



## **N2Africa Baseline Report**

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## **N2Africa**

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



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## 1 Introduction

This report presents the results of the baseline study for the N2Africa project as it is implemented in eight countries, namely Ghana, Nigeria, DR Congo, Rwanda, Kenya, Malawi, Mozambique and Zimbabwe. It is meant to provide a benchmark against which the project will be able to assess its progress and achievements towards the end of the project. The baseline is to establish the current status of livelihoods, through assessment of household characteristics (including education, occupations, sources of income), agricultural production, control, nutrition and market access.

Overall, the baseline will facilitate monitoring project progress over time, assessment of achievement of goals through project interventions and impact at the end of the project. The project aims to reach 225,000 households by the end of the four years. These households will be using two N2Africa components, of which one is tied directly to agronomic management and this 'improved legume cultivation' should be used on a minimum surface of 100 m<sup>2</sup>. The longer-term vision of success for the N2Africa project is as follows:

To raise average grain legumes yields by 954 kg/ha in four legumes (groundnut, cowpea, soybean, and common bean), increase average biological nitrogen fixation (BNF) by 46 kg/ha, and increase average household income by \$465, directly benefiting 225,000 households (1,800,000 individuals) in eight countries in sub-Saharan Africa (DRC, Kenya, Rwanda, Malawi, Mozambique, Zimbabwe, Nigeria, and Ghana).

The measurements of biological nitrogen fixation (BNF) was originally planned to be part of this milestone. However, given the inaccuracies associated with the measurement of BNF, especially with the determination of the % of plant N derived from the air, it was not considered to be worthwhile to invest heavily in measuring on-farm BNF if these measurements are not supported by detailed soil and management data. Therefore BNF is measured in other N2Africa activities such as the detailed farm characterisations and the agronomy trials. Otherwise grain and haulm yield are used as indicators for BNF. In other words, if yields increase by 30%, BNF is also likely to increase with the same %, assuming that the plant N concentrations and %N derived from air are not affected by project interventions. Absolute changes in BNF can then be assessed on the basis of measured or estimated plant N concentrations.

The action sites for project intervention have been classified according to agro-ecological potential and in terms of market access (Table 1, see Franke *et al.* 2011 for a further characterisation of impact zones and mandate areas in the N2Africa project). Hence four classifications of action sites emerge (see Table 1). This should also enable the identification of the socio-ecological niches that will be used to identify the legume/rhizobium combination that is appropriate for a given type of farm within a given agro-ecology, farming system depending on market opportunities (Ojiem *et al.*, 2006). Matching a legume genotype with the right socio-ecological niche is necessary for high productivity, improved yield and enhanced farmer income (Ojiem *et al.*, 2007).

The determination of these classifications was done per country and are somewhat subjective assessments, especially of market access. In some countries, the areas classified are quite large, e.g. in Zimbabwe per district, whereas for example in Ghana the classification has been done at the level of localities/villages.

According to the design of the baseline survey, a total of 400 households with equal representation of the different classes were to be interviewed in each of the eight countries where the N2Africa project is implemented. In most countries this was achieved, although in the analyses some cases had to be dropped due to problems with the data collected. In some countries, the sample was not representing the four classes equally for diverse reasons.



**Figure 1.1: Classification based on agro-ecological potential and market access**

		Agro-ecological potential	
		Low	High
Market access	Low	I	II
	High	III	IV

In addition, it should be noted that sites belonging to different classes also differed in respects other than market access and agro-ecological potential. As of now, the classification was not used very often to structure the presented data, as other ways of structuring data were found to be more informative. The stratification was nevertheless useful to ensure that contrasting regions were selected for the baseline survey.

The development of the baseline questionnaire was done with wide participation of project staff and partner organisations in the different countries. It was agreed to use a relatively brief instrument, focussing on the key indicators for the project to ensure reliable data collection and efficient use of time of participants. The questionnaire was pre-tested in most countries, which resulted in few adjustments.

The questionnaire consisted of nine sections (see Appendix I):

- A. Demographic information: Composition of household, affiliation to (community) organisations, education, involvement in on- and off-farm activities (income)
- B. Income: source of income, importance of farming
- C. Labour: hiring of labour, for which crops, cost
- D. Household assets/resources (wealth indicators)
- E. Livestock ownership
- F. Land holding and crops cultivated
- G. Production Activities: cultivation of legumes and to a lesser extent of other crops
- H. Nutrition and legume utilization: consumption in general and of legumes, used of haulms
- I. Markets: availability, distance, frequency, distance, etc

The aim was to interview 400 households in each of the eight N2Africa project countries. These targets numbers were approximately attained in all countries but Mozambique (Table 1.1). In Mozambique the planned 400 were not conducted due to budgetary constraints – largely resulting from the large distances and poor infrastructure in Mozambique. In Nigeria, a total of almost 800 interviews were conducted.

In the next chapters of this report, the results of the baseline survey are presented for each country. Subsequently, some key results are compared across countries and lessons learned from the baseline survey implementation and results are presented.





**Table 1.1: Number of baseline interviews conducted and analysed per country and the regions where the interviews were held**

Country	Regions	Number of households interviewed and analysed
DRC	South Kivu	381
Kenya	Nyanza and Western Province	400
Rwanda	Northern, Eastern and Southern Province	400
Nigeria	Kano and Kaduna State	781
Ghana	Upper East, Upper West and Northern Region	400
Malawi	Dowa, Lilongwe, Ntcheu, Salima	394
Mozambique	Gurue, Madimba, Sussundenga	247
Zimbabwe	Guruve, Mudzi, Makoni, Chegutu	400



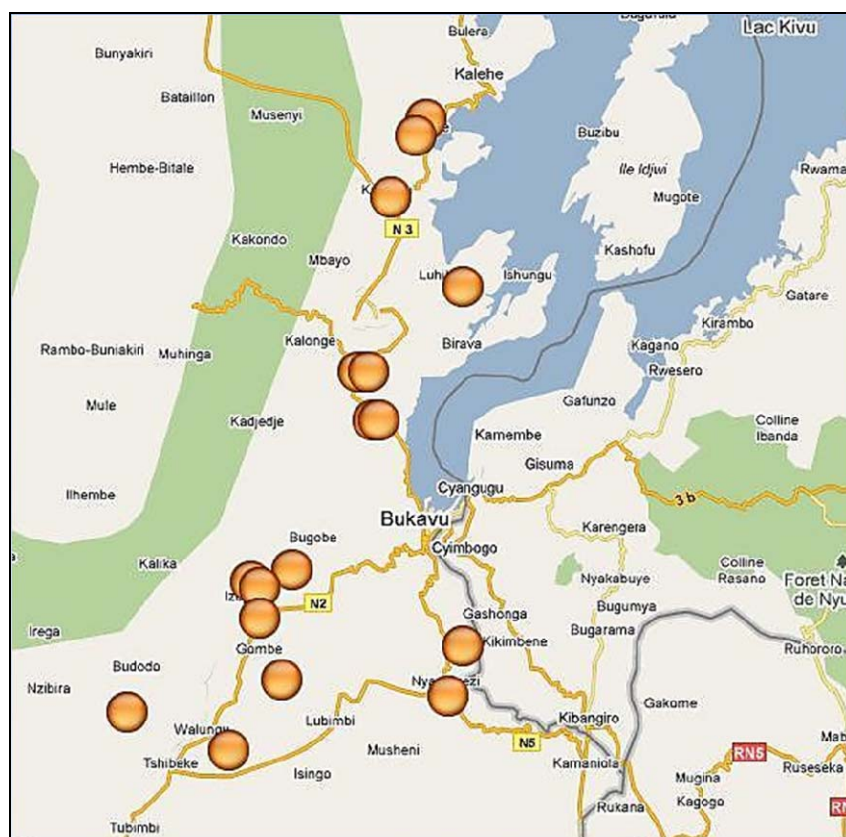
## 2 Eastern DR Congo

### 2.1 Sites

Data from 381 households was used in the analysis of the baseline survey conducted in DRC. The households were located in the districts of Kalehe, Kabare and Walungu in North and South Kivu (Figure 2.1). Most households were situated in relatively densely populated and intensively farmed areas nearby Lake Kivu and/or nearby main roads. Kabare is the smallest district of the three and relatively few households were interviewed there (Table 2.1). Altitude of the homesteads varied between 1420 and 1850 meters above sea level. Interviews were held in late August and early September 2010. In the following analysis, households are sometimes separated based on their location: 139 households were located in the northern axis (north of the town of Bukavu in Kalehe and part of Kabare) and 242 households in the southern axis (south of Bukavu in Walungu and part of Kabare).

**Table 2.1: Distribution of interviewed households over districts in DRC**

District	Number of households interviewed
Kalehe	115
Kabare	49
Walungu	217



**Figure 2.1: Location of the villages in eastern DRC where baseline interviews have been conducted (underlying map taken from Google Maps).**



## 2.2 Household characteristics

On average, 6.9 persons lived in a household. Children make up a large part of the rural population, as 53% of the household members were younger than 17 years old.

In 47% of the households, at least one person was member of an association. Men and women were about equally frequent member of an association. Most associations aimed to improve farming activities of its members; some associations dealt with finances, collective work or literacy. Farm associations appear to be a relatively new phenomenon in DRC, as about three-quarter of the people who joined an association became a member after 2005.

Education levels of adults of 35 years or younger were considerably higher than those of older adults (Table 2.2). Nevertheless, also among the younger adults, about one-third of the females and one-fifth of the males had completed no education at all. Males were generally better educated than females.

**Table 2.2: Education level of household members of 17 years and older in eastern DRC (% of household members)**

		None	Primary	Secondary	Post-secondary	Informal education / other
Age 17-35	Female	32.1	38.4	29.0	0.3	0.0
	Male	19.1	35.8	43.6	0.5	0.5
Age > 35	Female	76.2	15.6	25.0	0.0	0.0
	Male	39.3	37.7	8.2	1.6	0.8

## 2.3 Occupations

Overall, females were more often engaged in farm activities than males (Table 2.3). Also older adults (above 35 years old) were more frequently full-time involved in farming activities than younger adults.

59% of the households had at least one member involved in off-farm income generation. In the survey, about three-quarter of the individuals involved in off-farm income generation indicated the amount of money earned with the activities. On average, households with one or more members involved in off-farm income generation received US\$ 41 per week from off-farm activities. The variation in income was high however (0.5-300 US\$ per week). Males were more frequently involved in off-farm income generation than females and older adults earned on average slightly more than younger adults (Table 2.4). It should however be noted that income estimations should be treated with great care. Such estimations are difficult because off-farm incomes may heavily fluctuate during the year and such information may be considered sensitive as well. Typical off-farm income sources included remittances, own businesses, work on other people's land and the sale of wood or charcoal (Table 2.5).

**Table 2.3: Involvement of males and females of 17 years or older in farm activities in eastern DRC (% of household members)**

		Full-time	Seasonal	Not at all
Age 17-35	Female	57.4	24.7	17.9
	Male	26.3	37.6	36.1
Age > 35	Female	88.9	6.1	4.9
	Male	66.3	17.8	15.9



**Table 2.4: Involvement of females and males of 17 years and older in off-farm income generation and average earnings per person per week in eastern DRC**

		% of adult household members	Average earnings (US\$ per week)
Age 17-35	Female	19.9	16.6
	Male	27.8	28.1
Age > 35	Female	29.1	22.4
	Male	41.1	29.9

**Table 2.5: Type of off-farm income generation by household members of 17 years or older in eastern DRC**

Type of off-farm income	Female involvement (%)	Male involvement (%)
Sale of firewood or timber	0.3	2.2
Sale of charcoal	0.7	0.3
Remittances	8.9	12.4
Trade	1.7	1.1
Handiwork	0.3	0.3
Work on other people's fields	1.5	1.5
Food for work	0.2	0.8
Sale of bricks	0.3	0.9
Fishing	0.8	0.2
Own business	7.0	11.3
Other <sup>1</sup>	10.1	12.5

<sup>1</sup> Other types of off-farm income included: mining (usually gold digging), production or sale of clothes, teacher, carpenter, milling, secretarial work, smith, sale of beer, journalist, guard, mechanic, nurse and craftsman.

Although the majority of households had one or more members involved in off-farm income generation, the main income for the vast majority of households was derived from cropping (Table 2.6 and 2.7).

**Table 2.6: Main sources of household income in eastern DRC**

Class	Cropping	Livestock	Trade	Remittance	Other off-farm income
% of households	89.2	2.1	4.7	1.8	2.2

**Table 2.7: Proportion of income from farming and off-farm sources in eastern DRC**

Class	All income from farming	Three-quarter from farming	Half from farming, half from off-farm	Three-quarter from off-farm	All income from off-farm
% of households	87.1	1.6	2.6	7.9	0.8



## 2.4 Hired labour

31% of the households hired labour for crop production or processing. Hired labour was used for land preparation (26% of the cases), weeding (21%), planting (24%), harvest (17%) transport of harvest (10%) and crop processing (2%). Labour was applied in bush beans (51% of the cases when labour was hired), cassava (33%), climbing beans (4%), potato (2%) and groundnuts, maize, sorghum, soybeans, sweet potato, sugar cane, vegetables and bananas (all less than 1.5% of the cases).

## 2.5 Livestock ownership

83% of all households owned or took care of livestock (Table 2.8). 59% of all households owned large livestock species. Popular larger livestock species were goats, pigs and cattle (dairy and beef). Guinea pigs and chicken were the most common type of livestock owned by households. In the southern axis, livestock appeared to be slightly more common than in the northern axis. Especially cattle, pigs and guinea pigs were more common in the southern axis. Occasionally, households took care of other people's livestock. This was most frequently the case with goats (5.0% of all households), cattle (3.4%) and pigs (3.0%).

**Table 2.8: Percentage of interviewed households owning a type of livestock and the average number of livestock owned or taken care of in eastern DRC**

Type of livestock	% of households owning or taking care of livestock		Average number owned or cared for
	Northern axis	Southern axis	
Cattle (all types)	8	23	2.2
Dairy cows	6	17	1.9
Oxen	1	3	1.4
Beef cattle	1	2	1.2
Goats	42	40	2.0
Sheep	0	6	1.4
Pigs	17	29	1.4
Chickens	45	52	3.0
Guinea pigs	38	60	5.8
Rabbits	15	18	2.4
Donkeys	0	2	5.0
Turkeys	1	1	7.0
Bees	1	0	
Other <sup>1</sup>	<1	<1	

<sup>1</sup> includes horses, pigeons, ducks, fish and guinea fowls

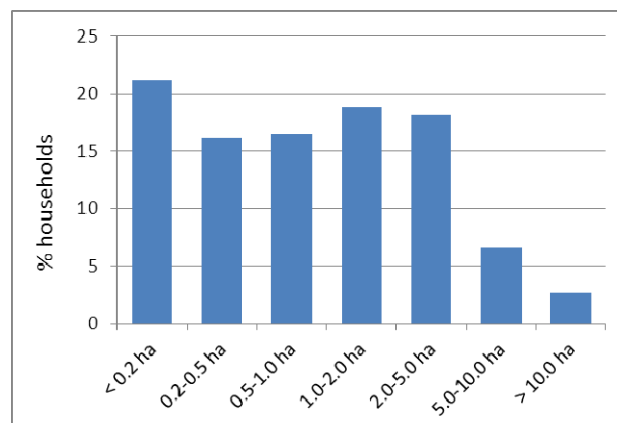
## 2.6 Landholding

81% of the households indicated the size of their fields available for farming. The average amount of land available for farming was 2.0 ha spread over three fields. The available land was slightly higher in the northern axis (2.3 ha) than in the southern axis (1.7 ha). More than half the households had less than 1 ha available for farming (Figure 2.2). 10% of the farmers had 5 ha or more for farming. However, figures on landholdings should be treated with care, as farmers are often unwilling or unable to estimate the size of fields. The general impression was that farmers over-estimate the size of their landholdings.

75% of the farmed fields were owned by the household. The other fields were rented from other farmers or rented out to other farmers. 97% of the fields were used for cropping, 2% as



a woodlot and 1% as a pasture. Only one out of 952 fields was left fallow, indicating that the available land is farmed intensively in this part of DRC.



**Figure 2.2: Distribution of land available to households for farming in eastern DRC (% of households falling in a given category of landholding size)**

Cassava and bush bean were commonly cultivated, often in combination with each other (Table 2.9). Other main crops were banana, potato, climbing bean and sweet potato. Note that the area planted with sweet potato on a farm was usually small (Table 2.10). Groundnut and soybean were almost exclusively cultivated in the northern axis.

**Table 2.9: Use of fields among interviewed households in eastern DRC (% of fields)**

	Northern axe			Southern Axe		
	1 <sup>st</sup> crop	2 <sup>nd</sup> crop	3 <sup>rd</sup> crop	1 <sup>st</sup> crop	2 <sup>nd</sup> crop	3 <sup>rd</sup> crop
Cassava	30.9	21.2	4.3	44.0	15.8	1.9
Bush bean	32.3	9.3	2.0	30.9	14.3	0.9
Banana	9.3	1.8	0.0	9.1	1.5	0.4
Potato	1.1	1.8	0.5	5.0	8.5	4.4
Climbing bean	3.8	1.1	0.0	2.1	0.4	0.0
Sweet potato	1.6	0.5	0.5	4.7	5.6	2.8
Soybean	6.8	3.6	0.0	0.3	0.2	0.0
Groundnut	5.4	3.2	0.7	0.0	0.0	0.0
Maize	1.6	8.8	5.4	1.5	4.7	2.6
Sorghum	2.3	1.4	0.5	0.2	0.6	0.6
Coffee	0.9	1.6	0.5	0.3	0.0	0.0
Sugarcane	1.1	0.2	0.0	0.0	0.0	0.0
Onion	0.5	0.0	0.0	0.3	0.0	0.3
Other crops *	<0.3	<0.2	0.0	<0.3	<0.2	0.0
None		47.0	86.2		51.0	88.7

\* Includes: cabbage, pineapple, tomato, eucalyptus trees, amaranth and cocoyam



**Table 2.10: Average field size per crop in eastern DRC (Ha)**

Crop type	Average field size (ha)	No. of observations
Cassava	0.73	355
Bush bean	0.63	271
Banana	0.64	85
Potato	0.50	31
Climbing bean	1.20	22
Sweet potato	0.05	28
Soybean	0.64	27
Groundnut	0.77	20
Maize	0.48	13
Sorghum	0.45	10

## 2.7 Legume cultivation

97% of the households cultivated legumes in the previous growing season. Bush bean and climbing bean were by far the most popular legumes (Table 2.11). Soybean and groundnut were primarily grown in the northern axis. Most legume fields received organic inputs such as manure, compost, household waste or ash.

**Table 2.11: Cultivation of legumes and use of organic inputs in eastern DRC**

Legume type	Households growing the crop (%)		Field receiving organic inputs (%)
	Northern axis	Southern Axis	
Bush bean	86.3	78.5	92.4
Climbing bean	38.8	45.9	92.7
Soybean	25.9	5.8	84.0
Groundnut	23.0	4.5	74.4
Cowpea	0.7	0.8	100.0
Bambara nut	2.2	0.0	0.0
Fodder legume	0.7	0.8	100.0

The majority of grain from legumes was consumed within the household (Table 2.12). The proportion of grain sold on markets was higher for groundnut and soybean than for common bean and climbing bean. This is also reflected in the percentage of growers of a crop selling the relevant crop (Table 2.12).

Legume haulms were mostly used to make compost (Table 2.13). Legume haulms were rarely used to feed livestock. The use of legume haulms was not related to legume type (data not given).

**Table 2.12: Utilisation of legume grain in eastern DRC: average percentage used for home consumption, seed and sale**

	% used for home consumption	% used for seed	% used for sale	% of growers selling some or all crop products	N
Common bean	74	17	9	21.7	333
Soybean	61	15	25	43.1	77
Climbing bean	76	12	12	28.8	62
Groundnut	55	9	37	55.6	48
<i>All legumes</i>	<i>70</i>	<i>15</i>	<i>14</i>		<i>523</i>



**Table 2.13: Use of legume haulms in eastern DRC (% of haulms used for given purpose)**

	Compost	Livestock feed	Left in the field / mulch	Food preparation
% of haulms	91.7	1.7	6.2	0.4

## 2.8 Cultivation of non-legume crops

Almost all households cultivated cassava (Table 2.14). Other main crops were potato, maize, banana and sweet potato. The reported frequency of households growing bananas seems to be low, given that most households have a banana plantation. It is possible that banana fields were not always included in the assessment.

Most fields, irrespective of the crop, received organic inputs such as animal manure (e.g. from goats, guinea pigs or cattle), compost, ash or other households wastes. Only two farmers used mineral fertiliser (NPK and urea) in cassava and maize. One farmer used deltamethrin (a pesticide from the class of pyrethroids) in cabbage; three other farmers used dithane (a fungicide with Mancozeb as active ingredient) in tomato and onion fields. None of the farmers used pesticides in legumes or in any other staple crop.

**Table 2.14: Percentage of households growing particular non-legume crops and the use of organic fertilisers in these crops in eastern DRC**

Crop	Households growing the crop (%)	Organic inputs (% of fields)
Cassava	92.7	95.2
Potato	34.9	98.5
Maize	34.1	96.2
Banana	26.0	93.9
Sweet potato	23.4	88.8
Sorghum	6.0	95.7
Coffee	3.9	80.0
Onion	2.1	100
Sugarcane	2.1	75.0
Other crops	<2%	

<sup>1</sup> Includes tomato, amaranth, pineapple, cabbage, cocoyam, pepper, sunflower, yam and eggplant

Important food crops such as cassava, potato, maize, sweet potato and sorghum were mostly grown for home consumption (Table 2.15). Bananas however were also frequently sold on markets, perhaps because of the limited storage life of bananas. Crops primarily produced for markets were coffee, onion, tomato, cabbage, pineapple and eggplant (data not given).

**Table 2.15: Utilisation of non-legume produce in eastern DRC: average percentage used for home consumption, seed and sale**

Crop	% used for home consumption	% used for seed	% used for sale	N
Cassava	76	1	23	211
Potato	79	1	20	30
Maize	67	3	30	50
Banana	34	3	63	38
Sweet potato	69	1	30	24





Sorghum	59	1	40	17
Coffee	0	0	100	13

## 2.9 Control over land use and harvest

Most fields were controlled by either the wife or the husband (Table 2.16). However, husband and wife usually decided together on the use of the harvest. No typical men's or women's crops could be distinguished (data not given).

**Table 2.16: Control over land use and harvest by household members in eastern DRC (% of fields)**

	Land use	Legume crop harvest	Non-legume crop harvest
Wife	29	28	24
Husband	30	9	13
Both	41	63	63

## 2.10 Nutrition

83% of the households consumed two meals per day; 11% one meal and 6% three meals per day. Almost all households consume beans and cassava, suggesting that these two food crops are main staples for rural people (Table 2.17). A large proportion of households also has access to fish and meat. Note that no questions were asked about the frequency of consumption, so the frequency of meat and fish consumption could not be assessed. Other main food items were banana, potato, vegetables and sweet potato.

**Table 2.17: Main food items in household nutrition in eastern DRC**

Type of food	Consumption (% of households)
Beans	93.2
Cassava	89.0
Fish	59.6
Meat	55.4
Banana	52.0
Potato	50.4
Vegetables	41.2
Sweet potato	26.2
Soybean	16.8
Maize	12.9
Rice	10.8
Groundnut	6.8
Climbing bean	6.6
Sorghum	3.9
Milk	3.4
Palm oil	2.1



## 2.11 Household assets

Table 2.18 gives a list household assets and services available to households in eastern DRC.

