Rapid Rural Appraisal Report of Northern Uganda February-March 2014

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Rapid Rural Appraisal Report of Northern Uganda

International Center for Tropical Agriculture (CIAT)

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

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List of Acronyms

AAH	Action Against Hunger
ACET	AIDS Care Education and Training
ACF	Action Against Hunger
ACORD	Agency for Cooperation and Research in Development
ACTED	Agency for Technical Cooperation and Development
AEI	Acholi Education Initiative
AHA	Africa Humanitarian Action
ALIN	Arid Land Information Networks
ALREP	Agricultural Livelihoods Recovery Program
AMREF	African Medical and Research Foundation
ARC	America Refugee Committee
AVSI	Association of Volunteers in International Service
A2N	Africa 2000 Network
CARYM	Catholic Agricultural and Rural Youth Movement
CCO	Certificate of customary ownership
CDD	Community Driven Development
CDO	Cotton Development Organization
CEFORD	Community Empowerment for Rural Development
CIAT	International Center for Tropical Agriculture
COOPI	International Cooperation
CRS	Catholic Relief Services
CSA	Climate Smart Agriculture
DAO	District Agricultural Office
DLG	District Local Government
DNU	Diocese of Northern Uganda
DRC	Danish Refugee Council
EACU	East Acholi Cooperative Union
EASSFF	East Africa Small Scale Farmers Forum
FAO	Food and Agriculture Organization of the United Nations
FFH	Football for Hope
FFS	Farmer Field School
GADC	Gulu Agricultural Development Company
GDFA	Gulu District Farmers Association
IFAD	International Fund for Agricultural Development
IGF	Irene Gleeson Foundation

IIRR	International Institute of Rural Reconstruction
IITA	International Institute for Tropical Agriculture
IRC	International Rescue Committee
ISSD	Integrated seed sector development in Africa
JICA	Japan International Cooperation Agency
KICWA	Kitgum Concerned Women's Association
KIDFA	Kitgum District Farmers Association
KLBF	Kitgum- Lamwo Business Forum
LGDP	Local Government Development Program
LSB	Local Seed Business
LWF	Lutheran World Federation
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
NAADS	National Agricultural Advisory Services
NARO	National Agricultural Research Organization
NFA	National Forestry Authority
NRC	Norwegian Refugee Council
NUDIEL	Northern Uganda Development of Enhanced Local Governance
NUSAF	Northern Uganda Social Action Fund
NYC	Nwoya Youth Center
OVC	Orphans and Vulnerable Children
PRA	Participatory Rural Appraisal
PRDP	Peace, Recovery and Development Plan for Northern Uganda
RRA	Rapid Rural Appraisal
RULNAC	Restoration of Agricultural Livelihood in Northern Uganda
UNADA	Uganda National Agro-input Dealers Association
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
UWA	Uganda Wildlife Authority
UWN	Uganda Women Network
VSLA	Village Savings and Loans Association
V2V	Village to Village
WFP	World Food Programme

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Executive summary

A rapid rural appraisal (RRA) was carried out by the CIAT-IITA team in northern Uganda between 18th February and 1st March 2014. The RRA aimed to assess within and between district variations in farming systems and agricultural management practices in order to guide strategic agricultural investments and projects. The RRA used key-informant interviews, participatory workshops, transect walks, village and farm visits, as well as gender-disaggregated methods to gather information on important agriculture-related features and constraints faced by farmers.

The RRA was carried out in four districts: Gulu, Nwoya, Kitgum, and Adjumani. The first three are part of the Acholi sub-region while the latter is in the West Nile sub-region. Selection criteria included encompassing the greatest variability in climate and topography as well as proximity to commercial centres and road networks. The districts can be distinguished by ethnicity, with the Acholi people dominant in the Acholi sub-region and the Madi in Adjumani district.

Rainfall across the Acholi sub-region is bimodal, with the first rainy season lasting from March to June and the second rainy season lasting from July to November. Mean annual precipitation for Gulu, Kitgum, and Nwoya districts is about 1555, 1130, and 1500 mm respectively. The mean annual temperature is about 23^0C for Gulu and Nwoya and 24.6^0C for Kitgum. In Adjumani the annual temperature ranges from 19° C to 36° C. Farmers in all the four districts perceive climate variability to be a serious challenge limiting agricultural production. More specifically, they cite unreliability in the onset and cessation of the rains, uncertainty about the duration of the rainy season, and the long dry spells that fall within the season, as major constraints.

Socio-economic assessments of key household variables were gathered from respondent households through the resource mapping exercises. Results indicate that more than half of the households surveyed were monogamous. Seventy percent of households surveyed were male headed, 25% were women headed, and 5% were child-headed. The average household size was ten members. Agricultural labour is largely supplied by family members, and was cited as inadequate for the amount of labour required on the farm. Availability of hired labour is also limited due to competition with other farms. Majority of the land is held under customary tenure with access based on the membership to a community, clan, or family. Households reported they have sufficient access to land in order to produce food for the family. Rights to land, ownership, and control are in favour of men. Presently, there are land conflicts after the return of communities from the IDP camps. Disputes are mainly related to boundaries and ownership at an individual, family, and clan level.

Topographically, the Acholi sub-region is dominated by gentle and level landforms. Land cover is characterized predominantly by grasslands with some woodlands across the four districts. The farmers described the dominant soil textures as loam, clay, and

sandy. The typical farm size per household in Gulu, Nwoya, Kitgum and Adjumani districts were three, ten, three, and eight acres, respectively. Nwoya district had larger farm sizes with vast fallow lands. Currently, there is some commercial farming in Nwoya, due to land availability and the flat terrain.

Agriculture, including the cultivation of crops and livestock keeping, is the dominant livelihood activity in all four districts. Livestock numbers significantly decreased during the conflict in the region and are yet to increase to adequate numbers needed for ploughing. Livestock tethering is carried out during the rainy season and open grazing is practiced during the dry season. Crop production is primarily rain-fed, favouring multi-cropping. The most important crops are different across the four districts include: groundnut, beans, cassava, and sesame in Gulu; groundnut, beans, and rice in Nwoya; sesame and cassava in Kitgum; and maize, rice, and sesame in Adjumani. Intercropping with cassava/maize or maize/groundnuts is common. The most important crops according to farmers include the priority commodity crops for the district reported in the government's agricultural development strategy. Gender-disaggregated data on crops indicate that vegetable cultivation was associated with women. While rice, cassava, and maize were associated with men. In general, crops grown for cash were perceived as 'male crops' while crops produced for home food consumption were considered 'women crops'. Off-farm income also contributes to the livelihoods of the farmers in each of the districts surveyed. Activities such as brick making and charcoal burning were reported as being economically important.

Seed systems are locally integrated. Across each of the districts, farmers reported that seeds for 89% of the crop varieties cultivated are sourced through what is referred to as the traditional/local/informal seed system. Farmers produce, disseminate, and procure their own seeds. Despite this, farmers reported poor seed quality and access to seeds as major constraints to agricultural production. Farmers practice traditional farming systems and rely largely on indigenous knowledge. For example, broadcast seeding is widely practiced in the four districts. In Kitgum and Adjumani, farmers also reported broadcasting a mix of seeds, such as sorghum, sesame, and foxtail millet.

The most common land management practices in the study districts are slash-and-burn (to prepare fields) and intercropping (e.g., of cassava with groundnut, maize or foxtail millet). Use of fallowing has declined in the last ten years as a result of an increase in the population. The use of inorganic and organic fertilizers is still very limited in each of the districts. Farmers perceive their soils as fertile and the cost of fertilizer high. Several challenges to increasing agricultural productivity were identified including: enhancing seed quality and accessibility, soil and water conservation, improved crop management, improved road network, provision of climate information, proper grain storage, better developed markets, and promoting value addition in produce.

1. Introduction

This Rapid Rural Appraisal (RRA) exercise in northern Uganda (Acholi sub-region and Adjumani district) is part the CIAT-CCAFS project titled, "Increasing Food Security and Farming System Resilience in East Africa through Wide-Scale Adoption of Climate-Smart Agricultural Practices". Information gathered in the RRA will be used to inform activities within the CIAT-CCAFS project as well as the IFAD Programme for Enhancement of Livelihoods in Northern Uganda (PRELNOR). This report is a detailed and comprehensive summary of the information obtained during the RRA, structured by activity.

1.1. Objectives of the RRA in northern Uganda

1. To introduce the CIAT-CCAFS & PRELNOR projects to the communities.
2. To obtain a preliminary understanding of the farming systems, household characteristics, infrastructure, land tenure, and other important agriculture-related features.
3. To obtain a preliminary understanding of major challenges and constraints faced by farmers (i.e., climate variability, land health, specific cropping and/or livestock issues, markets, etc.) across the four districts.
4. To identify current CSA, agronomic, and land management practices.
5. To identify farmers' perceptions of weather patterns (e.g., climate variability) and its perceived impact on agricultural production.
6. To guide the final selection of sites for future land health surveys and on-farm trials of climate smart agriculture practices.

1.2. Site selection

The RRA focused on the Acholi sub-region and Adjumani district, which is IFAD's target region in northern Uganda. The Acholi sub-region is composed of the following seven districts: Amuru, Apac, Gulu, Kitgum, Nwoya, Oyam, and Pader. Four districts (Gulu, Nwoya, Kitgum, and Adjumani) were chosen to capture variability of climate and topography, which is expected to be reflected in variability in farming systems across the Acholi sub-region (Figure 1). Other differences in these four districts include, variability of land-use intensity, distance to population centres, percentage of land under cultivation, and road network densities.

Gulu and Nwoya are in the southern part of the Acholi sub-region while Kitgum is in the north. Gulu and Nwoya have higher elevation and rainfall compared to Kitgum and

Adjumani (Appendix A). Gulu also has higher farm and population densities compared to the other three districts. Nwoya is a recently created district (2010) carved from Amuru district, which was earlier (2006) part of Gulu district. Adjumani is not part of the Acholi sub-region; it is in the Madi sub-region, yet it is contiguous to the Acholi sub region. Sub-counties and villages were chosen based on local partners' suggestions, as well as access.

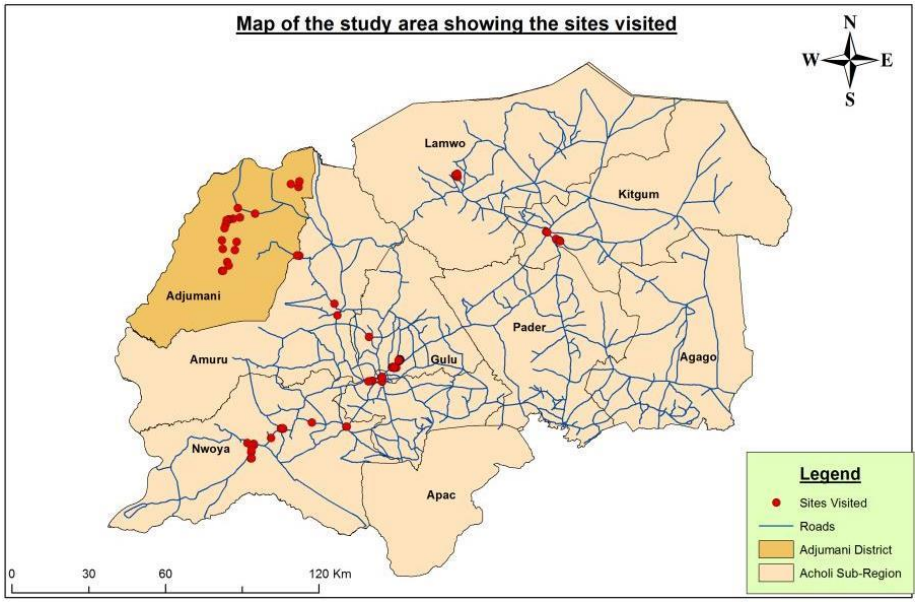

Figure 1: RRA study area in Acholi sub-region and Adjumani. Red solid circles indicate the sites visited.

2. Methodology

A multi-disciplinary team, which included CIAT, IFAD, and IITA staff, in collaboration with and Gulu University lecturers and students, conducted the RRA in February-March 2014. Participatory tools and techniques were used in collecting primary data. Secondary information was also collected to inform the fieldwork and identify key contacts. The following subsections include a description of the tools employed in the RRA.

2.1. Semi-structured interviews with key informants

Key informants were identified and included: district level agricultural officers and NAADS extension agents, as well as representatives of FAO, CARE, ALIN, and ISSD (see Appendix C for details). A questionnaire was developed to guide the discussion with key informants and included the following modules: key institutions in the region; activities of the institutions; basic household characteristics; important crops and

livestock of the district; crop and livestock management practices (current and past); land tenure issues; perceived climate variability; challenges facing farmers related to climate variability; market access; input availability; credit access; pest and diseases; and seed supply.

2.2. Farmer workshops

A workshop was held with local farmers in each district. These workshops were organized with the assistance of the either the local farmer organization or the district-level agricultural office. Representation of both men and women was encouraged. Several activities were undertaken during the farmer workshops are discussed below.

2.2.1. Guided discussion

The guided discussion was used as an ice breaking exercise and to: 1) identify residence of participants; 2) identify the different crops and livestock in the region; 3) understand some of the gender agricultural norms; 4) understand the primary uses of the crops (e.g., home consumption, vs. cash crop); and 5) identify and discuss the most common crop varieties.

2.2.2. Climate calendar

The climate calendar is a tool used to understand how climate influences cropping seasons. Farmers were asked to describe their cropping calendar for three major crops under typical weather patterns and abnormal weather patterns (i.e., drought and/ or heavy rainfall). Farmers were also asked to discuss overall impact of weather on agricultural production and to recall common and extreme weather events (strong winds, hail, floods, etc.).

2.2.3. Crop calendar

A crop calendar was used to identify the activities related to agricultural production for specific crops and who performs them, times for specific activities, busiest months, and the period of labour demand for men, women and youth.

2.2.4. Institutional mapping and network analysis using Venn diagrams

Venn diagrams were used to document the key local institutions and groups utilized by farmers. After naming all the institutions, participants ranked each in terms of its relative importance (using small, medium, and large circles). The circles were placed relative to each other to symbolize linkages between different institutions as follows: Separate circle = no contact; Touching circles = information passes between institutions; Small overlap = some co-operation in decision making, planning and/or implementation; and Large overlap = a lot of co-operation in decision-making, planning and/or implementation.

Figure 2: Institutional mapping exercise at Adjumani District.

2.3. Village and farm visits

We visited two different villages in Gulu and Nwoya and three villages in Adjumani and Kitgum districts. The villages were selected with the help of the sub-county agricultural officials. Farm visits, transect walks, and resource allocation mapping were conducted in each village.

2.3.1. Transect walks

A transect walk through the village and individual farmer's fields was conducted to identify food and cash crops, landmarks, soil and vegetation patterns, socio-economic indicators, livestock types, and forestry practices. Specifically, the transect walk was used to familiarize the team with the biodiversity and the resource endowments and gain a visual understanding of the challenges and opportunities for agriculture in that area. Photos were taken of key landmarks and GPS coordinates noted.

Figure 3: Transect walk exercise in Unyama county, Gulu district.

2.3.2. Resource allocation mapping

Resource allocation maps were drawn with the help of household members (Figure 4). Objects indicated include: location of houses, agriculture land and farm size, animal

pens, grazing fields, granaries, and fallow fields. Public and private infrastructure such as roads, markets, health centres, schools, water sources, etc. were also noted. These diagrams can be used to compare and identify farming systems, on-farm activities, non-farm, activities as well as indicators of income and expenditure of the household.

Figure 4: Resource allocation mapping exercise.

3. Results and Discussion

3.1. Participation in the RRA

A total of 158 farmers and 24 district agricultural officials attended the workshops. The proportion of male and female farmers was 63% and 37%, respectively. Guided interviews were held separately with the agricultural officials in order to only include farmers in the workshops. In addition, we interviewed 14 key informants (Appendix C) and held 10 farm visits (see section 3.10 for details) in the four districts.

3.2. Household and farm characteristics

From the expert interviews, we established that the average family size was eight in Gulu and Nwoya, nine in Kitgum, and 10 in Adjumani. Polygamy is practiced in about 45% of the households. Farmers mentioned that one of the reasons for practicing polygamy was to obtain labour for the farm.

The average farm size among the households surveyed was 10 acres in Gulu, 1379 acres in Nwoya, 48 acres in Adjumani and 16 acres in Kitgum. The high farm acreage in Nwoya was due one of the respondents having extensive land holdings. However, we observed that in general, Nwoya had large farm sizes with idle lands and the lowest farm density compared with the other districts surveyed. Gulu had the highest farm density and greater pressure on the land. In all of the workshops, participants highlighted lack of labour limiting the opening up new lands for agriculture.

The dominant soil texture identified across the districts was loam, with presence of sandy loam and clay soils (Table 1). The most commonly recognized soil type in the study site was reddish brown followed by black. Most farmers perceive the soil fertility

as high. However, key informant interviews expressed that fertility levels are declining rapidly in the region. Farmers reported that use of inorganic fertilizer is low except among tobacco and cotton growers. A few farmers reported incorporating pig manure on their horticultural crops. Use of manure from cattle, goats, and sheep was not common, as the animals mainly grazed freely. Farmers indicated that they did not apply inorganic fertilizer because of its high cost, while some reported they lacked knowledge about application. Some respondents believed that the use of inorganic fertilizers could reduce the fertility of the soils.

Table 1: Household size, farm size, and soil texture over the study site based on key informant interviews, transect walks, and workshops.

