**	**4.83×10^9**	**33**	**2.38×10^7**	**71**
BIOFIX	expired stock	soybean	2	345	3.30×10^7	21	6.33×10^7	4

One of the main goals of the N2Africa Project is to advance the use of legume inoculants across Africa and to assure that those reaching farmers are of adequate quality. Kenya is well positioned to achieve this goal because it hosts commercial production of BIOFIX inoculants produced by MEA Ltd. at its dedicated facility in Nakuru. The University of Nairobi MIRCEN Laboratory is responsible to independently monitor inoculant quality for BIOFIX and other biofertilizers under arrangement with the Kenya Bureau of Standards. Samples are routinely recovered from the factory shelves and tested using the drop plate method on Congo Red YMA from dilutions of 10^{-6} to 10^{-9}. To date during 2015, 43 such samples were subjected to quality control testing and the results reported by the laboratory Chief Technician, Stanley Kasamuli (Table 5). While Kenya has not yet finalized its regulatory framework for legume inoculants, a target of at least one billion cells per gram of rhizobia and no more than one million contaminants was established during N2Africa Phase 1.

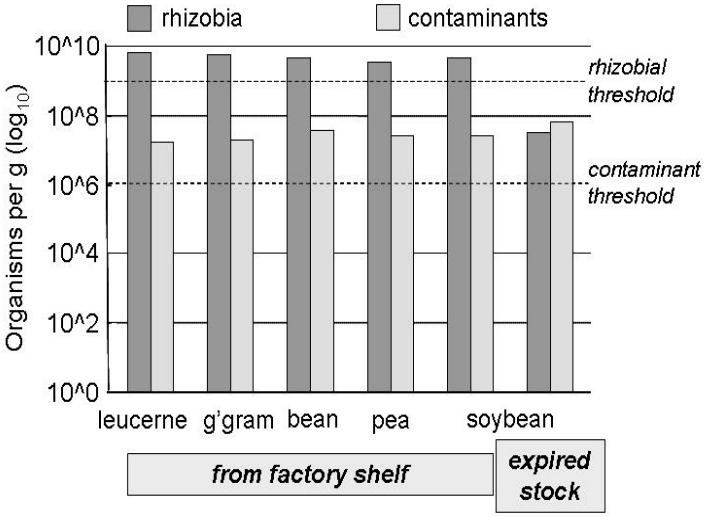


Figure 2. Quality control results for BIOFIX inoculant produced in 2015 of 43 samples from five host products.

These quality control findings are mixed in that the number of rhizobia consistently exceeds the minimum threshold (Figure 2) but contaminants greatly exceed the maximum. Large numbers of rhizobia appear in every host legume product, overall surpassing the target 4.8-fold. Contaminants are also ubiquitous, exceeding the target over 24-fold. The tests of expired soyabean inoculant stock suggest that it is best to rely upon recently produced product. N2Africa partners purchased and applied large amounts of BIOFIX for bean and soyabean during 2015 and routine achieved effective nodulation from this product. Excessive contamination, however, raises two concerns; contaminant organisms may be antagonistic to rhizobia, reducing product efficacy and shelf life, and these contaminants may include human pathogens as has been reported for impure inoculants elsewhere. These findings lead to three main recommendations; BIOFIX must improve the sterilization of its "filter mud" carrier, MEA should consider an alternative carrier such as pre-sterilized peat used by NoduMax in Nigeria (a much purer product), and finally MIRCEN should conduct a more thorough examination of BIOFIX contaminants to assure their safety to product users *(Activity 4.8)*. The MIRCEN laboratory continues to explore the improvement of soyabean inoculants by combining sterilized filter mud (from MEA) with its three elite soyabean strains, NAK 84, 89 and 128. Inoculants are being tested in conjunction with MEA Limited in Kenya, Rwanda. Tanzania, Uganda and Zambia. Results of this activity will appear in our next report *(Activity 4.8)*.