**Table 2.18: Household assets and access to services in eastern DRC**

Type of asset or service	% of households
<i>Farm implements</i>	
Hoe	99.5
Cutting knife	85.0
Plough / Cart	0.8
Watering cans	9.4
<i>Livestock facilities</i>	
Roofed shelter	50.9
Fenced shelter without roof	4.2
<i>Storage of produce</i>	
Bags	90.8
Earthenware pots	3.9
Mud silo / granary	7.6
<i>Water supply</i>	
Surface water	7.1
Community borehole / well	10.2
Private borehole / well	3.4
Tap water	79.3
<i>Housing properties</i>	
Mud floor	96.9
Concrete or cement floor	7.5
Metal or asbestos roof	59.6
Grass or thatch roof	75.1
Tiles roof	1.0
Mud un-burnt bricks	86.1
Burnt bricks	2.1
Poles or planks	23.4
<i>Household power</i>	
Paraffin	88.5
Battery	1.3
Electricity	7.3
Solar power	0.5
Generator	1.3
<i>Cooking</i>	
Wood	98.7
Charcoal	15.7
Paraffin	1.3
<i>Electronics</i>	
Cell phone	37.5
Radio	58.5
Television	3.9
<i>Transport</i>	
Bicycle	2.9
Motorbike	2.9
Car / truck	0.8
Animal cart	0.0



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## 3 Western Kenya

### 3.1 Sites

Four hundred households were interviewed in N2Africa's mandate areas of Nyanza and Western Province in western Kenya, between October 25 and November 5, 2010. Households were stratified based on the agro-ecological potential of the area (high or low) and market access (high or low). 100 households were interviewed in each stratum. Most interviewed households (300 interviews) were concentrated within a radius of 50 km north and west from Kisumu (Figure 3.1).

A group of interviewed households were located west of Kisumu in Nyanza Province. Areas targeted in the baseline survey included Bondo, Kisumu West, Masikolo, Mudete, North Sakwa, Rarieda, South Gem and Wamuluma. This area was considered to have a low agro-ecological potential. Altitude in this area varies between 1150 and 1400m with locations closer to Lake Victoria having a lower altitude than places further north. In South Gem and Rarieda, market access was considered low. In the other areas, market access was relatively high.

Farms in the villages located north of Kisumu (towards to Kakamega town) were considered to have a high agro-ecological potential for arable farming and a good access to markets. This included the areas of Masigolo, Gwaranda, Iduku and Wamuluma. In these areas, the altitude varied between 1500 and 1650 m.

The households in Central and East Kanyamkago (100 interviews) were located 100-120 km south of Kisumu in the Western Province. Kanyamkago is an area with a high agro-ecological potential but a relatively poor access to markets. The altitude of the household locations varied between 1350 and 1550 m.



**Figure 3.1: Location of the villages where households have been interviewed for the baseline survey in western Kenya (underlying map taken from Google maps)**

1 refers to villages with a low agro-ecological potential and a low market access;  
2 to villages with a high agro-ecological potential and a low market access;  
3 to villages with a low agro-ecological potential and a high market access;  
4 to villages with a high agro-ecological potential and a high market access.

### 3.2 Household characteristics

On average, 4.7 persons lived in a household. Almost all children of 6 years and older received some sort of education. The question about completed schooling levels was probably understood as a question about schooling levels attended, but not necessarily completed by household members. Most adult household members had followed primary education and a substantial part also followed secondary education (Table 3.1). However, some adults (mostly females) had not received any education at all. These were usually household members older than 35 years. Adults of 35 or younger were generally higher educated than adults of over 35 years. More men than women had followed secondary education. Post-secondary education in the age group of over 35 years old had mostly been



enjoyed by males. However, in the age group of 17-35 years old, slightly more females than males had received post-secondary education.

**Table 3.1: Education level of household members aged between 17-35 and >35 aggregated by gender in western Kenya (%)**

		None	Primary	Secondary	Post-secondary	Informal education / other
Age 17-35	Female	0.8	62.1	29.1	8.0	0.0
	Male	1.0	56.1	36.0	6.2	0.7
Age > 35	Female	9.1	67.4	20.0	2.8	0.7
	Male	3.0	59.3	25.6	11.8	0.3

### 3.3 Sources of household income

Although the majority of households received off-farm income, crop farming was the most important source of income for most households (Table 3.2). Also the role of livestock appeared to be rather limited as source of income (Table 3.3). The vast majority of households indicated they received more than half of their income from farm activities (Table 3). Some differences in sources of household income could be observed between Nyanza and Western Province. Households in the south in the area of Kanyamkago were more reliant on farming for their household income than households nearby Kisumu where more off-farm income sources were available (data not given).

**Table 3.2: Main sources of household income in western Kenya (% of households)**

	Cropping	Livestock	Off-farm income	Remittance
% of households	89.7	0.3	9.0	1.1

**Table 3.3: Proportion of income from farming and off-farm sources in western Kenya**

Class	All income from farming	Three-quarter from farming	Half from farming, half from off-farm	Three-quarter from off-farm	All income from off-farm
% of households	25.6	45.9	15.3	11.3	1.8

Females were more frequently involved full time in farm activities than males (Table 3.4). Men tended to be more often involved in off-farm activities (Table 3.5).

73% of the households had at least one household member involved in the generation of off-farm income. 38% of household members of 17 years or older was involved in off-farm income generation (Table 3.5). The average total earnings of households involved in off-farm activities was estimated at US\$ 31 per week. Earnings per person were on average estimated at US\$ 22 per week per person with men earning generally more than women (Table 3.5). However, given that many interviewees could not provide an estimation of earnings, and given the inaccuracies and sensitivities associated with income estimates, it is unsure how reliable these figures on earnings are. The figures on earnings should thus be seen as crude indications. Typical off-farm income generating activities included: trade,



handiwork (e.g. tailoring), and own businesses (Table 3.6). No typical male or typical female type of activities could be distinguished.

4.8% of the children (between 6 and 16 years old) contributed to off-farm income generating activities. Earnings made through the activities carried out by children were rarely specified. Probably these were included in the adults' earnings. 42% of the children were engaged in on-farm, usually seasonal, activities.

**Table 3.4: Involvement of males and females of 17 years or older in farm activities in western Kenya (% of household members)**

	Full-time	Seasonal	Not at all
Female	70.5	23.4	6.1
Male	56.6	33.8	9.7

**Table 3.5: Involvement of females and males of 17 years or older in off-farm income generation and average earnings per week in western Kenya**

	% of household members	Average earnings (US\$ per week per person)
Female	32.2	18.3
Male	42.8	25.5

**Table 3.6: Type of off-farm income generation by household members of 17 years or older working off-farm in western Kenya**

Type of off-farm income	Female involvement (%)	Male involvement (%)
Sale of firewood or timber	5.6	3.2
Sale of charcoal	6.2	8.9
Remittances	8.4	4.0
Trade	13.5	10.5
Handiwork	11.8	18.6
Rent	0.0	0.8
Work on other people's fields	9.0	5.3
Food for work	0.0	0.4
Pension	1.1	3.6
Sale of bricks	0.0	0.4
Fishing	2.2	2.0
Own business	43.3	23.1
Other <sup>1</sup>	15.2	30.0

<sup>1</sup> Other types of off-farm income included: security guard, health worker, social worker, midwife, teacher, researcher, private sector employee, barber, plumber, veterinary officer, artist, public sector employee and retired chief.



### 3.4 Membership of associations

In 57% of the interviewed households, at least one person was affiliated to a community organisation or association. These usually dealt with issues related to farming and/or financial support, and sometimes with issues such as improving family health, livelihood improvement or poverty alleviation or women empowerment. Men and women were about equally frequent member of associations. Villages situated in an area with a high agro-ecological potential and a good market access were less frequently member of an association (37%) than households in areas with a low agro-ecological potential (67% of households member of an association).

### 3.5 Hired labour

56% of the farms used hired labour for crop activities. Hired labour was used for land preparation (29% of the cases when labour was hired), weeding (25%), planting (21%), harvesting (15%) and transport / processing (11%).

85% of the fields cultivated with the help of hired labour had maize as the main crop, usually intercropped with common bean; 3.5% had sugarcane and 2.8% common bean as a main crop. In a few instances, tobacco, tea, bananas, groundnuts, sorghum, soybeans, cowpea, green gram, pineapple, yam or cassava were cultivated with the help of hired labour.

### 3.6 Livestock ownership

Only 3% of the farmers had no livestock at all. Cattle were an important component of the farming system, as 67% of the households owned at least one head of cattle (Table 3.7). Cattle were used for dairy and draft power. Most households owned chickens, on average a dozen of chickens per household. A large part of the households also owned small ruminants such as sheep and goats. Other types of livestock were rare. Households in the area with a high agro-ecological potential and high market access (Class 4) tended to have less sheep, goats and oxen (lower percentages of households with such animals and lower number of animals per household) than households in other areas, probably because landholdings of class 4 households tended to be smaller (see below).

Only 3% of the farm households took care of livestock that was not owned by them. In most cases, it concerned cattle. In a few cases, goats or sheep were taken care of by others.

**Table 3.7: Percentage of households owning a specific type of livestock and the average number of livestock owned or taken care of in western Kenya**

Type of livestock	% of households owning the relevant type of livestock	Average number owned or cared for
Cattle (all types)	66.8	3.4
Dairy cows	58.5	2.1
Oxen	24.5	2.7
Sheep	20.8	3.5
Goats	39.8	2.7
Donkeys	1.8	2.0
Pigs	1.8	3.3
Chickens	88.5	12.2
Guinea fowls	1.3	1.8
Turkeys	1.5	6.0
Rabbits	1.0	4.0





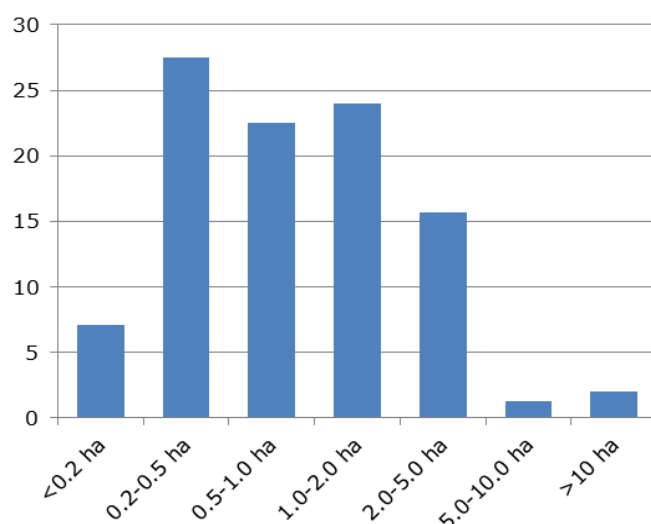
Pigeons	1.3	5.0
Bees	1.0	
Fish ponds	0.6	1.5
Other <sup>1</sup>	2.1	

<sup>1</sup> Included dogs, ducks, geese and pet rats.

### 3.7 Landholding and land use

Households had on average 1.6 ha available for farming activities, according to the estimated field areas given by the interviewed household members. It should be noted that farmers were often unable to accurately estimate the size of their fields. Only few households had access to more than 5 ha of land (Figure 3.2). Almost all fields (97%) were used for cropping. The remaining fields were used as pastures (2%) or were left fallow (1%). Most fields (93%) were owned by the household and only few households rented or borrowed land from other households or rented out land to other farmers.

**Figure 3.2: Distribution of land available to households for farming in western Kenya (% of households within a given category of landholding size)**



Farm class had a strong effect on average landholdings (Table 3.8). Landholdings were small in the areas with a high agro-ecological potential and a high market access, presumably because these areas are relatively densely populated. Households in the area of Kayamkago (class 2) had larger landholdings.

**Table 3.8: Average landholding as affected by household class in western Kenya**

Farm class	Land holding (ha)
1. Low agro-ecological potential, low market access	1.3
2. Low agro-ecological potential, high market access	2.6
3. High agro-ecological potential, low market access	1.8
4. High agro-ecological potential, high market access	0.6

Most fields (89%) in the 2010 short rainy season were cropped with more than one crop. Maize was grown on 91.6% of all fields, usually as a main crop (Table 3.9). Common bean





was the second most important crop, although it is rarely grown as a main crop. Other important crops grown on more than 10% of all fields were groundnut, sugarcane, cassava, bananas and cowpea. Sugarcane, tobacco and pineapple were primarily cultivated in the area of Kayamkago. The data in Table 9 apply to the short rainy season in 2010. In general, farmers in western Kenya grow more cereals and less legumes during the long rainy season earlier in the year.

**Table 3.9: Type of crops grown and percentage of fields with the relevant crop in western Kenya during the 2010 short rains season**

Type of crop	First crop (%)	Second crop (%)	Third crop (%)	Fourth crop (%)	Total (%)
Maize	85.9	2.6	2.8	0.3	91.6
Common bean	1.7	53.1	5.9	2.7	63.4
Sorghum	1.7	3.4	2.8	1.7	9.6
Groundnut	1.5	2.0	6.9	2.7	13.1
Sugarcane	1.5	6.9	3.8	0.8	13.0
Cassava	1.5	3.2	6.1	3.4	14.2
Sweet potato	1.3	1.2	5.5	2.4	10.4
Tea	1.1	0.2	1.0		2.3
Bananas	0.8	1.2	5.3	5.9	13.2
Tobacco	0.8	2.4	1.4	1.3	5.9
Kale ( <i>Brassica oleracea</i> )	0.6	0.6	0.2	0.7	2.1
Cowpea	0.6	2.8	6.5	2.2	12.1
Soybean	0.4	0.8	3.6	1.2	6.0
Coffee	0.2	0.0	0.0	0.0	0.2
Climbing bean	0.2	1.2	0.0	0.0	1.4
Amaranth	0.0	0.2	0.0	0.0	0.2
Fruits	0.0	0.2	0.6	0.4	1.2
Green gram	0.0	0.4	1.6	0.4	2.4
Millet	0.0	3.4	2.0	0.7	6.1
Potato	0.0	0.0	0.4	0.0	0.4
Tomato	0.0	0.0	0.2	0.2	0.4

### 3.8 Legume cultivation and use

98% of the households cultivated at least one legume type in the 2010 short rainy season. The data suggest that common bean is the most popular legume type, followed by cowpea, groundnut and soybean (Table 3.10). Fodder legumes were grown by only a few households. The average area cultivated with legumes (usually intercropped with non-legume crops) was 0.43 ha per household. However, legumes were often intercropped with cereals and therefore achieved much lower yields than legumes grown as a single crop. It should also be noted that farmers were often unable to accurately estimate the size of their fields.

Some differences in legumes cultivated and areas with legumes between household classes could be observed. Groundnut was little cultivated by farmers in Class 4, perhaps because of the higher altitude and cooler climate experienced by farmers in this class. Climbing bean was particularly popular among farmers in Class 4.



**Table 3.10: Percentage of households growing the particular legumes and the average area cultivated with legumes in the 2010 short rainy season in western Kenya**

	Households growing the crop (%)					Average area per household (ha)				
	Class	Class	Class	Class	All	Class	Class	Class	Class	All
	1	2	3	4		1	2	3	4	
Common bean	79	92	89	96	82	0.20	0.37	0.29	0.21	0.27
Cowpea	54	43	67	69	50	0.14	0.09	0.08	0.08	0.10
Groundnut	69	47	36	6	35	0.23	0.19	0.20	0.07	0.20
Soybean	22	16	20	31	19	0.09	0.23	0.04	0.08	0.10
Climbing bean	10	11	12	20	12	0.18	0.31	0.29	0.21	0.19
Green gram	10	0	19	0	6	0.13		0.11		0.12
Fodder legume	2	2	9	8	3		0.13	0.32	0.20	0.20
Bambara nut	0	5	0	0	1		0.30			0.30
Desmodium	0	0	1	0	0.3			0.02		0.02
All legumes	96	97	97	100	98	0.43	0.55	0.42	0.32	0.43

Class 1 refers to villages with a low agro-ecological potential and a low market access;  
Class 2 to villages with a high agro-ecological potential and a low market access;  
Class 3 to villages with a low agro-ecological potential and a high market access;  
Class 4 to villages with a high agro-ecological potential and a high market access.

Many farmers applied farmyard manure and/or cow dung to grain legumes (Table 3.11). Only a minority of farmers applied synthetic fertiliser; mostly di-ammonium phosphate (DAP) and lesser amounts of urea, single or triple super phosphate (SSP/TSP) or calcium ammonium nitrate (CAN). 1% of the households (all four located in the same village) used inoculants in common bean, cowpea or groundnut.

**Table 3.11: Use of organic and mineral fertilisers in legumes in the 2010 short rainy season in western Kenya (% of fields receiving fertiliser)**

	DAP (% of fields)	Urea (% of fields)	SSP/ TSP (% of fields)	CAN (% of fields)	Farmyard manure / Cow dung (% of fields)
Common bean	19.3	4.1	0.0	2.3	50.7
Cowpea	11.5	3.4	0.0	1.7	48.5
Groundnut	6.9	0.0	0.0	0.0	32.9
Soybean	18.7	3.3	4.4	4.4	46.1
Climbing bean	21.1	7.0	1.8	1.8	60.4
Green gram	6.9	0.0	0.0	0.0	34.5
Fodder legume	4.2	0.0	0.0	0.0	4.2
Bambara nut	20.0	0.0	0.0	0.0	40.0
Desmodium	0.0	0.0	0.0	0.0	0.0

Most of the legume grain harvest was used for home consumption (Table 3.12). None of the grain legumes were primarily cultivated for commercial purposes. However, all types of legume grain had a market and were used for sale. Market access and the percentage of produce sold on markets were unrelated (data not given). Class 4 households (high agro-ecological potential and high market access) sold less produce on markets than households



in other classes, probably because landholdings of households in Class 4 were smaller and produced less surplus production (after satisfying the household demand for food) that could be sold on markets.

**Table 3.12: Utilisation of legume grain in western Kenya: % used for home consumption, seed and sale, and number of households reporting on the use of the relevant legume (N)**

	% used for home consumption	% used for seed	% used for sale	N
Common bean	70	15	14	349
Cowpea	65	18	17	135
Groundnut	64	13	23	151
Soybean	70	11	18	74
Climbing bean	76	11	13	17
Green gram	65	13	22	29
Bambara nut	50	3	47	2
<i>All legumes</i>	<i>68</i>	<i>15</i>	<i>17</i>	<i>757</i>

Legume haulms, primarily haulms from common bean, were mostly used to make farmyard manure (Table 3.13). Haulms were also frequently burned and the ash was used in food preparation. The use of legume haulms as animal feed was less than anticipated, given the large proportion of farmers taking care of ruminants.

**Table 3.13: Use of legume haulms in western Kenya (% of haulms used for a specific purpose)**

Use of legume haulms	Farmyard manure	Burned and ash used for cooking	Animal feed	Left in the field	Burned in the field
% of haulms	65.8	22.7	10.6	5.7	2.1

### 3.9 Cultivation of non-legume crops

Almost all households grew maize (Table 3.14). Usually, maize received farmyard manure or dung and in many cases also synthetic fertiliser (Table 3.15). Other major non-legume crops included banana, cassava, sweet potato, sugarcane, sorghum, millet and tobacco. Among these crops, only sugarcane and tobacco frequently received synthetic fertilisers, presumably because these are grown as cash crops.



**Table 3.14: Cultivation of non-legume crops among interviewed households in western Kenya (% of households growing the relevant crop)**

Crop	Class 1	Class 2	Class 3	Class 4	All
Maize	99	98	98	99	98
Banana	22	38	23	53	34
Cassava	29	33	42	22	31
Sweet potato	22	31	33	35	30
Sugarcane	0	68	2	10	20
Sorghum	21	3	27	6	14
Millet	19	2	16	8	11
Tobacco	0	36	0	1	9
Kale	8	0	14	1	6
Fruits	2	5	6	4	4
Tea	0	0	0	12	3
Potato (Irish)	1	0	6	3	2
Other <sup>1</sup>	2	0	4	6	3

<sup>1</sup> Included yam, tomato, coffee, Napier grass, amaranth and trees.

Class 1 refers to villages with a low agro-ecological potential and a low market access;

Class 2 to villages with a high agro-ecological potential and a low market access;

Class 3 to villages with a low agro-ecological potential and a high market access;

Class 4 to villages with a high agro-ecological potential and a high market access.

**Table 3.15: Use of organic and synthetic fertilisers in non-legume crops in western Kenya (% of fields receiving the relevant fertiliser)**

Crop	Farmyard manure / cattle dung	Any mineral fertiliser	DAP	URE A	CAN	NPK	SSP	MAVUNO
Maize	70.2	45.5	44.8	7.4	1.5	0.5	0.3	0.0
Banana	63.7	4.4	3.7	0.7	0.0	0.7	0.0	0.0
Cassava	25.6	2.4	2.4	0.0	0.0	0.0	0.0	0.0
Sweet potato	28.3	0.8	0.0	0.8	0.0	0.0	0.0	0.0
Sugarcane	34.2	69.6	69.6	30.4	0.0	0.0	0.0	0.0
Sorghum	51.8	8.9	8.9	0.0	1.8	0.0	0.0	0.0
Millet	61.4	5.9	15.9	0.0	0.0	0.0	0.0	0.0
Tobacco	38.9	80.6	69.4	27.8	13.9	11.1	0.0	11.1
Fruits	21.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tea	72.7	54.5	18.2	9.1	0.0	0.0	9.1	0.0
Potato (Irish)	11.1	11.1	11.1	11.1	11.1	0.0	0.0	0.0

MAVUNO is a brand name for different fertilizer blends

Some of the non-legume crops like sugarcane, tobacco, tea and fruits (especially pineapple) were almost entirely cultivated for commercial purposes (Table 3.16). The produce of cereals, cassava and sweet potato was primarily consumed within the household.



**Table 3.16: Utilisation of non-legume crops in western Kenya: percentage used for home consumption, seed and sale, and number of households reporting on the relevant crop (N)**

Crop	% used for home consumption	% used for seed	% used for sale	N
Maize	85	4	10	393
Banana	63	0	37	75
Cassava	71	1	27	76
Sweet potato	77	0	23	84
Sugarcane	0	2	98	44
Sorghum	79	5	15	47
Millet	81	10	10	36
Tobacco	0	0	100	6
Fruits	18	0	83	6
Tea	0	0	100	9
Potato (Irish)	69	0	31	6

### 3.10 Control over land use and harvest

Questions were asked regarding who in the household controls the use of fields and who controls the harvest produced by the fields. The results suggested that husbands and wives often controlled the use of their own fields (Table 3.17). Only in a minority of the cases, these aspects were controlled by both wife and husband. Women had more frequently control over the harvest than over land use. Thus in some cases, women controlled the harvest from fields managed by men. The data provided some evidence that the harvest of legume crops is more frequently controlled by women than that of non-legume crop.

**Table 3.17: Control over land use and harvest by household members in western Kenya (% of fields)**

	Land use	Legume crop harvest	Non-legume crop harvest
Wife	32.2	53.8	44.2
Husband	43.9	19.0	26.6
Both	20.1	23.0	24.2
Owner (in case land is rented)	3.3	3.8	5.0
Child	0.4	0.4	0.1

### 3.11 Nutrition

Households primarily consumed maize, beans, cassava, bananas, vegetables, sweet potatoes and cowpea. 90% of the households consumed three main meals per day. Common bean was often eaten as a main meal. While many household members consumed groundnut (Table 3.18), it was usually eaten as a side dish. Also soybean was often eaten as a side dish.



**Table 3.18: Consumption of legumes by households in western Kenya**

Legume	% of households
Common bean	94.3
Groundnut	43.5
Cowpea	27.0
Soybean	15.5
Green gram	7.3
Climbing bean	1.0
Bambara nut	0.5

### 3.12 Market access

All interviewed households except for one had access to a local market where they could sell farm produce within a distance of 5 km or less from their homestead. Most farmers also had access to larger regional markets, though they were usually located further away (>10 km) and were normally reached with a vehicle or motorcycle.

### 3.13 Household assets

Many households possessed a hoe, a cutting knife and a plough, while only few owned an ox or donkey cart or a tractor (Table 3.19). Provisions to keep livestock under roofed shelters were available in many households. Most households depended on surface water for their water supply. Houses were usually built with mud floors and (un-burnt) mud bricks with roofs of metal. Paraffin was generally used to generate light. Most households possessed electronic goods such as a radio and a cell phone. Cooking was mostly done with wood or charcoal. Most households possessed a cell phone and a radio.

