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NURI CSA ADOPTION STUDY REPORT 2020



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EXECUTIVE SUMMARY

Introduction and methodology

NURI seeks to enhance resilience and equitable economic development in Northern Uganda. Its focus includes Climate Smart Agriculture (CSA), Rural Infrastructure (RI) and Water Resources Management (WRM). Under CSA, farmer groups are trained on various aspects of CSA through 10 sessions using a demo plot approach, to encourage improved farming practices. It is expected that, when farmers adopt the practices, their production levels will improve. In South West Nile and Acholi sub-region, training was rolled out in 2019 with farmer groups selected early in the year. These groups were in their second year of support at the time of the survey. Farmer groups were assessed to establish the level of uptake or adoption of CSA practices on their individual farmers. This is a key outcome indicator under CSA in NURI. The study was done in Q3 & 4 of 2020 in 9 districts (recently including gazetted Terego District); Arua, Madi-Okollo, Terego, Nebbi, Zombo and Pakwach in South West Nile, Kitgum, Agago and Lamwo in Acholi sub region.

Using mixed method (qualitative and quantitative), a cross-sectional study was done where data was collected from farmer groups in the 9 districts, targeting 1,376 members of farmers' groups from the host communities and 123 members of mixed refugee groups (consisting of 43 nationals/hosts and 80 refugees) as well as leaders in the communities. 21% of the respondents were youth who are participating in the NURI programme under CSA. Analysis was done and findings have been explained in this report. Results show that adoption of CSA practices was noticeable on farmer fields and surpass the year one target. Adoption of the CSA practices is attributed to the training methodology used by the extension teams.

KEY FINDINGS

Demographics of respondents

The study covered slightly more female (56.2%) than male (43.8%) farmers of which 21% were youths (18-28 years) and 80% aged 29 years or above. Majority (55.9%) had attained Primary as their highest education level. Among the mixed refugee groups, female respondents were the majority, comprising 62.8% of the sample. Among the refugee category, the female respondents were 65.8% while the host/national female were 57.1%. Majority of the national respondents (55.9%) and the refugees (57.5%) attained primary education as their highest education level.

Composition and leadership of groups

Membership of farmers' groups ranges between 25-30 members per group, most of whom are female. Results show that the mean number of males reported per group ranged between 7-10 while that of females ranged between 16-22. In terms of leadership, males dominated the chairpersons' position while female treasurers are most common. 66% reported having male chairpersons and 88.7% reported having female treasurers.

CSA training and its relevance in on-farm production activities

Almost all the new national farmers (99.9%) and all the mixed refugees (100%) who participated in the CSA Adoption study reportedly received training on CSA from NURI extension staff. 84.3% of the new national farmers and 62.3% of the mixed refugees received the training for the first time, and report having learnt at least three new practices. Among the mixed refugees, slightly more nationals/host (65.1%) received the training for the first time than the refugees (60.8%). 15.7% of the farmers who

had previously received similar trainings were from Arua and Madi-Okollo.

Majority of the farmers that attended the CSA training sessions appreciated the organization of the sessions. About 91% of the new national farmers and about 82% of the mixed refugees acknowledged the duration of the training sessions as appropriate, timing was perfect, and the sessions were held following the farming calendar. Over 78% of both farmers and mixed refugees highly rated the sessions as being very relevant to daily on-farm production activities. In addition, almost all the farmers and mixed refugees (98.4%) reported that they would recommend other farmers in their community to attend a similar training.

Strategic crops grown and practice of seedbed preparation.

About 30% of the farmers were growing the strategic crops (including Sesame, Cassava, Soybeans, Sunflower, Beans, Rice, Potatoes and Onion) for the first time. Farmer groups growing the strategic crop for the first time were mainly from Nebbi (53.7%), Kitgum (44.4%) and Lamwo (40.5%). The farmers were motivated to grow these strategic crops due to the crops' early maturity, high yields, and availability of market. Only 15% of the mixed refugee groups had grown the field crops for the first in the 2020 planting season. There was a very slight difference between the nationals/host (14.3%) and refugees (15.6%) who had grown the strategic crops for the first time.

Majority of the new national farmers used slashing (58.7%) and cutting of shrubs/trees (55.6%) to clear their land before ploughing. Only 12.3% used bush-burning to clear their land for ploughing during the 2020 planting season. Bush-burning was practiced most frequently in Kitgum district, Madi-Okollo and Nebbi before the farmers received training from NURI extension staff. Most farmers reported use of the hand hoe (77.4%) and animal traction (47.3%) as the method of land tillage in preparation for the 2020 planting season. Animal traction was used by more farmers in the Acholi subregion (over 80%) than West Nile (less than 10%). In West Nile, the dominant method of land tillage is the hand hoe.

For the mixed refugee groups, Slashing was the most used method of clearing the fields (76.4%), followed by cutting shrubs/trees (35.8%). While use of slashing method to clear fields was common in both nationals (74.4%) and refugees (77.5%), the nationals/hosts (51.2%) who cut shrubs/trees were more than refugees (27.5%) who used the same method to clear their fields. Among the mixed refugees, a hand hoe (88.6 %) and Animal Traction (13.8%) were the most used methods of land tillage.

Use of improved seeds before and after NURI training.