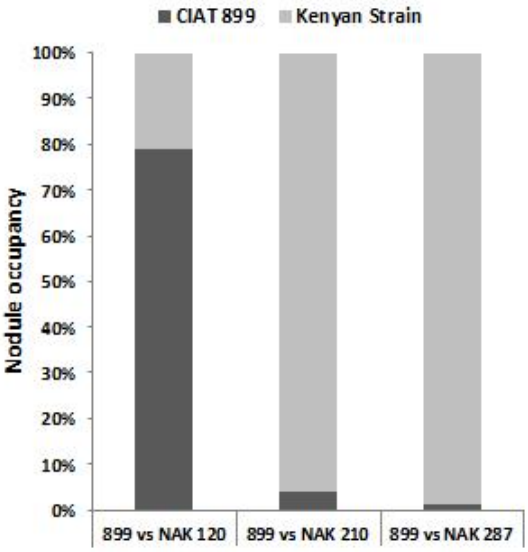


Figure 3. Nodule occupancies in *P. vulgaris* cv Kenya Tamu after seed was inoculated with CIAT 899 into backgrounds of three different Kenyan strains.

Ph.D research by George Mwenda at Murdoch University (Australia) continues on the competitiveness of *R. tropici* CIAT 899 in the presence of native Kenyan strains (NAK) for nodulation of bean. The goal is to better understand

and manage the competitive advantages of rhizobia to form root nodules on bean. For example, CIAT 899 on seed was able to overcome a stable population of 10^5 cells per g of soil of NAK 120 to occupy a large majority of nodules but was out-competed for nodule occupancy in NAK 210 and NAK 287 backgrounds (Figure 3). A moderate supply of nitrogen affects some nodulation parameters but had no effect on nodule occupancy. These findings shed light on difficulties in achieving bean inoculation response in many Kenyan soils.

7. Monitoring and Evaluation

WeRATE has a well established M&E department that works closely with the Farm Liaison team to conduct regular field visits. This ensures that farmers and all stakeholders adhere to the protocols, project milestones, work plans and set targets within a specified time frame. Training in survey tools was conducted before administering M&E. A one-day training workshop to update member groups on M&E tools was conducted among 26 WeRATE members on 29 June 2015 at the ARDAP guest house in Busia County. The workshop was facilitated by Theresa Ampadu-Boakye (N2Africa M&E Specialist) and assisted by Celister Kaleha (WeRATE M&E Specialist) and Wycliffe Waswa (WeRATE Farm Liaison Officer). The main items covered included overview and update of required N2Africa M&E activities that included data collection strategy and structure, N2Africa Theory of Change, project milestones, and feedback mechanisms. Such fora provides a platform for groups to learn from one another, it also harmonized the tools; ensured consistency in the kind of information collected, and leads to validation of tools. The reviewed M&E tools were shared and data collection is ongoing and once ready it will be analyzed by the M$E Specialists and results shared. The M&E department also considers activities related to demonstrations, field days and farmer training in BNF technologies. Eight different, standardized M&E forms were distributed and many filled and returned to the M&E Specialist. Unfortunately we received no feedback from the N2Africa M&E Specialist in advance of preparing this report *(Activity 5.7)* and recommend more rapid performance in the future.

Table 6. Key characteristics of WeRATE members in 2015.

13	WeRATE stakehollder groups interviewed
3230	members per stakeholder group
70%	of these members are women
92%	of groups operate women's chapter
46	field events were conducted
165	participants per field day
56%	of field day participants were women
8	trained Master Farmers operating per group
45%	of Master Farmers are women
18	agrodealers aligned with groups
616	packets of BIOFIX inoculants marketed per shop
75	% of these shops store inoculants under refrigeration
2.4	tons of Sympal fertilizer marketed per shop
92%	of groups produce legume seed
7.4	tons of grain legume seed produced per group
$4,710	$ value of legume seed per group
92%	of groups market legume grain
7.4	tons of grain marketed per group
$0.64	$/kg soybean sales price
$10,339	US $ grain marketed per group
69%	of groups process grain legumes
5.9	tons of grain legumes processed per group
$1.65	$/kg sales price of soy flour
$9,766	$ value of processed legumes per group
$20,584	$ value of legume enterprise per group
$535,174	$ value of legume enterprise per network (estimated)
$68,080	$ budget for 2015 outreach activities
7.9	outreach benefit to cost ratio