**Table 3.19: Household assets and access to services in western Kenya**

Type of asset or service	% of households
<i>Farm implements</i>	
Hoe	84
Cutting knife	52
Ox plough / plough	46
Ox / donkey cart	3
Watering cans	1.0
Tractor	0.8
Tobacco press	0.3
<i>Livestock facilities</i>	
Roofed shelter	55
Fenced shelter without roof	16
<i>Water supply</i>	
Surface water	72
Community borehole	18
Private borehole / well	13
Tap water	6
<i>Housing properties</i>	
Mud floor	76
Concrete or cement floor	24



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Metal or asbestos roof	88
Grass or thatch roof	12
Mud un-burnt bricks	76
Burnt bricks	21
Cement	2
Poles or planks	2
<hr/>	
<i>Household power</i>	
Paraffin	69
Car battery	12
Electricity	6
Solar power	4
Generator	0.8
<hr/>	
<i>Cooking</i>	
Wood	97
Charcoal	28
Paraffin	7
Gas cooker	0.3
<hr/>	
<i>Electronics</i>	
Cell phone	79
Radio	78
Television	19
<hr/>	
<i>Transport</i>	
Bicycle	41
Motorbike	18
Car / truck / Minibus	6
Animal cart	0.8

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## 4 Rwanda

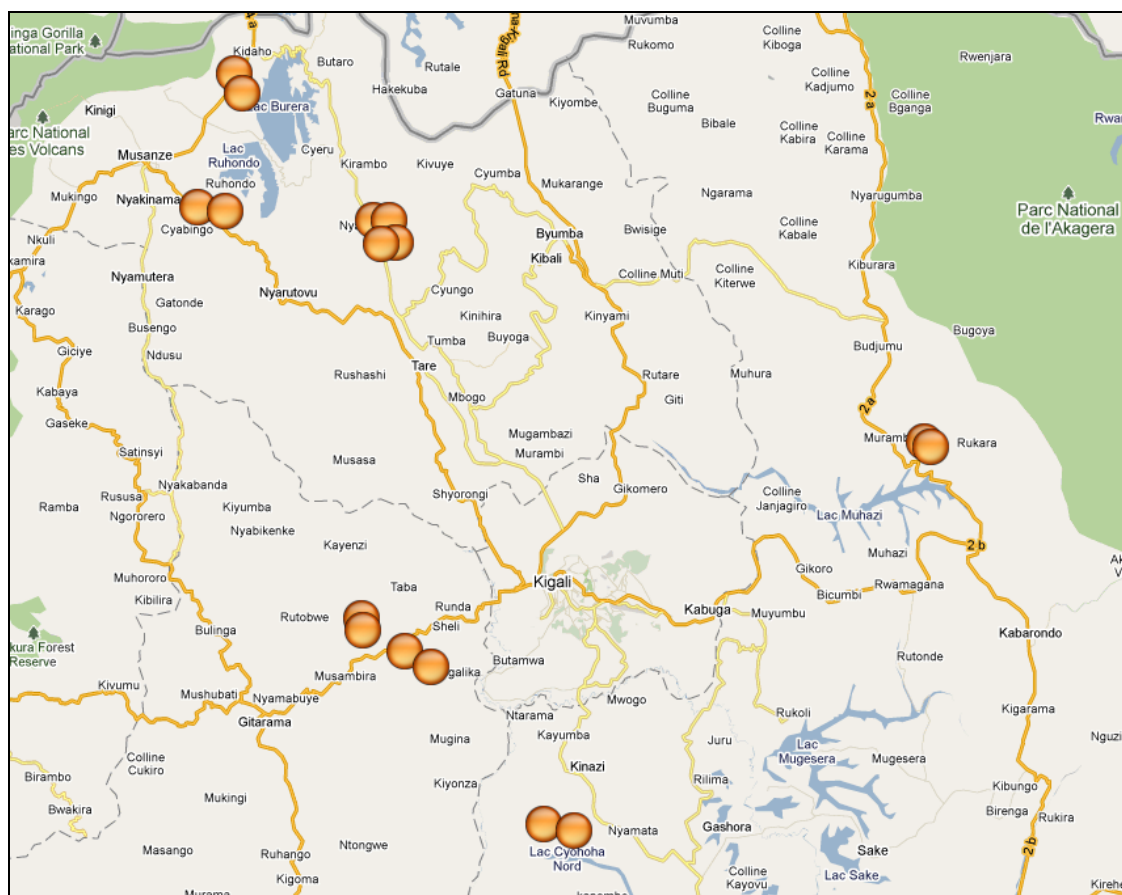
### 4.1 Sites

Households were interviewed in and around 16 villages with 25 households interviewed per village (Table 4.1 and Figure 4.1). The villages were located in the Northern, Eastern and Southern Provinces of Rwanda. The 8 villages targeted in the Northern Province are all situated in high altitude areas; the other villages in Eastern and Southern Province are all situated in mid altitude areas. Based on the N2Africa report on the characterisation of the impact zones and mandate areas (Franke et al., 2011), it can be expected that villages in the Northern Province receive slightly more rain, have a longer growing season and slightly cooler temperatures, compared to the villages in the Eastern and Southern Province. While the whole of Rwanda is relatively densely populated, the villages of Gakenyeri and Butimba 2 are situated in a slightly more sparsely populated area than the other villages. Interviews were conducted in the second half of October and the first half of November 2010.

**Table 4.1: Location of villages and the average altitude of the homesteads where interviews have been held**

Village	Action site	Province	Average altitude (m)
Kanoni	Kinoni	Northern	1812
Nyagafunzo	Kinoni	Northern	1917
Buraza	Cyabingo	Northern	1812
Musebeya	Cyabingo	Northern	1833
Nyamusanze	Nemba	Northern	2004
Ngongwe	Nemba	Northern	2090
Busogo	Nemba	Northern	1963
Kadehero	Nemba	Northern	1917
Gakenyeri	Rukara	Eastern	1528
Butimba 2	Rukara	Eastern	1524
Gihembe	Musambira	Southern	1651
Busasamana	Musambira	Southern	1656
Rugwiro	Nyamiyaga	Southern	1617
Magu	Nyamiyaga	Southern	1545
Kigusa	Musenyi	Eastern	1437
Nyakajuri	Musenyi	Eastern	1390





**Figure 4.1: Location of the villages in Rwanda where baseline interviews have been conducted**

## 4.2 Household characteristics

On average, 4.9 persons lived in a household. In 55% of the households, at least one person was member of an association.

Education levels were in general low with a majority of adult household members without a completed primary education (Table 4.2). Men were slightly better educated than women while younger adults (35 years or younger) were on average higher educated than older people.

**Table 4.2: Education level of household members of 17 years and older in Rwanda (%)**

		None	Primary	Secondary	Post-secondary	Informal education / other
Age 17-35	Female	60	35	4	0	1
	Male	55	38	4	0	2
Age > 35	Female	75	24	0	0	2
	Male	61	35	0	1	3



### 4.3 Occupations

Adult females generally spent more time on farm-activities than men, who were more frequently involved in off-farm activities (Tables 4.3 and 4.4). Men also earned on average more money through off-farm activities than females. Those females that were involved in off-farm income generation usually worked on other people's fields (Table 4.5). Males more frequently had jobs outside agriculture, e.g. businesses, trade or handiwork.

Farming in general and cropping in particular was for most households the most important source of household income (Table 4.6 and 4.7).

**Table 4.3: Involvement of males and females of 17 years or older in farm activities in Rwanda (% of household members)**

		Full-time	Seasonal	Not at all
Age 17-35	Female	77	10	14
	Male	61	23	16
Age > 35	Female	98	0	1
	Male	93	5	2

**Table 4.4: Involvement of females and males of 17 years and older in off-farm income generation and average earnings per week**

	% of household members	Average earnings (US\$ per year)
Female	16.1	189
Male	30.1	390

**Table 4.5: Type of off-farm income generation by household members of 17 years or older working off-farm**

Type of off-farm income	Female involvement (%)	Male involvement (%)
Sale of firewood or timber	2	6
Sale of charcoal	1	0
Remittances	4	1
Trade	8	11
Handiwork	15	30
Rent	0	1
Work on other people's fields	58	25
Food for work	4	1
Sale of bricks	0	2
Own business	10	16
Other <sup>1</sup>	7	13

<sup>1</sup> Other types of off-farm income included: driver, bicycle taxi, bee keeping, soldier and money lending.



**Table 4.6: Main sources of household income in Rwanda (% of households)**

Class	Cropping	Livestock	Off-farm income	Remittance
% of households	93.3	0.5	6.0	0.3

**Table 4.7: Proportion of income from farming and off-farm sources in Rwanda**

Class	All income from farming	Three-quarter from farming	Half from farming, half from off-farm	Three-quarter from off-farm	All income from off-farm
% of households	58.0	32.3	2.8	6.5	0.5

#### 4.4 Hired labour

33.5% of the households hired labour for crop production and processing. Hired labour was used for: land preparation (31%), weeding (19%), planting (19%), transport of harvest or manure (11%) and processing (7%). Labour was applied in beans (76% of the hired labour), cassava (11%), sorghum (7%), maize (4%), Irish potato (4%), bananas (4%) and other crops such as groundnuts, onion, sweet potato, tomato and wheat.

#### 4.5 Livestock ownership

Almost 60% of the interviewed households owned or took care of cattle (Table 4.8). In 2008 the government instituted the 'One Cow Per Poor Household Program', which aimed to give the 257,000 of the poorest households in the country training and support to raise milk for home consumption. It is likely that this policy has contributed to ownership of cattle, especially among the poorest households. Other popular livestock included goats, sheep, pigs, chickens and rabbits. It was fairly common for households to look after other people's cattle or goats; 14% of all households took care of on average 1.3 heads of cattle that were not owned by them. 12% took care of other people's goats. In a few instances, households took care of other people's chicken, pigs, sheep or rabbits.

**Table 4.8: Percentage of interviewed households owning a type of livestock and the average number of livestock owned or taken care of in Rwanda**

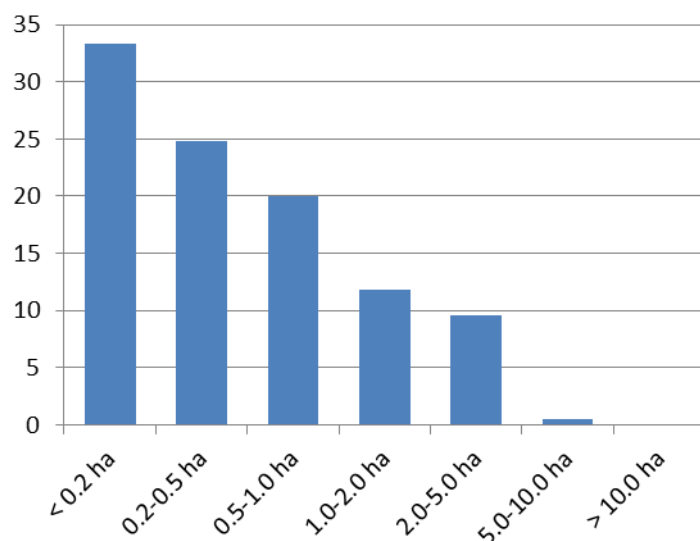
Type of livestock	% of households owning or taking care of livestock	Average number owned or cared for
Cattle	59.5	1.4
Sheep	21.0	2.0
Goats	37.0	2.0
Pigs	16.0	1.2
Chickens	28.3	3.2
Rabbits	12.0	3.0
Bees	1.5	
Other <sup>1</sup>	0.8	

<sup>1</sup> turkeys, guinea pigs or pigeons



## 4.6 Landholding

The majority of farmers in Rwanda had less than 0.5 ha available for farming (incl. land hired or borrowed from other people (Figure 4.2). As some farmers owned larger plots, the average land available for farming per household was 0.71 ha. The vast majority of the farmed land was owned by the households (92%). The remaining land was rented or borrowed from other people. A few households rented or borrowed land to others. 94% of the fields was used for cropping, 4% as woodlots and 2% as fallow or pasture.



**Figure 4.2: Distribution of land available to households for farming in Rwanda (% of households falling in a given category of landholding size)**

## 4.7 Legume cultivation

Virtually all interviewed households in the Eastern and Southern Province and most households in the Northern Province cultivated legumes (Table 4.9). In the Northern Province, climbing bean was the most important legume crop. In the Southern and Eastern Province, common bean, groundnut and soybean were more important. Garden peas (or green beans) were grown by some households. Few farmers also cultivated fodder legumes. The average area covered with grain legumes on a farm was 0.27 ha. Given an average farm size of 0.71 ha, on average 38% of the farmland contained grain legumes. However, these figures should be treated with care, as farmers were not always able or willing to provide accurate estimates of field sizes.

Many farmers used organic inputs (farmyard manure or compost) for the cultivation of grain legumes (Table 4.9). Only few farmers used synthetic fertilisers such as DAP or NPK and only two farmers (0.5% of the total) used urea in climbing or common bean. None of the households indicated that inoculants were used in legume crops.



**Table 4.9: Frequency of legume cultivation, the average area cultivated with legumes, and the use of organic and synthetic fertilisers in legumes in the Northern and Eastern & Southern Province in Rwanda in the 2010 B season from January-July**

	Households growing the crop (%)		Average area (ha)	Farmyard manure / compost (% of fields)	DAP (% of fields)	NPK (% of fields)
	Northern Province	Eastern & Southern Province				
Climbing bean	77	15	0.17	81	7.1	3.8
Common bean	32	93	0.22	72	1.2	0.8
Groundnut	0	43	0.11	41	1.2	0
Soybean	4	37	0.08	78	1.2	4.9
Garden pea	3	7	0.08	37	0	0
All grain legumes	91	99	0.27			
All fodder legumes	2	4	0.15			

Most of the legume grain harvest was used for home consumption (Table 4.10). None of the grain legumes were primarily cultivated for commercial purposes. However, all types of legume grain were occasionally sold. Markets for all grain legumes thus existed.

**Table 4.10: Utilisation of legume grain in Rwanda: average percentage used for home consumption, seed and sale**

	% used for home consumption	% used for seed	% used for sale
Climbing bean	80	16	4
Common bean	69	15	16
Groundnut	71	15	15
Soybean	66	14	21
Garden pea	55	22	24
All legumes	68	15	17

Legume haulms were in most cases re-used as compost, mulch for specific crops (e.g. bananas or tomatoes) or as litter for livestock in a pen (Table 4.11). Presumably, the litter is eventually returned to the land as mulching material or farmyard manure. In some instance, legume haulms were used to feed livestock, but the frequency was relatively low, given the high number of households owning ruminant livestock. Even the haulms of a good fodder provider such as groundnut were used by only 16% of the households growing groundnut. Haulms were sometimes used for cooking. 'Burning' may imply the haulms were used in the homestead (e.g. for cooking) or were burned in the field. In a few instances, households gave away the haulms to others who used them as compost or livestock feed.

**Table 4.11: Use of legume haulms in Rwanda (% of haulms used for a given purpose)**

	Compost / Mulch / Litter for livestock	Livestock feed	Cooking	Burning	Given away to others
% of haulms	80	22	9	4	1



## 4.8 Cultivation of non-legume crops

Popular non-legume crops in Rwanda were sweet potato, maize, cassava (Southern and Eastern Province), sorghum, banana, Irish potato and wheat (Northern Province) (Table 4.12). Some high-value crops were grown by a small part of the households, such as coffee, tomatoes and other vegetables, and pineapple. The use of synthetic fertilizers in non-legume crops was generally low. Maize, (Irish) potato, tomato and coffee were the crops receiving most frequently synthetic fertilizer. Organic manures were however frequently used in all crops, except for coffee.

**Table 4.12: Frequency of non-legume crop cultivation and the use of organic and synthetic fertilisers in these crops among interviewed households in the 2010 B season from January till July**

Crop	Households growing the crop (%)		Farmyard manure / cattle dung (% of fields)	No synthetic fertiliser (% of fields)	DAP (% of fields)	UREA (% of fields)	NPK (% of fields)
	Northern Province	Southern & Eastern Province					
Sweet potato	76	54	53	98	1	1	1
Maize	57	35	74	77	14	10	12
Cassava	6	79	47	100	0	0	0
Sorghum	42	32	58	99	1	1	1
Banana	36	38	64	100	0	0	0
Irish potato	27	22	65	86	3	12	1
Wheat	26	0	62	88	8	2	6
Tomato	4	9	92	62	4	15	23
Coffee	0	9	33	72	0	28	0
Other crops	6	9					

<sup>1</sup> Includes: cabbage, carrot, onion, eggplant, cocoyam, other vegetables, pineapple and yam.

Most of the non-legume crop produce was consumed within the households (Table 4.13). The produce of some high-value crops (coffee, tomato, other vegetables, sugarcane, and to a lesser extent banana) was frequently sold on markets.

**Table 4.13: Utilisation of non-legume produce in Rwanda: average percentage used for home consumption, seed and sale and number of observations (N)**

Crop	% used for home consumption	% used for seed	% used for sale	N
Sweet potato	79	1	19	251
Maize	73	6	20	175
Cassava	69	1	30	161
Sorghum	56	7	37	148
Banana	49	0	50	142
Irish potato	61	12	26	93
Wheat	49	17	34	52
Tomato	12	0	88	24



Vegetable (excl. tomato)	30	1	69	24
Coffee	6	0	94	19
Sugarcane	9	0	91	4

## 4.9 Control over land use and harvest

While in most cases both men and wife decided over the use of land and the use of crop harvest, women clearly had more frequently control over these aspects than men (Table 4.14). The data provided no evidence of the existence of typical 'men's crops' or 'women's crops' in Rwanda.

**Table 4.14: Control over land use and harvest by household members in Rwanda (% of fields)**

	Land use	Legume crop harvest	Non-legume crop harvest
Wife	25	32	28
Husband	9	4	6
Both	62	59	64
Others (e.g. child)	1	1	1

## 4.10 Nutrition

Beans were very popular ingredients in main dishes (Table 4.15). Much fewer households, primarily in the Southern and Eastern Province mentioned other legumes such as groundnut and soybean as important foods for household nutrition. Moreover, the legumes were usually eaten as a side dish. Popular non-legume food items include sweet potato, cassava (Southern & Eastern Province), Irish potato, banana, maize and vegetables.

90% of the households consumed two main meals per day, 9% one meal a day and 1% three meals per day.

**Table 4.15: Most important foods in household nutrition in Rwanda**

Type of food	% of households	
	Northern Province	Southern & Eastern Province
Beans	100	96
Sweet potato	86	57
Cassava	3	81
Irish potato	43	17
Banana	27	31
Maize	38	17
Groundnut	7	25
Vegetables	21	16
Soybean	3	19
Sorghum	12	9
Wheat	12	0




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Rice	4	3
Meat	1	1

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#### 4.11 Market access

All farmers had access to a local or regional market, but the time needed to travel to a market varied between two minutes and five hours. Markets were usually reached on foot or by bicycle (taxi), and occasionally by bus or motorcycle.

#### 4.12 Household assets

Table 4.16 gives a list household assets and services available to households in Rwanda.

**Table 4.16: Household assets and access to services in Rwanda**

Type of asset or service	% of households
<i>Farm implements</i>	
Hoe	100
Cutting knife	87
Plough / Cart	0
Watering cans	5
<i>Livestock facilities</i>	
Roofed shelter	31
Fenced shelter without roof	35
<i>Storage of produce</i>	
Bags	93
Earthenware pots	6
Mud silo / granary	8
<i>Water supply</i>	
Surface water	24
Community borehole / well	70
Private borehole / well	3
Tap water	13
<i>Housing properties</i>	
Mud floor	93
Concrete or cement floor	10
Metal or asbestos roof	57
Grass or thatch roof	21
Tiles roof	39
Mud un-burnt bricks	73
Burnt bricks	4
Poles or planks	29
<i>Household power</i>	
Paraffin	74
Battery	11
Electricity	2
Solar power	1





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Wood	2
Generator	1
<hr/>	
<i>Cooking</i>	
Wood	99
Charcoal	1
Paraffin	1
<hr/>	
<i>Electronics</i>	
Cell phone	39
Radio	67
Television	0.3
Sewing machine	0.3
<hr/>	
<i>Transport</i>	
Bicycle	17
Motorbike	1
Car / truck	0
Animal cart	0

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## 5 Ghana

### 5.1 Locations

The baseline study in Ghana was conducted in the N2Africa mandate area, i.e. the three Northern Regions of Ghana (Northern Region, Upper East, and Upper West Regions) (Figure 5.1). A total of seven districts and twenty-nine communities were selected for the study (Table 5.1). The districts were selected purposively after thorough discussion among the national team members. The selection was based on multiple criteria including initial project activities in the area, legume production activities and/or potential, market access and geographic representation. Communities or villages in each district and households in each community were selected for interview through a simple random sampling technique. Due to the limited number of households in certain communities, the number of communities selected was increased in some districts in order to meet the sample size requirement.

Households were stratified based on the agro-ecological potential of the area (high or low) and market access (high or low). Table 5.2 gives the details of the spread of households interviewed across the strata. In all, a total of four hundred (400) households were selected for the baseline survey (Table 5.1). Trained enumerators conducted the interviews in local languages to facilitate effective communication. After the interview, selective field visits were embarked upon to measure some legume farms. The geographic coordinates of all selected households were taken with GPS equipment.

In terms of challenges faced in the implementation of the baseline survey in Ghana, it was found that during certain periods of the day it was more difficult to find respondents (unavailability of respondents) or they were more tired than at other times of the day (respondent fatigue). This caused some delays. It was found that in general, information on land area and/or plot size was quite difficult for respondents to provide. Only few field measurements could be taken due to limited number of GPS equipment on the field.

Of the three regions, the Northern region is the lowest with altitudes of 128 to 189 m, Upper East ranges from 183 to 262 m and Upper West 262 to 360 m. The sites in Upper East were further north, and therefore drier with shorter growing seasons, in comparison with the sites in the Northern Region and Upper West.

**Table 5.1: Locations of households interviewed for N2Africa baseline survey in Ghana**

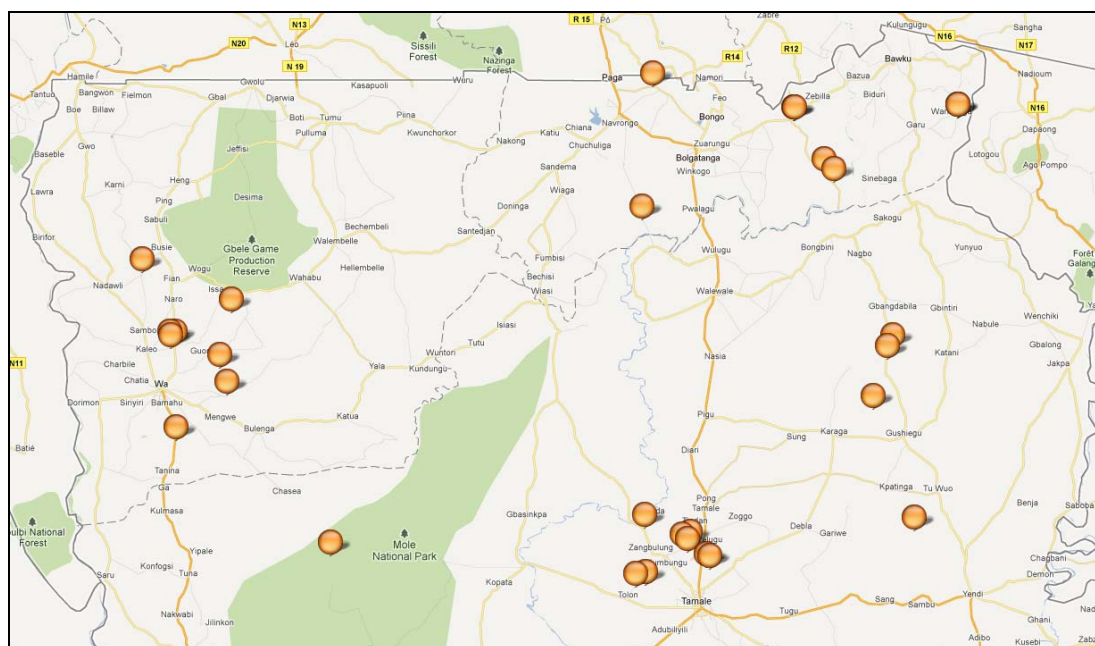
	District	No. of communities selected	No. of households interviewed	Classification of locations in district <sup>1</sup>
Upper East	Bawku West (Zibilla)	4	69	1,2,3,4
	Kassena Nankana East	4	52	1,2,3,4
Northern Region	Chereponi	4	51	2,3,4
	Tolon-Kumbungu	4	51	1,3,4
	Savelugu-Nanton	5	49	1,2,3
Upper West	Nadowli	4	63	1,2,3,4
	Wa East	4	65	1,2,3,4

<sup>1</sup> 1= High agro-ecological potential, high market access, 2= Low agro-ecological potential, high market access, 3= High agro-ecological potential, low market access, 4= Low agro-ecological potential, low market access



**Table 5.2: Percentages of households in the 4 classes, Ghana**

Classification	No. of households	%
1	108	27.0
2	79	19.8
3	114	28.5
4	99	24.8



**Figure 5.1: Location of the villages where households have been interviewed for the baseline survey in Ghana (underlying map taken from Google maps)**

## 5.2 Household characteristics

### 5.2.1 Household size and Education

On average 8.8 persons lived in the interviewed households in Northern Ghana; 43% of the household members were younger than 17 years old. A relatively large percentage of household members indicated not to have finished any education, the older generation of the people above 35 year even more so than the age group between 17 and 35 years old. The younger generation of men constitutes the largest group of household member who enjoyed secondary education. Cases of people receiving post-secondary or even university education are rare (see Table 5.3).