District	Typical Household size	Farm size (acres)			Dominant soil texture
		Typical	Smallest	Largest	English name
Gulu	8	3	0.5	100	Loam
Kitgum	9	3	1	20	Loam
Nwoya	8	10	5	1000	Clay, sandy-loam, loam
Adjumani	10	8	5	400	Clay loam

3.3. Livestock types as obtained from farmer workshops and farm visits

At least every household surveyed owned at least one type of livestock. Livestock-type disaggregated data revealed that ownership of goats and poultry was most common, 50% and 29.6%, respectively (Figure 5).

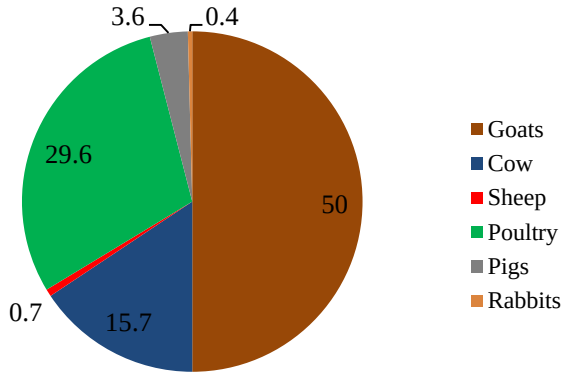

Figure 5: Percentage of livestock types kept by households across the four districts.

During the livestock listing, farmers were also asked to indicate the gender they associated with each livestock species with (Tables 2-5) and their reasons for this association. The reasons they gave are:

1. Cattle are associated with men, as they used in dowry payment, which is a man's responsibility. Cattle are also reared for commercial purposes and the marketing is mainly carried out by men.
2. Goats are managed by men since men have more time to tether them as opposed to women.
3. Poultry is associated with women as they are the ones who feed them. Women are also responsible for maintaining the chicken coop. Ducks are considered dirty and are also associated with women.
4. Fish are associated with men because of the hard work associated with digging the ponds.
5. Bees are associated with men, as women reported being afraid of bee stings.

3.3.1. Gulu district livestock list

In Gulu cattle, goats and chicken were listed as the most important livestock. Farmers mentioned that both men and women are involved in livestock rearing. However, over 75% of the livestock was associated with men as compared to 17%, mainly poultry, was associated with women (Figure 6). A total of 12 livestock species were listed (Table 2).

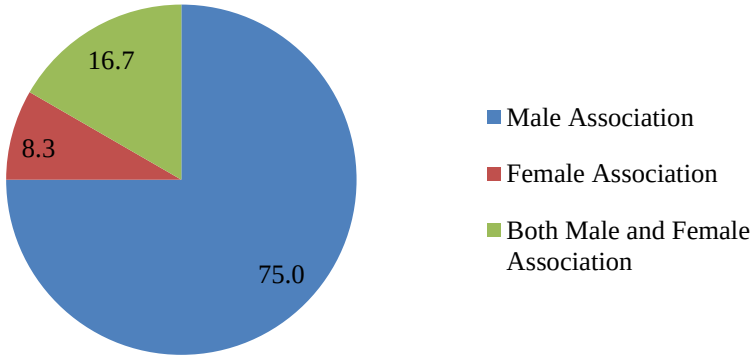

Figure 6: Percentage of livestock types associated with each gender in Gulu district.

The most common livestock management practices in Gulu include:

1. Paddocking for cattle.
2. Free range for cattle, goats and sheep.
3. Spraying against external parasites in cattle.

There have been changes in livestock management. Previously open grazing was common for cattle and goats. Currently, tethering and zero grazing are also practiced. Improved chicken breeds are being introduced in the region such as the broiler. Vaccination, spraying, and deworming of livestock are also currently being practiced.

Table 2: Livestock species in Gulu district as listed in farmer workshop.

Common name	Gender association
Cattle	M
Goats	Both
Chicken	Both
Sheep	M
Ducks	F
Pigs	M
Rabbit	M
Fish	M
Edible rat	M
Guinea fowl	M
Bees	M
Turkeys	M

3.3.2. Kitgum district livestock list

In Kitgum, cattle, goats, pig, sheep, chicken, bees, and fish were highlighted as the most important livestock. Sixty-three percent of the livestock was associated only with men and 31% with women (Figure7; Table 3).

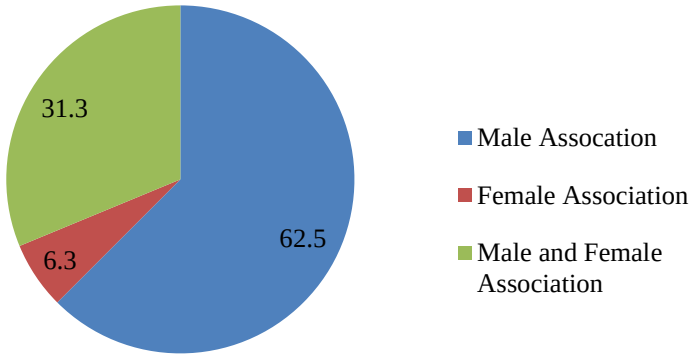

Figure 7: Percentage of livestock types associated with each gender in Kitgum district.

Common livestock management practices in Kitgum include:

1. Vaccination in chicken and pigs.
2. Deworming in cattle, goats, sheep and pigs.
3. Spraying for external parasites in cattle.
4. Livestock identification e.g., ear notching in cattle.
5. Zero grazing in cattle.

Farmers used to graze cattle in communal fields. Currently, zero grazing has been introduced in Kitgum. This was fuelled by the rise in land disputes. Population increase has also contributed to the disappearance of the communal fields. Farmers mostly reserve land for livestock near the homestead and parcels farther away are allocated for crops.

Table 3: Livestock species in Kitgum district as listed in farmer workshop.

Common name	Gender association
Pig	Both
Cattle	M
Goat	Both
Duck	F
Pigeon	M
Chicken	Both
Sheep	M
Rabbit	M
Turkey	Both
Rats	M
Donkey	M
Guinea fowl	M
Fish	M
Ostrich	M
Geese	Both
Bees	M

3.3.3. Nwoya district livestock list

The most important livestock mentioned in Nwoya were: goats, cattle, pigs, chicken, sheep and bees (Table 4). Only 14% of the total livestock mentioned was associated with women (representing poultry), while 85.7% was associated with men (Figure 8).

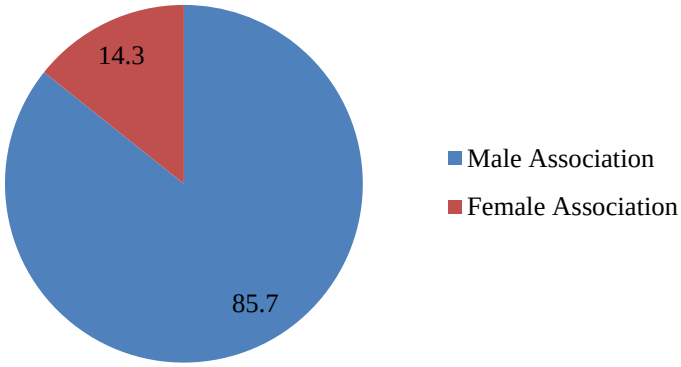

Figure 8: Percentage of livestock types associated with each gender in Nwoya district.

Common livestock management practices in Nwoya include:

1. Farmers rely on open grazing for cattle, goats and sheep. As well as communal grazing, where one farmer rears for one week and then a different farmer the following week.
2. Tethering in the rainy season and free range in dry season, for goats.
3. Grazing of cattle.

Table 4: Livestock species in Nwoya district as listed in farmer workshop.

Common name	Gender association
Pig	M
Duck	F
Goats	M
Chicken	F
Cows	M
Sheep	M
Bees	M
Pigeon	M
Turkey	M
Guinea fowl	M
Rabbit	M
Fish	M
Guinea pig	M
Donkey	M

3.3.4. Adjumani district livestock list

Most important livestock in Adjumani include: chicken, cattle, goat, and pig. A total of 13 livestock species were listed (Table 5).

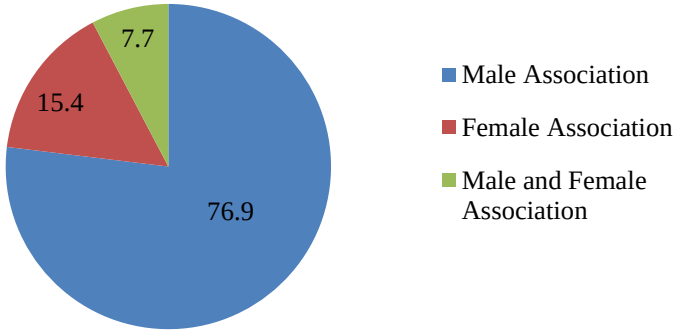

Figure 9: Percentage of livestock types associated with each gender in Adjumani district.

Common livestock management practices are:

1. Grazing of cattle during the dry season and tethering during the cropping season.

Table 5: Livestock species in Adjumani district as listed in farmer workshop.

Common name	Gender association
Pig	M
Duck	F
Goats	M
Chicken	F
Cows	M
Sheep	M
Bees	M
Pigeon	M
Turkey	M
Guinea fowl	M
Rabbit	M
Fish	M
Guinea pig	Both

3.4. Cultivated crop species based on information from the farmer workshops

Farmers in the four districts cultivate a high number of crops (Appendix B: Table 8-11). The majority of the crops are associated with men and over 60% of the crops were grown for home consumption. Cassava, sesame, rice, and maize were the main cash crops cultivated. Overall cassava was more popular in Adjumani and Kitgum while groundnut and sesame were the major crops in Nwoya and Gulu. Vegetable crops were reported as grown for home consumption. A few commercial farms in Nwoya district are engaged in mono-cropping of maize and coffee. During the crop listing exercise, farmers were asked to indicate the gender they associated with each crop (Appendix B: Tables 8-11) and to describe their reasons for this association.

3.4.1. Overall gender differences in crop association

1. Vegetable cultivation was associated with women, while rice, cassava, and maize were associated with men. In general, crops grown for cash were perceived as 'male crops' while crops produced for home food consumption were considered 'women crops'. Cash crops are associated with men as marketing is mainly carried out by them.
2. The gender association is related to the crop management activities. As seen from the cropping calendars (Section 3.6), crops requiring more manual labour, such as cultivating rice in swamps, are associated with men. Management activities carried out by women, for example cultivation of sesame, result in the crop also being associated with them.
3. Cereals were generally associated with men and legumes with women. This was because activities in management of legumes require smaller tools and more bending, which the men find difficult.

4. For the crops associated with either gender, a greater proportion of subsistence food crops were associated with women compared to men (Figures 11, 13, 15 and 17).

3.4.2. Gulu district crop list

Cassava, sesame, beans, groundnuts, sweet potato, and maize were reported as the most important crops in Gulu (Appendix B: Table 8). Seventy-eight percent of the crops were reported as grown for home consumption and 22% as cash crops. Fifty-three percent of the crops were associated with men, 14% with women and 3.3% to both genders (Figure 10). Of the total crops mentioned associated with either gender, subsistence food crops accounted for the majority (Figure 11).

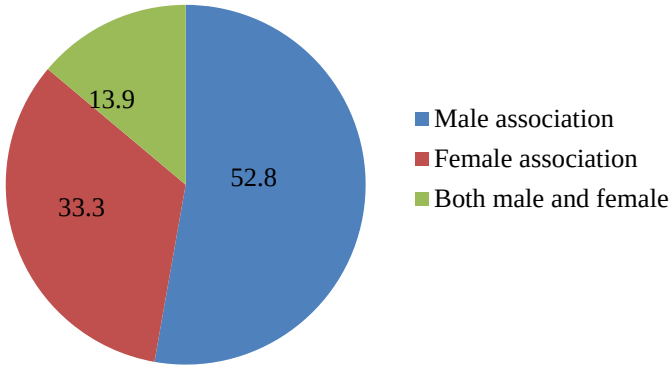

Figure 10: Percentage of crops associated with each gender in Gulu district.

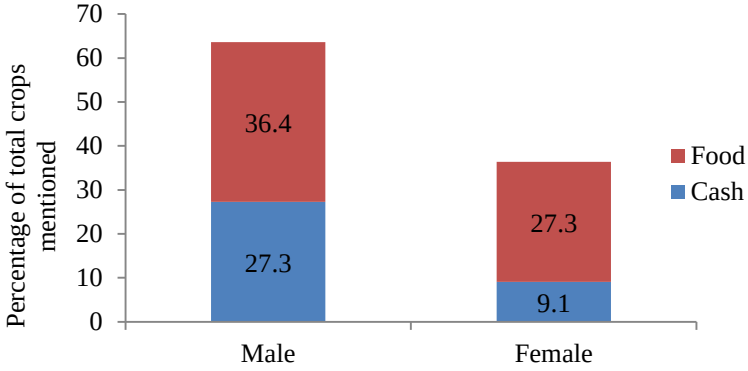

Figure 11: Gender association between cash and food crops in Gulu district.

3.4.3. Kitgum district crop list

Groundnuts, cassava, sesame, maize, sorghum, sweet potatoes, and beans were reported as the most important crops. Subsistence food crops were mainly associated with women and cash crops with men (Appendix B: Table 9). Sixty-one percent of the crops were associated with men, of which 39.1% were subsistence food crops (Figure 12). For the crops associated with women 30% were food crops as compared to 7% cash crops (Figure 13).

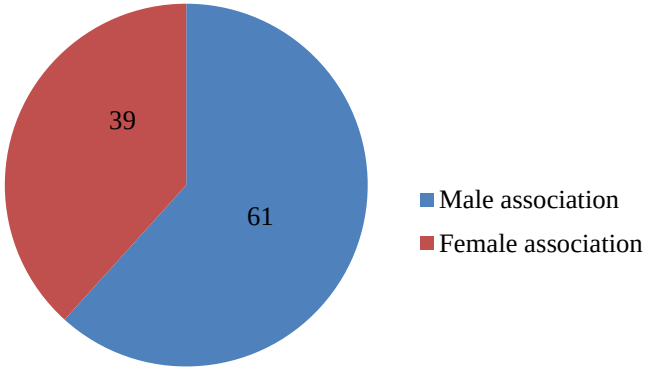

Figure 12: Percentage of crops associated with each gender in Kitgum district.

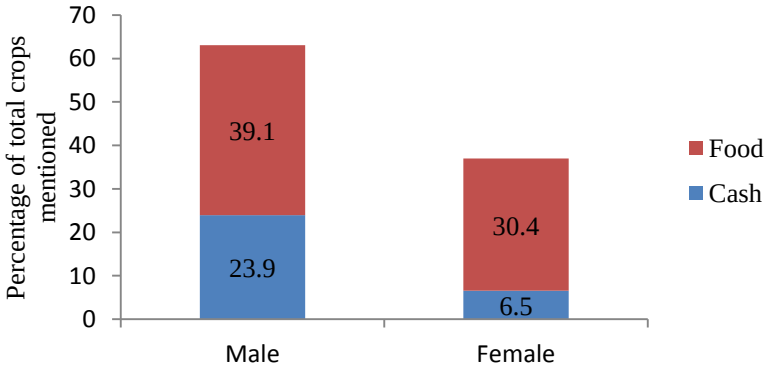

Figure 13: Gender association between cash and food crops in Kitgum district.

3.4.4. Adjumani district crop list

In Adjumani, maize, cassava, rice, sesame, groundnut, beans, and sweet potato were listed as the most important crops. Over 79% of the crops are grown mainly for food (Appendix B: Table 10). Crops associated with men account for 57% of all the crops mentioned as compared to 35% which were associated with women (Figure 14). For the crops associated with women 32% were food crops as compared to 6% cash crops (Figure 14).

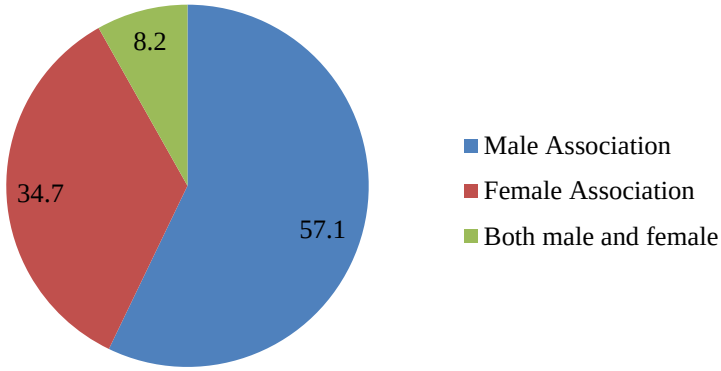

Figure 14: Percentage of crops associated with each gender in Adjumani district.

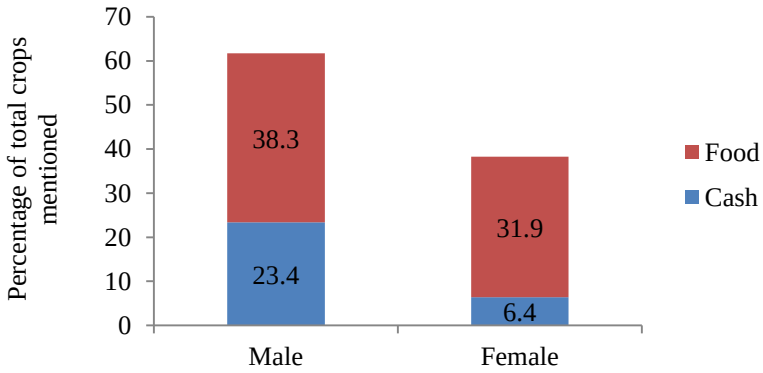

Figure 15: Gender association between cash and food crops in Adjumani district.