To prepare for this report, the 24-query stakeholder questionnaire developed in 2014 was reissued to a sub-sample of 13 WeRATE members during November 2014. The questionnaire was received, completed and returned electronically. A database of 98 descriptors was constructed, inspected and selected summary statistics for 2015 calculated (Table 6). Strong participation by women continues in terms of group membership

and farm liaison *(Activity 3.1)*, although grassroots events are rather small (average 165 participants). Members continue to conduct local partner-led dissemination events *(Activity 2.4)* and last-mile links to BNF production inputs are consolidated, including legume inoculants largely stored under refrigeration *(Activity 2.7)*. Community-based seed production continues with over 7 tons of seed worth over $4,700 produced per group *(Activity 2.6)*. Most groups market (92%) and process (67%) legume grain, generating revenues of over $20,000 through their collective efforts *(Activity 2.8 and 3.6)*. By aggregation and extrapolation to the whole of WeRATE, estimated revenues of $535,174 were directly generated among WeRATE partners in 2015, not including the One Stop Shops, through an "indirect" project outreach investment of about $68,000, resulting in a benefit to cost ratio of 7.9:1. While the electronic pathway of the questionnaire is expedient, it does not allow for direct follow up and restricts open-ended query so that underlying causes and effects of group achievements are not fully explored. Still it offers a monitoring mechanism that may be useful in other countries and to the project as a whole *(Activity 5.7)*.

Finally, a series of focused group discussions were conducted in Migori, Busia and Bungoma counties between 22 and 26 June 2015 to characterize current levels of legume consumption and processing, and identify existing gaps in intervention *(Activities 3.2 and 3.6)*. A total of 45 persons (71% women) described their legume consumption patterns and processing opportunities. There is widespread use of cowpea leaves as a green vegetable, roasted groundnuts as snacks and garnish, soyabeans processed into beverages and fried foods, and bean stews consumed almost daily. About 20% of household diets were legumes, second after cereals and greater than root crops. Groundnut was often roasted and sold in local markets and occasionally beans are boiled and sold to local institutions. Two agro-processing factories were visited in Malakisi (Bungoma County) and Migori town where soyabean flour is milled, blended and sold under the Kinoko packaging strategy *(Activity 3.2)*. Participants recognize the importance of legumes in their diets, are interested in learning new recipes and processing technologies and, as usual, request assistance in developing stronger market linkages.

8. Lessons learned

- Establishment of BNF technology demonstrations in schools and Agriculture Society of Kenya (ASK) county shows widens potential for technology dissemination than relying upon partner field days alone. The ASK shows also provide an excellent platform to display and promote value-added products and recruit new members to the WeRATE platform. Because of its strong pull to the rural community, the ASK shows shall continue to be our preferred media events.
- The WeRATE Agricultural Clearinghouse continues to provide an expedient and cost-effective planning and technology exchange mechanism. It assists in integrating BNF technologies with others, particularly those relating to maize- and cassava-based cropping systems. Combining project planning budgets allows for increased operational funds.
- Marketing of soyabean is now well established in west Kenya. Like beans, much of the soyabean crop remains in west Kenya. Rather than rely upon "top-end" buyers in Nairobi, the crop is increasingly purchased by local institutions, purchased as seed by other development programs and processed into a wide range of nutritious foods. AWE discovered mechanisms that allow smaller-scale processors to benefit from collectively distributed packaging.
- To maximize on the financial gains brought about by increased commercial soyabean production, processing and marketing. WeRATE partners should create trading arms of their organizations, for example, Ground Power Ltd. by KESOFA and True Agriculture Ltd by OWDF.
- The University of Nairobi MIRCEN continues to conduct excellent rhizobiology. Means should be found to provide the laboratory with additional responsibilities, students and funds.

9. Challenges encountered

- The rains continue to be episodic and well above normal in 2015 with floods and hailstones also being experienced. This situation has adversely affected crop production. The heavy rains also have made many back roads impassable, complicating monitoring efforts. This situation continues into the 2015-2016 short rains growing season. WeRATE has two vehicles but neither has four wheel drive.
- Participation in Agricultural Society of Kenya (ASK) county shows was limited to one county event due to shortage of funds. Funds in 2016 must be earmarked to support an additional ASK event.
- Collective marketing through WeRATE continues to pose challenges. Farmers remain reluctant to release their produce without payment resulting in collection point shortfalls. Buyers too often are slow to pick up and to pay. Operations are not based upon contractual arrangements. Fortunately, two new buyers have recently agreed to assigned recurrent quotas and spot payment during the next season.
- Under partner-led Tier 1 arrangements, it is difficult to sustain intense M&E. Partners are reluctant to allow us to evaluate activities that we do not fully support, in large part because of the time and effort required to complete long and complicated M&E forms. We have made suggestions to streamline M&E which has apparent advantages (see Table 6).
- We requested that BNF Technology Business Development Guidelines be prepared.