**Table 5.3: Education level of household members aged between 17-35 and >35 disaggregated by gender (%)**

		None	Informal	Primary	Secondary	Post secondary/ university
Age 17-35	Female	64.9	3.7	15.1	15.1	1.1
	Male	51.2	1.7	15.9	29.5	1.7
Age >35	Female	84.7	7.4	3.5	4.4	0.0
	Male	76.5	5.7	6.6	9.2	2.1



## 5.2.2 Membership of associations

In just over 40% of the households interviewed, there is at least one person who is a member of some sort of community-based organisation (CBO) or farmer-based organisation (FBO). The large majority of the associations deal with issues around agriculture, this could be crop production, accessing inputs, credit, sale of produce, etc. (about 90% of all associations mentioned). Membership was more or less equally spread across the regions, with in Upper West slightly fewer people were members of an association than in the other two regions.

## 5.3 Occupations

### 5.3.1 Involvement in farming

Men are more involved in farming activities on a full-time basis than women (Table 5.4). Women are comparably equally involved on a seasonal basis at 41.5%. Slightly more women are not at all involved in farming activities than men (12% and 8%).

**Table 5.4: Involvement of males and females of 17 years or older in farm activities (%)**

Gender	Full time	Seasonal	Not at all
Female (n=881)	46.4	41.5	12.0
Male (n=986)	62.2	29.5	8.3

### 5.3.2 Off-farm income generation

Of the household members of 17 years and older, 28% of the women and 20% of the men are involved in off-farm income generation. Table 5.5 shows the diverse income generating activities in which people are involved. For both men and women trade and 'own business' are the most important sources of off-farm income.

Although the baseline questionnaire included questions on earnings from off-farm income generating activities, the results are not presented here as the information is very diverse and might not be completely accurate and meaningful.

**Table 5.5: Type of off-farm income generation by household members of 17 years or older engaged in off-farm activities**

Type of farm income	Female involvement (%)	Male involvement (%)
Trade	9.2	5.6
Own business	5.8	6.2
Handiwork	2.5	3.1
Sale of charcoal	2.2	0.9
Sale of firewood or timber	2	1.4
Food for Work	1.4	0.0
Remittances	0.2	1.4
Work on other people's fields	0.1	1.0
Other (Pension, sale of bricks, fishing, rent)	0	1.0



### 5.3.3 Sources of household income

The large majority of households rely on cropping for their main source of income, almost 90% (Table 5.6). The percentage of households having a main source of income from remittance and petty trade is negligible and therefore included in the general 'off-farm income' category in Table 5.7, the role of livestock as main source of income is also rather limited. All households reported to derive the larger part of their income from livestock were located in the Upper West region.

The large majority of households indicated that all or three quarters of their income came from their farming activities, respectively 41% and 42% so in total over 80% (see Table 5.7).

**Table 5.6: Main source of household income (%)**

Main source of income	% Households
Cropping	89.5
Livestock	4.0
Off-farm income (incl. petty trade)	6.5

**Table 5.7: Proportion of income from off-farm and farm sources**

Income	Region	%
All from farming	Northern Region	22.0
	Upper East	8.3
	Upper West	11.0
	<b>Subtotal</b>	<b>41.3</b>
Three quarter from farming, rest off-farm sources	Northern Region	13.5
	Upper East	14.8
	Upper West	13.5
	<b>Subtotal</b>	<b>41.8</b>
About half-half from farming and off-farm	Northern Region	1.0
	Upper East	3.5
	<b>Subtotal</b>	<b>4.5</b>
Three quarter from off-farm sources, quarter from farming	Northern Region	1.0
	Upper East	2.8
	Upper West	7.5
	<b>Subtotal</b>	<b>11.3</b>
All from off-farm sources	Northern Region	0.3
	Upper East	1.0
	<b>Subtotal</b>	<b>1.3</b>

## 5.4 Hired labour

In total 77% of the interviewed households hired labour from outside of their households to assist in farming activities. Table 5.8 gives the details of what the hired labour was used for, with land preparation being the most important one at 36%, followed by weeding (23%) and planting (18%). The crops for which most hired labour was used were maize, millet, rice, groundnuts and soya beans.



**Table 5.8: Percentage of households hiring labour for agricultural activities and the allocation of labour to different activities, Ghana**

Total % of household hiring labour	77%
<i>What labour is hired for:</i>	
Land preparation	36.4%
Planting	18.0%
Fertilizer application	0.0%
Weeding	23.4%
Harvest	11.3%
Transport of harvest	8.9%
Crop processing	2%

## 5.5 Livestock ownership

Only one household reported not to have any livestock at all. Chickens, goats, guinea fowls and sheep are most frequently owned. Ownership of cattle is more common in the Upper West region. Pigs and donkeys are also quite common, other smaller animals such as doves, ducks, rabbits, turkeys and guinea pigs were less frequently owned by households interviewed (Table 5.9).

**Table 5.9: Livestock ownership**

Type of livestock	% households owning	average number owned or cared for
Cattle (total number)	31.3	8.2
Cattle	3.5	13.9
Cows for dairy	4.0	4.8
Oxen	9.3	3.1
Chickens	91.5	18.7
Goats	78.8	7.1
Guinea fowls	55.3	14.1
Sheep	54.8	9.6
Pigs	28.8	5.0
Donkeys	10.3	2.8
Doves/pigeons	5.3	14.3
Bee hives	5.0	5.4
Ducks	3.8	10.4
Rabbits	2.3	6.9
Turkeys	1.3	4.5
Guinea pigs	0.5	2.0
Horse	0.5	14.0
Fish	0.3	



## 5.6 Landholding and land use

### 5.6.1 Landholdings

Field sizes were not measured in Ghana and all data presented here is based on information obtained from farmers. 3.5% of the interviewees did not provide any information on field size (all in Upper East). The remaining households had on average 3.86 ha available for cultivation. The differences between the three regions are noteworthy: in the Northern Region interviewees reported access to 5 ha per household, Upper East 3.26 ha per household and 3.02 ha per household in Upper West.

Few households had less than half a hectare (1.3%), 4.5% had between 0.5 and 1 ha. A bigger group, about 16% had 1-2 ha. Just over half of the households had between 2 and 5 ha (55%). Almost 18% had access to 5-10 ha. 20 farmers in Ghana had more than 10 ha available (5%).

### 5.6.2 Land use: cultivation of non-legume crops

Maize was the most important crop cultivated by farmers in the three regions in Northern Ghana. Other cereals cultivated were rice, millet and sorghum. Yam was also cultivated frequently. Groundnuts, soybeans and cowpeas are the most important legume crops grown, not only as 'first crop' in a field, but even more so as second, third and fourth crop (see Table 5.10).

**Table 5.10: Type of crop grown (% fields with relevant crop)**

<b>Crop:</b>	<b>First crop</b>	<b>Second crop</b>	<b>Third crop</b>	<b>Fourth crop</b>
Bambara nuts	3.0	6.4	7.3	7.4
Cassava	3.2	5.0	5.5	3.7
Common beans	1.7	5.0	1.8	11.1
Cotton	0.3	0.0	0.0	0.0
Cowpeas	6.8	7.9	5.5	22.2
Groundnuts	17.0	12.9	16.4	14.8
Maize	21.0	12.9	9.1	7.4
Millet	9.2	17.1	5.5	7.4
Okra	0.7	0.0	0.0	0.0
Pepper	0.9	0.0	1.8	0.0
Rice	13.7	6.4	9.1	7.4
Sorghum	5.2	15.7	23.6	3.7
Soybeans	7.7	6.4	10.9	11.1
Tomatoes	0.5	0.0	0.0	0.0
Yams	9.0	4.3	3.6	3.7
<b>Total number of fields</b>	<b>1493</b>	<b>140</b>	<b>55</b>	<b>27</b>



**Table 5.11: Percentage use of inorganic and organic fertilizers on non-legume crops**

Crop	No. of fields	% Fields where input was used				
		Ammonium Sulphate	NPK	Urea	Compost	Manure
Cassava	49	2.0	0	0	0	0
Cotton	3	33.3	66.7	0	0	0
Maize	328	35.1	61.6	0	1.5	11.9
Millet	138	2.9	6.5	0	1.5	26.1
Pepper	5	0	40.0	0	0	0
Rice	199	12.1	40.2	1.0	0	0
Sorghum	98	1.0	2.5	0	0	0
Tomatoes	5	20.0	0	0	0	0

Except for rice and tomatoes, the largest part of produce from non-legume crops was used for consumption within the household, such as cassava, maize, millet, sorghum, sweet potatoes and yams (see Table 5.12).

Most decision-making is shared and done by both wife and husband, only with okra and tomatoes, women are never in a position to take a decision on their own (Table 5.12).

**Table 5.12: Use of products from non-legume crops**

Crop	N	% for food	% for seed	% for sale	Who makes decision (%)		
					Wife	Husband	Both
Cassava	47	78.4	7.6	14.1	0.0	21.3	78.7
Maize	310	64.9	8.4	26.7	9.4	34.0	56.6
Millet	147	59.7	15.0	25.3	15.0	28.6	56.5
Pepper	4	12.0	18.0	70.0	25.0	50.0	25.0
Rice	194	18.4	11.9	69.8	7.1	34.2	58.7
Sorghum	111	58.4	10.9	30.8	30.8	8.1	61.3
Yams	130	29.1	31.3	39.7	5.2	32.2	62.6
Other <sup>1</sup>	12	26.1	18.1	55.7	8.3	37.5	54.2

<sup>1</sup> Sweet potato, tiger nut (*Cyperus esculentus*), okra, tomato, pepper

## 5.7 Legume cultivation and use

In the past five years, 78% of the interviewed households cultivated legumes. The average land area allocated to grain legumes is 1.28 ha however legumes are most often intercropped with other crops. Table 5.13 specifies the percentages of households cultivating which legumes; groundnut, cowpea and soybeans are the most popular legumes. In Ghana, very few people cultivated fodder legumes. Overall, more legumes were cultivated in the Upper West Region than in the other two regions. Especially in the Upper East fewer legumes were grown (Table 5.13).

The use of the haulms of legume crops in Ghana is specified in Table 5.14, most is used for livestock feed, compost or green manure.





The utilization of the legume grain was for all legumes spread between household consumption, keeping for seed and selling. Soybeans are most important for selling, however still a quarter of the produce is used for household consumption. Bambara nuts were the least sold legumes and with the larger part consumed in the household (see Table 5.15).

**Table 5.13: The cultivation of legume crops (% of households growing the relevant legume), Ghana**

	Northern Region	Upper East	Upper West	All
Bambara nuts	0.1	0.9	6.1	7.1
Common bean	1.3	0.1	4.6	6.0
Cowpeas	6.6	1.9	17.2	25.7
Fodder legume	0.1	0.0	0.4	0.5
Groundnuts	14.8	5.1	19.9	39.8
Soybeans	7.0	0.6	13.2	20.8
<i>Grand Total</i>	<i>29.9</i>	<i>8.6</i>	<i>61.4</i>	<i>100.0</i>

**Table 5.14: Use of legume haulms (percentage of haulms used for a given purpose), Ghana**

Use of legume haulms	%
Compost, farmyard or green manure	41.7
Left in the field / mulch	3.1
Burned in the field	7.0
Cooking / Food preparation	<0.2
Sale	4.0
Livestock feed	44

**Table 5.15: Utilization of legume grain, Ghana**

Legume Crop	% household consumption	% kept for seed	% sold
Bambara nuts	57.4	17.3	25.3
Common bean	38.2	20.8	41.0
Cowpeas	45.8	13.9	40.4
Groundnuts	24.4	19.3	56.3
Soybeans	24.4	13.1	62.5

As Table 5.16 shows, farmers apply very little nutrients to the fields where legumes were grown, the highest being just of 6% of cowpeas receiving Compound D. Even manure or compost was hardly applied to legumes in Ghana. However, since they are regularly cultivated together with other crops, legumes may benefit from fertilizers applied to these other crops. One farmer used inoculants on soybeans.



**Table 5.16: Use of organic and inorganic fertilizers' in legume fields, Ghana**

Legume crop	Number of fields	% of fields with this particular legume	Average area (ha) allocated to this legume	% of fields where this input was used			
				Inoculant	Compound D	Manure (kraal, fowl)	Compost
Bambara nuts	58	7.3	0.40	0	0.0	0.0	0.0
Common beans	48	6.1	0.65	0	2.1	0.0	0.0
Cowpeas	205	25.9	0.57	0	6.3	2.9	1.5
Groundnuts	317	40.0	0.84	0	1.0	2.2	2.2
Soybeans	165	20.8	0.70	0.6	1.3	2.4	0

**Table 5.17: Summary of control over land use & harvest by household members (% of fields)**

Control over:	Wife	Husband	Both	Owner (in case land is rented)
Use of land	3.4	79.7	11.6	5.3
Harvest – Legumes	7.6	56.8	33.1	2.4
Harvest – Non-legumes	7.3	66.1	25.6	1.0
Harvest – All crops	7.3	65.2	26.4	1.1

## 5.8 Nutrition

The majority of households in Ghana consumed three meals per day (about 75%). Almost everyone else consumed two meals a day. People were asked to list the six most commonly consumed food items in their household. In Ghana maize, rice, cowpeas, groundnuts, yam soya bean and sorghum were the most commonly consumed foods (see Table 5.18).

**Table 5.18: Principle food items consumed in interviewed households in Ghana (% of household mentioning the food item)**

Type of food	% of households
Bambara nuts	16.5
Cassava	16.0
Common bean	12.0
Cowpeas	40.3
Groundnut	38.3
Guinea Corn	0.5
Maize	62.8
Meat (chicken, beef)	0.3
Millet	11.3
Other	12.5
Rice	51.8
Sorghum	15.8
Soybean	25.3



Vegetables	2.3
Yams	37.0

**Table 5.19: Legume grain consumption as a main or side dish among interviewed households**

Type of legume	%
Bambara nut	21.3
Common bean	16.0
Cowpea	60.3
Groundnut	55.5
Soybean	34.5

## 5.9 Market access

About 65% of the identified markets in Ghana are local markets, the remaining 35% are central, regional or district markets. In most cases people use markets for both the sale and purchase of goods. Agricultural produce and household goods dominated on the market. Additionally, markets may be used for repair of machinery.

## 5.10 Household assets

Many households possessed a hoe and a cutting knife. Plough and ox/ donkey cart were owned by few only (Table 5.20). Many households have access to a community borehole or well. The information collected on the houses seems rather incomplete, no information was collected on cooking arrangements. A large majority of households had a mobile phone, radio's and bicycles were also widely possessed.

**Table 5.20: Household assets and access to services**

Type of asset or service	% of households	Average no. owned
<b>Farm implements</b>		
Hoe	90.3	5.6
Cutting knife / Panga	78.5	3.7
(Ox) Plough / Cart	6.0	1.3
Ox/donkey cart		
Watering cans	3.0	2.5
Tractor	5.0	1.5
Tobacco press		
Tobacco drying shed	0.3	1
Wheelbarrow	0.8	1.3
<b>Livestock facilities</b>		
Roofed shelter		
Fenced shelter without roof		
<b>Storage of produce</b>		
Bags		



Earthenware pots		
Mud silo / granary		
<b>Water supply</b>		
Surface water	13.3	
Community borehole / well	77.0	
Private borehole / well	6.0	
Tap water	7.3	
Channel	0.3	
<i>Irrigation</i>		
Diesel pump		
Treadle pump		
Channel irrigation		
<b>Housing properties</b>		
Mud floor	1.5	
Concrete / cement floor	3.0	
Tiles floor		
Metal / asbestos roof	4.3	
Grass / thatch roof	2.8	
Tiles roof		
Mud un-burnt bricks	4.0	
Burnt bricks	0.5	
Cement		
Poles or planks		
<b>Household power</b>		
Paraffin	0	
(Car) Battery	0.3	
Electricity	0.8	
Solar power	0.5	
Generator	0.8	
Wood		
<b>Cooking</b>		
Wood		
Charcoal		
Paraffin		
Gas cooker		
<b>Electronics</b>		
Cell phone	76.3	2
Radio	69.8	1.7
Television	13.5	1.4
Fridge		
DVD player		
Sewing machine		
<b>Transport</b>		
Bicycle	81.8	2.5
Motorbike	22.5	1.3
Car / truck / Matatu	0.5	1
Truck	0.5	1
Animal cart		



## 6 Nigeria

### 6.1 Sites

The Nigerian baseline survey for N2Africa was conducted among 781 households in Kaduna and Kano State (Table 6.1). Local Government Areas (LGAs) targeted in Kano State were all situated south of Kano city in the transition zone between northern Guinea savannah and Sudan savannah. In Kaduna State, LGAs of Giwa and Igabi were situated south and west the city of Zaria and fall into a agro-ecological zone different from the LGAs in southern Kaduna (Kachia and Zangon Kataf). In each LGA, four villages were targeted with 20-25 households interviewed in the surroundings of each village. No GPS data were collected, so the exact location of the households is not known.

**Table 6.1: Distribution of interviewed households over Local Government Areas and State in Nigeria**

Local Government Area	State	Number of households interviewed	Agro-ecological zone
Bunkure	Kano	93	Northern Guinea / Sudan savannah
Dawakin Kudu	Kano	95	Northern Guinea / Sudan savannah
Garko	Kano	97	Northern Guinea / Sudan savannah
Tudun Wada	Kano	99	Northern Guinea savannah
Giwa	Kaduna (north)	99	Northern Guinea savannah
Igabi	Kaduna (north)	99	Northern Guinea savannah
Kachia	Kaduna (south)	100	Southern Guinea savannah
Zangon Kataf	Kaduna (south)	99	Southern Guinea savannah

### 6.2 Household characteristics

The average number of people in a household was high, while values of individual households varied a lot (Table 6.2). Some households, especially in Kano state, harboured very large extended families involving 100 to 150 people in a single household. The exact number was usually unknown in these large households. On the other hand, also households with only 1 or 2 members were interviewed.

**Table 6.2: Average number of people in a household in Kano and Kaduna State**

	Kano State	Kaduna north	Kaduna south
No. of people	14.6	8.0	6.9

In 49% of the households, at least one person was member of an association. Membership of an association was more common among interviewed households in Kano State, where 61% of the households had somebody who was member of an association. The aim of the association was often related to agriculture (to gain excess to technologies, to purchase inputs, etc.), finances (access to credit), to general development (e.g. 'to build the nation'), or simply to help each other.



Males were generally better educated than females (Table 6.3). In southern Kaduna State, education level was more equal between sexes. In Kano and northern Kaduna State, a relatively high proportion of adults received 'informal education'. In most cases, this education was received at Koranic schools.

**Table 6.3: Education level of household members of 17 years and older in Nigeria (%)**

		None	Primary	Secondary	Post-secondary	University	Informal education / other
Kano State	Female	5.3	21.4	8.8	0.8	0.5	63.1
	Male	2.7	26.5	21.4	4.6	5.0	39.9
Kaduna state (north)	Female	34.3	33.0	13.6	0.3	0.5	18.4
	Male	7.8	38.0	14.5	2.2	1.7	9.8
Kaduna State (south)	Female	17.5	30.8	39.2	10.6	1.9	0.0
	Male	11.3	28.1	45.1	12.6	1.8	1.0

### 6.3 Occupations

In southern Kaduna State, the vast majority of both males and females were full-time engaged in farm activities (Table 6.4 and 6.5). In Kano and northern Kaduna State, men were more frequently part-time or not at all involved in farm activities. Women were rarely full-time involved in farm activities in these regions.

Typical off-farm income sources included handiwork, trade, remittances, sale of firewood, timber or charcoal and other businesses (Table 6.6).

**Table 6.4: Involvement of males and females of 17 years or older in farm activities in Nigeria (% of household members)**

		Full-time	Seasonal	Not at all
Kano State	Female	11.2	20.8	68.0
	Male	43.3	45.0	11.7
Kaduna state (north)	Female	2.6	23.5	73.8
	Male	47.0	29.2	23.8
Kaduna State (south)	Female	93.6	4.0	2.4
	Male	92.8	5.9	1.3

**Table 6.5: Involvement of females and males of 17 years and older in off-farm income generation in Nigeria**

		% of adult household members
Kano State	Female	68.4
	Male	65.8
Kaduna state (north)	Female	2.9
	Male	41.0



Kaduna State (south)	Female	35.7
	Male	35.9

**Table 6.6: Type of off-farm income generation by household members of 17 years or older in Nigeria**

Type of off-farm income	Female involvement (%)	Male involvement (%)
Sale of firewood, timber or charcoal	4.1	3.9
Remittances	6.2	3.1
Trade	9.8	15.6
Handiwork	12.6	12.7
Rent	0.6	0.7
Work on other people's fields	0.4	1.7
Pension	0.0	1.0
Fishing	0.2	1.2
Own business	7.1	10.7
Other <sup>1</sup>	5.1	8.8

<sup>1</sup> Other types of off-farm income included: food processing, medical work, civil servant, driver, teacher.

Cropping was the most important source of household income for a great deal of households in the study area (Table 6.7 and 6.8). For a fairly large percentage of households in Kano and northern Kaduna State, off-farm income was the most important source of income. Due to the closeness of major urban centres in these areas, opportunities for off-farm income generation were probably more abundant than in southern Kaduna State. Livestock keeping as a prime source of income played a role in Kano and southern Kaduna, but not in northern Kaduna State. It is likely that many of those households which have livestock as their main source of income were settled Fulani herdsman.

**Table 6.7: Main sources of household income in Nigeria (% of households)**

	Cropping	Livestock	Off-farm income
Kano State	73.8	9.8	16.4
Kaduna State (north)	68.2	0.0	31.8
Kaduna State (south)	92.9	3.5	3.5

**Table 6.8: Proportion of income from farming and off-farm sources in Nigeria (% of households interviewed)**

State	All income from farming	Three-quarter from farming	Half from farming, half from off-farm	Three-quarter from off-farm	All income from off-farm
Kano State	21	2	12	24	43
Kaduna State (north)	26	1	45	2	28
Kaduna State (south)	77	5	8	2	7



## 6.4 Hired labour

Hiring labour for crop activities was more common in Kano State and northern Kaduna State than in southern Kaduna State (Table 6.9). Hired labour was commonly used for land preparation, planting, weeding and harvesting. Labour was used in fields with maize (50% of all cases), sorghum (16%), millet (13%), rice (6%), yam (4%), groundnut (4%), cowpea (2%), or cassava (2%) as a principle crop.

**Table 6.9: Percentage of interviewed household hiring labour and the allocation of labour to farm crop activities in Nigeria**

	Kano State	Kaduna State (north)	Kaduna State (south)
% of households hiring labour	77.6	75.8	47.7
<i>Labour hired for:</i>			
Land preparation	57.6	73.7	37.7
Planting	57.6	70.2	23.1
Weeding	74.0	69.7	31.7
Fertiliser application	0.0	0.0	7.0
Harvest	59.9	68.2	20.6
Transport	57.0	61.6	13.6
Processing	30.2	60.1	3.0

## 6.5 Livestock ownership

Livestock ownership was unequally distributed over the survey areas with farmers in Kano and southern Kaduna State owning more livestock than farmers in northern Kaduna (Table 6.10). Also the type of livestock owned differed between regions. For instance, oxen, among others used for land cultivation, were most common in northern Kaduna. Pigs were exclusively kept in southern Kaduna.