3.4.5. Nwoya District crop list

Major crops cultivated in Nwoya were groundnut, beans, maize, rice, cassava, and sesame (Appendix B: Figure 11).Sixty-percent were categorized as subsistence food crops. Crops associated with men represented 54% of all of the crops mentioned and the 42% were associated with women (Figure 16). Similar to the other three districts the major proportion of the crops associated with women represented food crops (Figure 17).

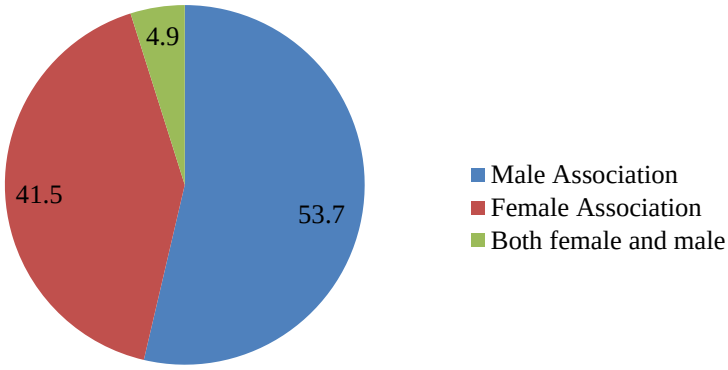

Figure 16: Percentage of crops associated with each gender in Nwoya district

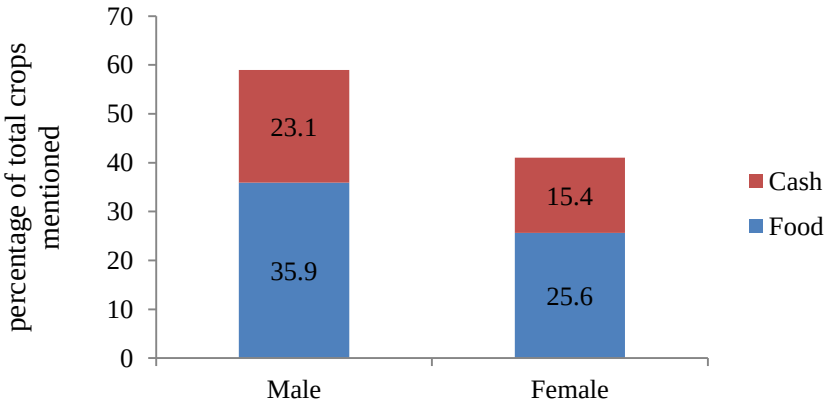

Figure 17: Gender association between cash and food crops in Nwoya district.

3.5. Current agronomic and land management practices across the districts

Table 6: Current agronomic and land management practices in Acholi sub-region and Adjumani district.

Practice	Crops	District where it was noted
Stone lining, construction of drainage channels and waterways	Mainly along swamps with horticultural plots	All districts, rare
Crop rotation	All crops	All districts
Burning	All crops	All districts, common
Fallowing	All crops	All districts, rare
Application of organic manure	Horticultural crops	All districts, rare
Mulching	Onion, carrots and tomato	All districts, rare
Inorganic fertilizer application	Tobacco and cotton	All districts, rare
Contour ploughing	Mainly along the swamps with horticultural crops	All districts, rare
Broadcasting	Sesame, sorghum, and millet	Kitgum and Adjumani
Row spacing	Maize and cassava	Adjumani
Application of herbicides	Horticultural crops	All districts
Manual weeding	All crops	All districts
Intercropping	- Maize/ groundnuts /cassava - Cassava/ finger millet	All districts, common
Chemical pest control	Maize, tobacco, cotton, and horticultural crops	All districts, rare
Drought-tolerant and early maturing varieties	Cassava and millet	All districts

3.6. Crop calendars and agronomic practices based on information from the farmers workshops

During the farmer workshops, participants were divided into small groups to develop cropping calendars for three of the most important crops. In Gulu, these groups were also gender disaggregated.

A summary of the observations made from the crop calendars in the four districts were:

1. The start of the farmers cropping seasons coincides with the start of the rainy season

in Gulu, Nwoya, and Adjumani. In Kitgum the start of the cropping season was given as February.

2. During the cropping season farmers spend most of their time in the fields for activities like ploughing, harrowing, and weeding. Land clearing and ploughing was mainly undertaken by men. Weeding and post-harvest handling (threshing, winnowing, and storage) was carried out by women. It is considered taboo for men and boys to enter the granary.
3. Beans, cassava, maize, and groundnuts were cultivated in both rainy seasons. Sesame was only cultivated in the second rainy season.
4. Generally across the districts, women participate less in marketing. Even for crops that they manage, such as sesame. Once the sesame is ready for marketing, men take control. Men also have control over production and marketing of crops perceived as lucrative. However, in Adjumani, women are in charge of decision-making concerning crop suitability and crop allocation.
5. There were gender differences in the perception of the most important crops. For example, the male group in Gulu selected cassava, groundnut, and sesame, all cash crops. The women group selected beans (a subsistence food crop), cassava, and sesame.
6. According to the farmer workshops, cassava was considered as enhancing household food security, because it can survive in poor soils and low rainfall. This could be the reason why women classified it as a very important crop. Pest control was only mentioned for rice, maize, and tobacco.

3.6.1. Gulu crop calendars for the three most important crops - prepared in the farmer workshops

The crop calendars in Gulu were prepared by women and men separately, which provided the following information:

A. Women's group - Gulu

The women group selected beans, cassava, and sesame as their three most important crops.

1. For beans, the land is cleared, ploughed, and harrowed in May by both men and women. The main equipment used is tractors, ox-ploughs, hoes, pangas, and axes. Planting is usually done in June. Main varieties are K1, K20, and K32. K1 has a small seed. K20 is long, red, spotted, and early maturing. K20 takes two months to mature and K32 takes three months. Weeding is usually done in August by women and girls using small hoes (Appendix D: Figure 39). Women and girls are also involved in harvesting of beans in October. The crop is dried in the fields. Between October and November, winnowing and threshing are carried out by women and girls and the grain is stored in the granaries. Marketing of beans is by both men and women in December. Decisions about the proportion to sell and that to use for ceremonies such as marriage and settling bride price are made by both men and women.

2. For cassava, land is cleared and ploughed in March by the family before planting in June. The women group indicated that cassava is weeded two times: in July and November. This is done by the whole family using hoes. Harvesting of cassava starts from January until March, and is done by women and girls.
   The average farm cultivated under cassava in Gulu is 3 to 5 acres per household with an average yield of 5 to 10 bags per acre. Marketing of cassava is carried out in April by women and girls.
3. Cropping activities for sesame begins in May with land clearing by both men and women using hoes, pangas, and axes. In June, the land is ploughed and harrowed by both men and women before sowing/broadcasting in July. Planting is during the dry season, farmers reported that sesame planted in August with the rains will not produce yields. Weeding is carried out only once, before flowering. This is between August and September. In November, the crop is harvested and stacked to dry. Threshing, storage, and marketing of sesame begin in January.

In Gulu ploughing is commonly done using hand hoes and oxen. Farmers who use ox-ploughing attributed it to increased household incomes.

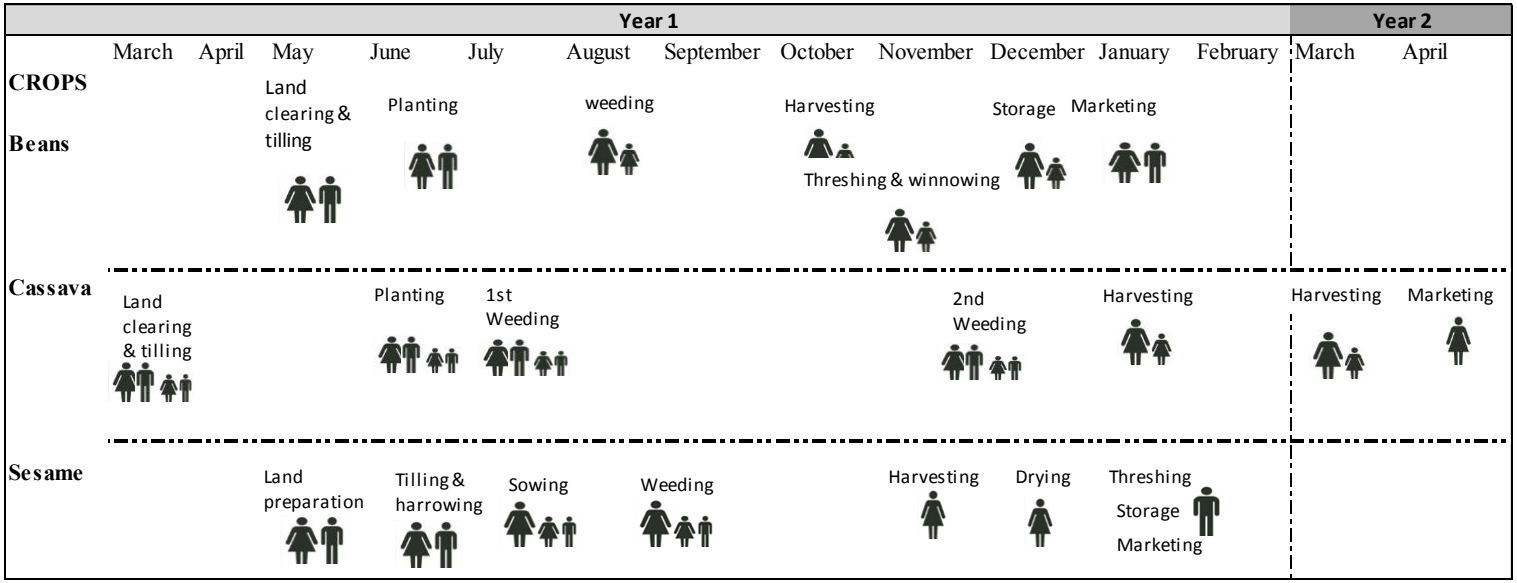

Figure 18: Crop management activities by month for beans, cassava, and sesame as detailed by the women's group in Gulu district. Symbols indicate who undertakes the activity.

B. Men's group - Gulu

The men's group in Gulu district selected groundnuts, cassava, and sesame.

1. Groundnuts are cultivated in both rainy seasons. In the first season, men and women both prepare the land in mid-March. . This is followed by planting in April by the whole family. In May, women and girls engage in weeding. Harvesting is at the end of July by women and children. Postharvest activities i.e., drying and storage are done by women in August. Marketing is carried out by the men.

   For the second season, land preparation is in August by men and women. In early September, the whole family engages in planting. Weeding is done by women and girls three weeks after planting. Harvesting is in December by women and children. Marketing activities take place in January by men.

   Common groundnut varieties in Gulu include Serenut 4 (improved) and Lajeba (local variety). Farmers reported that the second season gives better yields, typically between 12 to 13 bags compared 8 bags obtained in the first season.
2. The second most important crop selected was cassava. Similar to groundnuts, cassava is also cultivated in both rainy seasons. Land preparation begins in March followed by planting in April. Weeding is carried out three times; in July, September, and February. The whole family participates in all of the above activities. In March of the subsequent year, cassava is harvested by men and women. Women do the marketing.

   The second season starts in July with land preparation, followed by planting in August. The first, second, and third weeding are carried out in November, January, and May. Weeding is done by the whole family. Harvesting is done by men and women in June and July. Marketing is done by women and begins in May.

   The most common cassava varieties in Gulu include Akena (improved) and Okonyo ladak (local). The improved variety takes one year to mature while the local variety takes two years. The improved variety also yields higher, 6 to 12 tubers per plant compared to the local variety, which yields at most 4 tubers. Cassava planted in the second season, (which is harvested in the first season of the subsequent year) was reported to have higher yields.
3. Land preparation for sesame begins in May by both men and women. Between July and August, the whole family is involved in the planting. Weeding is in September and October, and is done by the women. Harvesting starts in November by the whole family. Men do the marketing from December.

   Sesame is planted once a year and takes three months to mature. Common varieties of sesame include Ladongo and Lazimo. While both are local varieties, the former is shorter, has a wider and yellow stem, and is greenish in colour. Lazimo is tall, has a small stem and is brown in colour. Both varieties have similar yields of about four bags per acre.

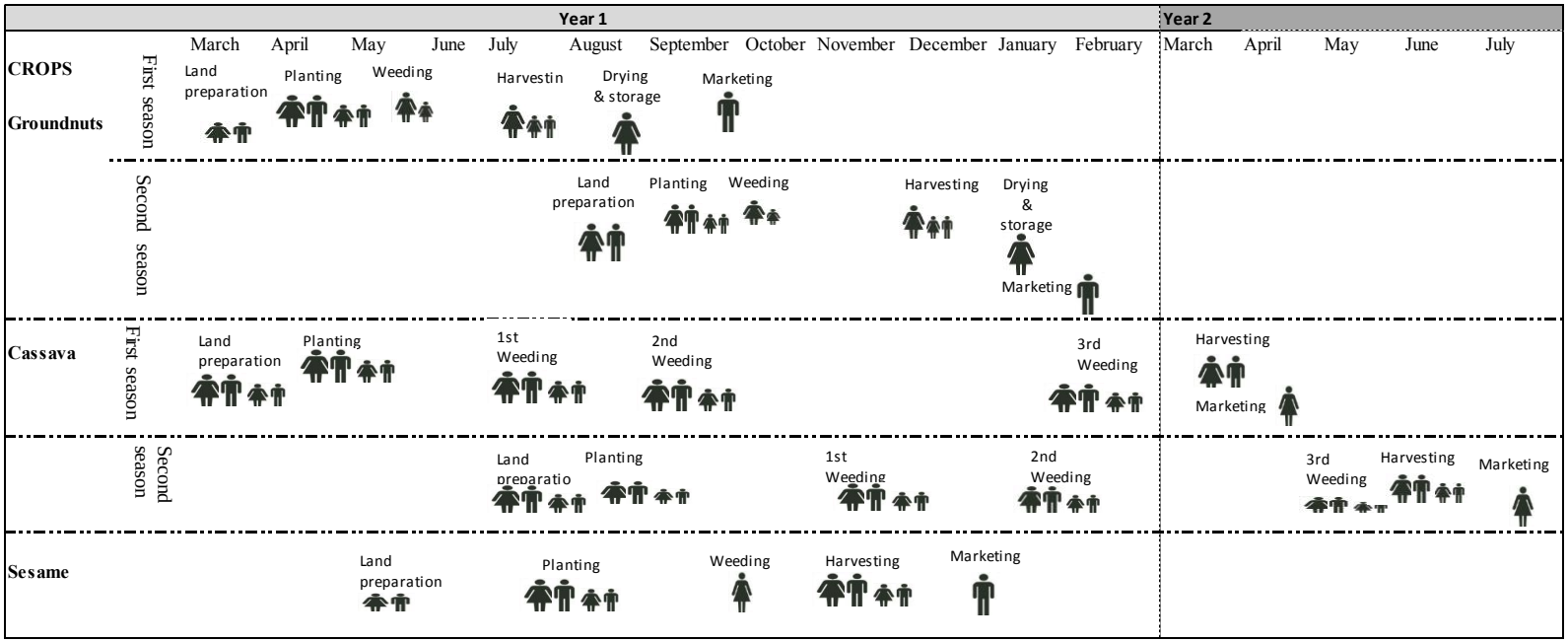

Figure 19: Crop management activities by month for groundnut, cassava, and sesame as detailed by the men's group in Gulu district. Symbols indicate who undertakes the activity.

3.6.2. Crop calendars prepared in Kitgum district farmer workshop

During the participatory workshop in Kitgum, farmers selected sesame and cassava as the two most important crops.

1. Land preparation for sesame takes place between May and June. Both men and women are involved. Planting is carried out by the whole family from July to August. Between September and October women and girls engage in weeding. Harvesting is from late November to December by the whole family. During December and January drying and threshing are carried out, this involves the whole family. Marketing takes place in February, and is carried out mainly by men.
   The main varieties grown are Ladongo, Larenge, Oturu tata, Lajimu, Guru, Sesame 1, and Sesame 2.
2. Cassava is cultivated as an annual crop. Clearing fields for cassava begins in February. This is done by both men and women. During the same month, farmers are also drying cassava from the previous harvest. In March, the land is ploughed followed by planting of the new crop in April. These activities are done by the whole family. The first weeding for cassava takes place in May, while the second weeding is in August. The first and second weeding for cassava are carried out by men and boys. The third weeding takes place in December. Unlike the first and second weeding, women participate in the third weeding. Drying of cassava from the previous harvest continues in June. Harvesting of the new cassava crop starts in January (nine months after planting). This is carried out by men, women, and children. The most common cassava varieties in Kitgum are NASE 13, NASE 14, Akena 29, Akena 61, TME 14, Okonyo-Ladak, Tarack, No.7, No.8, Tyenyo, and Bitter Kuli.