10. Opportunities identified

- WeRATE effectively collaborates with commercial interests and government bodies and links them to members at the grassroots level. These public-private partnerships include production input suppliers (MEA Ltd), seed companies (Western Seed, FRESCO, SeedCo, Kenya Seed), County Agricultural Extension, the Ministry of Agriculture, and the Kenya Agriculture Research and Livestock Organization.
- WeRATE participates in various platforms and fora including county planning and development groups, the Agriculture Sector Development Programme, and the Humidtropics R4D Platform. WeRATE is also a member of county project steering committees and participates in annual review of group members; time-consuming services that were not anticipated when the platform was first established. These activities serve to raise BNF and legume technologies within partner agendas.
- WeRATE is also evaluating and disseminating more than only BNF and legume technologies. These technologies relate to improved cassava management, striga elimination and control of Maize Lethal Necrosis Virus. In addition, Feed the Future also funds WeRATE to conduct additional BNF technology tests. Some or all of these various technology tests are clustered within sites through arrangement of the Clearinghouse. This provides more efficient management and supervision of field activities but dilutes the profile of N2Africa within "indirect" outreach actions.
- Working through a commercial partner has opened new opportunities and insights. AWE marketing services reached local, larger-scale soyabean buyers including The Lake Basin Development Authority, purchasing 80 tons at KES 60/kg on a cash basis, and Victoria Feeds in Kisumu, purchasing 12 tons annually at KES 50/kg with payment after 21 days. The shared soyabean flour packaging approach offered to WeRATE members that agree to comply with industry standards is novel.

Kenyan achievements in 2015 within the context of Year 2 Milestone Targets

Activity per Objective	Milestone	Milestone Achieved in 2015	Comments
Objective 1: Project strategy, coordination and implementation and capacity strengthening			
1.3. Engage research, development, private sector, and other relevant partners in each of the target countries	1.3. Partners along the legume input and output value chains cooperate actively towards achieving the overall N2Africa goals	WeRATE, AWE and MIRCEN work together to advance BNF technologies and legume enterprise	Private sector partners include MEA Ltd and FreshCo and SeedCo Seed Companies
	1.3.1. By Q2 of year 1, potential partners operating within priority legume value chains mapped	Not applicable in Year 2	
	1.3.2. By Q3 of year 2, MoUs with priority partners in each of the target countries signed	Contracts awarded to WeRATE, AWE and MIRCEN	MoUs not considered for private sector partners
1.6. Organize seasonal/yearly project-wide and country-specific planning workshops	1.6 Scientists and other stakeholder groups are empowered to further the N2Africa research and development	MIRCEN continues rhizobiology and inoculant research and development, Master Farmers report field results	Two MSc graduates from Phase 1 (Bintu and Isaac) awarded PhD scholarship under separate arrangements
	1.6.2. By Q4 of each year, 1 or 2 seasonal, in-country implementation plans developed, evaluated, and revised through in-country- planning meetings	Agricultural Technology Clearinghouse meetings organized by WeRATE and held in advance of long and short rains	Clearinghouse also supported by Humidtropics Program
1.8. Develop and implement a non-degree-related capacity strengthening plan for relevant partners working within legume value chains	1.8.1. By Q4 of year 1, a non-degree-related capacity strengthening plan developed	WeRATE and AWE organize training in BNF technologies and legume value addition	Difficulties in tracking the full extent of farmer-to-farmer BNF technology dissemination resulting from grassroots training
	1.8.2. By Q4 of each year, at least 4 relevant and demand-driven training materials developed in cooperation with the African Soil Health Consortium (ASHC)	"Better Farming in Western Kenya" requested by WeRATE Members, developed and 4000 copies printed	Disseminated at field days and media events, also translated into KiSwahili
Objective 2: Delivery and dissemination, sustainable input supply, and market access			
2.1. Constitute and facilitate in-country/in-region N2Africa stakeholder platforms	2.1. Country-specific inoculant, seed, and fertilizer supply strategies guarantee the sustainable supply of high quality seeds and inoculants and legume-specific fertilizer	BIOFIX legume inoculants and Sympal blended fertilizers are commercially distributed by MEA Ltd. SeedCo registers soyabean cv Saga	BNF technology products distributed through 40 agrodealers including those operated by 13 WeRATE members
	2.1.1. By Q2 of year 1, N2Africa stakeholder platforms operationalized	WeRATE grows in size, difficulties in registration and banking resolved	WeRATE membership grows to 27 groups representing over 79,000 farmers
	2.1.2. By Q4 of years 1-4, stakeholders agree on specific roles and responsibilities across the various N2Africa objectives	WeRATE, AWE and MIRCEN work together to advance BNF technologies and legume enterprise	AWE negotiates use of KIRDI processing facilities in Bungoma, Kisumu and Migori
2.2. Facilitate N2Africa-led	2.2. Dissemination partners attain/surpass the anticipated	Not applicable to Tier 1 countries	