**Table 6.10: Percentage of interviewed households owning a type of livestock and the average number of livestock owned or taken care of in Nigeria**

Livestock type	Livestock owned or taken care of by household (%)			Average number
	Kano	Kaduna (north)	Kaduna (south)	
Cattle (all types)	37.2	10.6	16.6	10.6
Dairy cows	11.7	2.0	5.0	10.3
Oxen	6.5	27.8	0.5	3.4
Goats	88.8	24.7	57.3	12.4
Sheep	87.8	26.3	17.1	10.9
Pigs	0.0	0.0	58.3	6.3
Chicken	79.9	21.7	77.9	27.3
Guinea fowls	20.6	0.0	1.0	27.6
Donkeys	4.7	2.0	1.5	3.1
Doves/pigeons	8.1	0.0	0.0	29.5
Horses	0.8	1.5	0.0	2.2
Rabbit	1.8	0.0	1.5	9.2
Turkey	0.3	0.5	3.0	3.6





Guinea pigs	2.6	0.0	0.0	45.8
<i>All types</i>	<i>93.0</i>	<i>64.6</i>	<i>91.2</i>	

## 6.6 Landholding

Households in Kano State had on average 7.0 ha available for farming, in northern Kaduna State this was 3.5 ha, and in southern Kaduna 2.7 ha. These numbers however should be treated with caution as actual field sizes were not measured. Relatively large landholdings in Kano and northern Kaduna can be explained by the large size of many households in these regions.

The principal cereal in Kaduna State was maize, while in Kano State maize, sorghum and millet were grown about equally frequent (Table 6.11). Also rice was an important cereal crop in the region. Yam was a main crop in Kaduna State, but not in Kano State. Among the legumes, cowpea and groundnut were the most important grain legumes in Kano State, while in Kaduna State these were groundnut and soybean. Legumes were often intercropped with cereals. Ginger was exclusively grown in southern Kaduna State.

**Table 6.11: Use of fields in 2010-2011 season among interviewed households in Nigeria (% of fields)**

Crop	Kano State				Kaduna State (north)				Kaduna State (south)			
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Maize	25.2	2.0	2.0	1.0	45.8	1.5	0.3	0.0	59.7	4.8	0.4	0.7
Sorghum	21.2	10.8	0.5	2.9	6.4	5.4	0.8	0.3	7.7	17.2	1.5	0.4
Millet	18.2	15.5	0.3	0.7	1.8	0.5	2.9	0.0	6.6	3.3	0.0	0.7
Rice	10.4	4.0	0.8	0.1	19.5	2.8	15.4	0.3	1.1	1.1	2.2	11.4
Yam	0.0	0.0	0.0	0.0	11.3	4.9	1.0	0.0	3.3	4.0	11.7	2.2
Cassava	0.7	0.7	0.0	0.1	2.1	0.3	0.0	0.0	0.7	0.0	0.0	0.0
Cowpea	11.8	2.9	4.9	1.3	4.1	1.5	0.5	17.0	3.7	0.4	0.4	0.4
Groundnut	6.9	7.8	2.7	1.9	2.3	3.6	0.0	0.0	3.7	0.0	0.7	0.4
Soybean	5.3	1.0	0.2	0.1	5.7	16.5	1.0	0.0	6.6	3.3	1.1	1.5
Bambara nut	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Ginger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.4	1.8	0.4
Other*	<0.7	<0.5	<0.2	<0.1	<0.7	<0.5	<0.2	<0.1	<0.7	<0.5	<0.2	<0.1
None	0.0	52.8	88.0	91.5	0.0	62.7	81.0	82.5	0.0	65.2	75.8	81.3

\* includes cocoyam, onion, pepper, tomato, (Irish) potato, sweet potato, wheat, okra and sugarcane.

## 6.7 Legume cultivation

In Kano State, the majority of interviewed households grew cowpea and groundnut (Table 6.12). In Kaduna State, soybean and cowpea were the most popular legume crops. Bambara nut was a minor legume crop. The use of organic or mineral fertiliser, especially NPK and SSP, was quite common in legumes (Table 6.13).



**Table 6.12: Cultivation of legume crops among interviewed households in Nigeria (% of households growing the relevant legume)**

Crop	Kano State	Kaduna State (north)	Kaduna State (south)
Groundnut	76.8	8.6	36.2
Cowpea	93.5	59.6	49.7
Soybean	27.9	51.0	53.8
Bambara nut	0.8	0.0	0.0

**Table 6.13: Use of organic inputs and mineral fertiliser in legumes in Nigeria**

Crop	% of fields receiving organic inputs	% of fields receiving NPK	% of fields receiving SSP	% of fields receiving urea
Groundnut	74.0	19.5	29.8	6.3
Cowpea	55.5	32.2	27.9	7.4
Soybean	39.0	36.2	61.3	5.4

The three main legumes – soybean, groundnut and cowpea – were commonly used for home consumption as well as sale (Table 6.14). Groundnut was the crop that was most frequently used for sale.

**Table 6.14: Utilisation of legume grain in Nigeria: average percentage per household used for home consumption, seed and sale**

	% used for home consumption or seed	% used for sale
<i>Kano State</i>		
Groundnut	38.5	61.5
Cowpea	48.3	51.7
Soybean	47.0	53.0
<i>Kaduna State (north)</i>		
Groundnut	3.5	96.5
Cowpea	59.2	40.8
Soybean	62.0	38.0
<i>Kaduna State (south)</i>		
Groundnut	38.5	61.5
Cowpea	48.3	51.7
Soybean	47.0	53.0

Legume haulms from cowpea, groundnut and soybean were frequently used to feed domestic animals (Table 6.15). The sale of legume haulms, especially of groundnut and to a lesser extent of cowpea, was also common. In southern Kaduna, where livestock densities were lower, the sale of residues was more common. Probably, traders from areas with a high livestock density (Kano and northern Kaduna State) where more peri-urban livestock keeping is taking place, bought groundnut stover from farmers in southern Kaduna where livestock densities were relatively low. Soybean crop residues were frequently burned in southern Kaduna.



**Table 6.15: Use of legume haulms in Nigeria (percentage of haulms used for the given purpose and number of observations)**

	Animal feed	Sale	Burned	Green manure	N
<i>Kano State</i>					
Cowpea	98.2	1.8	0.0	0.0	328
Groundnut	97.1	2.9	0.0	0.0	306
Soybean	100.0	0.0	0.0	0.0	121
<i>Kaduna State (north)</i>					
Cowpea	92.3	7.7	0.0	0.0	52
Groundnut	100.0	0.0	0.0	0.0	19
Soybean	100.0	0.0	0.0	0.0	8
<i>Kaduna State (south)</i>					
Cowpea	69.5	28.0	1.2	1.2	82
Groundnut	25.3	69.0	0.0	5.7	87
Soybean	22.1	5.3	72.6	0.0	95

## 6.8 Cultivation of non-legume crops

Maize, sorghum, rice and millet were the main non-legume staple crops (Table 6.16). Yam was the only non-cereal and non-legume crop that played an important role in Kaduna State. The use of mineral fertiliser (urea, NPK 15-15-15 and SSP) was high in non-legume crops, often in combination with organic manure (Table 6.16). All non-legume crops were used for home consumption as well as sale (Table 6.17). Ginger could be considered more of a cash crop, while sorghum tended to be more of a subsistence crop.

**Table 6.16: Cultivation of non-legume crops by the interviewed households in northern Nigeria (% of households growing the relevant crop)**

	Kano State	Kaduna State (north)	Kaduna State (south)	% fields receiving mineral fertiliser	% fields receiving organic manure
Maize	60.9	84.3	85.9	98.3	52.4
Sorghum	82.0	21.7	41.2	90.9	63.0
Rice	36.7	66.7	20.6	97.8	46.8
Millet	51.8	2.0	27.1	98.1	66.5
Yam	0.0	29.8	32.7	91.9	4.0
Cocoyam	0.0	0.0	9.0	100.0	0.0
Ginger	0.0	0.0	20.1	95.0	60.0
Sweet potato	1.0	2.0	4.2	95.5	63.6
Cassava	3.9	5.1	2.5	60.0	60.0
Other crops *	<2.0	<2.0	<2.0		

\* Other crops include: tomato, wheat, pepper, potato, onion, cotton, cocoa, okra, sugarcane and cabbage.



**Table 6.17: Utilisation of non-legume produce in Nigeria: average percentage used for home consumption, seed and sale**

Crop	% used for home consumption or seed	% used for sale	N
Maize	58.3	41.7	403
Sorghum	71.9	28.1	277
Rice	57.4	42.6	193
Millet	73.8	26.2	286
Yam	38.7	61.3	77
Cocoyam	38.7	61.3	16
Ginger	13.2	86.8	36
Sweet potato	45.1	54.9	7
Cassava	40.4	56.6	21

## 6.9 Control over land use and harvest

In Kano and northern Kaduna State, men decided on the use of land and on the use of the harvest (Table 6.18). The data in Table 6.18 suggest a strong male domination in these areas. In southern Kaduna, decisions on land use and harvest use were more frequently taken together by men and women.

**Table 6.18: Control over land use and harvest by household members in Nigeria (% of all fields)**

	Kano State		Kaduna State (north)		Kaduna State (south)	
	Land use	Harvest	Land use	Harvest	Land use	Harvest
Wife	0.0	0.5	0.0	0.0	4.9	5.3
Husband	99.9	99.4	97.9	94.8	58.5	54.7
Both	0.1	0.1	0.8	5.2	34.3	37.7
Owner	0.0	0.0	1.3	0.0	2.3	2.3

## 6.10 Nutrition

Most households ate on average three meals per day (Table 6.19). Data on legume consumption suggest that cowpea is the most popular grain legumes for consumption eaten by almost all households, followed by groundnut and soybean (Table 6.20).

**Table 6.19: Percentage of households eating 2 or 3 meals per day**

	2 meals per day	3 meals per day
Kano State	6.5	93.5
Kaduna State (north)	21.0	79.0
Kaduna State (south)	11.3	88.7



**Table 6.20: Legume grain consumption as a main or side dish among interviewed households in Nigeria**

Type of legume	Consumption (% of households)
Groundnut	41.2
Cowpea	96.5
Soybean	25.4
Bambara nut	0.8

## 6.11 Market access

All farmers had access to markets. In the Local Government Areas of Bunkure and Dawakin Kudu – closely located to Kano city – farmers generally had access to several markets, which often had a wider regional function. In other LGAs, farmers had less choice of markets and these markets were more frequently considered local markets. Transport to markets in Kano State and northern Kaduna State was often by car, bus or motorbike. In southern Kaduna, bicycles were also commonly used for transport to markets.

## 6.12 Household assets

Table 4.21 gives a list household assets and services available to households in Nigeria.

**Table 6.21: Household assets and access to services in Nigeria**

Type of asset or service	Kano State	Kaduna State (north)	Kaduna State (south)
<i>Farm implements</i>			
Hoe	81.8	93.9	96.0
Cutting knife	62.0	28.8	39.7
Ox/donkey cart	10.4	1.5	0.5
Watering cans	7.8	5.6	3.0
Wheel barrow	16.7	42.9	6.0
Plough	30.5	40.4	0.0
Tractor	4.9	0.0	0.0
<i>Livestock facilities</i>			
Roofed shelter	53.4	64.6	45.7
Fenced shelter without roof	31.0	16.2	0.5
<i>Storage of produce</i>			
Bags	51.8	69.3	62.1
Earthenware pots	4.4	0.0	0.5
Mud silo / granary	43.5	3.0	39.7
<i>Water supply</i>			
Surface water	14.3	0.0	17.1
Community borehole / well	54.2	1.0	84.0
Private borehole / well	81.8	98.5	56.3
Tap water	21.1	0.0	0.0
Channel	3.6	0.0	0.0
<i>Irrigation</i>			
Diesel pump	28.1	7.1	15.6
Treadle pump	1.3	5.1	2.5



Channel irrigation	1.6	0.0	0.0
<i>Housing properties</i>			
Mud floor	27.3	4.0	18.6
Concrete or cement floor	81.8	93.4	79.9
Tiles floor	1.8	1.0	1.0
Metal or asbestos roof	87.8	81.3	88.9
Grass or thatch roof	26.8	18.2	10.1
Tiles roof	2.1	1.0	1.5
Mud un-burnt bricks	82.0	81.8	90.5
Burnt bricks	26.8	18.2	2.5
Poles or planks	2.3	0.0	2.5
<i>Household power</i>			
Paraffin	9.1	85.9	65.8
Battery	6.5	1.5	4.5
Electricity	45.3	35.4	45.7
Solar power	1.3	1.0	0.0
Generator	15.4	6.1	29.6
<i>Cooking</i>			
Wood	95.8	96.5	89.9
Charcoal	3.9	60.1	5.0
Paraffin	0.0	56.6	31.7
<i>Electronics</i>			
Cell phone	64.8	29.3	85.4
Radio	76.3	89.4	86.4
Television	23.4	33.8	52.8
Fridge	1.3	2.0	5.0
<i>Transport</i>			
Bicycle	69.5	58.1	53.3
Car	12.8	4.0	9.0
Motorbike	51.6	42.9	55.3
Truck	14.6	2.5	1.0



## 7 Malawi

### 7.1 Sites

The baseline survey was conducted among 394 households in four districts of Malawi (Table 7.1). Approximately 25 households were interviewed in a village and its surroundings, and four villages were targeted in each district. Dowa and Lilongwe districts border the city of Lilongwe. These districts have relatively high population densities and most farmers in these districts have good access to markets. Salima and Ntcheu districts are further away from major urban centres. Both districts have a lower altitude than Dowa and Lilongwe, and mean annual temperatures are higher. Salima district borders Lake Malawi. No GPS data were collected at the homesteads, and therefore the exact locations of households remain unknown.

In the case of Malawi there was no attempt to skip households that were already involved in N2Africa project activities. N2Africa trials plots were excluded from the data on legume cultivation and management practices.

**Table 7.1: Distribution of interviewed households over districts in Malawi**

District	Number of households interviewed
Dowa	97
Lilongwe	100
Ntcheu	101
Salima	96

### 7.2 Characteristics of household members

On average, 4.7 people lived in a household. 50% of the household members were less than 17 years old.

In 32% of the households, at least one person was member of an association. The purpose of the associations was related to farming, finance, health and social care, infrastructural development, religion or crime fighting. Almost all members became a member of the association in the last five years. 51 households indicated that someone in the household was member of the 'N2Africa association'. Since these memberships are a direct result of the N2Africa project activities, the N2Africa members were not included in the membership figures presented above.

Among the older generation (> 35 years old) men were generally better educated than women (Table 7.2). No such difference can be observed among the younger adults, who were often better educated than the older adults.

**Table 7.2: Education level of household members of 17 years and older in Malawi**

		None	Primary	Secondary	Post-secondary	Informal education / other
Age 17-35	Female	9.0	63.0	27.3	0.3	0.3
	Male	6.0	64.4	27.2	0.2	0.4



Age > 35	Female	29.8	66.5	2.6	0.0	1.0
	Male	10.1	76.4	13.1	0.0	0.5

### 7.3 Occupations

Females were more frequently involved full-time in farm activities, whereas males were more engaged in off-farm income generation (Table 7.3 and 7.4). Work on other people's fields was the most common form of off-farm income generation, followed by trade and other businesses (Table 7.5). Salaried jobs were very rare among household members.

**Table 7.3: Involvement of males and females of 17 years or older in farm activities in Malawi (% of household members)**

		Full-time	Seasonal	Not at all
Age 17-35	Female	77.3	21.3	1.4
	Male	63.2	31.4	5.4
Age > 35	Female	93.6	4.8	1.6
	Male	92.9	4.6	2.5

**Table 7.4: Involvement of females and males of 17 years and older in off-farm income generation and average earnings per person per week in Malawi**

		% of adult household members
Age 17-35	Female	23.1
	Male	36.8
Age > 35	Female	35.9
	Male	46.3

**Table 7.5: Type of off-farm income generation by household members of 17 years or older in Malawi**

Type of off-farm income	Female involvement (%)	Male involvement (%)
Sale of firewood, timber or charcoal	2.9	2.6
Remittances	0.2	1.1
Trade	6.8	6.4
Handiwork	1.2	3.7
Work on other people's fields	14.5	14.3
Pension	0.0	0.7
Sale of bricks	0.2	0.2
Fishing	0.6	3.3
Own business	6.8	8.2
Other <sup>1</sup>	1.0	6.4

<sup>1</sup> Other types of off-farm income included: extension worker, guard, salesman, driver, teacher, bicycle hire, construction, traditional doctor





Although the majority of households had one or more members involved in off-farm income generation, the main income of the vast majority of households was derived from cropping (Table 7.6 and 7.7).

**Table 7.6: Main sources of household income in Malawi**

Class	Cropping	Livestock	Trade	Remittance	Casual labour	Other off-farm income
% of households	86.0	2.8	0.5	0.3	0.3	9.7

**Table 7.7: Proportion of income from farming and off-farm sources in Malawi**

Class	All income from farming	Three-quarter from farming	Half from farming, half from off-farm	Three-quarter from off-farm	All income from off-farm
% of households	41.0	31.9	10.1	11.1	5.8

## 7.4 Hired labour

28% of the interviewed households in Malawi indicated to hire labour for crop production or processing. Hired labour was used for weeding (30% of the cases), land preparation (29%), planting (6%), harvest (14%), transport of harvest (17%), and crop processing (5%). Labour was applied in maize (75% of the cases when labour was hired), groundnut (12%), tobacco (10%), cotton (1%) and soybean (1%).

## 7.5 Livestock ownership

76% of the households owned or took care of livestock. Most households owned chicken (Table 7.8). Goats and pigs were popular large livestock species. Only few farmers owned cattle. There were a few exceptionally large livestock owners though. For instance, one particular farmer possessed 72 goats and 9 heads of cattle. Livestock ownership was however rather limited among the majority of farmers. In only a small number of cases, households took care of goats, pigs or chicken that were not owned by them.

**Table 7.8: Percentage of interviewed households owning a type of livestock and the average number of livestock owned or taken care of in Malawi**

Type of livestock	% of households owning or taking care of livestock				Average number owned or cared for
	Dowa	Lilongwe	Ntcheu	Salima	
Chicken	60	60	79	48	7.6
Goat	38	35	40	39	4.9
Pig	5	12	25	11	4.2
Cattle	6	7	4	0	4.7
Guinea fowl	1	1	7	5	4.0
Pigeon	3	0	9	2	15.8
Rabbit	1	0	2	2	6.0

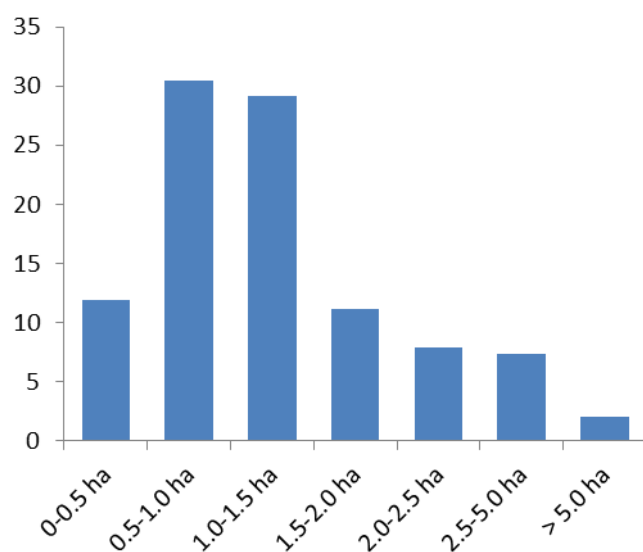


Ducks	5	0	10	2	4.0
Other <sup>1</sup>	<2	<2	<2	<2	

<sup>1</sup> includes donkey, duck, fish, guinea pig, rabbit, sheep and turkey.

## 7.6 Landholding

Households had on average 1.4 ha available for farming. The majority of farmers had between 0.5 and 1.5 ha of land available (Figure 7.1). It should be noted that for a variety of reasons, data on size of fields might not be accurate and the data in Figure 2 should be treated with caution.



**Figure 7.1: Distribution of land available to households for farming in Malawi (% of households within a given category of landholding size)**

Maize was by far the most important crop, grown on the majority of fields as a principal crop, followed by groundnut and tobacco (Table 7.9). Also the size of the fields with maize was generally larger than the size of fields with other crops (Table 7.10). Groundnut was popular as a second crop, usually with maize as a first crop. Some regional differences in the use of fields for cropping could be distinguished (data not given). Cotton was primarily grown in Salima district, while tobacco was particularly popular in Lilongwe and Dowa districts. Pigeon pea and cassava were only found in Ntcheu district on small areas.

**Table 7.9: Use of fields in 2010-2011 season among interviewed households in Malawi (% of fields)**

	1 <sup>st</sup> crop	2 <sup>nd</sup> crop	3 <sup>rd</sup> crop	4 <sup>th</sup> crop
Maize	60.4	4.0	0.5	
Groundnut	16.3	20.0	4.7	0.8
Tobacco	12.4	5.6	2.3	0.4
Cotton	2.9	1.5	0.8	0.1
Soybean	2.6	4.6	2.3	1.0
Common bean	1.8	4.2	2.4	1.2
Sweet potato	0.9	0.8	0.5	



Cowpea	0.6	1.2	0.9	0.3
Pigeon pea	0.6	0.4	0.6	0.1
Bambara nut	0.5	0.3	0.4	
Other	<0.3	<0.1	<0.3	
None		56.4	83.5	96.2

\* Includes: cassava, tomato, potato, vegetables, sugarcane and banana

**Table 7.10: Average field size per crop (principal crop) and number of observations in Malawi**

Crop type	Average field size (ha)	N
Maize	0.80	471
Groundnut	0.48	127
Tobacco	0.62	97
Cotton	0.65	23
Soybean	0.57	20
Common bean	0.28	14
Sweet potato	0.56	20
Cowpea	0.28	14

## 7.7 Legume cultivation

More than 98% of the farmers in Dowa, Ntcheu and Salima and 89% of the farmers in Lilongwe district indicated they have grown legumes in the last five years. Average total land allocated to legumes was 0.43 ha. Groundnut was by far the most important legume, grown by 84% of all interviewed household in the 2010-2011 season, followed by soybean, common bean (bush and climbing) and cowpea (Table 7.11). Soybean cultivation was most widely spread in Dowa district.

The use of organic inputs or mineral fertiliser was not widespread in legumes (Table 7.12). Farmers used urea (3.1% of all legume fields), NPK (23:21:0+6S) (2.8%), and D compound (NPK 7:14:7), CAN and 'chitowe' (basal fertiliser, could be of any type including organic inputs like compost) (all in less than 1% of legume fields). Only one farmer in Ntcheu indicated to use inoculant in soybean.

**Table 7.11: The cultivation of legumes in the 2010-2011 growing season in selected districts of Malawi (% of households growing the relevant legume)**

Crop	Dowa	Lilongwe	Ntcheu	Salima
Groundnut	77	77	90	91
Soybean	45	18	24	13
Bush bean	39	30	22	3
Climbing bean	3	5	18	0
Cowpea	20	3	30	13
Bambara nut	2	2	6	3
Pigeon pea	0	1	13	1
Fodder legume	1	0	0	0



**Table 7.12: Use of organic inputs and mineral fertiliser in legumes in the 2010-2011 growing season in selected districts of Malawi**

Crop	N	Average area planted with legume crop (ha)	% of households using organic inputs	% of households using mineral fertiliser
Groundnut	330	0.47	6.1	1.2
Soybean	99	0.44	18.2	12.1
Bush bean	93	0.25	8.6	15.1
Climbing bean	26	0.26	23.1	34.6
Cowpea	65	0.57	16.9	13.8
Bambara nut	13	0.17	0.0	0.0
Pigeon pea	15	0.18	6.7	0.0
Fodder legume	1	1.50	0.0	0.0

Produce of groundnut and soybean was used about equally for consumption within the household and for sale (Table 7.13). Other legumes were more frequently used for household consumption, but all had markets. Bambara nut however stood out as a legume that is almost entirely consumed within the household. Legume haulms were usually added to a compost heap, left in the field or burned (Table 7.14). Only in a few cases, haulms were used to feed livestock.