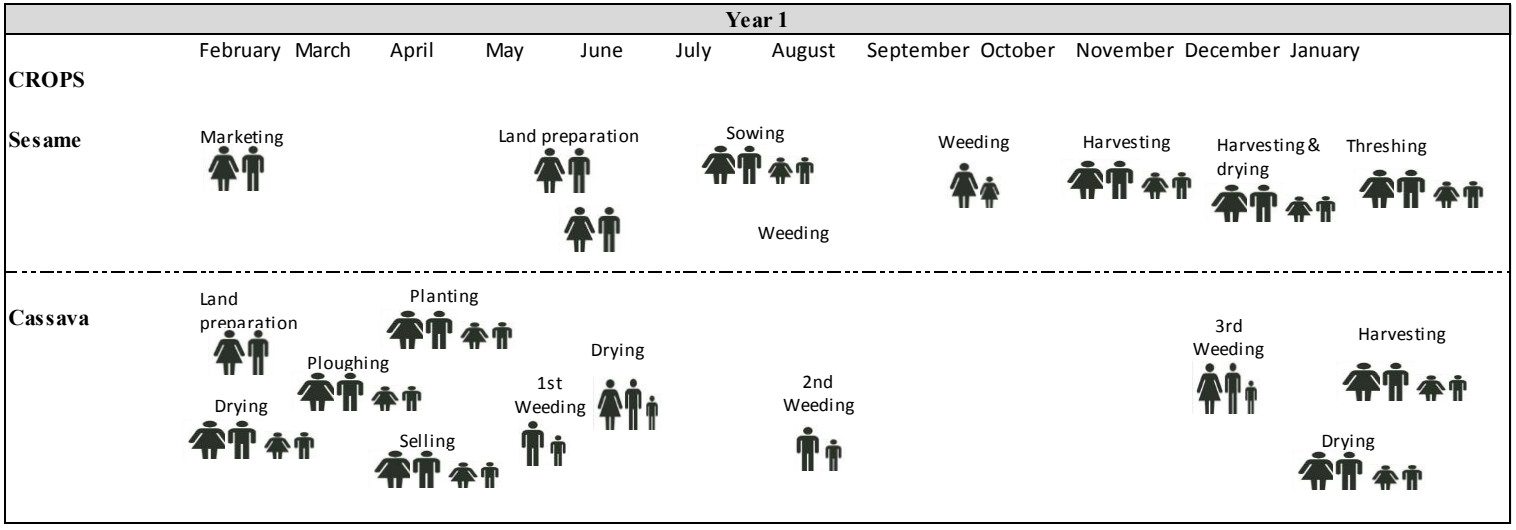

Figure 20: Crop management activities by month for sesame and cassava as detailed in Kitgum farmers' workshop. Symbols indicate who undertakes the activity.

3.6.3. Crop calendars prepared in Adjumani district farmers' workshop

In Adjumani, farmers selected maize, sesame, and rice as the three most important crops. Below is a detailed description of all the management activities for each crop.

1. Maize is grown in the two rainfall seasons. In the first season, land preparation is carried out by both men and women in March. Planting is undertaken by all members of the family in early April. . Two weeks after planting, the first weeding is done by men. The second weeding is in mid-May by the whole family. In late May, after the second weeding, men engage in pest control. Harvesting and drying take place in early July and the whole family is involved. In late August, men and women engage in threshing and storage. Marketing starts from late August and is done by Men.
   In the second season, ploughing begins in June followed by harrowing in early July. This is by the whole family. Planting is in mid-July, followed by the first weeding in late July and second weeding in the second week of August. Two weeks after the second weeding, in September, men engage in pest control. Harvesting is in October by the whole family followed by drying, threshing and storage in October.
2. Ploughing sesame fields is carried out by men between April and May followed by harrowing done by the whole family in June. In early July, the family engages in planting. Weeding is done twice. The first weeding is in early August while the second weeding is in late August. Weeding is by women and girls. From early November to December, both men and women engage in harvesting. This is followed by threshing, winnowing and storage which are done by women. Marketing of sesame takes place between February and March and is by men.
3. Land preparation for rice involves ploughing and harrowing. Ploughing takes place in March by men while harrowing is in late April by the whole family. In mid-May the whole family engages in planting of rice. The first weeding is in early June while the second weeding is in September. Weeding is by women and girls. In early October, the whole family engages in pest control, followed by harvesting which starts in late October. Threshing and storage is in late November by both men and women. Marketing of rice is by women in mid-December.

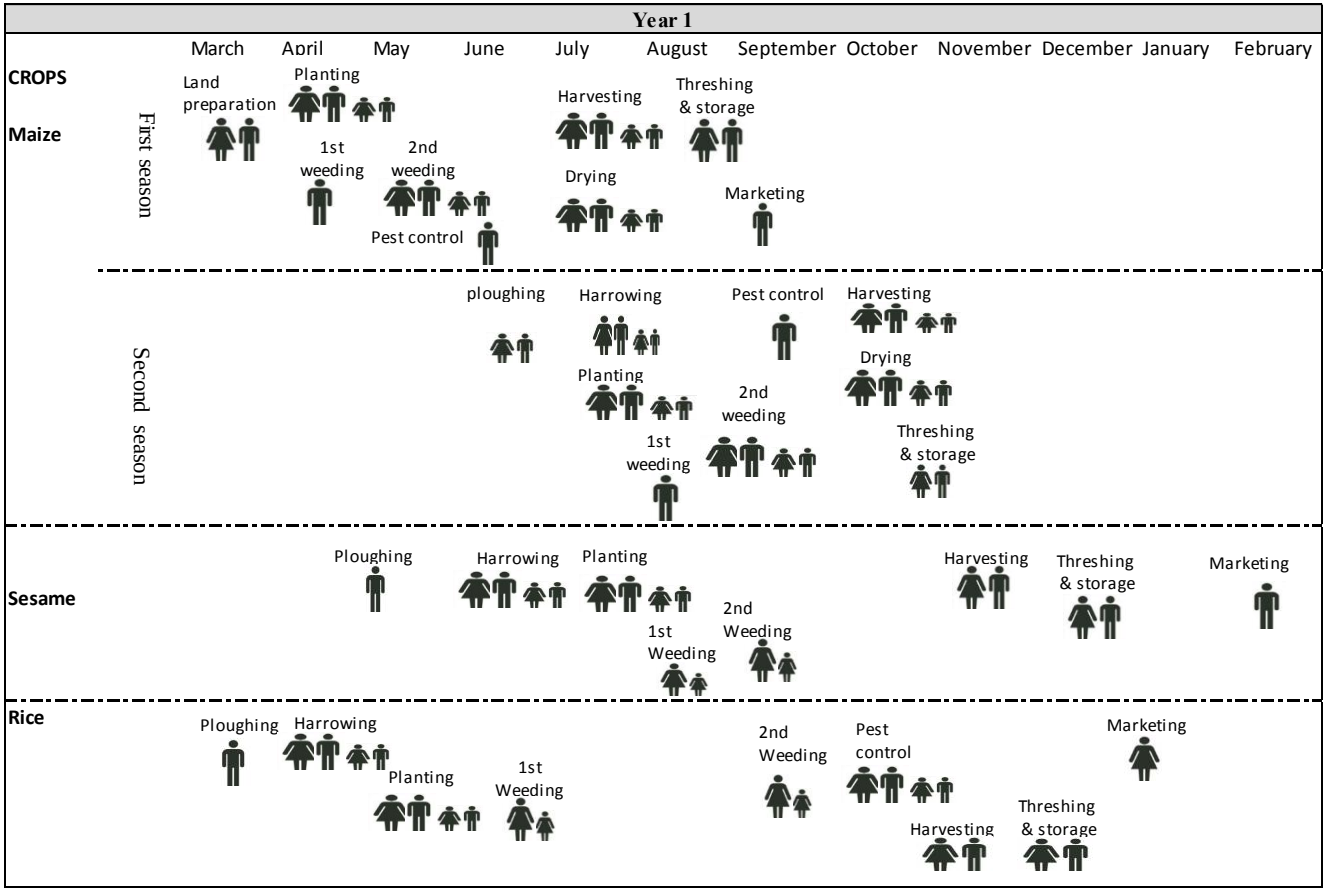

Figure 21: Crop management activities by month for maize, sesame, and rice as detailed in Adjumani farmers' workshop. Symbols indicate who undertakes the activity.

3.6.4. Crop calendars prepared in Nwoya district farmer workshop

Farmers in Nwoya selected rice, beans, and groundnuts as the most important crops.

1. For rice, between March and May, the land is prepared followed by planting in May to July. Both activities are undertaken by men and women. Weeding is carried out between July and August by women and girls. Women then engage in harvesting from September to December. Postharvest activities which involve drying, storage, and transportation take place from September to December. These are performed by both women and men. Marketing of rice is by men between September and March. The main varieties of rice include Supper, Sindani and Nerica. Supper and Sindani take four months to mature while Nerica takes three months. According to the farmers, Sindani yields higher and tastes better.
2. Land preparation for beans is in April, followed by planting in June, by both women and men. Weeding is in July and harvesting in September, both by women and girls. Drying, storage, and transportation take place between September and December and this is by women and girls. Marketing is in September and December by men.
   The most common varieties are K-20, K-132, and Agwete. The first two are improved varieties while the latter is a local variety. Typical yields are 400-600 kg per acre for the three varieties. The major challenges in bean production are lack of market, postharvest losses due to rotting, and poor spacing.
3. Preparation of land for groundnuts takes place between November and December. This is carried out by both women and men. The two are also involved in planting in March. The first weeding is in early April while the second weeding is in May. Harvesting takes place in July to August. Weeding and harvesting are carried out by women and girls. Both men and women are involved in drying and storage. Marketing of beans is by men between August and October. The common groundnuts varieties in Nwoya include Serenut 4 and Red beauty. Serenut 4 is disease-resistant and yields about 10 bags per acre. Yields obtained from the second season harvest are higher than those in the first.

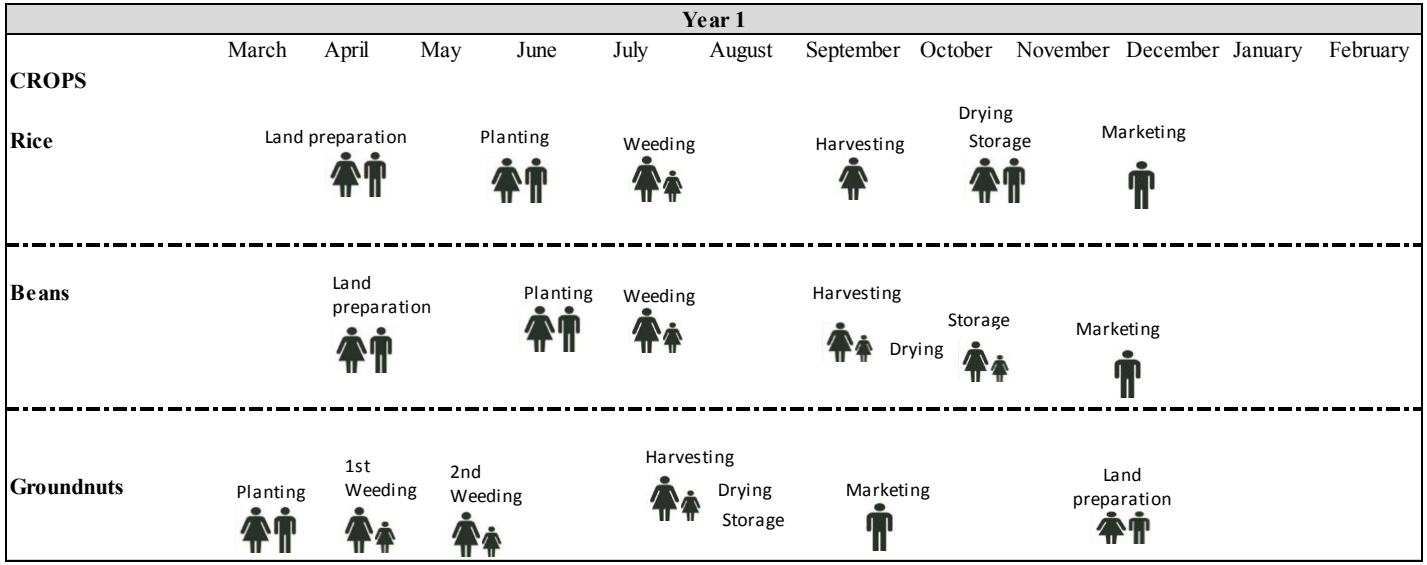

Figure 22: Crop management activities by month for rice, beans and groundnuts as detailed in Nwoya farmers' workshop. Symbols indicate who undertakes the activity.

3.7. Climate

The mean annual precipitation across Adjumani district is around 900 mm in the north and 1200 in the south. In Gulu, Kitgum and Nwoya districts the mean annual precipitation is about 1555, 1130 and 1500 mm, respectively (Figure 23). The mean annual temperature is approximately 23^0C in Gulu and Nwoya, and 24.6^0C in Kitgum. In Adjumani, the annual temperature ranges from 19°C to 36°C. Kitgum and Adjumani have higher temperatures and are drier than the other two districts. According to information from farmers' workshops, the Acholi sub-region and Adjumani is characterized by two rainy seasons with the main dry season lasting about three months from December to March.

Farmers described inter-annual variations in climate including, droughts, floods, variation in the timing of onsets and cessation, uncertain rainfall duration, and seasonal precipitation. More specifically, the onset is perceived to be later "now" than "in the past", the cessation is perceived to arrive earlier, with fewer rainy days and sometimes high-intensity rainfall.

According to the farmers workshops there is increased climate variability. It is the unpredictability in rainfall with respect to the start, cessation of the rains, number of rainy days and long dry spells, which causes problems for agriculture in the region. Farmers' perceptions on rainfall variability are consistent with key findings from studies in the region. An USAID 2013 study reported that the onset of rainy seasons can shift by 15 to 30 days (earlier or later), while the length of the rainy season can change by 20 to 40 days from year to year.

Farmers perceive the second rainy season to be more reliable than the first. Farmers in Nwoya stated that groundnut yields are higher in the second season as compared to the first. We obtained similar information in Gulu where farmers mentioned obtaining a 50% increase in groundnut yields in the second season. Farmers mentioned using indigenous knowledge to predict climate, for example by observing the cloud patterns, wind patterns, and animal behaviour (birds). Farmers mentioned receiving climate forecast information mainly through radio. However, the information is sometimes inaccurate. They expressed interest in obtaining more accurate and site- specific weather forecast information.

There was variation in the weather pattern information provided across the districts. For instance, in Kitgum, farmers reported that 2013 was the most recent year with heavy rainfall. While 2013 was described as a dry year in the other three districts. In addition, farmers described differences in crop vulnerability to heavy rainfall and prolonged drought. Heavy rainfall mainly affects tubers and legumes and is characterized by rotting of the crops. Groundnuts, carrots, and onions are more sensitive to prolonged dry spells. In agreement, the USAID 2013 study reported that cassava is least vulnerable to climate. Households reported, on average, being food insecure for almost three months

each year, from March to June.

Even at the same location, we noted differences in the information provided by different groups of farmers. For example, the male and female groups in Gulu gave different times for the onset and cessation of the rainy season (Figure 25 and 26). This emphasizes the need to collect accurate climate information, and dissemination of these information. In the next section, we present details on the climate calendars prepared by farmers in each district.

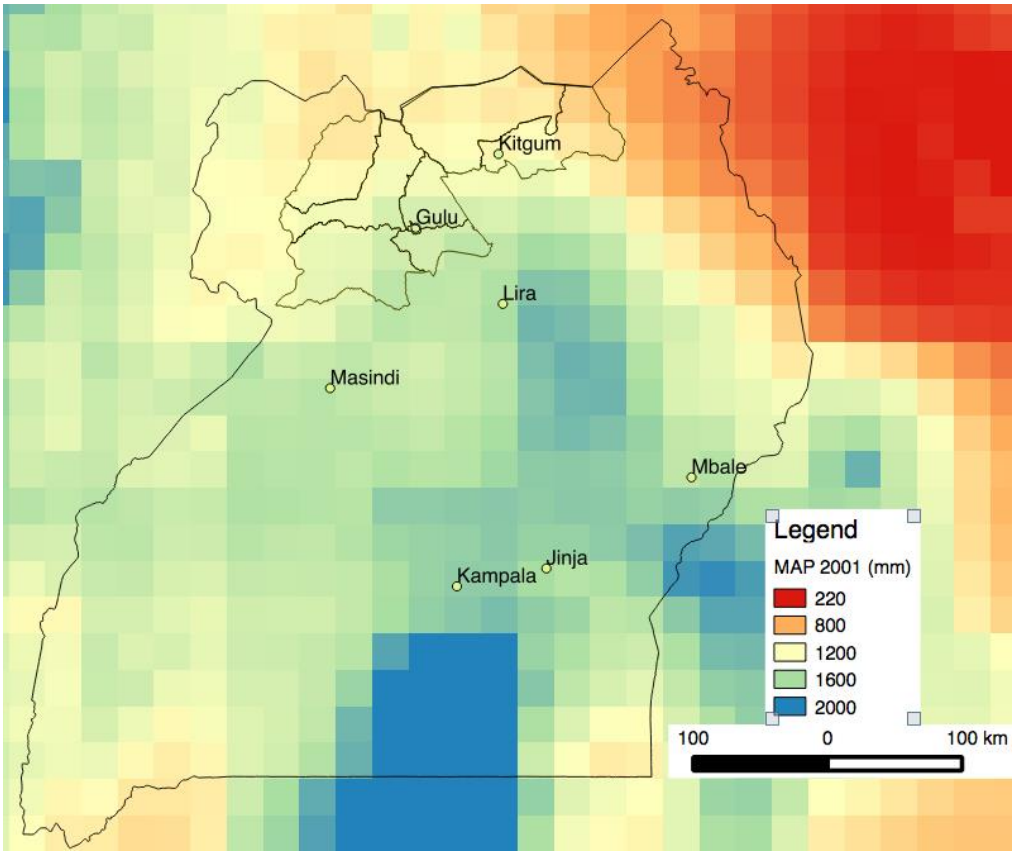

Figure 23: Mean Annual Precipitation (MAP) in mm across Uganda using TRMM data for 2001.

3.7.1. Climate calendar prepared at the farmer workshop in Kitgum district

Farmers in Kitgum stated that a normal year is characterized by two seasons. The first rains are from mid-March to the end of May. The second rainy season runs from July to mid-November. There are two dry seasons. A short dry season in June, and a longer dry season from mid-November to mid-March (Figure 24). The most recent wet year was reported as 2013. In this year, the rainy season was longer, from early July to mid-December. It was characterized by floods and rotting of crops especially legumes. Heavy rains coupled with hailstones also destroyed crops. The rains affected drying of the crops, resulting in post-harvest losses. The first season was also shorter than expected, lasting from end of February to end of April. The conditions in the wet year had negative effects to household food security.