Activity per Objective	Milestone	Milestone Achieved in 2015	Comments
dissemination campaigns in the context of development-to-research learning cycles with attention to gender	number of households targeted and continue to engage in legume intensification		
	2.2.1. By Q1 of years 1-4, specific dissemination guidelines for legume intensification assembled	Not applicable to Tier 1 countries	
	2.2.2. By Q4 of years 1-4, specific dissemination guidelines evaluated by a preset number of male and female farmers	Not applicable to Tier 1 countries	
2.3. Create widespread awareness on N2Africa technologies and interventions	2.3. Local agro-dealers marketing fertilizer, seed, and inoculants are aligned with grassroot producer groups and input wholesalers and manufacturers	MEA distributes BIOFIX and Sympal through its commercial distribution network, including N2Africa One Stop Shops	Distribution of cv Saga delayed, shortcoming filled by community-based seed producers
	2.3.1. By Q4 of years 1-4, at least 2 media events (e.g., radio, newspaper articles, field days, etc) per country implemented	WeRATE participates in Kakamega ASK show. 13 field days conducted.	WeRATE receives 2 awards from the Agricultural Society of Kenya (ASK) including "Best in Agro-processing"
2.4. Facilitate partner-led dissemination campaigns with specific attention to gender	2.4. A preset (see Returns-on-Investment calculations) number of households engaged in the collective marketing and value addition of legume grains and value-added products	471 tons of legumes produced by 27 WeRATE members, records of 224 tons sold, processed or used for seed collected	Mostly soyabeans, sales and processing of long rains production not yet reported. Many WeRATE members no longer report their routine legume sales
	2.4.1. By Q4 of years 2-4, household targets (see Returns-on-Investment calculations), dissemination approaches, and content for partner-led dissemination activities agreed and implemented, with specific attention to gender	Year 2 household target = 10,000. Year 2 achievement 18,097 based upon grassroots training, field day participation and media events.	Difficult to determine how many of the farmers reached with BNF technologies through "indirect" partner mechanisms and commercial channels in 2015 are actually new to N2Africa
	2.4.2. By Q4 of years 3-5, feedback on the performance of the dissemination models and the demonstrated content fed back to N2Africa	Not applicable in Year 2	
2.5. Facilitate private-public partnerships towards the sustainable supply of inoculants and fertilizer	2.5.1. By Q4 of years 1-4, inoculants available through public-private partnerships, through importation and/or local production, the latter facilitated by the inoculant production pilot plant	BIOFIX inoculant widely distributed through commercial channels	Inoculants are now fully commercialized, MEA no longer reports production and sales to N2Africa
	2.5.2. By Q4 of years 1-4, legume-specific fertilizer made available to smallholder farmers by fertilizer companies/retailers	Sympal fertilizer blend widely distributed through commercial channels, new starter N blend for beans recently developed	Legume fertilizer blends are now fully commercialized, MEA no longer reports production and sales to N2Africa
2.6. Facilitate the establishment of private sector-led and/or community-based legume seed systems	2.6.1. By Q4 of years 1-4, sufficient legume foundation seed produced by private enterprises and/or government institutions	SeedCo registers soyabean cv Saga, FreshCo enquires about licensing SB 20	Technology tests suggest SeedCo Squire outperforms Saga and SB 20
	2.6.2. By Q4 of years 1-4, sufficient quality legume seed available to farming communities	No records for 2015 but over 75 tons of improved soyabean seed produced in 2014	SeedCo demands royalties from WeRATE over community-based production of cv