**Table 7.13: Utilisation of legume grain in Malawi: average percentage used for home consumption, seed and sale across households and % growers selling some or all crop products**

	% used for home consumption	% used for seed	% used for sale	% of growers selling some or all crop products	N
Groundnut	46	12	42	76	306
Soybean	48	9	43	66	92
Bush bean	66	13	21	45	83
Climbing bean	63	16	22	50	4
Cowpea	62	12	27	51	57
Bambara nut	81	16	3	11	9
Pigeon pea	59	6	35	62	13

**Table 7.14: Use of legume haulms in Malawi**

	Compost	Livestock feed	Left in the field	Burned	Thrown away
% of haulms	73	2	9	14	2

## 7.8 Cultivation of non-legume crops

Virtually all household cultivated maize in Malawi (Table 7.15). Also tobacco in Lilongwe and Dowa and cotton in Salima were major crops. Few other non-legume crops were cultivated. Mineral fertilisers (urea, NPK, CAN, Compound D and Chitowe) were widely used in maize and tobacco.



**Table 7.15: Cultivation of non-legume crops by households in Malawi and the use of organic inputs and mineral fertilisers in these crops**

Crop	Households growing the crop (%)				Organic inputs (% of fields)	Mineral fertiliser (% of fields)
	Dowa	Lilongwe	Ntcheu	Salima		
Maize	96	100	100	100	36.4	92.8
Tobacco	77	54	18	6	46.4	94.1
Cotton	1	0	1	45	8.9	2.2
Sweet potato	5	3	2	0	0.0	0.0
Tomato	0	1	1	3	40.0	20.0
Potato	1	0	2	0	0.0	66.7
Cassava	0	0	3	0	0.0	0.0
Other crops <sup>1</sup>	<1	<1	<1	<1		

<sup>1</sup> Includes millet, sorghum and vegetables

Tobacco and cotton yield was almost entirely used for sale as expected (Table 7.16). Also tomato was a typical cash crop. Maize was primarily used for home consumption.

**Table 7.16: Utilisation of non-legume produce in Malawi: average percentage used for home consumption, seed and sale**

Crop	% used for home consumption	% used for seed	% used for sale	N
Maize	82	4	14	383
Tobacco	1	0	99	146
Cotton	2	0	98	45
Sweet potato	65	4	39	9
Tomato	13	1	87	6
Potato	61	6	33	3
Cassava	92	8	0	2

## 7.9 Control over land use and harvest

In most cases both husband and wife decided over the use of fields and the use of produce (Table 7.17). Groundnut and especially bambara nut were more under the control of women, while tobacco cultivation and harvest was more frequently controlled by men.

**Table 7.17: Control over land use and harvest (by crop) by household members in Malawi (% of fields)**

	Land use	Groundnut	Soybean	Common bean	Cowpea	Bambara nut	Maize	Tobacco	Cotton
Wife	16	25	19	20	20	44	19	13	20
Husband	22	13	17	16	18	11	17	22	17
Both	57	60	61	62	61	44	61	63	61
Other relatives	1	1	2	1	2	0	0	2	2
Owner	4	2	1	1	0	0	2	1	0



## 7.10 Nutrition

Legume grain were usually consumed as a side dish and rarely as a main dish. Groundnut and common bean were most commonly consumed by households (Table 7.18). The high consumption rate of common bean was somewhat surprising, given that only 24% of the households indicated to grow common bean. It is likely that part of the consumed beans were produced in other areas of Malawi which were not included in the baseline survey and where beans are a more important component of the farming systems.

**Table 7.18: Legume grain consumption as a main or side dish among interviewed households in Malawi**

Type of legume	Consumption (% of households)
Groundnut	92
Common bean	73
Cowpea	34
Soybean	27
Bambara nut	6
Pigeon pea	6

## 7.11 Household assets

Ownership of various household assets is given in Table 7.19.

**Table 7.19: Household assets and access to services in Malawi**

Type of asset or service	% of households
<i>Farm implements</i>	
Hoe	98.0
Cutting knife	78.4
Ox/donkey cart	4.3
Watering cans	53.0
Tobacco drying shed	31.7
<i>Livestock facilities</i>	
Roofed shelter	45.9
Fenced shelter without roof	20.3
<i>Storage of produce</i>	
Bags	47.2
Earthenware pots	13.2
Mud silo / granary	68.3
<i>Water supply</i>	
Surface water	4.1
Community borehole / well	90.4
Private borehole / well	2.8
Tap water	8.4
<i>Housing properties</i>	
Mud floor	89.0
Concrete or cement floor	11.0



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Metal or asbestos roof	17.0
Grass or thatch roof	82.5
Tiles roof	0.5
Mud un-burnt bricks	60.9
Burnt bricks	41.4
Poles or planks	3.3
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<i>Household power</i>	
Paraffin	60.7
Battery	27.0
Electricity	1.0
Solar power	2.3
Generator	1.5
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<i>Cooking</i>	
Wood	97.5
Charcoal	5.1
Paraffin	0.3
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<i>Electronics</i>	
Cell phone	44.2
Radio	46.4
Television	4.8
Fridge	0.3

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## 8 Mozambique

### 8.1 Locations

The baseline survey for N2Africa in Mozambique was conducted among 247 households in Gurue, Mandimba and Sussundenga districts (Table 8.1; Figures 8.1). In each district, three villages were targeted with 25-34 households interviewed per village. All villages were located along main roads and the homesteads were located within a distance of a few hundred metres from the main road (see Figure 8.2 for an example). Villages were selected because of their known high production of soybean and groundnut. Households within the villages were randomly selected from lists of households from the District Director of Agriculture.

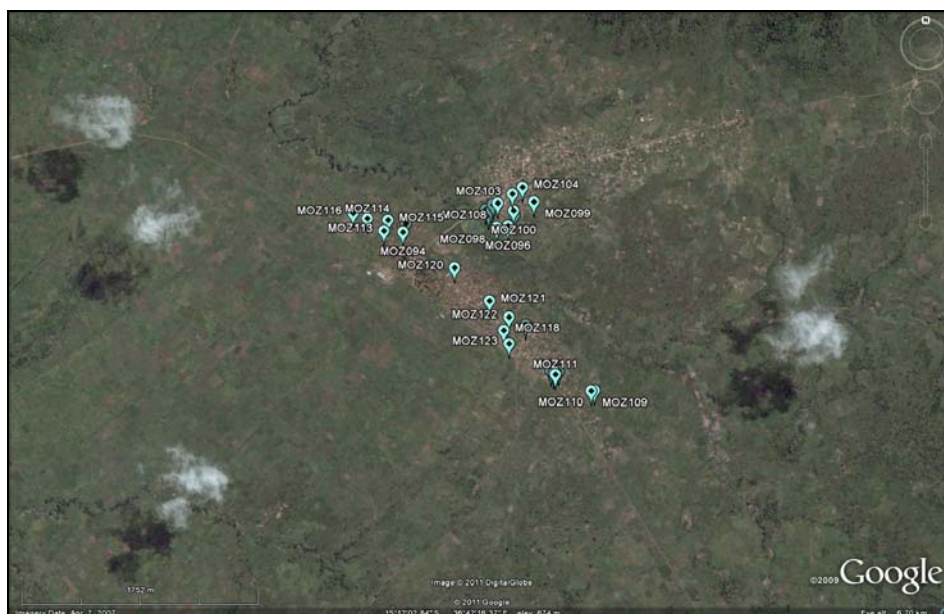
**Table 8.1: Locations and numbers of interviewed households in Mozambique**

Province / District	Village	Number of households interviewed
<i>Zambezia / Gurue</i>		80
	Magige	25
	Ruasse	30
	Tetete	25
<i>Niassa / Mandimba</i>		75
	Congerenge	25
	Leulele	25
<i>Manica / Sussundenga</i>		92
	Munhinga	34
	Nhamizara	25
	Rotanda sede	33





**Figure 8.1: Location of the villages in Mozambique where households were interviewed for the baseline survey (underlying map taken from Google Maps)**



**Figure 8.2: Location of homesteads of interviewed households in Ruasse village in Gurue**



## 8.2 Characteristics of households and their members

On average, 5.5 people lived in a household. 54% of the household members were younger than 17 years old, which is the highest percentage found in the baseline survey. Second highest percentage was found in DRC (53% of the households members younger than 17 years old). It is the two countries that recently came out of long periods of war and civil unrest.

26% of the households in Mozambique had at least one person who was a member of an association. Membership rates greatly differed between sites and villages (Table 8.2). Associations mostly dealt with agriculture and agri-business.

**Table 8.2: Membership of associations in action sites and villages in Mozambique where the baseline survey was held**

District / village	% of households
<i>Gurue</i>	33
Magige	21
Ruasse	60
Tetete	13
<i>Mandimba</i>	27
Congerenge	4
Leulele	21
Muita	54
<i>Sussundenga</i>	20
Munhinga	18
Nhamizara	8
Rotanda sede	30

Men had generally completed higher levels of education than women (Table 8.3). Only few adults had completed secondary or post-secondary education.

**Table 8.3: Education level of household members of 17 years and older in Mozambique (%)**

	None	Primary	Secondary	Post-secondary	Informal education / other
Female	26.1	65.8	7.8	0.3	0.0
Male	11.8	75.5	12.1	0.3	0.3

## 8.3 Occupations

Females were more frequently full-time engaged in farm activities than males (Table 8.4).

**Table 8.4: Involvement of males and females of 17 years or older in farm activities in Mozambique (% of household members)**

	Full-time	Seasonal	Not at all
Female	81.3	2.8	15.9
Male	64.4	2.6	32.8



16% of the adult females and 49% of the adult males were involved in some sort of off-farm income generation. Trading was the most common type of off-farm income, followed by remittances and work on other people's land (Table 5). Information on sources of income and proportion of income from farming and off-farm sources (Table 8.5-8.7) was probably biased by the fact that all villages targeted by the baseline were located along major regional roads, where opportunities for trade and other sources of off-farm income are likely to be higher than in places further away from major roads. Cropping was the most important source of household income and none of the households mentioned livestock farming as a main source of income. Trade and other off-farm income sources were mentioned as main sources of income by 19-35% of the households in a village.

**Table 8.5: Type of off-farm income generation by household members of 17 years or older in Mozambique**

Type of off-farm income	Female involvement (%)	Male involvement (%)
Sale of firewood or charcoal	1.2	1.3
Remittances	1.2	7.8
Trade	9.9	28.1
Handiwork	0.6	1.6
Work on other people's fields	1.2	4.2
Pension	0.3	0.3
Fishing	0.0	1.3
Own business	0.9	2.9
Other <sup>1</sup>	0.3	1.3

<sup>1</sup> Other off-farm income included teaching, mechanic driver, carpenter, medicine man, mining and construction worker.

**Table 8.6: Main sources of household income in Mozambique (% of households)**

	Cropping	Trade	Other off-farm income	Remittances
Gurue	62.5	21.3	13.8	2.5
Mandimba	79.7	13.5	5.6	1.4
Sussundenga	71.7	7.6	19.5	1.1

**Table 8.7: Proportion of income from farming and off-farm sources in Mozambique (% of households interviewed)**

State	All income from farming	Three-quarter from farming	Half from farming, half from off-farm	Three-quarter from off-farm	All income from off-farm
Gurue	25.0	36.3	2.5	31.3	5.0
Mandimba	32.9	31.5	8.2	23.3	4.1
Sussundenga	13.0	45.7	5.4	32.6	3.3



## 8.4 Hired labour

45% of the interviewed households in Mozambique hired labour for the cultivation of crops. Hired labour was applied to maize (84% of cases when labour was hired), common bean (7%), soybean (7%), rice (1%) and tobacco (1%). Hired labour was used for weeding (34% of cases), land preparation (26%), harvest (16%), planting (12%), transport (11%) and processing (1%).

## 8.5 Livestock ownership

60% of the households owned livestock; none of the households took care of other people's livestock. Only a small percentage of households owned larger livestock species like sheep, goats, pigs or cattle. Livestock ownership was higher in Sussundenga than in Gurue and Mandimba (Table 8.8). Certain livestock species were only found in particular districts, for example pigs were only found in Gurue.

**Table 8.8: Percentage of interviewed households owning a type of livestock and the average number of livestock owned or taken care of in Mozambique**

Livestock type	Households owning livestock (%)			Average number per household
	Gurue	Mandimba	Sussundenga	
Chicken	28.8	40.0	67.4	8.8
Dairy cow	2.5	0.0	9.8	3.9
Oxen	2.5	0.0	28.3	4.9
Sheep	0.0	2.7	1.1	4.7
Goat	6.3	8.0	23.9	7.2
Pig	13.8	0.0	0.0	4.6
Turkey	0.0	0.0	7.6	5.1
Rabbit	2.5	0.0	0.0	6.0
Pigeon	0.0	2.7	1.1	23.7
Duck	2.5	12.0	8.7	4.5
Fish	0.0	0.0	1.1	

## 8.6 Landholding

Households had on average 2.9 ha available for arable farming. The available land varied between 0.5 ha and 12 ha with the vast majority of farmers (83%) cultivating between 1 and 4 ha. These areas are based on farmers' estimates as actual field sizes were not measured. Compared to other N2Africa countries, land ownership was relatively equally distributed. Possibly, in Mozambique, (available) labour is more determining for what is feasible for a household than land availability.

More than 90% of the fields contained only one crop (Table 8.9). Maize was the main crop in the three districts. However, the percentage of fields with maize varied between the districts. Bean, soybean, sorghum, groundnut and rice were also commonly grown crops.



**Table 8.9: Use of fields in 2010-2011 season among interviewed households in Mozambique (% of fields)**

Crop	Gurue			Mandimba			Sussundenga		
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Maize	39.8	0.4	0.0	39.1	0.9	0.0	67.6	0.0	0.0
Bean	24.0	4.7	1.3	15.3	3.6	0.0	17.0	4.7	1.6
Soybean	15.8	0.9	0.0	1.5	0.0	0.0	2.1	0.0	0.0
Wheat	5.0	0.0	0.0	4.0	0.0	0.0	13.3	0.5	0.5
Tobacco	2.3	0.0	0.0	8.9	0.0	0.0	0.0	0.0	0.0
Sorghum	6.3	0.0	0.0	5.9	2.3	0.0	0.5	1.0	0.0
Groundnut	2.3	0.0	0.0	5.4	0.0	1.4	2.7	0.0	0.0
Rice	2.3	0.0	0.0	3.5	0.0	0.0	1.6	0.0	0.5
Cassava	1.4	0.0	0.0	5.9	0.5	0.0	0.0	0.5	0.0
Pumpkin	1.4	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0
Sesame	0.9	0.0	0.0	2.0	0.5	0.0	2.7	0.5	0.0
Onion	1.8	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Tomato	0.0	0.0	0.0	1.0	0.0	0.0	2.7	0.0	0.0
Cabbage	0.0	0.0	0.0	3.0	0.0	0.0	0.5	0.5	0.0
Sweet potato	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Other*	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
None		94.0	96.6		92.3	98.6		90.2	96.9

\*includes cotton, cucumber, hot pepper, okra, bambara nut and sunflower.

## 8.7 Legume cultivation

Common bean was the most widely cultivated legume crop in the three surveyed districts, followed by groundnut and soybean (Table 10). Soybean was mostly cultivated in Gurue and not in Mandimba or Sussundenga. Groundnut was especially frequently grown in Mandimba. Two households also indicated to grow and eat 'boer bean' (excluded from Table 10). Boer bean probably refers to *Schotia brachypetala*, an indigenous leguminous tree bearing seeds that can be consumed after roasting. Largest areas of legumes were allocated to beans (Table 11).

None of the farmers used organic inputs in legumes. Only in Mandimba and Sussundenga, a few farmers applied mineral fertiliser to common bean, cowpea or soybean (Table 12). None of the interviewed farmers used inoculants in legumes.

Grains produced by legumes were used for home consumption as well as sale (Table 13). Soybean however stood out as a crop that was primarily used for sale.



**Table 8.10: Cultivation of legume crops among interviewed households in Mozambique (% of households growing the relevant legume)**

Crop	Gurue	Mandimba	Sussundenga	All districts
Cowpea	52.5	45.3	35.9	43.8
Pigeon pea	51.3	42.7	7.6	32.1
Common bean	28.8	17.3	45.7	30.9
Groundnut	12.5	42.7	19.6	24.1
Soybean	56.3	6.7	4.3	21.7
Faba bean	6.3	4.0	0.0	3.2
Bambara nut	0.0	1.3	1.1	0.8

**Table 8.11: Average area per farm cropped with legumes in Mozambique (ha per farm).**

Crop	Gurue	Mandimba	Sussundenga
Cowpea	0.47	0.67	0.62
Pigeon pea	0.76	0.56	0.37
Common bean	1.04	2.13	0.70
Groundnut	0.40	0.46	0.38
Soybean	1.04	0.45	0.44
Faba bean	0.25	0.25	
Bambara nut	0.0	0.50	0.25

**Table 8.12: Use of organic inputs and mineral fertiliser in beans in Mozambique**

	% of fields receiving NPK	% of fields receiving urea
Mandimba	1.6	1.6
Sussundenga	13.8	7.7

**Table 8.13: Utilisation of legume grain in Mozambique: average percentage per household used for home consumption, seed and sale and the number of observations**

	% used for home consumption	% used for seed	% used for sale	N
Cowpea	52.7	9.9	37.4	104
Pigeon pea	35.8	8.0	56.2	81
Common bean	33.4	9.2	56.1	83
Groundnut	47.6	16.6	35.8	56
Soybean	3.2	9.2	87.5	47
Faba bean	47.1	15.4	37.5	4
Bambara nut	73.3	16.7	10.0	2



## 8.8 Cultivation of non-legume crops

Maize was the most important non-legume crop grown by more than 97% of all households (Table 8.14). Other important crops included rice, sorghum and cassava. Tobacco was also frequently grown in Mandimba and Gurue. A wide variety of minor crops including vegetables were also common. Tobacco, sesame and vegetables like tomato, onion and cabbage were mostly grown for sales (Table 8.15). Pumpkin however was typically used for home consumption. Also staple crops like maize, sorghum, rice and cassava were mostly grown for home consumption.

**Table 8.14: Cultivation of non-legume crops by the interviewed households in Mozambique (% of households growing the relevant crop)**

	Gurue	Mandimba	Sussundenga
Maize	97.5	97.3	100.0
Rice	13.8	10.7	4.3
Cassava	15.0	21.3	6.5
Tobacco	10.0	32.0	0.0
Sorghum	31.3	45.3	7.6
Cabbage	0.0	6.7	3.3
Onion	7.5	1.3	0.0
Sweet potato	2.5	4.0	6.5
Pumpkin	3.8	8.0	0.0
Sesame	5.0	5.3	5.4
Sugarcane	2.5	2.7	1.1
Wheat	0.0	0.0	8.7
Tomato	2.5	2.7	7.6
Other crops *	<2.0	<2.0	<2.0

\* Other crops include: cotton, cucumber, garlic, hot pepper, mango, millet, okra, sunflower and yam.

**Table 8.15: Utilisation of non-legume produce in Mozambique: average percentage used for home consumption, seed and sale, and number of observations**

Crop	% used for home consumption	% used for seed	% used for sale	N
Maize	61.9	7.3	30.7	233
Sorghum	77.0	8.0	14.9	60
Rice	63.1	10.4	26.5	23
Cassava	67.2	2.1	30.7	30
Cabbage	8.6	0.0	91.4	11
Onion	22.8	0.0	77.2	9
Sweet potato	65.0	35.0	0.0	9
Pumpkin	96.4	0.0	3.6	7
Sesame	15.6	14.5	69.9	11
Tobacco	3.4	2.6	94.0	31
Tomato	9.0	0.0	91.0	8
Wheat	60.4	9.4	30.2	8





## 8.9 Control over land use and harvest

The use of most fields and the produce coming from these fields was usually controlled by both wife and husband (Table 8.16). However, men controlled fields and harvests more frequently than women. Around 1% of fields was controlled by the owner who was not the person who managed the field.

**Table 8.16: Control over fields and harvest by men and women in households in Mozambique (% of fields with the relevant crop and number of observations)**

	Wife	Husband	Both	Land owner / other	N
Field	17	39	43	1	650
Harvest:					
Cowpea	10	22	68	1	68
Pigeon pea	16	32	52	0	52
Common bean	10	20	67	3	67
Groundnut	11	23	66	0	66
Soybean	16	38	44	0	44
Non-legume crops	14	22	63	2	435

## 8.10 Nutrition

3% of the households indicated to consume one meal per day, 65% two meals per day, and 32% three meals per day. Among the legumes consumed in the household, bean was by far the most important one, followed by groundnut (Table 8.17 and 8.18). The principal staple food for many households was maize. Also sorghum, rice, and to a lesser extent cassava, were common staple foods.

**Table 8.17: Principal food items among interviewed households in Mozambique (% of households mentioning the relevant food item)**

	Gurue	Mandimba	Sussundenga
Cowpea	26.3	40.0	5.4
Pigeon pea	26.3	37.3	2.2
Common bean	26.3	20.0	3.3
Groundnut	8.8	20.0	0.0
Soybean	7.5	4.0	0.0
Maize	85.0	94.7	100.0
Rice	26.3	18.7	5.4
Sorghum	27.5	48.0	5.4
Cassava	15.0	13.3	4.3
Sweet potato	0.0	0.0	2.2
Wheat	0.0	0.0	6.5
Fish	0.0	1.3	5.4
Meat	0.0	2.6	1.1





**Table 8.18: Legumes consumed by households in Mozambique (% of households consuming the relevant legume)**

	Gurue	Mandimba	Sussundenga
Cowpea	57.5	53.3	53.3
Pigeon pea	56.3	92.7	17.4
Common bean	56.3	34.7	67.4
Groundnut	13.8	26.7	25.0
Soybean	10.0	4.0	2.2
Faba bean	2.5	1.3	0.0
Bambara nut	1.3	1.3	2.2

## 8.11 Market access

As all households were located nearby main roads in villages that usually had a market function as well, market access of the interviewed households was generally high. Larger regional markets in provincial towns were located further away (approximately 10-50 km).

## 8.12 Household assets

**Table 8.19: Household assets and access to services in Mozambique (% of households)**

Type of asset or service	
<i>Farm implements</i>	
Hoe	100.0
Cutting knife	91.1
Ox/donkey cart	7.7
Watering cans	10.5
Wheel barrow	2.8
Plough	6.1
<i>Livestock facilities</i>	
Roofed shelter	15.0
Fenced shelter without roof	19.0
<i>Storage of produce</i>	
Bags	30.8
Earthenware pots	18.6
Mud silo / granary	76.5
<i>Water supply</i>	
Surface water	2.8
Community borehole / well	85.8
Private borehole / well	14.5
Tap water	7.3
<i>Housing properties</i>	
Mud floor	86.8
Concrete or cement floor	13.2
Metal or asbestos roof	25.1



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Grass or thatch roof	81.4
Mud un-burnt bricks	53.8
Burnt bricks	45.3
Poles or planks	17.4
<hr/>	
<i>Household power</i>	
Paraffin	38.9
Battery	44.2
Electricity	10.5
Solar power	4.0
Generator	2.8
<hr/>	
<i>Cooking</i>	
Wood	91.1
Charcoal	13.4
<hr/>	
<i>Electronics</i>	
Cell phone	31.2
Radio	76.5
Television	11.3
DVD player	0.8
Fridge	2.0
<hr/>	
<i>Transport</i>	
Bicycle	72.1
Car	1.6
Motorbike	13.8

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## 9 Zimbabwe

### 9.1 Sites

The mandate areas and action sites for the N2Africa project in Zimbabwe are Manicaland province (Makoni district), Mashonaland East (Goromonzi, Mudzi, Murehwa and Hwedza districts), Mashonaland West (Chegutu) and Mashonaland Central (Guruve). A total of 400 households were randomly sampled for purposes of interviewing in a baseline survey that was conducted in January and February 2011. Four districts were selected based upon agro-ecological potential (high, low) and market access (high, low) (Table 9.1; Figure 9.1). The team of eight enumerators was led by two lecturers from the Department of Agricultural Economics and Extension, University of Zimbabwe, who had extensive experience in conducting surveys.

In each of the four districts, the wards where the N2Africa project was started were identified. From these wards, villages were randomly selected and in each village, about 25 households were interviewed. Since it was a baseline, assessing the situation before project intervention, it was decided to skip the households that were already participating in N2Africa project activities.