The most recent dry year was reported as 2011. This dry year had a late onset in the first season, from mid-March. This resulted in a shorter growing season, contributing to crop failure. In addition, the shorter dry season, which normally occurs in June was prolonged, running from June to mid-August. The second rainy season was also shorter, from mid-August to early November. It was characterized by very windy conditions.

Farmers in Kitgum indicated that they are currently observing changes in their cropping seasons. For example, the first rains, which normally commence in March, are now occurring later affecting the planting times. There is also an increase in dry spells within the rainfall season. Coping strategies in the dry year include, the introduction of short-cycle varieties such as cassava and reliance on food reserves by the households.

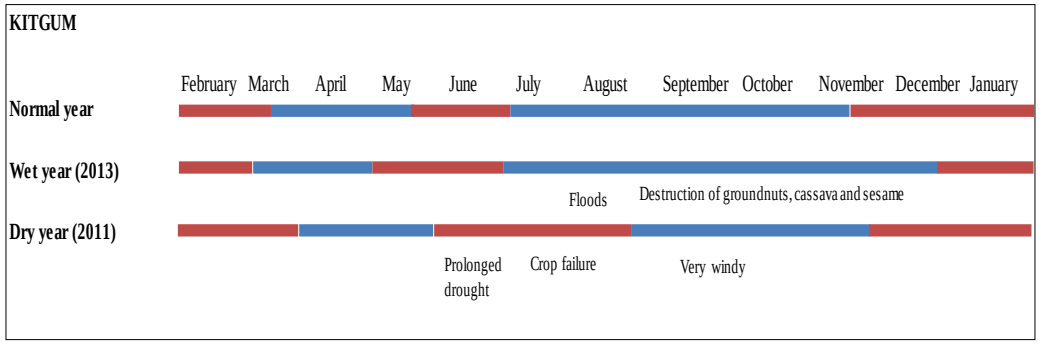

Figure 24: Climate calendar for a normal, wet (2013) and dry year (2011) prepared by the farmers group in Kitgum.

3.7.2. Climate calendar prepared by the men's group at the farmer workshop in Gulu district

In a normal year, the first wet season runs from early-April to end of June. The second wet season runs from the end of July to mid-December. Within the second season, there is a dry spell in October (Figure 25). The last wet year was 2008. In this year, both seasons were longer, March to mid-July and mid-August to mid-December. Both seasons were characterized by flooding, lightning, and destruction of crops, mainly for tubers and legumes. The last dry year was 2013. Both seasons were shorter than normal. The prolonged drought resulted in crop failure. The main crops affected were groundnuts, onion, and carrot.

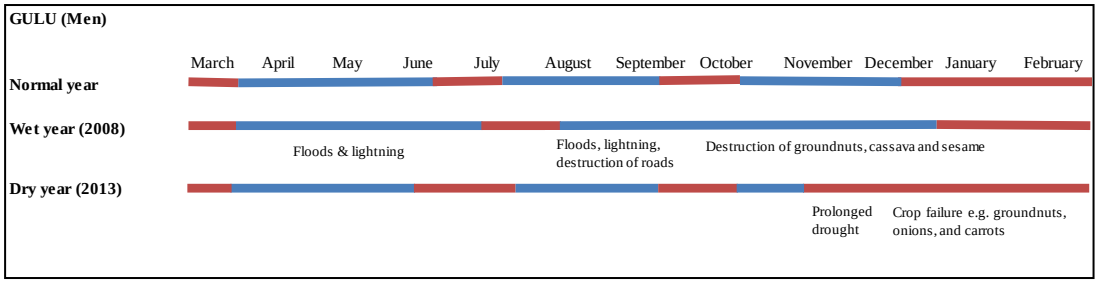

Figure 25: Climate calendar for a normal, wet (2008) and dry year (2013) prepared by the men's group in Gulu.

3.7.3. Climate calendar prepared by the women's group at the farmer workshop in Gulu district

Similar to the men's group, the dry year was given as 2013 and the wet year as 2008 (Figure 26). However, there were differences between the two genders on the timing of the onset and end of the seasons. According to the women, in a normal year, the first season is from early March to end of June. The second season runs from early August to the end of November. The women reported a much shorter first season for the dry year (2013), only lasting two weeks in April. They said that this resulted in total crop failure, leading to food shortage in majority of the households. For the wet year, the first season did not deviate from the normal pattern. However, the second season was longer, with rainfall from August to February. This resulted in destruction of mature grains in the fields.

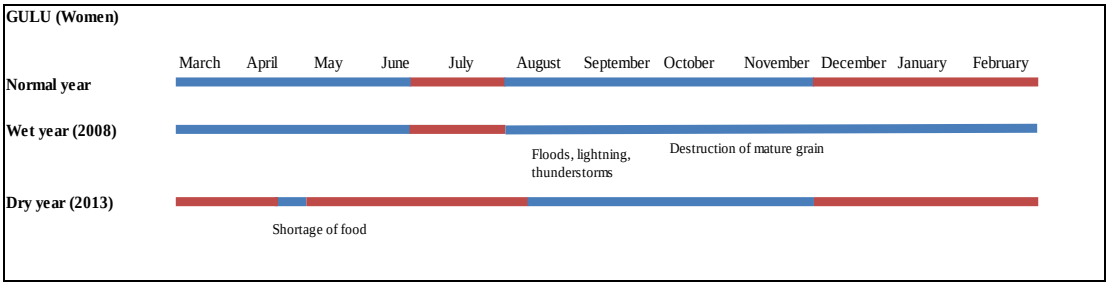

Figure 26: Climate calendar for a normal, wet (2008) and dry year (2013) prepared by the women's group in Gulu.

3.7.4. Climate calendar prepared at the farmer workshop in Nwoya district

According to farmers in Nwoya, the first rainy season is from April to August. During this season there is a dry spell in July. The second rainy season is from end of September to end of November. 2007 was the most recent wet year. In this year, rainfall was experienced from April to early December. Problems encountered were: increased episodes of lightning, rotting of crops, washing away of bridges, famine due to low food supplies, and water borne diseases like cholera. However, there was an increased yield for rice. In the dry year, the first season was from mid-March to early-May and the second season from mid-August to early-December. Both seasons were shorter than normal (Figure 27).

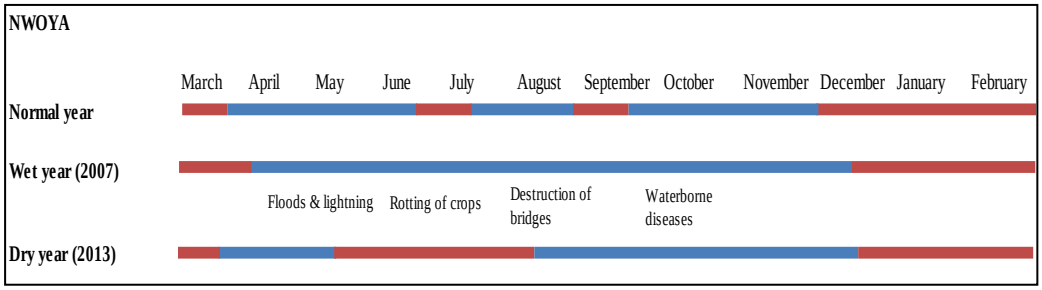

Figure 27: Climate calendar for a normal, wet (2007) and dry year (2013) prepared by the farmer group in Nwoya.

3.7.5. Climate calendar prepared at the farmer workshop in Adjumani district

The year 2012 was reported as very wet. Rainfall started in mid-January to mid-February followed by a short dry period from mid-February to early April. The second rains started in early April and continued to early August (Figure 28). Severe lightning was experienced in October and several people lost their lives. There were also floods from late April to August and from October to December. This caused major damage to crops, poor growth as a result of water logging and rotting of tubers. The most affected crops were sesame, cassava and groundnuts. Rice was, however, least affected because it tolerated the water logging. Farmers responded by introducing drainage channels and growing early maturing vegetables crops. The most affected were the poor farmers who did not have diversified livelihoods. This resulted in theft.

The most recent dry year was given as 1997. There was a prolonged dry spell between January and July and another from early October to mid-November. This caused famine leading to loss of life and livestock losses due to lack of pasture. Farmers coped by eating wild plants and fruits such as seeds of water lilies which could be found along river banks, hunting wild animals, buying food from the refugees, food aid, exchanging livestock for food, and disposing of livestock.

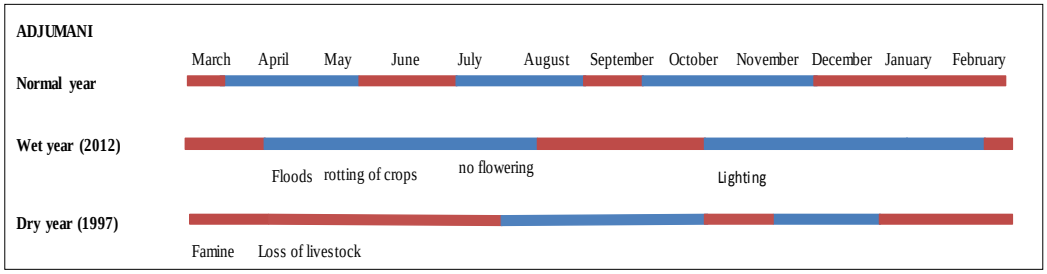

Figure 28: Climate calendar for a normal, wet (2007) and dry year (2013) prepared by the farmer group in Adjumani.

3.8. Institution mapping and Network analysis using Venn diagrams

Several types of institutions and organizations have activities across the Acholi sub-region and Adjumani. Table 7 highlights the services provided by the organizations. The institutional mapping exercise revealed linkages between organizations operating in the region (Figures 29-33). Kitgum had the highest number organizations (38), followed by Nwoya (31), then Gulu (21), and finally Adjumani (19). In Nwoya, there was a closer network between the organizations (Figure 33).

Farmers reported that most organizations work with all members of the community. However, some organizations have specific programmes targeted towards the youth, women, widows, and/or orphans. Farmers' ranking revealed that organizations considered important (denoted by blue circles) were involved in providing information, inputs, and infrastructure development. Across the four districts farmers reported that agricultural extension services were inadequate.

Table 7: Institutions perceived by farmers as the most important for obtaining different services.

Agriculture	**Information**	**Finance**
NAADS	NAADS	Commercial banks
NUSAF	Radio stations	Village saving and loans associations
District farmers associations such as KIDFA and GDFA	Newspapers	
FAO (runs farmer field schools)	Farmer groups	
	Farmer field schools	

3.8.1. Institution mapping by the men's group in Gulu district

The Gulu men's group selected NAADS, FAO, CARE, Mega FM, GDFA, ACTED, and USAID as their most important organizations (Figure 29). Gulu District Farmers' Association (GDFA) works closely with other organizations such as NAADS. The association receives funds and inputs, e.g., seed to distribute to its members. Mega FM radio station creates awareness among farmers on new varieties and farming methods. It is a key source of information related to agriculture, and advocates for attitude change promoting farming as a key source of livelihood. Some of the activities undertaken by ACTED are improving of rural access roads, construction of markets, and sensitizing farmers on village savings.

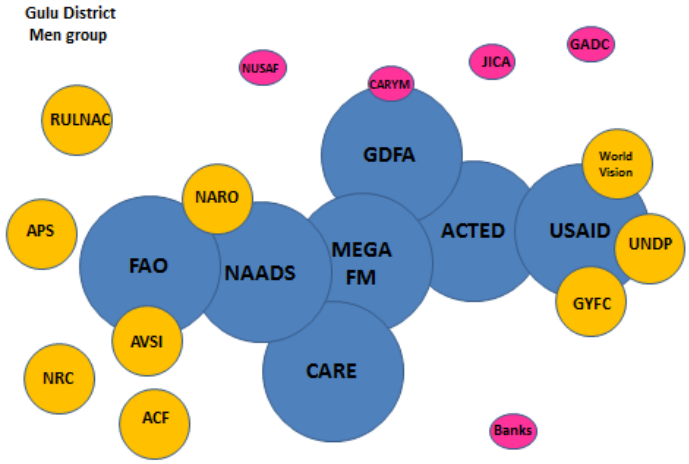

Figure 29: Institution mapping and linkages between organizations as detailed by men farmers in Gulu district. Blue circles denote those ranked as of high importance, yellow circles of medium importance, and pink circles of low importance.

3.8.2. Institution mapping by the women's group in Gulu district

The women's group ranked ten organizations as important: ALREP, NAADS, World vision, CRS, HEIFER International, DVO, NUSAF, VSLA, CARE and FAO (Figure 30). Heifer International gave dairy heifers and provided seeds for calliandra and lablab fodder trees. World vision and NUSAF are also involved in giving cattle and goats. CARE supports the village saving and loans associations. The associations were supplied with credit books and facilitators to train them on village savings.

In Gulu, both the women and men's groups ranked NAADS, CARE and FAO as important organizations (Figure 29 and 30). NAADS provides extension services and farm inputs such as seed and fertilizer. NAADS also gave chicken, goats, and cattle to farmers. The goat programme involved giving and improved breed, Toggenburg.

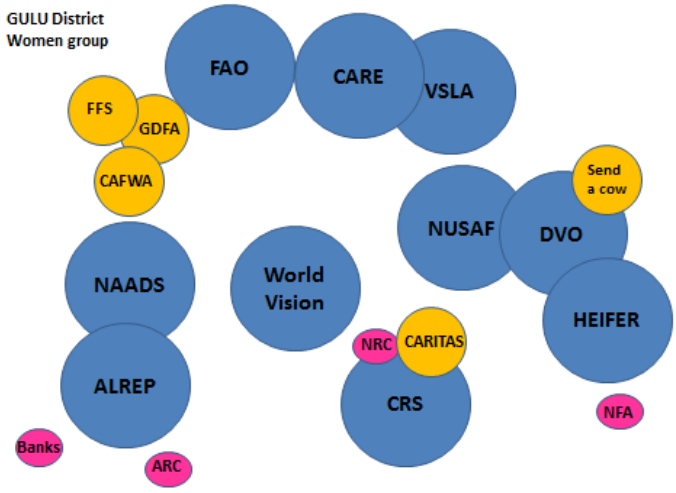

Figure 30: Institution mapping and linkages between organizations as detailed by women farmers in Gulu district. Blue circles denote those ranked as of high importance, yellow circles of medium importance, and pink circles of low importance.

3.8.3. Institution mapping by the farmers in Kitgum district

The most important organizations in Kitgum ranked by farmers were: NAADS, EACU, LWF, commercial banks, KIDFA, Meeting Point, NUSAF, NARO, and Mercy Corps (Figure 31). NAADS provides seeds and extension services. Commercial banks provide loans to individuals and to farmer groups. NUSAF has been involved in the development of rural roads. There were a greater number of organizations, a total of 38, mentioned in Kitgum in comparison to the other districts.

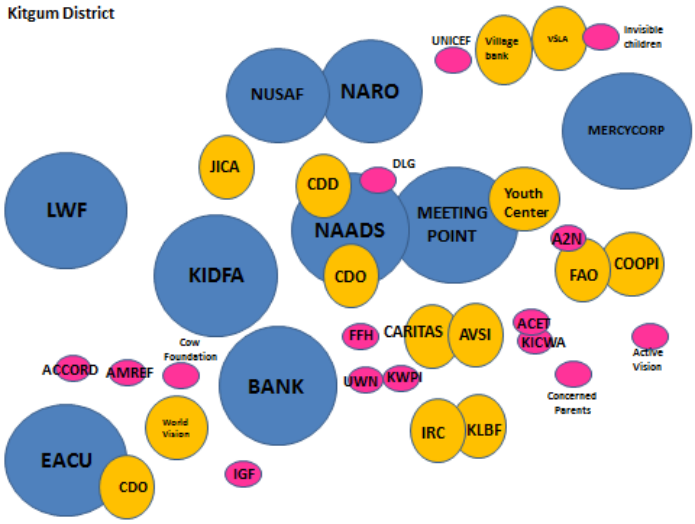

Figure 31: Institution mapping and linkages between organizations as detailed by farmers in Kitgum district. Blue circles denote those ranked as of high importance, yellow circles of medium importance, and pink circles of low importance.

3.8.4. Institution mapping by the farmers in Adjumani district

Key organizations reported for Adjumani were: NUSAF, NAADS, FAO, and MAAIF (Figure 32). NUSAF and NAADS provide extension services through community-based organizations. FAO has a farmer field school (FFS), which offers information on agronomic practices for crops such as cassava and beans.

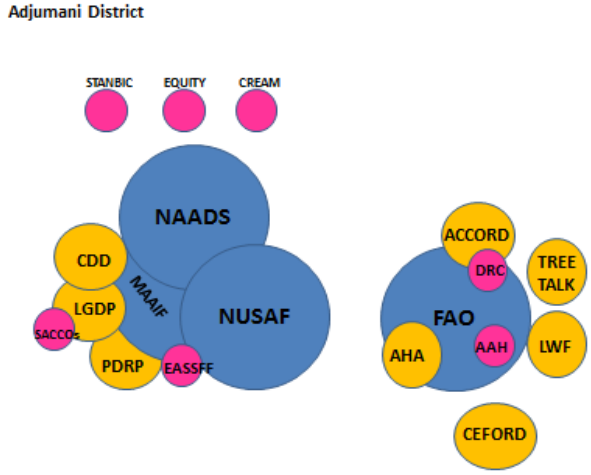

Figure 32: Institution mapping and linkages between organizations as detailed by farmers in Adjumani district. Blue circles denote those ranked as of high importance, yellow circles of medium importance, and pink circles of low importance.