Activity per Objective	Milestone	Milestone Achieved in 2015	Comments
			Squire
2.7. Engage agro-dealer and other last-mile delivery networks in supplying legume agro-inputs	2.7.1. By Q4 of years 1-2, a minimum number of agro-dealers and other delivery network partners trained in the storage, handling, and use of inoculants	No training of agrodealers conducted. One Stop Shop applicants developed business plans for consideration by WeRATE	Five new One Stop Shops commissioned. Training in value added processing conducted by AWE instead
	2.7.2. By Q4 of years 2-5, agro-dealer and other last-mile delivery networks engaged in the commercial supply to farmers of agro-inputs, including inoculants	WeRATE commissions five additional One Stop Shops, 13 total in operation	WeRATE members slow to develop business plans for One Stop Shops
2.8. Establish agri-business clusters around legume marketing and value addition	2.8.1. By Q4 of years 1-4, opportunities for collective marketing and value addition for smallholder farmer associations identified	AWE coordinates the agribusiness cluster, detailed report submitted for Year 2	Novel arrangement for production and sales of Kinoko soyabean flour developed
Objective 3: Empower women to increase benefits from legume production			
3.1. Sensitize partners, farmer associations, and farming households and mainstream approaches to address gender inequity in farming and decision-making	3.1. Female farmers increasingly lead N2Africa promotion and dissemination activities	Does this make sense? The WeRATE Innovation Platform disseminates BNF technologies not farmers?	Women occupy 75% (3 of 4) WeRATE and AWE positions (Celister Kaleha, Welissa Mulei and Josephine Ongoma)
	3.1.1. By Q4 of years 1-4, all partners and households engaged in N2Africa activities that address gender inequity	Women empowerment in West Kenya is very advanced. Records from 2014 indicate that 64% of WeRATE member farmers are women.	Fuller documentation expected from M&E Specialist
3.2. Assess business opportunities for women in agro-input supply and legume marketing and value addition opportunities	3.2.1. By Q4 of years 2-4, business opportunities for women identified	Records from 2014 indicate that 70% of those marketing legumes and 85% of those processing legumes are women	Fuller guidance expected from Business Development Officer (but we never hear from him during 2015)
	3.2.2. By Q4 of years 4-5, at least 2 businesses led by women established per country	Not applicable to Year 2	
3.6. Develop legume product-enriched food baskets for smallholder families	3.6.1 Food consumption and diversity scoped for at least 2 Core Countries	Not applicable to Tier 1 Countries	
Objective 4: Tailor and adapt legume technologies to close yield gaps and expand the area of legume production within the farm			
4.8. Develop standard operating procedures for the production, quality control and application of rhizobium inoculants	4.8.1. By Q4 of year 2, standard operating procedures of quality control (storage), product registration and application of inoculants used by inoculant producers and retailers	Inoculant quality assurance by MIRCEN continues, 41 tests of five different BIOFIX products conducted in 2015. Rhizobial threshold met, contaminant threshold exceeded	In addition, bioprospecting, effectiveness testing and advanced characterization of elite NAK isolates and advanced formulation inoculants continue at MIRCEN under direction of Prof. Nancy Karanja
Objective 5: Enable learning and assess impacts at scale through strategic M&E			

Activity per Objective	Milestone	Milestone Achieved in 2015	Comments
5.7. Conduct impact assessment studies with a specific focus on the sustainability of interventions	5.7.1. By Q4 of year 4, the sustainability of legume interventions for smallholder farmers evaluated through impact assessment studies	Eight different M&E templates received for M&E Specialist, WeRATE staff trained in their use, several forms are routinely submitted to M&E Specialist	No feedback provided by M&E Specialist in the preparation of this 2015 Country Report. Are we expected to wait for Year 4 before this happens?