**Table 9.1: Classification of districts where baseline was conducted, Zimbabwe**

District	Agro-ecological potential		Market access		Class	Names of the selected villages
	High	Low	High	Low		
Guruve	X		X		I	Bukuta, Kanhanga, Mamini, Mashizha
Mudzi		X		X	IV	Dakati, Kakore, Mazonde, Tsekese
Chegutu		X	X		II	Mapira, Munyongani, Mupondi, Nevanji
Makoni	X			X	III	Gwangwara, Mataranyika, Mutowa, Zinudza

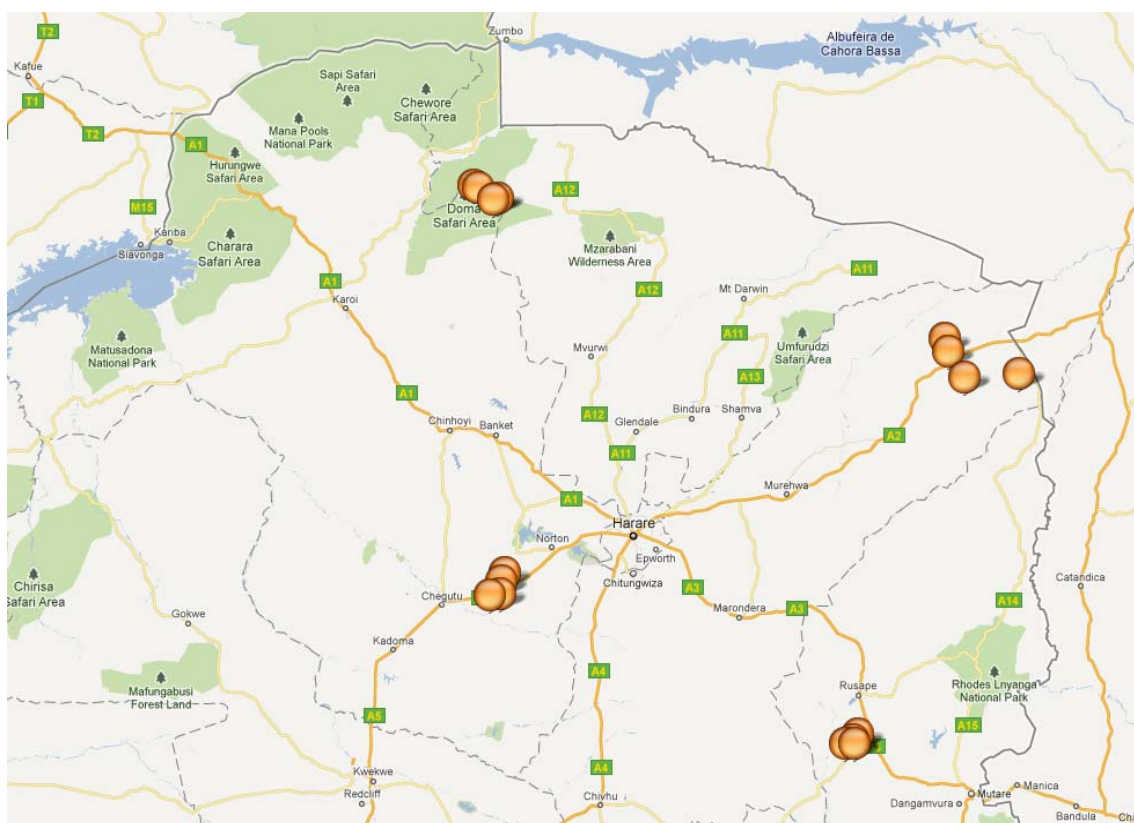


Figure 9.1: Location of the villages in Zimbabwe where baseline interviews were held

## 9.2 Household characteristics

On average, the interviewed households had 5.2 persons in the household; of the household members, 46% was younger than 17 years old.

In 34.8% of the households interviewed, at least one person was affiliated to a community group or association. Most of these groups or associations were dealing with farming (including Conservation Agriculture), more general livelihood improvement or female empowerment activities.

## 9.3 Education

Table 8.2 shows that there are more women (15.9%) above 35 years who do not have education at all compared to men (5.8%) in the same age category. There are no significant differences in level of education in the other age categories (Table 9.2).

Table 9.2 Education level of household members aged between 17-35 and >35 disaggregated by gender (%)

		None	Primary	Secondary	Post-secondary / university
Age 17-35	Female	2.3	28.9	66.1	2.7
	Male	1.9	25.6	69.4	3.1
Age > 35	Female	15.9	53.3	30.4	0.3
	Male	5.8	48.6	42.8	2.9



## 9.4 Involvement in farm activities

Table 9.3 shows that more women (64.4%) were involved in full-time farming activities compared to men (55.2%) while more men (36.4%) are involved in seasonal farming activities compared to women (26.2%). The number of people not at all involved in farming is more or less similar for men and women.

**Table 9.3: Involvement of males and females of 17 years or older in farm activities (%)**

Gender	Nature of involvement		
	Full-time	Seasonal	Not at all
Female	64.4	26.2	9.4
Male	55.2	36.4	8.4

## 9.5 Involvement in off-farm activities

More men participated in off-farm income generating activities than women (Table 9.4). Although information on the earnings is not always given and might not be accurate, the income from off-farm activities of men is higher than of women (30%, based on the data collected).

The major off-farm income generating activity among females is trade (8.7%) while handiwork topped the list for males (9.5%) (Table 9.5).

**Table 9.4: Percentage of household members of 17 years and older involved in off-farm income generating activities, Zimbabwe**

Gender	% households
Female	24.5
Male	29.5



**Table 9.5: Type of off-farm income generation by household members of 17 years and older**

Type of farm income	Female involvement (%)	Male involvement (%)
Sale of firewood or timber	0.7	1.3
Sale of charcoal	0.2	0.4
Remittances	4.1	2.3
Trade	8.7	5.7
Handiwork	5.3	9.5
Rent	0	0.6
Work on other people's fields	6.3	7.2
Food for Work	0.2	0.6
Pension	0	1.0
Sale of Bricks	0	1.3
Fishing	0	0.4
Own business	2.0	4.0
Other	1.9	6.7

## 9.6 Main sources of household income

The large majority of households relied on cropping as their main source of income (70.5%), for a small portion (2.5%) livestock formed the main source of income. 16.5% had off-farm income generating activities that provided the main source of income, while remittances formed the main source of income for 10.5% of the households (Table 9.6). Table 9.7 specifies the proportion of income coming from farming and from off-farm sources, which confirms that for almost 70% of the households farming is an important source of income.

**Table 9.6: Main source of household income**

Main source of income	% of households
Cropping	70.5
Livestock	2.5
Off-farm	16.5
Remittances	10.5

**Table 9.7: Proportion of income from farming and off-farm sources**

Class	% of households
All from farming	13.5
Three quarter from farming	52.5
Half from farming, half from off-farm source	6.0
Three quarter from off-farm sources	23.3
All income from off farm sources	4.8



## 9.7 Hired Labour

About 45.8% of the interviewed households hired labour mostly for agronomic activities such as land preparation, planting, weeding and harvesting. However, the major activity for which the hired labour was used is weeding (48.6%) while land preparation, planting and harvesting constituted 20.2%, 8.5% and 19.1% respectively. Activities such as transporting harvest and processing accounted for 3.3% of the hired labour. Maize dominated the share of hired labour for the first crop in the field (84.7%) while groundnuts dominated the share of hired labour for the 2<sup>nd</sup> and 3<sup>rd</sup> crop with 50% and 34.6%. For the 4<sup>th</sup> crop, the major crop for which labour was hired was bambara nuts with a share of 50%.

## 9.8 Livestock

The commonly owned livestock were cattle (52.8%), goats (48.3%), and chickens (83.5%) (Table 9.8). About 31.8% of the households own dairy cows while 27.8 own oxen for draft power. Amongst the cattle owners, about 3.3% use cows for provision of draft power.

**Table 9.8: Livestock ownership, Zimbabwe**

Kind	% households owning	average ownership (cared and owned)
Bee hives	2.3	3.3
Broilers	0.3	100.0
Cattle (total number)	52.8	5.1
Chickens	83.5	8.5
Cows for dairy	31.8	2.2
Cows for draft	3.3	2.9
Donkeys	2.0	2.6
Doves/pigeons	5.5	8.5
Ducks	0.3	2.0
Goats	48.3	4.2
Guinea fowls	14.8	4.0
Guinea pigs	1.0	4.5
Oxen	27.8	2.6
Pigs	7.3	3.7
Rabbits	3.0	4.5
Sheep	2.8	3.4
Turkeys	4.3	5.7

## 9.9 Land holdings

On average, interviewed households in Zimbabwe had 1.8 ha available for farming. There were differences between districts, with Guruve on the higher side of on average 2.2 ha per household, while households in Makoni had the least available at 1.6 ha per household (Chegutu 1.9 ha per household, Mudzi 1.7 ha per household).

On average, about 5% of the households have less than 0.5 ha available. 18.5% of the interviewed households had between 0.5 and 1 ha available. The biggest portion, 42% have between 1 and 2 hectares available, while just over 30% have 2-5 ha available. A small percentage of 5% have 5-10 ha available. One person in Makoni district had more than 10



hectare available. The difference between the district are not large, only that in Guruve more household had 2-5 ha available.

## 9.10 Cultivation of crops

Table 9.9 shows that most crops were grown on more than one field and also different crops were being grown in the same field. The commonly grown crops across fields were maize, groundnuts, sorghum and common beans. The differences between the districts were not big. Beans are cultivated more in Guruve, while millet and sorghum were mainly grown in Mudzi.

Amongst the non-legume crops, maize is the only crop to which significant amounts of Ammonium Nitrate and compound D were applied to the fields with these crops (Table 9.10). In all cases, compound X was only applied to fields that had maize and millet. Manure was widely applied to about 35.7% of the fields which had maize crop.

Most of the non-legume crops were produced for home consumption with the exception of tobacco and cotton (Table 9.11). Only one person produced yam and rice and these were purely for household consumption. Maize is the dominant crop among non-legume crops grown for home consumption by at least 369 households. In all cases, farmers reserved a mere 10% of their harvest for seed purposes.

**Table 9.9: Type of crop grown (% fields with the relevant crop), Zimbabwe**

Crops	First crop	Second crop	Third crop	Fourth crop
Maize	67.1	11.2	6.4	4.6
Groundnuts	12.6	44.2	33	18.2
Sorghum	5.7	6.8	8.1	4.6
Common beans	4.7	5.6	9.3	9.1
Soybeans	2.7	6.8	5.8	6.1
Sunflower	1.8	2.7	5.2	12.1
Bambara nuts	1.6	4.4	12.1	18.2
Cotton	1.4	1.2	0	4.6
Millet	0.9	5.1	6.4	6.1
Cowpeas	0.6	10	11.6	9.1
Tobacco	0.6	0.2	0	0
Sweet potato	0.3	1.2	1.7	1.5
Sugar beans	0.1	0	0	0
Bush bean	0	0.2	0	0
Okra	0	0.2	0	0
Pumpkins	0	0.2	0	1.5
Rice	0	0	0.6	0
Sugar cane	0	0	0	1.5
Tomatoes	0	0	0	1.5
Yams	0	0	0	1.5





**Table 9.10: Percentage use of inorganic and organic fertilizers on non-legume crops**

Non legume crop	AN	Compound C	Compound D	Compound L	Compound X	Urea	Manure
Butternuts	0.2	0	0	0	0	0	1
Cotton	0	0	0.9	0.9	0	0	35.7
Maize	19.6	0	29.9	0.3	0.2	1.4	2.8
Millet	0.5	0	1	0	0.2	0.2	0.2
Potato (Irish)	0	0	0	0.2	0	0	0.2
Rice	0	0	0.2	0	0	0	2.4
Sorghum	0.5	0	1	0	0	0	1.4
Sunflower	0.2	0	1.7	1	0	0	0.3
Sweet potato	0.6	0	1.4	0	0	0	0.3
Tobacco	0.2	0.2	0.2	0	0	0.2	0.2
Yams	0	0	0.2	0	0	0	1

Compound C: 6% N, 16% P, 13% K, 8% S and 0.1% S; Compound D: 7% N, 14% P, 7% K and 8.5% S; Compound L: 5% N, 18% P, 10% K, 8 S, 0.25% B; Compound X: 21% N, 10% P, 5% K, 6% S and 0.8% Zn. Urea 46% and AN 34.5%

**Table 9.11: Percentage distribution of grain yield from non-legume crops**

Non-legume crop	N	% household consumption	% used for seed	% used for sale
Cotton	15	0	9.4	90.6
Maize	369	73.8	4.2	21.9
Millet	32	93.0	3.9	6.0
Rice	1	100.0	0	0
Sorghum	79	91.8	3.7	1.5
Sunflower	38	95	2.8	11.1
Sweet potato	17	62.3	4.2	39.3
Tobacco	2	0	0	100.0
Yams	1	100.0	0	0

## 9.11 Legume cultivation

The vast majority of households cultivated legumes and had done so over the past years. In Chegutu there were only two household that did not cultivate any legumes, in the other district these numbers were slightly higher. Overall, the pattern of legume cultivating is similar across the four districts, with slightly more common beans in Guruve and slightly more than average groundnuts in Chegutu. Inoculants are reportedly used by four farmers, three on soybean and one on cowpeas.

Groundnuts are the most commonly grown legume crop amongst sampled households with over 50% of the legume fields being allocated to groundnuts. Cowpeas, common bean, soybean and bambara nut were allocated to 21.2%, 12.3%, 9.2% and 7% of the fields allocated to legumes. Legumes such bambara, bush bean and climbing beans occupied the remainder of the fields.



Most of the legumes produced such as bambara nuts, cowpeas, groundnuts and soybean were used for home consumption. The main crop of which a large portion went for sale was common bean with just over half of the produce being sold (Table 9.13).

**Table 9.12: Use of inorganic and inorganic fertilizers on legumes, Zimbabwe (All legume fields as 100%)**

Legume crop	% of particular legume <sup>1</sup>	Average Area (ha)	% of fields with particular input per legume							
			AN	Compound D	Compound L	Compound G	Compound X	Gypsum	Lime	Manure
Bambara nuts	7.0	0.16	0	7.0						14.0
Climbing beans	0.3	0.11	50	100						0
Common beans	12	0.34	16.2	50	5.4		1.4			18.9
Cowpeas	21.2	0.17	18.3	21.4				1.5		13.0
Groundnuts	50.3	0.33	7.7	13.2	0.6	0.3		4.8	0.3	14.5
Soybeans	9.2	0.34	14.0	33.3	5.3					15.8

<sup>1</sup> All legume fields as 100%

**Table 9.13: Percentage distribution of grain yield from legume crop**

Legume crop	N	% Household consumption	% Seed	% Sale
Bambara nuts	46	84.8	11.9	2.2
Common beans	73	21.3	4.3	56.2
Cowpeas	130	64.7	8.7	26
Groundnuts	309	60.6	9.6	29.1
Soybeans	61	50.7	9.1	40.4

## 9.12 Use of legume haulms

Legumes haulms were commonly used for making compost manure and livestock feed (Table 9.14). Of the legume haulms that are used for livestock feed, the most commonly used is groundnuts (52.1%), followed by cowpeas (17.7%), soybeans (11.5%), common beans (10.9%), and bambara nuts (7.8%). A significant share of the haulms was just left in the field.

**Table 9.14: Use of legume haulms**

Use	% of haulms
Burn	3.3
Compost	49.5
Dump	3.0
Kraal manure	3.3
Leave in field	13.8
Livestock feed	27.2



### 9.13 Control over land use and harvest

The decision-making with regards to the use of the land and of the harvest in Zimbabwe is quite balanced between men and women in Zimbabwe (Table 9.15). The decision on the use of the land is slightly more done by men, whereas women take decisions about the harvest a little more frequently. There is hardly any different between decision making about legume and non-legume crops.

**Table 9.15: Control over land use and harvest by household members, Zimbabwe (% of all fields)**

		Wife	Husband	Both	Owner	Other (child or other relative)
Land use	Non-legumes	29.4	32.1	25.5	9.4	3.6
	Legumes	29.6	32.5	22.5	10.7	4.7
Harvest	Non-legumes	32.9	28.3	26.5	8.7	3.6
	Legumes	35.0	28.8	22.8	9.3	4.1

### 9.14 Nutrition

Most of the households (55.3%) interviewed consumed 2 meals per day while about 36% consumed 3 meals per day. The remainder consumed only one meal per day.

The commonly consumed legume among most households is groundnuts (48.3%) with almost 59% of the households consuming it as a side dish. However, cowpeas (21.7%) and common beans (15.4%) are also significantly consumed but mostly as main dishes (over 80%) (Table 9.16).

**Table 9.16: Consumption of legumes by households**

Legume	% of households consuming
Groundnuts	48.3
Cowpeas	21.7
Common beans	15.4
Soybeans	8.3
Bambara nuts	6.3

### 9.15 Market access

Only 6 households (0.9%) had no market access at all while just over 90% of the households had access to local markets. However, about 8.8% of the households had access to the regional markets. To access the local markets which in most cases were less than 5 km away, farmers commonly walked or used bicycles while buses and trucks were used to access regional markets. Local markets were largely for procurement of household goods and on a lesser scale agricultural produce and inputs. Regional markets still dominated in their share for household goods.



## 9.16 Household assets

Table 9.17 gives a list household assets and services available to households in Zimbabwe.

**Table 9.17: Household assets and access to services in Zimbabwe**

Type of asset or service	% of households
<i>Farm implements</i>	
Hoe	96.8
Panga	35.5
(Ox) Plough / Cart	49.3
Ox/donkey cart	23.3
Watering cans	37.5
Tractor	0.8
Tobacco press	0
Tobacco drying shed	3.5
Shovel	0.5
Cultivator	1.3
Harrow	0.3
Wheelbarrow	39.3
Axes	8.8
<i>Livestock facilities</i>	
Roofed shelter	41.0
Fenced shelter without roof	32.0
<i>Storage of produce</i>	
Bags	18.5
Earthenware pots	0.5
Dara	1.3
Mud silo / granary	26.3
<i>Water supply</i>	
Surface water	
Community borehole	35.3
Community well	15.3
Private borehole	3.5
Private borehole well	30.0
Tap water	0
Channel	
<i>Irrigation</i>	
Diesel pump	
Treadle pump	0.3



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Channel irrigation	
<i>Housing properties</i>	
Mud floor	66.8
Concrete / cement floor	65.8
Tiles floor	0.8
Metal / asbestos roof	60.5
Grass / thatch roof	97.3
Mud un-burnt bricks	33.0
Burnt bricks	84.5
Poles or planks	9.3
<i>Household power</i>	
Paraffin	1.5
(Car) Battery	18.8
Electricity	0.3
Solar power	22.5
Generator	1.5
Wood	0
Lantern	0
Kerosene	0
Torch	2.0
<i>Cooking</i>	
Wood	
Charcoal	
Paraffin	
Gas cooker	
<i>Electronics</i>	
Cell phone	54.8
Radio	31.5
Television	12.8
Fridge	0.5
DVD player	0
Sewing machine	0
<i>Transport</i>	
Bicycle	23.0
Motorbike	0.3
Car / Matatu	1.5
Truck	0
Animal cart	0

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## 10 Some comparative analyses across countries

### 10.1 Gender differences

In most countries, women are more frequently full-time engaged in farm activities than men, who are more frequently engaged in off-farm income generation, with the exception of Nigeria and Ghana where women's involvement in farming activities is rather limited (Table 10.1 and 10.2). The differences in participation in off-farm income generation between women and men is especially large in Mozambique where very few women were reported to be involved in off-farm income generation.

Among the adults younger than 35 years old, the difference in education level between men and women is smaller or even entirely absent, while education levels are higher than those of the older generation.

In Kenya, Rwanda and DRC, women tend to have more control over the use of crop harvests than men (Table 10.3). This is true for both legume and non-legume crops. In Nigeria, Ghana and Mozambique, men were more frequently in control of the harvest than women. The differences are especially notable in West Africa.

Specific socio-cultural circumstances are oftentimes considered as an important if not determining influence in many aspects of livelihoods, such as the division of work, participation in education, decision-making processes and income generating activities. Obviously, a survey like the N2Africa baseline survey cannot provide explanatory information with regards to gender relations within each of the eight countries, let alone the differences within a country. It is however clear that for example limited participation of women in off-farm income generation does not mean participation by women is limited in all aspects of livelihoods.

**Table 10.1: Involvement of adult females and males (17 years and older) in farm activities (% of household members)**

Country	Gender	Full-time	Seasonal	Not at all
DRC	Female	73	15	11
	Male	46	28	26
Kenya	Female	71	23	6
	Male	57	34	10
Rwanda	Female	88	5	8
	Male	77	14	9
Malawi	Female	85	13	2
	Male	78	18	4
Mozambique	Female	81	3	16
	Male	64	3	33
Zimbabwe	Female	64	26	9
	Male	55	36	8
Nigeria	Female	30	17	53
	Male	57	31	12
Ghana	Female	46	42	12
	Male	62	30	8



**Table 10.2: Involvement of females and males of 17 years and older in off-farm income generation**

Country	Gender	% of adult household members
DRC	Female	25
	Male	34
Kenya	Female	32
	Male	43
Rwanda	Female	16
	Male	30
Malawi	Female	30
	Male	42
Mozambique	Female	0
	Male	49
Zimbabwe	Female	25
	Male	30
Nigeria	Female	43
	Male	52
Ghana	Female	28
	Male	20

**Table 10.3: Control over land use & harvest by household members (% of fields)**

	Wife	Husband	Both	Others (e.g. child, other relatives, owner)
<i>Control over use of land</i>				
DRC	29	30	41	
Kenya	32	44	20	4
Rwanda	25	9	62	1
Malawi	16	22	57	5
Mozambique	17	39	43	1
Zimbabwe	30	32	24	14
Nigeria	1	89	9	1
Ghana	3.4	80	12	5
<i>Control over harvest – legumes</i>				
DRC	28	9	63	
Kenya	54	19	23	4
Rwanda	32	4	59	1
Malawi	26	15	58	2
Mozambique	13	27	59	1
Zimbabwe	35	29	23	13
Ghana	8	57	33	2
<i>Control over harvest – non-legumes</i>				
DRC	24	13	63	
Kenya	44	27	24	5
Rwanda	28	6	64	1
Malawi	17	19	63	2



Mozambique	14	22	63	
Zimbabwe	33	28	27	12
Ghana	7	66	26	1
<i>Control over harvest all crops</i>				
Mozambique	13	26	60	1
Zimbabwe	32	30	24	14
Nigeria	2	87	11	1
Ghana	7	65	26	1

## 10.2 Livestock ownership

In Table 10.4 the percentages of households owning and/or taking care of livestock are presented. Clearly, livestock ownership greatly differs between countries. Cattle is particularly important in Kenya, Rwanda and Zimbabwe. Large numbers of smaller ruminants such as goats and sheep could be found in Ghana and Nigeria in West Africa. Livestock ownership in DRC, Malawi and Mozambique is relatively low and often limited to smaller animals such as chicken, and guinea pigs and rabbits in the DRC. As expected, chickens are widely kept by households in all surveyed areas. Differences in livestock keeping between regions appear to be more associated with cultural practices and agricultural development pathways than with agro-ecology. For instance, while Malawi and Zimbabwe face comparable agro-ecological conditions, livestock keeping greatly differs between the two countries. The same is true for Rwanda and Eastern DRC. In general, crop cultivation is the most important source of household income for the farmers interviewed. Only in Nigeria, a sizeable number of farmers (6% of the respondents) considered livestock keeping as their most source of income.