3.8.5. Institution mapping by the farmers in Nwoya district

In Nwoya there were seven important organizations as ranked by farmers: NUSAF, PRDP, ZOA, NAADS, Radio Mega, ALRPI, and NUDIEL (Figure 33). ALRPI supplies farmers with seed for new varieties. Mega FM radio station is a source of agriculture-related information. NAADS was described as the best supplier of inputs and a provider of extension services. NAADS has a program where it gives grants for the purchase of seed by poor farmers. ZOA works closely with NAADS in supplying market information via the short message service (sms).

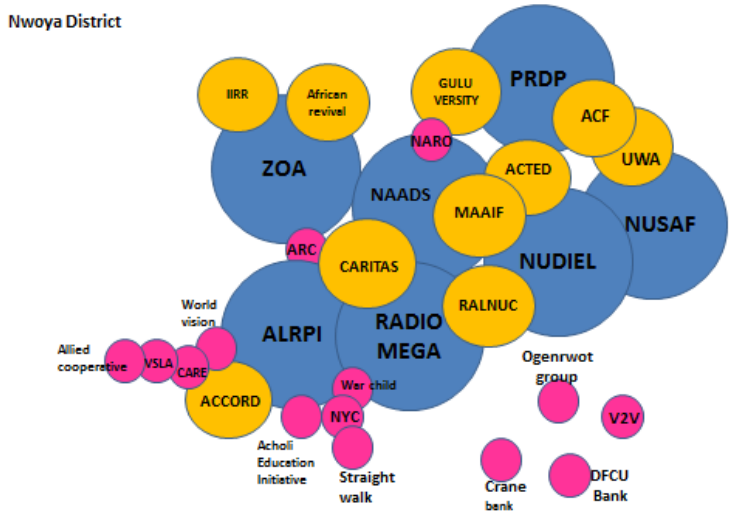

Figure 33: Institution mapping and linkages between organizations as detailed by farmers in Nwoya district. Blue circles denote those ranked as of high importance, yellow circles of medium importance, and pink circles of low importance.

3.9. Households resource mapping

The resource mapping was carried out with household members in 10 villages across the four districts. We present below the information obtained from each household.

3.9.1. Gulu district

Box 1: Farmer Unyama village, Gulu

He is in a monogamous relationship. 8 adults and 10 children, two in secondary school and the rest in primary school. 5 grass thatched huts, 1 chicken house, and 1 goat pen. The home farm is less than 1 acre. A second farm of 8 acres is about 1Km away. Land is owned communally by the clan. Man and wife are members of the CARYM (Catholic Agricultural Rural Youth Movement) farmers group.

Borehole 200m away and a protected well 150 m away. School for the children, 30 min walk. A health centre, 2 hours walk. Gulu town, 10 km away. He also keeps 3 pigs. Has a plan to start rearing cattle. He has 15 goats and 30 chickens. Major livelihood sources are agriculture and brick making. Man also carries out retail trade selling cooking oil, small fish (mukene) and onions.

Crops cultivated are cassava, groundnuts, beans, sorghum, sweet potato, maize, sesame, mangoes, vegetable, lemons, jackfruits, finger millet and pigeon pea. Most are local varieties with few improved varieties which were mainly supplied by NGOs. Improved varieties are common for cassava (Akena, MH97, TME14) and maize (longe 5, longe 7 etc.). White sorghum and red sorghum varieties. Local cassava variety, okonyoladak. Fruit trees: Mango, jack fruit, lemon. Local tree species grown near the homes to act as local herbs (Oduku, neem).

Sells agriculture produce at unyama market, 5 km away. Beans yields are 7-10 bags of 100 kgs per acre.

Uses hand hoes and sometimes hires an ox-plough.

Challenges: Unfavourable weather affecting yields. The last year with good yields was 2008.

Main expenditure at the household is paying school fees, purchasing food, health care and clothing.

The soil is relatively fertile and farmers do not apply any fertilizer. Predominantly loam and sand soils.

Farming practices:

Consist of mixed cropping, fallowing, crop rotation, intercropping and mono cropping (cotton). Mulching for vegetables grown by the swamp.

Main sources of livelihood ranked by importance:

1. Farming
2. Retail trading: buys cooking oil, fish (mukene) and onion from the nearby market and sells in the village.
3. Village saving and loan association
4. Charcoal burning
5. Brick making

Challenges

1. Poor road network. He currently carries produce on the head.
2. Main crop disease is cassava mosaic.
3. Pests include potato weevil; glow worms for beans; monkeys for maize; birds for sorghum, rice and finger millet; storage pests such as weevils and rats.
4. Lack of tools to facilitate opening up of new lands.
5. Unreliable market information.
6. The market to buy farm inputs or sell produce is far.
7. The weather has been changing with most of the months being dry leading to drought stress. Heavy rains falling in a short period leading to flooding of the fields.
8. Livestock disease whose symptoms include diarrhoea and a standing hair coat in goats leading to death. A post mortem reveals burst bile. High incidence of African swine fever in pigs which leads to up to 100% mortality rate. Tick infestation in animals and humans. New castle, coccidiosis, flu and fowl pox in poultry.
9. Veterinary services are expensive and inadequate. Only dogs are vaccinated without charge.
10. The huts can catch wild fire or be set ablaze.

Box 2: Farmer Oding village, Gulu district

Member of Genrwot farmers group.

5 grass thatched huts. 5 children, 2 adults. 10 acres of land. Land ownership is customary. Home is 12 km from Gulu town. 30 min walk to the nearest primary school, 5 min walk to the borehole. Takes about 30 min to go to the hunt around the village. Homestead surrounded by eucalyptus, jack fruit, lemon, orange and mango trees. Has 25 chickens and 4 goats. He has a 0.5 acre garden by the swamp where he plants vegetables such as okra, tomatoes and greens. This is 5 min away from the homestead.

Takes about 30 minutes to get to the farm where he plants beans, sorghum and pigeon peas. This provides them with food for 4 months food supply. The cassava and sweet potato garden is 30 min walk. Cassava provides food for 6 months. Maize harvest is consumed in 4 months. He has local herbs planted around the homestead, which provide medicine. The local market is 30 min walk.

Main source of livelihood is agriculture. Beans are his main source of income. Expenditure: school fees, health care, purchasing food, dowry, and clothing. The soil is fertile but he lacks agricultural labour to increase the area under cultivation.

Main challenges:

1. Poor road network
2. Poor prices in the market.
3. Plant diseases - Cassava mosaic. Lack of clean planting material among neighbours and fungal infection of cassava, tomato bacterial wilt.
4. Climate variability, for example low rainfall in 2013, harvested less than 50% of the normal yields. In some seasons heavy rains leads to water logging.

5. Pests- potato weevil, glow worm in beans
6. Monkeys, bush fowls, wild rats, rats, birds
7. Livestock diseases - goat disease between September and December 2013. Symptoms were pot belly and diarrhoea. Led to death. Animals supplied by NAADS mostly died. New castle, coccidiosis, flu and fowl pox in poultry.
8. Veterinary services are expensive.

Practices: crop rotation, leaving the land fallow, farrows to carry water, mulching in tomato.

3.9.2. Nwoya district

Box 3: Farmer Purongo Omiro West village, Nwoya

It is a household of a husband, wife and 8 children. They cultivate 10 acres, loam soil texture. Homestead is on 1 acre with 7 grass thatched huts. They own 30 goats – 29 local breed and 1 Toggenburg, 20 local chickens, 3 large white breed pigs. Fruit trees are 3 mangos and 3 oranges. Has ¼ acre shrub plot for rearing goats and as a source of firewood.

Purchases vegetable seed at agro-dealer shop 5 km away. Protected well 200m away and underground borehole 100m. Local market is 1.5 km, health centre 2km, grazing land 5km and rice field 7km.

Cultivate rice (2 acres), sesame (2 acres), cassava (2 acres), maize (2 acres), groundnuts (1 acre) and horticultural crops (1 acre) - onions, tomatoes, carrots and amaranth. Horticultural plot and fish pond along the swamp. Cassava NASE 12 and NASE 14 varieties.

- Cassava yields about 3000 basins[3] per acre. Each row[2] of cassava sold at UGX 15000.

The man is a teacher at Purongo primary school, located 200 metres away earning UGX 300,000 per month.

Main livelihood source is agriculture, followed by teaching. Brick making to supplement income.

Expenditure: Ox-ploughing at 4000 per katala[1.]

Swamp soil is too compacted (clay and loam) for ox-ploughing, uses hoes instead. Has constructed a drainage channel of 2 metres width around the horticultural plot. Practices crop rotation. Manages crop- livestock conflict by leaving the cassava plot unweeded after 5 months from planting date to distract goats from destroying the cassava and feeding on the weeds. Mulching for onion in the seedbed.

Main challenges:

1. Weeds – star grass, Obiya (spear grass), lutoto (couch grass)
2. Inadequate capital for ploughing
3. Livestock diseases: coccidiosis, African swine fever.
4. Lack of veterinary services
5. Inadequate storage facilities for rice

6. Stray elephants
7. Unavailability of hired labour
8. Low productivity
9. Variation in rainfall onset dates
10. Poor quality seed
11. Theft of rice and ease of grass thatched granary catching fire, therefore rents storage away from home.
12. Bush fires

[1] 1.5m by 80m
[2] Row of cassava is 20 stems. 100 rows per acre.
[3] 20 litres capacity

Box 4: Farmer Layaji village, Nwoya

Owns 1112 hectares. He has 8 children. Has 20 pigs (large white and landrace breed), 5 cattle, 5 goats, 3 rabbits, 30 chicken. Soil is clay and sandy loam. At the swamp the soil is loam. Mango orchard (2 acres both local and improved), oranges (4acres), beans (1 acre), cassava (0.5 acres, sesame (3 acres), 2.5 acres on eucalyptus, rice (2 acres), was all destroyed by elephants, vegetables(1/4 acre for home consumption). Borehole is 3km away.

Equipment: 1 tractor, 7 hand hoes, 2 drums for water storage, 1 harrow, 1trailer.

- Harvested 32 crates of mangoes and sold at UGX 400,000.
- Sold cassava in the garden at UGX 1,000000 from 0.5 acre.

Major livelihood activities are farming, rearing pigs and tractor repair.

Expenses: 4 children in secondary each UGX 500,000 per year. 4 primary school children, each UGX 30,000 per term.

Soil management practices are slash-and-burn, crop rotation, controlled ploughing.

Challenges:

1. Weeds: star grass, spear grass, couch grass
2. Rampant damage of crops by elephants
3. Climate variability – prolonged dry season
4. Water for irrigation is not available
5. Livestock diseases: coccidiosis, African swine fever
6. Poor transportation and theft
7. Storage in grass thatched huts which catch fire easily
8. Lack of adequate capital to expand his farming activities
9. Lack of veterinary services

3.9.3. Adjumani district

Box 5: Farmer Openzinzi central village, Adjumani District

One man, 1 wife and 7 children. The household has three huts: a store, main house, and a kitchen. The farmer has 33 goats that are tethered during the rainy season and allowed to graze freely in the dry season. In addition, the he has three pairs of oxen, 29 local chickens, and 67 cattle. The crops grown include maize, sesame, green grams, paddy rice, yams and beans. The farmer mainly practices mono cropping. The total farm size is 55 acres: 35 acres is cultivated while 20 acres is left fallow. His fallow period is about 3 years. Land is measured in acres with the use of a yard stick called "tali" which is approximately 8.5 feet. Hence an acre is 12X50 tali Hired labour is usually paid 1X10 tali for UGX 1000, mainly for ploughing and weeding. Around where the farmer lives is a primary school, prison farm and health center. He sells his produce mostly to the local market in Adjumani, and to middlemen who buy from him and sell in South Sudan.

He sold one tipper lorry of cassava for 1.8 million shillings. A 100 kg bag of maize for UGX 150,000 shillings. Yams 7,000,000. The farmer has a store in Adjumani town for his produce which makes it easier for him to access markets.

Crop yields:

- Sesame: 27 bag from 16 acres
- Beans: 3 bags from 1 acre
- Green grams: 20 bag in 10 acres
- Maize: 87 bags from 8 acres
- Rice: Suparica variety, 34 bags in 16 acres

Agronomic practices:

- Row planting Crop spacing: sesame (25X10cm), maize (75X60cm), groundnuts (45X10cm) and rice (30X10cm).
- Mono cropping
- Crop rotation
- Slash-and-burn
- Use of herbicides to control weeds such as spear grass

Soil types: clay loam which according to him has high organic matter content

Challenges faced in farming:

1. Weeds e.g., striga
2. Lack of fertilizers in the market especially nitrogenous fertilizers
3. Price fluctuation
4. Shortage of labour
5. Lack of value addition
6. No mechanization
7. Lack of storage facilities

Box 6: Farmer Itowasi west village, Adjumani

The household size is 10. The farmer has three small huts. He has 20 chickens. In addition, the farmer keeps 10 goats that are tethered, 5 sheep, and 10 cattle. The main crop fields are at the bottom of the hill, about 30 minute walk from the homestead. The farmer also grows crops around the homestead. Total cultivated farm size is about 8 acres. 50 acres is fallow. Land is measured using "tali" i.e. 40X50 tali which is equal to 2 acres. According to the farmer 6.5 feet equals 2 meters. Main source of water is borehole which is about half kilometer away from homestead i.e. 10 minute walk. Nearest market is Arinyapi, about one hour walk from the homestead. There is also another new market Nyumaji about 40 minute walk from the home.

Crops grown include: sesame, sorghum, and yams (1 acres), cassava (7 acres)

Yields:

Cassava yield is about 50 bags[1] per acre. Dried cassava is sold in basins[2] at 10,000 shillings and a bag is sold at 50,000 shillings. Cassava cuttings are also sold at 20,000 shillings per bag.

Yields:

- Yams yield is about 10 bags per acre.
- Sorghum is about 3 bags per acre.

Management practices:

- Mono cropping for cassava and maize
- Row planting especially for maize and cassava
- Broadcasting for sesame, sorghum, and finger millet.
- The farmer perceives the soils to be fertile hence no fertilizer use. There is soil erosion and flooding for the field at the hill slopes. The farmer intervenes by digging drainage channels and water ways, stone lining.
- Water harvesting; farmer has dug a pan to collect rain water. The water is used to irrigate vegetables.
- Growing of drought-tolerant crops such as cassava and millet, seed is mostly obtained from NAADS.

Farmer uses seeds saved from previous harvests for other crops.

Other sources of income

- Quarrying near the hill
- Sand mining
- Brick making
- Charcoal burning; this activity is resulting to deforestation

Challenges faced in farming:

1. Destruction of crops by elephants from Nimule National park.
2. Shortage of labour; even when there is money to hire labour, labour is unavailable. The cost of hiring labour is 1,500 shillings for 1 tali by 30 tali. Ox-plough is about 80,000 – 100,000 shillings per acre.
3. Pests and diseases especially termites and grasshoppers
4. Shortage of water

[1] 100 kg bag; [2] 20 litres capacity

Box 7: Farmer Gbayi village, Adjumani

Household has husband, 1 wife, 1 child. He also has 5 dependents (1 sister and her 4 children). Man is also a primary school teacher. Land is 30 acres. Buys seed from Adjumani 15 km away. Borehole 3km, Health centre 30 minute walk, stream 2 km away. 2 pairs of oxen, 10 goats.

5 acre rice field, Nerica 4 variety. 2 acres on banana, 13 acres of cassava. 2 acres of groundnut.

Yields:

- 130 bags of cassava from 15 acres
- 20 bags of maize from 6 acres
- 4 bags of groundnuts from 2 acres
- 12 bags of beans from 3 acres.

Expenses: 100,000 for ploughing using tractor per acre, 55000 per acre for weeding, 70,000 per acre to weed in rice field. Soil fertility is good.

Crop management practices:

- Fallowing – 4 year fallow and cultivates it for 3 years.
- Crop rotation such as rice will be followed with beans.

Tethers goats during the cropping season and leaves to graze on crop residue after harvest.

Purchases improved seed for beans (K132), maize (Longe 5) and rice (Nerica 4) from Adjumani. Seed renewal: rice 8 seasons, maize 4years, beans 6 years.

Challenges:

1. Burning of his fields by hunters
2. Stray goats and cattle
3. Poor market prices. At times travels to Gulu (5 hours by bus), to sell produce
4. Lack of value addition
5. High processing fee
6. Monkeys
7. Unavailability of labor at weeding and for opening up land
8. Weevils and rats
9. Black quarter disease in cattle
10. Prolonged drought such as in 2011
11. Weeds-black jack, spear grass, striga
12. Diseases : potato weevil

Livelihood sources:

- Teaching – UGX 300,000 per month
- Farming
- Supplies cassava cuttings (0007 variety) through NAADS programme

3.9.4. Kitgum district

Box 8: Farmer Palabek village, Kitgum

Crops grown: Cassava (2 acres), sweet potatoes (1/2 acres), maize (1 ½ acres), sesame (2 acres). Total land size is 7 acres. 40 local chicken, 8 goats, 5 cattle. Family size is 9 members.

Yield:

- Maize 2 bags per acre
- Sesame 3 bags per acre

Main sources of livelihoods

- Crops and livestock production; the farmer earns income from selling livestock especially goats and also selling sesame.

Other activities besides agriculture:

- Hunting during the dry season basically for home consumption

Manure application on vegetables such as tomatoes. No fertilizer application because he believes that the soil is fertile.