Appendix 1: List of participants at the N2Africa 2015 Long Rains planning meeting and their organizations

Name	First Name	Organization	County
Adipo	Rachel	UCRC	Siaya
Akeyo	Dorcas	BUSCO	Kakamega
Amboga	Josephat	AVENE	Vihiga
Anjawa	Doris	ROP	Vihiga
Antony	Bakari	SeedCo Ltd	Kitale
Akaki	Veronica	Western seed	Kitale
Babali	Jane	OWDP	Busia
Bullock	Ronee	IITA	Nairobi
Etemesi	Brian	KENAFF	Busia
Juma	Gilbert	Freshco	Nairobi
John	Chibole	BUFSSAN	Busia
Joseph	Mito	SeedCo Ltd	Kitale
John	Otieno	KENAFF	Kisumu
Kaleha	Celister	RPK	Vihiga
Kasamani	Stephen	MUDIFESOF	Kakamega
Kimani	Moses	KENAFF	Busia
Kisimba	Paul	HECOP	Kisumu
Kwoba	John	OWD	Busia
Mandila	Jotham	BUSOFA	Bungoma
Morgan	Dick	MFAGRO	Vihiga
Ngolo	Phillip	WSC	Kitale
Nyangaria	Waikenya	KUFGRO	Migori
Obiero	Hannington	IFAD	Kakamega
Odwaro	Caroline	Muungano DG	Busia
Ogutu	Pamela	Hagonglo	Siaya
Okello	Dismas	SCODP	Siaya
Okumu	Chrispinus	MDG	Busia
Omaseti	Peter	AFSHG	Busia
Omondi	Boniface	ARDAP	Busia
Ongoma	Josephine	KHG	Kakamega
Onyango	John	KESOFA	Migori
Osendi	Richard	Ebusakami co	Vihiga
Otanga	George	Teso Farmers	Busia
Ragama	Sylvia	WeRATE	Mbale
Wabomba	Paul	SCC-VI	Kisumu
Wamalwa	Bonface	BUSSFFO	Bungoma
Wamalwa	Moses	CIP	Kisumu
Waswa	Wycliffe	N2Africa	Busia
Wesonga	Macdonald	WeRATE	Busia
Woomer	Paul	IITA-Kenya	Nairobi

Appendix 2. Economic analysis of combined 2015 long rains soyabean trials (from EZ C&R Utility).

WeRATE-N2Africa Project Crop Management Costs and Returns Utility EZ C&R Utility Version 2.exl (PLW Jan 2014)

Analysis of N2Africa Package Components 2015 Long Rains (14 farms) modified for N2Africa Project to consider legume inoculation

Developed by PL Woomer *(email plwoomer@gmail.com*) runs with any currency (see line 7)

Enter management codes (starting A15). This version of EZ C&R runs up to 12 different cases (e.g. land managements, treatments, farms)

Procede to cell B35 (Inputs) and enter information into all yellow fields to generate costs and returns, then examine output (A12 to J26)

Enter currency code in yellow cell (right) KSh **To express outputs in alternative currency see A130 (currency conversion)**

Costs and Returns

Crop	**seed**	**fertilizer**	**labor**	**bagging**	**total**	**gross**	**net**	**Benefit:**	**labor**	**details on crop management**
Management	**cost**	**cost**	**cost**	**cost**	**cost**	**return**	**return**	**Cost**	**days**	
Code	----------	----------	----------	KSh	ha-1 ----------	----------	----------	**Ratio**	**per ha**	
1	8800	0	10200	1327	20327	65730	45403	3.23	44	soyabean cv Squire no inputs
2	8800	4536	10200	1633	25169	80903	55733	3.21	44	soyabean cv Squire + 63 kg/ha sympal
3	8800	9000	10200	2006	30006	99330	69324	3.31	44	soyabean cv Squire + 125 kg/ha sympal
4	8800	10625	10500	2027	31952	100380	68428	3.14	46	soyabean cv Squire + 125 kg/ha sympal w/starter N
5	8800	13464	10200	1988	34452	103125	68674	2.99	44	soyabean cv Squire + 187 kg/ha sympal
6	8800	18000	10200	1869	38869	96965	58096	2.49	44	soyabean cv Squire + 250 kg/ha sympal

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 soyabeans, 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
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. Identified 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

66. Media Events in the N2Africa project
67. Launch 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 Launch 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

Partners involved in the N2Africa project

A2N

Bayero University Kano (BUK)

Caritas Rwanda

Diobass

Eglise Presbyterienne Rwanda

Kwame Nkrumah University of science and Technology

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Urbanet