**Table 10.4: Percentage of interviewed households owning or taking care of a type of livestock**

	DRC	Kenya	Rwanda	Malawi	Mozambique	Zimbabwe	Nigeria	Ghana
Cattle (all types)	16		60	4		53	25	31
Dairy cows	12	59			5	32	8	0.3
Cattle for draft	2	25			11	31	10	5
Goats	41	40	37	38	13	48	64	79
Sheep	3	21	21		1	3	54	55
Pigs	23	2	16	13	5	7	15	29
Chickens	49	89	28	61	47	84	64	92
Guinea pigs	49					1	1	0.5
Rabbits	17	1	12	1	0.8	3	1	2
Donkeys	1	2				2	3	10
Turkeys	1	2			3	4	1	1
Bees / bee hives	0.5	1	1.5			2		5
Guinea fowls		1		4		15	10	55
Doves / Pigeons		1		4	1	6	4	5
Fish ponds / fish		0.6			0.4			0.3
Ducks				4	8	0.3		4





### 10.3 Crop cultivation

In all farming systems in the eight countries, legumes play an important role. The main legume crops promoted by N2Africa (climbing and bush beans, soybean, groundnut and cowpea) are also the legumes most commonly grown by farmers across the project areas (Table 10.5). Climbing and bush beans are primarily grown in mid- and high altitude areas with project areas in Kenya, Rwanda and DRC being the largest producers of beans. Groundnut is grown in all project areas with the highest percentage of farmers growing the crop in Malawi (84%). Soybean is also cultivated by farmers in all eight countries, but generally by fewer farmers. Only in Nigeria, soybean production is widespread among farmers. Cowpea production is associated with warmer low and mid-altitude areas with most production on-going in Nigeria. In general, the diversity of legumes is somewhat lower in the two West Africa countries, even though a high percentage of farmers grow legumes there. Pigeon pea is a common legume in Mozambique. Although pigeon pea is popular in the Southern region of Malawi, in the areas where the baseline survey was carried out few farmers were growing pigeon peas. Bambara nut is grown in many areas, but usually only by small numbers of farmers. Fodder legumes are only grown by few farmers only in Kenya, DRC and Malawi.

**Table 10.5: Cultivation of legume crops (% of households growing the relevant legume)**

	DRC	Kenya	Rwanda	Malawi	Mozambique	Zimbabwe	Nigeria	Ghana
Bambara nut	1	1		3	1	7	0.4	7
Bush bean	81	82	63	24	31	12		6
Climbing bean	43	12	46	7		0.3		
Cowpea	1	50		17	44	21	74	26
Faba bean					3			
Fodder legume	1	3		0.3				
Garden pea			5					
Green gram		6						
Groundnut	11	35	22	84	24	50	49	40
Pigeon pea				4	32			
Soybean	13	19	21	25	22	9	40	21

Farmers commonly apply organic inputs to legumes in DRC, Kenya, Rwanda and Nigeria. In Malawi and Ghana, organic manure applications are much less common and none of the farmers in Mozambique apply organic inputs to legumes. The use of mineral fertiliser is less common. Only in Nigeria, the majority of farmers apply mineral fertiliser to legume crops. The use of inoculants was limited to four farmers in Kenya, four farmers in Zimbabwe and one farmer in Ghana. Even though these two countries have a good inoculant production capacity, current use by smallholders in the target areas is very low. Based on N2Africa experiences so far, this is likely to result from unavailability of the inoculants in the rural areas, i.e. close enough to smallholder farmers, and depending on the country, a lack of knowledge by smallholder farmers on the beneficial effects of inoculants on soybean.

**Table 10.6: Use of organic inputs in legumes (% of field receiving organic inputs)**

	DRC	Kenya	Rwanda	Malawi	Mozambique	Zimbabwe	Nigeria	Ghana
Bambara nut	0	40		0	0	1	67	<1



Bush bean	92	51	72	9	0	3		0
Climbing bean	93	60	81	23	0			
Cowpea	100	49		17	0	5	56	4
Faba bean					0			
Fodder legume		4		0				0
Garden pea			37					
Green gram		35						
Groundnut	74	33	41	6	0	14	74	4
Pigeon pea				7	0			
Soybean	84	46	78	18	0	2	39	2

**Table 10.7: Use of mineral fertiliser in legumes (% of field receiving mineral fertiliser)**

	DRC	Kenya	Rwanda	Malawi	Mozambique	Zimbabwe	Nigeria	Ghana
Bambara nut	0	20		0	0	7	0	0
Bush bean	0	23	2	15	18	60		10
Climbing bean	0	28	11	35	0	100		
Cowpea	0	16	0	14	2	29	56	2
Faba bean					0			
Fodder legume		4		0				0
Garden pea			0					
Green gram		7						
Groundnut	0	8	1	1	0	20	56	1
Pigeon pea				0	0			
Soybean	0	26	6	12	4	40	77	9

Maize is the only non-legume crop that is widely grown across all project sites. Sorghum is a common crop in all countries except for Malawi. Other crops cultivated are more specific for particular agro-ecological zones. For instance, bananas, cassava and potato (*Solanum tuberosum*) are primarily grown in the project areas in DRC, Kenya and Rwanda, yam and rice are often cultivated in Ghana and Nigeria, and tobacco is mainly cultivated in Malawi and Mozambique.

**Table 10.8: Cultivation of non-legume crops by interviewed households**

Crop	DRC	Kenya	Rwanda	Malawi	Mozambique	Zimbabwe	Nigeria	Ghana
Banana	26	34	37					
Cassava	93	31	43	0.8	14		4	12
Coffee	4		5					
Cotton				12		4		<1
Ginger							5	
Irish potato	35	2	25	1				
Maize	34	98	46	99	98	92	73	78
Millet		11				8	33	37
Onion	2				3			
Pumpkin					4			



Rice					9	0.3	40	49
Sesame					5			
Sorghum	6	14	37		27	17	56	27
Sugarcane	2	20			2			
Kale		6						
Sunflower						10		
Sweet potato	23	30	65	3	4	4	2	0.3
Tea		3						
Tobacco		9		39	13	0.5		
Tomato			7	1	5			0.8
Wheat			13		3			
Yam						0.3	16	33

## 10.4 Use of legume products

The use of legume haulms has a major impact on the rotational benefits of BNF for subsequent crops. In case legume residues are burned in the field or left in the field during the dry season with freely grazing animals, a great deal of the nitrogen in the legume residues is likely to be lost for subsequent crops. In case legume residues are used for making compost / farmyard manure or for animal feeding, the carry-over of nitrogen and other nutrients could be much larger if the residues, as well as the animal manure or green manure produced from the residues, are handled with care and nutrient losses are kept to a minimum. Also incorporation of the legume residues into the soil after harvest can lead to relatively high carry-over rates. When residues are left in the field, the length of the dry season and the presence of freely grazing animals are important factors determining the carry-over rates.

Interestingly, Nigeria and Ghana are the only countries where a great deal of the legume residues is used as animal feed (Table 10.9). While other countries such as Zimbabwe, Kenya and Rwanda also have relatively high densities of ruminants, the use of legume residues as animal feed is less common here. In countries with low livestock densities, such as the DRC and Malawi, very few households use legume residues as animal feed. Only in Nigeria and Ghana, farmers mentioned they sell legume residues (primarily groundnut and some cowpea), usually to traders.

**Table 10.9: Use of legume haulms (% of haulms used for a given purpose)**

	DRC	Kenya	Rwanda	Malawi	Zimbabwe	Nigeria	Ghana
Compost, farmyard or green manure	92	66	80	73	53	1	42
Left in the field / mulch	6	6		9	14		3
Burned in the field		2	4	14	3	7	7
Cooking / Food preparation	0.4	23	9				
Given away to others			1				
Sale						11	4
Thrown away / dump				2	3		
Livestock feed	2	11	22	2	27	82	44

Home consumption is the major use of the legume grain. Also a large part of the soybean produce, often assumed to be primarily a commercial legume crop, is used within the household, except for Mozambique where 88% of the soybean grain is sold. The percentage saved for seed is surprisingly similar between the eight countries; between 9 to 16%. Another



similarity between the countries is that the vast majority of farmers growing grain legumes sell part of the grain produce (Table 10.10). Bambara nut is the grain legume of which the smallest percentage is sold – except for in Kenya. Beans, groundnut, cowpea and soybean are all commonly grown both as commercial and as household food crop.

**Table 10.10: Sale of legume grain by households (average percentage of produce used for sale)**

	DRC	Kenya	Rwanda	Malawi	Mozambique	Zimbabwe	Ghana	Nigeria
Bambara nut		47		3	10	2	25	
Bush bean	9	14	16	21	56	58	41	
Climbing bean	12	13	4	22				
Cowpea		17		27	37	26	40	49
Garden pea			24					
Green gram		22						
Faba bean					38			
Groundnut	37	23	15	42	36	29	56	70
Pigeon pea				35	56			
Soybean	25	18	21	43	88	40	63	49



## 11 Lessons learned

The baseline questionnaire provided us with a rich database of information on a range of topics that will help us assess impact towards the end of the project. Important information derived from the baseline survey includes data on production orientation of the farmers (crops vs. livestock, on-farm vs. off-farm income generation), crops grown by farmers, as well as the management of these crops, sale of legume products, the importance of livestock in the farming system, and certain gender disparities. Especially data on the cultivation of different legume types and the use of inputs in legumes are relevant to assess the appropriateness of the technologies promoted by N2Africa.

Moreover, the baseline data can be used to identify farm types, defined by for instance wealth characteristics and production orientation. We have done this to sample farmers for follow-up studies in Kenya and Nigeria (not presented here). The main reason to collect data on household assets was to facilitate the categorisation of farmers based on resource endowment. In the analyses for the current report, we did not look into correlations between a large number of data items due to time constraints.

The sampling was supposed to have been done randomly within the four classes. For example in Zimbabwe, wards where N2Africa interventions were taking place were purposefully selected in 4 districts that were each classified in a different class. Villages and households in these villages were randomly selected; households that benefitted from N2Africa inputs were skipped. However, this was not done in all countries so in some cases the households interviewed had already been involved in N2Africa activities. As we aimed to establish a baseline that allows us to compare before and after intervention, the study did not have a control.

In Nigeria and Malawi no GPS data of homesteads were collected, because there was no GPS equipment available in these countries. In general, GPS coordinates were found to be very useful to get an overview of the geographic distribution of project sites within a country and the spread of households. Also the selection of farmers for follow-up studies is facilitated by the collection of GPS coordinates.

In analysing data, we found that certain data items that have been collected only played a minor role in the analysis. In retrospective, the collection of some of these data items could have been omitted, or asked and/or processed differently. Below follows a list of data items that could have been omitted or asked differently.

1. The baseline questionnaire contained a few questions to collect financial data on earnings and payments. Interviewees were asked about the income earned with off-farm income generating activities of the household members. Oftentimes this information was not provided, which is understandable as people are generally not keen to disclose this in detail. Moreover, earnings and payments might be very irregular over time and therefore it might be impractical to ask for an average. And finally, people might not know exactly how much other people in the household may be earning with their income generating activities.

We also tried to collect information on payments made for hired labour and land. This information is inconsistent and/or incomparable and not used in the analyses.

For these reasons, the information on income and expenditures is often not included in the country reports. However, the two things that are clear from the data available with regards to income earned, is that in general the variation within a country is large and it is clear that men reported to earn more than women.



2. Farmers were often unable to estimate amounts of inputs used in crops. Since field sizes were also not precisely estimated, it was not useful to calculate input use on a per hectare basis. The same was true for yield estimates.
3. Data on market access were also found to be difficult to analyse. Farmers were asked to specify the type of market (local, regional, etc.) but the type of markets was not defined, and therefore it was difficult to understand what was meant with a local or regional market. Though it would have been useful, GPS data of markets were not collected. As it was, the questionnaire did not provide sufficient information to gain meaningful insight into the supply at these markets, let alone the alternative marketing channels for farmers.
4. The baseline questionnaire contained a section on household assets which we hope would tell us something about the wealth status of households. However we find quite some anomalies in the data, such as housing in Ghana, the confusing use of both '(Ox) plough / Cart' and 'Ox/donkey cart' and for example the large percentage of people that reports to have access to tap water in DRC. While information on household assets has been used to identify farm types in some of the detailed farm characterizations, in retro perspective we doubt whether this limited use justifies the number of data items in the questionnaire related to household assets.

Other data items in the baseline survey were found to be useful, even though the data obtained through these questions may not be entirely accurate nor provide a comprehensive picture:

1. The questionnaire contained questions about the size of fields cultivated (owned and rented) by the household. However, it is generally agreed that all figures on landholdings should be treated with care for a number of reasons. The question on field sizes is not always answered. Even if answered, surely in some cases farmers might not be able to accurately estimate the exact size of their fields. Oftentimes, the land cultivated by a household is scattered over different plots which might make it more complicated to know all the difference sizes. In addition to the fact that people might not know precisely the size of their fields, farmers may have good reasons not to give the accurate size of their fields to enumerators. In some cases, the impression of local experts, such as in DRC, is that farmers over-estimated the size of their land holdings. In all cases, fields of farmers have not been physically measured in the baseline survey. In the Field Book and the Detailed Farm Characterizations farmers' fields are being measured. Possibly, this information can then be used to compare with the baseline data on landholdings in order to see if there are any patterns to be discerned.
2. The baseline questionnaire contained a small section on nutrition. While we recognised the need to collect data on nutrition, we also agreed to keep the baseline questionnaire short. We therefore included only three questions on the most important foods in the household (not the frequency), the number of meals per day and the frequency of legume consumption in the questionnaire. We hope this will give some impression of nutrition and legume consumption and will allow us to observe some change over time – if any. Note that no questions were asked about the frequency of consumption, so for example if 53% of the households report to eat meat, we do not know how often meat is eaten in a household.
3. Because manure from livestock can possibly benefit crop production and because livestock is an important household asset in certain countries, it was decided to include questions about 'livestock owned' and 'livestock cared for' in the questionnaire. However, in the first place, questions about livestock may be sensitive in most countries. People might be unwilling to give the actual number of cattle they own and therefore these figures need to be treated with caution. Secondly, people



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might own livestock that is taken care of by someone else, in which case there may be no benefits from the manure of this livestock to the owner. For the analyses we have put the livestock owned and livestock taken care of together. Usually, the numbers of livestock taken care of were much smaller, or even negligible, in comparison with the numbers of livestock owned by the households.

Follow-up studies such as detailed farm characterisations provide more reliable information on field sizes, input use and yield, livestock numbers, the main household expenditures and income sources, and access to markets, though on a limited number of farms. The detailed farm characterisations are in that sense important, as they make up for some of the weaknesses in the baseline study. Given that the baseline survey was a rapid household survey, some of these weaknesses were inevitable.



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## 12 References

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## Appendix I: Baseline questionnaire

# N2Africa Baseline Survey – Farm households (Rapid farming system characterisation)

Date of interview: \_\_\_\_/\_\_\_\_/2010

Country: \_\_\_\_\_

Enumerator: \_\_\_\_\_

Action site (District/Secteur/Cell): \_\_\_\_\_

Location/village: \_\_\_\_\_

Homestead Coordinates: Northing: \_\_\_\_\_

Easting: \_\_\_\_\_ Altitude: \_\_\_\_\_

Checked by: \_\_\_\_\_

Date checked: \_\_\_\_\_

Data entry by: \_\_\_\_\_

Starting time: \_\_\_\_\_

### Introduction

Introduce yourself and the N2Africa project (see separate sheet). Explain the purpose of the survey and assure the interviewee of the confidentiality. Make sure to check if the farmer has any questions at this time.

### A. Demographic information

A.1. Name of respondent: \_\_\_\_\_

A.2. Household head: Yes / No

A.3. Total number of people in household: \_\_\_\_\_

A.3. Is anyone in your household affiliated to a (community) organisation? Yes/ No

If yes, please fill the table below:

Name of the organisation	Purpose/objective	Who in household is a member?	Member since
1			
2			
3			
4			
5			

A.4. Household composition and employment:

No	Name	Age	Gender	Schooling level (completed)	Involved in on-farm activities:			Involved in off-farm income generation		
					1) Yes, full-time	2) Yes, but only seasonal	3) No, not at all	1) Yes 2) No	If yes, what kind of income generating activity/ies? (See below this table)	Earnings? (in money and/or food or other goods) (indicate the period, for example per week, per month, etc)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

1) sale of firewood or timber, 2) sale of charcoal, 3) remittances, 4) trading, 5) handiwork (e.g. tailoring), 6) rent, 7) work on other people's fields (ganyu), 8) food for work, 9) pension, 10) sale of bricks, 11) fish, 12) own business, 13) other.....

<sup>1</sup> For example vocational training.

**B. Income**

B.1. What do **you** consider to be the most important source of household income:

- 1) Cropping \_\_\_\_\_      2) Livestock \_\_\_\_\_      3) (Petty) trade \_\_\_\_\_  
 4) Off-farm income \_\_\_\_\_      5) Remittances \_\_\_\_\_      6) Other (specify): \_\_\_\_\_

B.2. Can you estimate the portion of the income in your household coming from farming activities and the portion from off-farm sources? Choose what best describes your situation:

	Tick
1) All income from farming	
2) Most from farming, a small part from off-farm sources	
3) About half-half from farming and off-farm	
4) More from off-farm sources and less from farming	
5) No Income from farming, all from off-farm sources	

[Note: it is not about the amount of money, but estimated proportions, for example half-half, or a quarter of the income is generated off-farm, the rest is from farming activities.]

**C. Labour**

Do you hire labour for your farm or work in the fields? 1) Yes \_\_\_ 2) No \_\_\_

If yes, indicate for what kind of activities:

Activity	1) yes 2) no	Mainly for which crop(s)?	How long (no. of days) & how many people hired?	Cost (money and/or food) (indicate per year, per month or per day)
Land preparation				
Planting				
Weeding				
Harvesting				
Transport harvest home				
Processing				
Other:				

**D. Household assets/resources (Wealth indicators)**

		Tick if yes	Number of items (if relevant)
<b>1</b>	<b>House: walls</b>		
a	Bricks (burnt)		
b	Un-burnt bricks or mud bricks		
c	Poles (bamboo or other), planks		
d	Other (specify):		
<b>2</b>	<b>House: roof</b>		
a	Grass, thatch		
b	Iron sheets, asbestos, tin		
c	Tiles		
d	Other (specify):		
<b>3</b>	<b>House: flooring</b>		
a	Mud		
b	Concrete, cement		
c	Tiles		
d	Other (specify):		
<b>4</b>	<b>Transport</b>		
a	Bicycle (if yes, total no. in HH)		
b	Motorbike		
c	Car or pick-up		
d	Truck		
e	Other (specify):		
<b>5</b>	<b>Communication &amp; other equipment</b>		
a	Cell phone (if yes, total no. in HH)		
b	Radio		
c	Television		
d	Fridge		
e	Other (specify):		
<b>6</b>	<b>Power</b>		
a	Solar power		
b	Car battery		
c	Electricity		
d	Paraffin		
e	Generator		
d	Other (specify):		
<b>7</b>	<b>Cooking</b>		
a	Wood		
b	Charcoal		
c	Paraffin		
e	Other (specify):		

<b>8</b>	<b>Tools for land preparation</b>		
a	Hoe		
b	Panga/ cutting knife		
c	Watering cans		
d	Plough		
e	Tobacco drying shed		
f	Tobacco pressing machine		
g	Wheel barrow		
h	Ox cart, donkey cart		
i	Tractor		
j	Others (specify):		
<b>9</b>	<b>Facilities for livestock</b>		
a	Roofed shelter		
b	Pen, kraal, fenced place		
<b>10</b>	<b>Storage of harvest</b>		
a	Bags		
b	Mud silo, granary		
c	Earthenware pot		
d	Other (specify):		
<b>11</b>	<b>Source of water (domestic use, drinking water)</b>		
a	Private well		
b	Private borehole		
c	Community well		
d	Community borehole		
e	Tap (piped water)		
f	Surface water (river, stream, etc)		
g	Others (specify):		
<b>12</b>	<b>Irrigation</b>		
a	Treadle pump		
b	Diesel pump		
c	Other (specify):		
<b>13</b>	<b>Other: [Here you can note what a farmer wants to add and/or could not fit above]</b>		

### E. Livestock ownership

	Number				Number:
	Owned	Cared for	Total:		
Cattle (total no.)				Chickens	
Cows for dairy				Guinea fowls	
Oxen				Turkeys	
Sheep				Guinea pigs	
Goats				Rabbits	
Donkeys				Doves/pigeons	
Pigs				Bees	
Horse				Fish (fish ponds?)	
				Other (specify):	

### F. Land holding

Where possible, fields of farmers will be measured. In some cases this can be done for example by sending a team of two enumerators; one to interview the farmer, the other one to go around the fields to measure the plots. In other cases, the enumerator will do both the interview and the measurements. Country team are to determine the appropriate way to do this.

No. of field	Acreage (ha, acres, m x m)	1) Own field 2) Rented field 3) Rented out from someone 4) Borrowed from someone 5) Lend to someone else	If rented, how much is payment in money and/or produce?	How long have you been farming/using this field?	Use: 1) crops 2) fallow 3) pasture 4) woodlot 5) other	Main crops grown in the last season	Who controls the use of land? 1) husband 2) wife 3) both 4) owner 5) other	Who controls the harvest from this field? 1) husband 2) wife 3) both 4) owner 5) other
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
<b>Total no.:</b>								

**G. Production activities: Legumes**

G.1. Have you cultivated legumes in the past 5 years? 1) Yes \_\_\_ 2) No \_\_\_

G.2. Which legumes did you cultivate last season:

Legume type	Variety	Area	Inputs used on legumes and amounts			
			Mineral fertiliser(s), what kind?	Organic fertilizer(s), what kind?	Inoculant	Other (specify):
Cowpeas						
Soybeans						
Common beans/ Bush beans						
Climbing beans						
Bush beans						
Groundnuts						
Other:						
Other:						
Fodder legume						
<b>Total land allocated to grain legumes:</b>						
<b>Total land allocated to fodder legumes:</b>						
<b>Total land allocated to legumes:</b>						



G.3. Total production of legumes:

	<b>Legume</b>	<b>Total production last season<sup>2</sup></b>	<b>Amount kept for household</b>	<b>Amount to keep for seed, paying labour, etc</b>	<b>Amount for sale</b>	<b>Who makes decision on division of harvest? 1) Wife 2) Husband 3) Both? 4) Other (specify)</b>
1						
2						
3						
4						
5						
6						

G.4. For your agricultural production other than legumes, what inputs do you obtain?

	<b>Crop</b>	<b>Seeds / planting material purchased? 1) yes, 2) no</b>	<b>Mineral fertilizer What kind?</b>	<b>Organic fertilizer What kind?</b>	<b>Biocides/ pesticides</b>	<b>Other inputs (specify)</b>
1						
2						
3						
4						
5						
6						
7						

<sup>2</sup> Local units like baskets, buckets, scotch carts, different sizes of bags, etc all need to be converted to kilogrammes

G.5. Production and utilisation of your **major crops**, apart from legumes:

	Crop	Total production last season	Amount kept for household	Amount to keep for seed, paying labour, etc	Amount for sale	Who makes decision regarding the division? 1) Wife 2) Husband 3) Both 4) Other (specify)
1						
2						
3						
4						
5						
6						
7						

**H. Nutrition & Legume utilisation**

H.1. What are the most important foods for your household?

1.	4.
2.	5.
3.	6.

H.2. In your household, how many meals do you take per day? *Here we refer to 'real' meals, not snacks and/or drinks.*

1) Once per day \_\_\_\_\_ 2) Twice per day \_\_\_\_\_ 3) Three times per day \_\_\_\_\_

H.3. How often do you eat grain legumes in your household? (Which kinds, number of times per week, main dish or side dish)

	Which grain legume	Frequency per week		How eaten? Main dish or side dish?
		Peak season	Low season	
1				
2				
3				
4				
5				

H.4. Do you use legume haulms for anything? (E.g. as feed for own livestock, sale to other people, burning, etc.)

	Type of legume	Haulms used for which purpose
1		
2		
3		
4		
5		

N2Africa

## I. Markets

	Place and/or name <sup>3</sup>	Kind of market (local, regional, etc.)	Frequency of market (once a week, every day, etc)	Distance (for example, kilometres or time walking)	Means of transport	Cost of transport to market ( <b>1 person, 1 way</b> )	Do you use it for 1) sale, 2) purchase 3) both	Main products at market 1) household goods, 2) clothes, 3) agricultural produce, 4) inputs, 5) livestock, 6) other (specify):
1								
2								
3								
4								
5								

<sup>3</sup> If possible, take the GPS coordinates of the places concerned, for example when you are passing through on your way.

Sketch of the farm layout (simple overview of homestead, indicate (main) fields and if appropriate, other relevant features such as well, orchard, etc.): **OPTIONAL**

***Sometimes, a sketch may help to understand the lay-out of the farm, all the fields and other possible features. Make sure the farmer is still up to this!***



**Please, thank the respondent for her/his time.**  
**Check if the farmer has any questions at this**  
**time.**

Ending

time: \_\_\_\_\_



## List of project reports

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



## Partners involved in the N2Africa project



Caritas Rwanda



Diobass



Eglise Presbiterienne Rwanda



Resource Projects-Kenya



Université Catholique de Bukavu



University of Zimbabwe