Box 9: Farmer Alango West, Kitgum

Cultivated land size: 8 acres. Family size: 7 .Savannah grassland vegetation.
Livestock: 12 cattle and 15 goats. A grazing land next to the homestead (12 acres).
Crops: Cassava, sesame, and millet.
The farmers also practices bee-keeping for home consumption.
Burning of grass is common to allow emergence of fresh grass for livestock. The farmer also burns to clear land. Hunters also burn to catch the wild rat.
Crop management practices

- Crop rotation e.g. sesame and sorghum in one season then in the next season groundnuts; cassava followed by beans
- Intercropping e.g. cassava and maize:
- Broadcasting: the farmer mixes seeds of sesame and sorghum together then broadcasts

The farmer owns an ox-plough which he uses on his farm and also hires out.

Box 10: Farmer Targi-Agoro, Kitgum
The family size is 8 members. Crops: Cassava, sweet potatoes, sesame, sorghum, foxtail millet, sunflower.
Livestock: Cattle 4, goats 6, chicken 20
Crops are grown mainly for subsistence and the surplus is sold. In total the farmer owns 20 acres of land.
Other activities besides agriculture

- Off-farm employment
- Renting out farm implements such as ox-plough
- Paid labour

Challenges faced in agriculture

1. Lack of seeds: seeds are not available when needed resulting to late planting. Consequently, germination is low and yields are depressed. The farmer obtains seeds from Ngetta research institute which is in Lira, 7 hours away by bus. NAADS also provides seeds. In addition, the farmer obtains seeds from neighbouring farmers.
2. Extreme weather events especially floods and prolonged drought. Last year (2013), there was a prolonged drought during the first season making farmers skip a whole season without planting. In the second season, there were heavy floods which destroyed all the crops.

Coping strategy
Sale of livestock

3.10. Summary of agricultural challenges and observations

A. Agricultural challenges

During the discussions with farmers, intercropping was commonly mentioned as a common management practice. Common intercrop combinations are maize, groundnuts, & cassava; cassava & finger millet. Crop rotation, fallowing, and mulching are also practiced. An example of crop rotation is planting sesame and sorghum in one season and groundnuts in the next season. Mulching is also carried out mainly for tomatoes and onions in the seedbed. The fallow period typically ranges from 1 to 6 years. A few farmers apply organic manure obtained from pigs as well as chickens and cattle. Application of inorganic fertilizer is usually only practiced by tobacco and cotton growers. The tobacco companies provide the fertilizer to contracted farmers. In Gulu one farmer reported adopting tree planting for soil management.

We observed growing of horticultural crops in small plots by the swamps in Nwoya. There were no reports of irrigation projects, rice cultivation is rain-fed. Storage was cited as a major problem in rice growing as most farmers have limited storage space. Also birds are a great problem at maturity.

Diseases, pests, and weeds also hamper production. Common crop pests are the bean beetle, potato weevil, and glow worm in beans. Common crop diseases are cassava mosaic virus, potato weevil, and bacterial wilt in tomato. For cassava, some organizations provide clean cuttings and resistant varieties. Prevalent weeds are striga, spear grass, and black jack.

The main challenges to crop production cited by farmers in Gulu were: climate variability, crop diseases for cassava and groundnuts, lack of markets, land conflicts (mainly regarding burning of other people's fields), lack of credit, HIV/AIDS, discrimination against women (especially widows, who are sometimes undermined and their crops burnt), tribalism, and clan rivalry. In Kitgum farmers cited: striga weed, land disputes, destruction of crops by livestock as they graze, climate variability, lack of extension advice, and low seed quality as the key challenges. The main problems mentioned in Adjumani were: destruction of crops by elephants from Nimule National park, shortage of labour, pests (especially termites and grasshoppers) and diseases. Farmers in Nwoya expressed the following main challenges: inadequate storage facilities, climate variability, diseases, low price for produce, poor means of transport for produce, tree stumps limiting the use of ploughs and tractors, stray elephants, lack of improved varieties, intercropping making management difficult, theft, lack of irrigation facilities, lack of capital for opening land, and the high cost of labour**.**

B. Youth and agriculture

Youth in this sense refers to young men and women. This is an important feature in post conflict recovery given the role of youth in rural community continuity and agriculture. In the discussions, we found that many youth are not interested in farming activities and prefer less tasking jobs. For example, youth have moved to the nearby urban centers where they are looking for off-farm work, or involved in small businesses such as motorcycle transportation. The elderly farmers expressed their frustration on the youth for disregarding agriculture. The elders blamed this on the youth's socialization, they were brought up in the IDP camps where they were not exposed to farming and hard work.

C. Land tenure

Land in Acholi sub-region and in Adjumani is held under customary tenure. Under this tenure system, land is not vested in one individual but is held by the clan and for the clan. An individual, household or community with customary rights to land can apply for a certificate of customary ownership (CCO) which is intended to allow farmers to use land for security. During the workshops, no single case of leasehold or freehold was reported.

Across the four districts, women continue to have substantially fewer rights to own and control over land than men. Although the current Land Act allows women the right of co-ownership over land held with their husbands, expert interviews and farm visits,

indicated that very few women own land. Women are unable to inherit or bequeath land due to the existing customary laws. Land passes from generation to generation in the male line and women only have access to land as daughters and wives. Land allocation decisions are also made by men, and a widow or divorcee is at the mercy of her in-laws. This is particularly problematic to young widows. The customary tenure system affects women's investments on the land. In Adjumani, for instance, women do not want to plant fruit trees and prefer growing annual and early maturing crops.

Farmers reported cases of land conflicts among clans, communities and within families. As a result of the war, elders lost their lives and the surviving members could not remember the boundaries when they resettled back from the camps. Some of the boundary marks were also destroyed during the war. Conflicts also arise when hunters burn the neighbouring field crops, and when stray livestock feed on crops. Farm transecting is also a sensitive issue within the region. Usually the person is perceived as surveying land that he has purchased.

D. Land and labour

The natural ecosystem, savannah grasslands and woodlands (trees and shrubs), means that a lot of labour is needed to clear, plough, and cultivate land using current technology. When leaving the land fallow, the weed density increases (without the use of inputs or more robust land management practices). Opening up more land is the main approach currently being employed to increase production. The main limitations are the large need for labour in the fields and the low availability and the high cost of labour. According to farmer workshops, polygamy is practiced as an attempt to obtain labour. Farmers in Nwoya mentioned seeking labour from Pakwach in the West Nile, approximately 65 kilometres away. Labour problems are aggravated during the harvesting period as all other farmers are occupied in their fields. The problem is more pronounced during the rice harvests. There is some participation in communal labour exchange. A household member offers labour in another household and in exchange he receives a day of labour in his land. The land – labour intersection is an important one with regards to household food security, and the challenge in labour availability influences the amount of land that can be put under cultivation. The labour problem is aggravated by the large-scale wartime loss of livestock able to engage in animal traction for ploughing and transport. The result is the cultivation of smaller plots. It is also worth noting that there were expressions of interest on the part of farmers for agricultural mechanization. Farm mechanization is scanty consisting of a tractor with a plough. All other farm operation including weeding, harvesting, and livestock feeding operations are manually performed. Farmers also mentioned the lack of knowledge and skills in the use of ox-ploughs. The slash-and-burn method is commonly practiced for clearing land. Farmers reported that burning is often not properly managed and can destroy adjacent fields. In all the workshops this was cited as a problem that has also contributed to conflicts.

E. Seed quality and accessibility

Approximately 89% of the seed is sourced from the informal sector. Geographic access to agro-dealers was far, especially for farmers located in remote areas. In all the four districts, there were only a few seed stockists who were located within the town, and none in the villages or sub-counties. Information gathered from the farmer workshops and key informant interviews was that the seed demand is higher than the seed supply. The main seed companies have concentrated their supply in the major towns with close proximity to their warehouses.

Some of the stockists in the local towns are supplying material that is adulterated and of low quality. Unscrupulous dealers mix quality seed with grain of unknown quality and repackage it. This mix can constitute as low as 40% of the quality in the initial seed. Farmers mentioned unavailability of reliable material from the nearby town centers. A farmer in Adjumani reported that he travels to Lira, 5 hours away by bus, in order to obtain quality seed. In Nwoya, they need to travel 10 km to the nearest agro-dealer for seed.

ISSD is currently engaging eight community groups in seed multiplication. The groups have started local seed businesses (LSB) where they purchase foundation seed, undertake multiplication, and sell the seed to farmers. The LSBs target orphan and self-pollinated crops. There are currently only four LSBs in the Acholi sub-region (in Nwoya, Gulu, Kitgum, and Pader). The main challenge for the groups is knowledge on the marketable crops to produce and creating awareness among farmers on the available seed. Investment is also needed to purchase the foundation seed and this could be a factor limiting the number of groups investing in the LSB.

Key informants also reported that farmers have low perception of commercial seed, and do not see the need for regular seed renewal. Some farmers indicated re-using the same seed for up to six years.

F. Household assets, income and expenditure

Among the 10 households interviewed, the average land holding was 296 acres. The high household acreage is due to presence of a respondent household in Nwoya district that had extensive land holdings. At least every household owned at least one type of livestock. Livestock-type disaggregated data reveals that 50% of the respondents owned goats, 16% owned cattle, and only 5% owning oxen.

The bicycle is the most common means of transport owned by almost every household. Only the wealthiest own motorbikes. Hand hoes, pangas, and axes were the most common farm tools owned by all households. Ox ploughs were owned by wealthy farmers (Table 15). Discussions at the households revealed that crop farming and livestock keeping are the main source of livelihood and cash income. Main household expenditure includes purchasing food, clothing, health care, and education.

Non-farm income sources across the four districts ranked in order of importance include: charcoal burning, brick making, stone quarrying, sand mining, trade, hunting, brewing, fishing, and mat weaving using papyrus reeds.

G. Markets

Majority of the households reported selling their produce at the farm gate and local markets. There are some satellite grain collection centres such as Purongo collection centre in Nwoya that was constructed with support of WFP. The collection centres offer post-harvest processing such as drying, shelling, bagging, storage, and fumigation, and link farmers to markets. Farmers indicated that they are unable to add any value to the produce due to the inaccessibility to collection centres and high fees charged at private processing facilities. Farmers are unable to move their produce to markets offering better price. This is linked to unavailability of market information, the poor road network and inadequate transport facilities. Farmers use human labour or various intermediate means of transport (IMTs) including bicycles, motorcycles and carts.

4. Major Challenges /Constraints and Recommendations

Based on the analysis contained within this report, the study team offers the following recommendations to improve agricultural productivity in the region. The suggestions are intended to assist IFAD, CIAT and other partners move forward with considerations to address some of the challenges identified within research and development projects. The recommendations are divided into priority areas, and other suggestions.

4.1 **Priority areas**

Priority actions	**Specific actions to consider**
Strengthen the seed system	- Inclusion of local landraces, minor and orphaned crops in the formal seed supply. - Scale up production of foundation seed for the non-commercial crops to create a base for an extensive, decentralized seed production system. - Engage farmers in local seed businesses (LSB) where they can multiply seed that is not targeted by commercial seed companies. - Enforce regular checks on agro-dealer stores to identify adulterated material. - Seed quality assessment capacity needs to be built at regional and local levels. - Promote creation of seed businesses. Agro-dealer placement has to be expanded to serve also those in more remote areas. - Package seed in small quantities demanded by farmers, especially for vegetable crops.

	- Create awareness on the benefits of certified seed use and seed renewal. - Increase awareness of the means by which farmers can redress grievances with agro-dealers (e.g., around quality of product). Awareness campaigns educating farmers in redress possibilities might be considered. - Enhance the agro-enterprise and marketing skills of the local seed businesses. - Provide information on the seed available among the LSBs, such as through radio.
Promote climate-smart agriculture and improved agronomic, land, soil and water management practices	- Encourage farm demonstrations of improved management practices. - Incorporate youth in agriculture training programs. - Create awareness on land, soil, water and crop management practices such as row spacing, pest and disease control, mulching, inorganic fertilizer use, compost, farmyard manure, ploughing, cover crops, green manure, fallows, crop rotation, agroforestry and water harvesting. - Increase awareness of agroforestry. - Promote use of organic manure and train farmers on incorporation of crop residues instead of burning. - Encourage soil fertility testing. To evaluate if soil fertility levels are declining, as stated by key informants or if soil fertility is high, as perceived by some farmers. - Provide recommendations on fertilizer application rates for various crops. - Sensitize communities on proper soil and land-use practices.
Enhance infrastructure	- Improve rural access roads. - Improve access to agricultural mechanization such as through subsidized farm machinery and implements.
Enhance information services	- Enhance the capacity of the climate information services. To be able to collect weather information and produce timely, accurate and site-specific forecasts. - Enhance channels of information dissemination such as extension services and farmer field schools.
Develop agricultural skills and knowledge	- Mechanization of agriculture as well as training in the use equipment. - Training on improved agronomic practices. - Youth-oriented training and capacity development.
Enhance agricultural	- Value addition. - Provide bulk grain storage centres.

markets	- Establish grain processing points e.g., for rice, groundnuts and maize in villages. - Providing information on volumes, prices, and products at local and regional scale. This can be facilitated especially through the use of radio and cell phone information systems.
Provide agricultural financing	- Improved access to agricultural oriented loans with low interest. - Support village saving and loan associations such as in capacity building. - Provide grants to groups interested in engaging in the LSB.

4.2 **Other suggestions**

Recommendation	**Specific actions to consider**
Management of human-wildlife conflict	- Securing the boundary with Murchison falls national park and Nimule national park. - Explore compensation measures for livestock and human life losses due to wildlife attack. - Promote community-based solutions to prevent and manage human-wildlife conflicts. - Developing strategies aimed to prevent or reduce human-wildlife conflicts. - Educate communities about co-existing with wildlife.
Land tenure	- Create awareness on the process of land registration. - Create awareness on women's rights to own and have authority over land. - Encourage the local communities to initiate discussions on conflict issues and seek for solutions. - Develop resource management activities (such as regulated hunting and habitat conservation).
Research and development project implementation	- Goals must be engendered especially since women play a critical role in agriculture. - Knowledge management to distil lessons and challenges. - Activities requiring participation of farmers such as in surveys and workshops could be planned in

	dry season when farmers have fewer engagements on the farms, such as in February. - On-farm trials may be carried out in the second season, which was mentioned as the most reliable. Between seasons variation in yields as mentioned should also be evaluated.

4.3 **Lessons learned**

1. It is important to incorporate several different tools in order to triangulate information and results.
2. Cross-district assessments are needed in order to understand the variability across the region.
3. Sufficient time is needed to train facilitators and to identify and engage with appropriate organizations.
4. Allow sufficient time for the entire process to be carried out effectively.
5. Use existing networks, organizations, and communication channels such as through farmer groups, farmer associations, and local agricultural offices. These are instrumental in planning and ensuring workshops are representative with desired number of farmers.
6. Use a bottom-up approach. This helps decision makers to understand the problems in the project area and bring the views of farmers to planners during the project design phase.

5 APPENDIX A: MAPS OF THE REGION

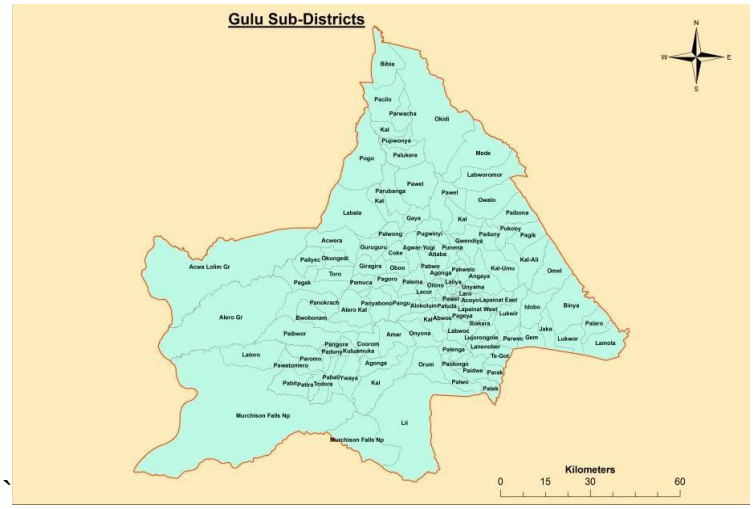

Figure 34: Map of Gulu district.

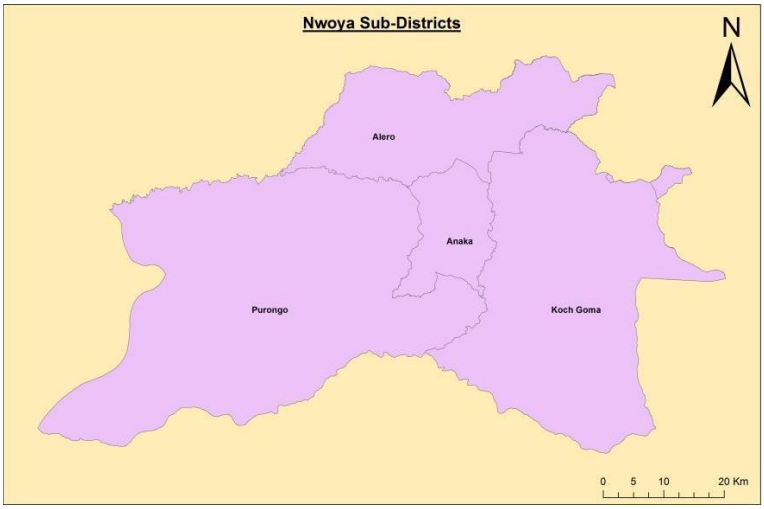

Figure 35: Map of Nwoya District.

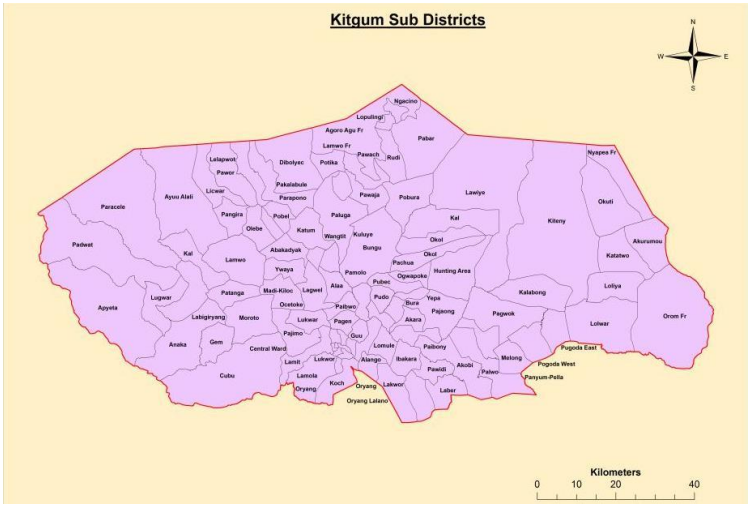

Figure 36: Map of Kitgum District.

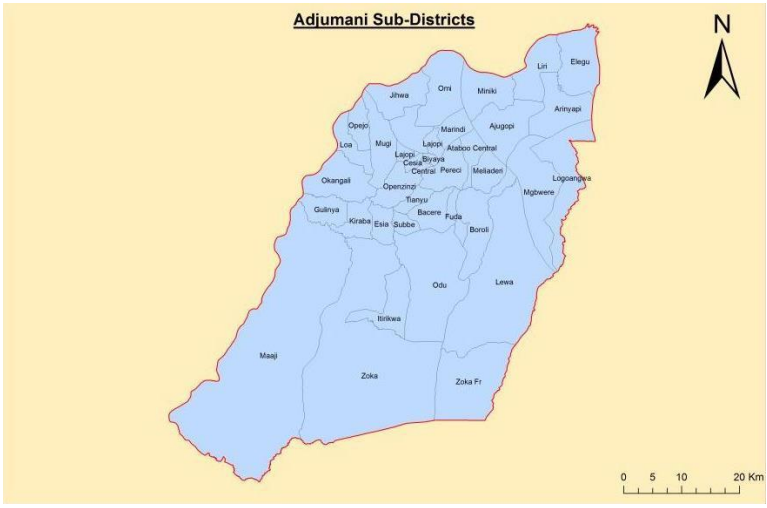

Figure 37: Map of Adjumani District.

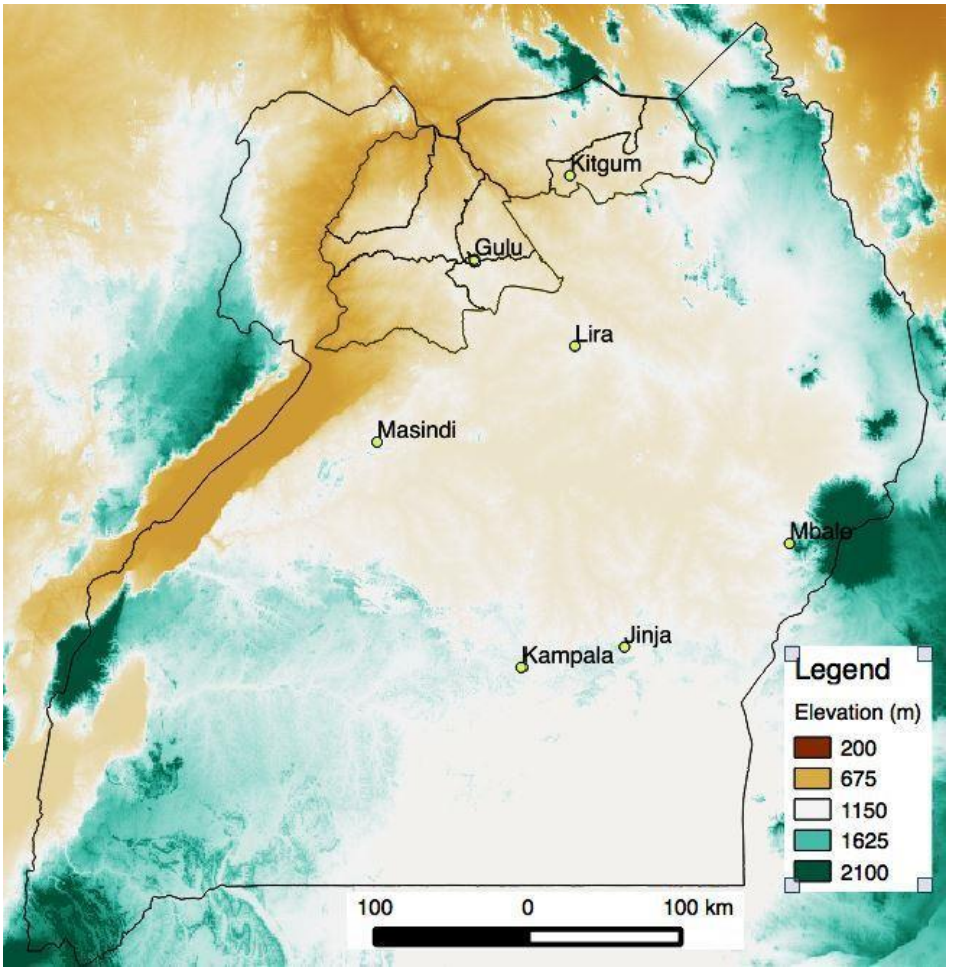

Figure 38: Elevation in metres (m) for Uganda.

6 APPENDIX B: CROPS CULTIVATED ACROSS THE DISTRICTS

Table 8: Crops cultivated in Gulu district as listed in farmer workshop.

Crop	Gender association	Main use
Common name	**Male/Female/Both**	**Food/Cash crop**
Cassava	M	Cash
Finger millet	F	Food
Sesame	F	Cash
Sorghum	F	Cash
Groundnuts	Both	Cash
Maize	M	Cash
Beans	Both	Food
Pigeon pea	F	Cash
Rice	M	Cash
Cotton	M	Cash
Tomato	M	Food
Red pepper	M	Food
Onion	M	Food
Fruit trees	M	Food
Banana	M	Food
Pumpkin	F	Food
Okra	F	Food
Egg plant	F	Food
Green pea	F	Food
Coffee	M	Cash
Tobacco	M	Cash
Yam	F	Food
Sweet potato	Both	Food
Pawpaw	M	Food
Cocoyam	F	Food
Spider weed	F	Food
Sugarcane	M	Food
Pineapple	M	Food
Cowpea	F	Food
Lemon grass	M	Food
Soybean	Both	Food
Sunflower	M	Cash
Carrot	M	Food
Green pepper	Both	Food
Avocado	M	Food
Cabbage	M	Food

Table 9: Crops cultivated in Kitgum district as listed in farmer workshop.

Crop	Gender association	Main use
Common name	**Male/Female/Both**	**Food/Cash crop**
Groundnuts	F	Food
Cassava	M	Cash
Beans	M	Cash
Rice	M	Cash
Sesame	F	Cash
Soybean	M	Cash
Green pepper	M	Food
Finger millet	F	Food
Onion	M	Food
Sweet potatoes	M	Food
Sorghum	F	Cash
Tomatoes	M	Food
Maize	M	Cash
Bananas	M	Food
Sunflower	M	Cash
Eggplant	M	Food
Pigeon pea	F	Cash
Cabbage	M	Food
Green pea	F	Food
Cow pea	F	Food
Okra	F	Food
Pumpkin	F	Food
Pineapple	M	Food
Avocado	M	Food
Amaranth	F	Food
Passion fruit	M	Food
Sugarcane	M	Food
Kale	F	Food
Yams	F	Food
Nightshade	F	Food
Watermelon	M	Cash
Cucumber	F	Food
Garden egg	F	Food
Spinach	F	Food
Red pepper	M	Food
Carrots	M	Food
Spider plant	F	Food
Garlic	M	Food
Wheat	M	Cash
Irish potato	M	Food
Tobacco	M	Cash
Cotton	M	Cash
Bulrush millet	M	Food
Barley	M	Cash
Ginger	M	Food
Cocoyam	M	Food
Mushroom	F	Food

Table 10: Crops cultivated in Adjumani district as listed in farmer workshop.

Crop	Gender association	Main use
Common name	**Male/Female/Both**	**Food/Cash crop**
Maize	Both	Cash
Beans	F	Cash
Sorghum	F	Cash
Rice	M	Cash
Cassava	M	Cash
Tomato	M	Food
Sweet potato	F	Food
Sesame	M	Food
Groundnut	F	Food
Green gram	F	Food
Finger millet	Both	Food
Banana	M	Food
Pigeon pea	F	Cash
Pawpaw	Both	Food
Yam	Both	Food
Cowpea	F	Food
Soybean	M	Food
Pineapple	M	Cash
Cabbage	M	Food
Onion	M	Food
Bambara nut	F	Food
Okra	F	Food
Egg plant	F	Food
Pumpkin	F	Food
Mango	M	Food
Orange	M	Food
Sugarcane	M	Food
Pumpkin	F	Food
Mango	M	Food
Orange	M	Food
Ginger	M	Food
Sugarcane	M	Food
Amaranthus	F	Food
Passion fruit	M	Food
Jack fruit	M	Food
Cocoyam	M	Food
Watermelon	M	Cash
Avocado	M	Food
Cucumber (local)	F	Food
Red pepper	M	Food
Green pepper	M	Food
Sunflower	M	Cash
Cotton	M	Cash
Carrots	M	Food
Guava	M	Food
Avocado	M	Food
Kalabi	F	Food
Leafy vegetable	F	Food
Brinjals	F	Food

Table 11: Crops cultivated in Nwoya district as listed in farmer workshop.

Crop	Gender association	Main use
Common name	**Male/Female/Both**	**Food/Cash crop**
Sorghum	F	Cash
Groundnut	Both	Food
Finger millet	F	Cash
Sesame	F	Cash
Beans	F	Food
Rice	M	Cash
Pigeon pea	F	Food
Cassava	Both	Cash
Maize	M	Cash
Sweet potato	F	Cash
Green gram	F	Cash
Banana	M	Food
Sunflower	M	Cash
Cotton	M	Cash
Soybean	M	Food
Cabbage	M	Food
Yam	F	Food
Cowpea	F	Cash
Pineapple	M	Cash
Tomato	M	Cash
Okra	F	Food
Mango	M	Food
Red pepper	M	Food
Tobacco	M	Cash
Onion	M	Food
Garden egg	F	Food
Egg plant	F	Food
Pumpkin	F	Food
Orange	M	Food
Ginger	M	Food
Sugarcane	M	Food
Amaranth	F	Food
Kale	F	Food
Garlic	M	Food
Cucumber (local)	F	Food
Avocado	M	Food
Cocoyam	M	Food
Watermelon	M	Cash
Carrots	M	Food
Pawpaw	M	Food
Bulrush millet	F	Cash

7 APPENDIX C: KEY INFORMANTS AND FARMER INFORMATION; DETAILS OF THE FARM TRANSECT WALKS; AND COMMON UNITS OF MEASURE USED BY FARMERS

Table 12: Key informants interviewed during the Rapid Rural Appraisal and their institution affiliation.

Name	Contact
Astrid Mastenbroek	Chief of Party, ISSD Uganda,
Omara Emmanuel Pacoto	District NAADS Coordinator, Nwoya
Okot Francis	Coordinator, Gulu District Farmers Association
Geoffrey Otim	Seed Expert, ISSD Northern Uganda Office, Lira
Dr. Christopher Dratele	District NAADS Coordinator, Adjumani
Dr. James Ukwir	District Production/Veterinary Officer, Nwoya
Achaye Nelson	Senior Agricultural Officer, Nwoya
Odong Mike	District NAADS Coordinator, Kitgum
John Opira	Arid Land Information Networks, Gulu
Lakor Jackson	District Agricultural Officer, Gulu
Simon Watti	Deputy Chief Administration Officer, Adjumani
Godfrey Ocan	Programme Officer/Head of Office, FAO Gulu Sub-Office
Joseph Onera	Programme Manager, Acholi & Teso, FAO Kampala
Mrs. Alice Opiyo	Sub-County NAADS Coordinator, Kitgum

Table 13: Transect walks and main observations made in each district.

	District	Start Point Coordinates (lat, long)	End Point Coordinates (lat, long)	**Approximate Distance**	**Main observations**
Transect 1	Gulu	3.155173, 31.736465	3.472117, 32.007723	63 km	• Higher farm intensity • Dominated by savannah grasslands interspersed with trees and shrubs • Land flat to gentle rolling. • Main crops are beans, cassava groundnut and sesame • Intercropping: sorghum with beans and pearl millet, groundnut and maize, maize and cassava
Transect 2	Nwoya	3.260424, 32.925341	3.499560, 32.564139	49 km	• Main crops are groundnut, beans and rice. • Large uncultivated fields • Horticultural farming along the swamps • Some commercial farms (3%) with an average of 2000 ha. • Coffee grown on a small-scale • Destruction of crops by elephants • Land is mainly flat with fewer trees
Transect 3	Kitgum	2.492513, 31.838755	2.780809, 32.299784	73 km	• Main crops are cassava and sesame. • Savannah with woodland patches • Cutting of mango trees for use in charcoal burning and brick curing
Transect 4	Adjumani	2.765206, 32.300393	2.844208, 32.362684	14 km	• Main crops are cassava, maize, rice and sesame. • Mainly shrubs and savannah grassland • Striga weed • High refugee influx. 59000 refugees in December 2013 (FAO, Gulu) • Trade with South Sudan, at better prices

Table 14: Units of measure commonly used by farmers in each district.

District	Distances	Area	Weights	Labour costs
Gulu	Yards/sticks Stick called talo I talo = 2 metres	Katala	100 kg sacks/bags	Katala Ush 2000-3000 – human Acre – 80,000 tractor Awak – traditionally provide food and drink for people who come and plough
Kitgum	Talo – one farmers yard	Katala	100 kg sack/bag 1 kg= 2 apwoti[1]	Weeding[2] by hand Kitala/50 tal – Ush 2000-3000 Ploughing 30 by 80 tal Oxen Ush75,00 Tractor – Ush 85,000 Hand hoe 1 kitala 3000-4000
Adjumani	Talo (8.5 feet) Katala (1taloby10 talo)	Acre - (12 talo*50 talo) -40m *100m	Basin (20 litres) 100 kg sack cups	Weeding cassava - 55000/acre. 70,000 for rice, beans and sesame. Ploughing using tractor 100000/acre Ox-plough 80,000-100,000/acre Labour 1500 (1 talo by 30 talo)
Nwoya	Katala	Katala (1.5m by 80m) In swampy area katala = 1m by 20m		4000/katala for ploughing

[1] 0.5 litre enamal/plastic mug
[2] Normally done by women

Table 15: Common tools owned by different groups of farmers across the study site in Acholi sub-region and Adjumani.

Everyone	**Wealthy**	**Poor**
Hand hoe	Combined harvester	Jerry can
Watering can	Ox-plough	Spear
Panga	Tractor	Sickle
Axe	Sheller	Bicycle
Knife	Vehicle	
Sprayers	Wheel barrow	
Rope	Carpet – for threshing	
	Motorbike	

8 APPENDIX D: PHOTOS FROM THE FIELD

Figure 39: Hand hoe used by women for weeding.

Figure 40: Burning is a common land management practice.

Figure 41: Protected well used as a source of water for household and animal use.

Figure 42: Cultivation of horticultural crops is practiced along the swamps.

Figure 43: Crop association by gender. Blue papers were used to indicate association to men and pink papers those associated with women.

Figure 44: RRA workshop in progress, Gulu district.

Figure 45: RRA workshop in progress, Kitgum district.

Figure 46: RRA workshop participants, Nwoya district.

9 WORK PLAN OF THE RRA

The work plan of the activities to be conducted was initially made by the team before leaving to the field. However, after arrival at the site, it was realized that the plan had to be revised due to different practical constraints such as availability of the farmers. There was an attempt to schedule the events with the aim of gaining maximum people's participation. A farmer workshop with 40-50 participants was held in each of the four districts. The team visited individual households and carried out nine resource allocation mapping exercises. We also conducted four transect drives/walks within the farm/villages and 10 key informant interviews. See Appendix B: Table 12 for the list of key informants interviewed and the organization affiliation. The sequence of activities in which the PRA tools were implemented is as follows:

Table 16: Schedule of activities for the RRA in northern Uganda.

No.	Activity	Date	Timing	Venue
1	Farmers' workshop Gulu District	20th February, 2014	10am-4pm	Gulu Farmers Association Hall
2	Transect walk /Household resource allocation maps in Gulu	21st February, 2014	8am-5pm	Unyama sub-county
3	Transect walk /Household resource allocation maps in Nwoya	24th February, 2014	8am-5pm	Purongo sub-county
4	Farmers' workshop Nwoya District	25th February, 2014	10am-4pm	Anaka Freedom hotel Hall
5	Farmers' workshop Kitgum District	24th February, 2014	10am-4pm	NAADS Hall, Kitgum
6	Transect walk /Household resource allocation maps in Kitgum	25th February, 2014	8am-4pm	Alango West village Targi-Agoro village Palabek village
7	Farmers' workshop Adjumani District	26th February, 2014	11am-4pm	District Administration Hall, Adjumani
8	Transect walk /Household resource allocation maps in Adjumani	27th February, 2014	8am-5pm	Adropi sub-county Arinyapi sub-county Openzinzi sub-county