Prior to the NURI CSA training, only 3.2% of the new national farmers were planting strategic crops using improved seed. Use of improved seed improved to about 70% in 2020 planting season after NURI training. Similarly, the use of improved seed increased among the mixed refugees from 4.2% before the training to 94.2% of the refugees in 2020 after NURI training in both districts of Lamwo and Madi-Okollo. Slightly more refugees (96.2%) planted improved seeds than nationals/host (89.7%) after the NURI training, increasing from 1.3% and 9.5%, respectively before the training.

Methods of planting seeds before and after NURI training

Following the NURI CSA training, farmers adopted modern planting methods of line planting. Prior to the NURI training, 78.5% of the new national farmers and 44.2% of the mixed refugees used the broad casting method. Only 16% of the new national farmers and 36.7% of the mixed refugees planted their strategic crops in lines. However, in the 2020 planting season after the training, 68.1% of the farmers and 92.5% of the mixed refugees reported to have planted the seeds of strategic crops in line. The

national farmers used an average spacing of 50 centimeters between rows and 10 centimeters between plants while the mixed refugees used an average spacing of 51.1 centimeters between rows and 31.1 centimeters between plants.

Pests and disease control

Generally, 56.6% of the farmers and 70.1% of the mixed refugees growing strategic crops registered pests and diseases on their fields. Among the refugee groups, more nationals/hosts (76.7%) than refugees (66.2%) experienced pests and diseases in their fields. The pests and diseases included rats, nematodes, aphids, gall midge and termites, and diseases like cassava mosaic, groundnuts rosette, bacterial wilt diseases and necrotic lesions on the pods. To control the pests, farmers adopted various measures including spraying pesticides or ash, spraying anti-killers, using traps to keep rodents out of the fields, uprooting infected plants and crop rotation.

Soil fertility and water management

More than 80% of members of farmers' groups and 79.2% of the mixed refugees were contented with the fertility of their soils (rated as good or very good). Among the mixed refugee groups, more refugees (79.7%) rated the level of soil fertility as good/very good than the nationals/hosts (78%). Slightly more farmers from the Acholi subregion expressed pleasure with the fertility of their soils while soil fertility and water management challenges were experienced more by farmers in West Nile.

Post-harvest handling and value addition

Several farmers translated the knowledge acquired from CSA trainings on post-harvest handling into practice. Results show that 72% of the national farmers applied some post-harvest handling measures during and after harvesting their crops in the 2019 planting season. Only 28% did not apply any post-harvest handling measures.

Among the mixed refugee groups, 78.3% of the farmers applied some post-harvest handling measures during and after harvesting their crops in the 2019 season. More Refugees (81.1%) applied post-harvest handling measures than the nationals (73.2%). Some of the measures employed included harvesting at physiological maturity, shelling, and threshing while produce is still fresh, proper drying on tarpaulins, sorting and grading, packaging well sorted and graded produce, and storing/keeping packed produce on wood pallets.

Conclusion

The study indicates that the adoption of CSA practices is on track. All activities planned to enhance resilience of both national farmers and mixed refugee groups through adoption of CSA practices have been implemented. All members of the farmers and mixed refugee groups were trained on all the CSA elements that support improved agricultural production as had been planned. Efforts to apply the knowledge and skills gained from the CSA trainings were evident and verified by leaders that monitored delivery of the CSA trainings in the respective districts. Many appreciate and acknowledge that all the CSA elements are relevant in their daily on-farm production activities, they attest it improved their knowledge but translation of knowledge into practice still requires concerted efforts of both NURI extension staff and the farmers themselves. Further, the size of acreage of land cultivated compared to land owned was still small with the hand hoe still dominating land opening.

1.0 INTRODUCTION AND METHODOLOGY

1.1 Background to the study

The Northern Uganda Resilience Initiative (NURI) is one of three engagements under the Uganda Programme on Sustainable and Inclusive Development of the Economy (UPSIDE). UPSIDE is one of the two thematic Programmes of the Danish Country Programme for Uganda 2018-2022, for which a Memorandum of Understanding (MoU) has been signed between the Government of Denmark and the Government of Uganda.

NURI will pursue enhanced resilience and equitable economic development in Northern Uganda, including for refugees and host communities, by supporting 1) Climate Smart Agriculture (CSA), 2) Rural Infrastructure (RI), and 3) Water Resources Management (WRM). Refugees and host communities will be among the beneficiaries as NURI is designed to support Uganda's progressive refugee policy and the nexus between development and humanitarian action.

Geographically, NURI covers 13 districts in the West Nile and Acholi Sub Regions of Northern Uganda. The districts are Agago, Kitgum and Lamwo in Acholi sub region; Arua, Madi-Okollo, Terego, Pakwach, Nebbi and Zombo in South West-Nile, Moyo, Obongi and Adjumani in North West Nile sub region. Besides targeting nationals in these districts, NURI will work with refugee settlements in Arua, Lamwo, Obongi and Adjumani.

One of the intervention areas of NURI is climate Smart Agriculture whose objective is to increase agricultural output of small-scale farmers. NURI supports the new nationals and refugee groups under CSA with training and input for establishment of demo plots. The implementation of NURI CSA activities kick started early 2019 in South West Nile and Acholi region. North West-Nile started in the last half of 2019 and only working with refugee groups. Adoption of CSA practices is an important output indicator in the NURI monitoring framework.

1.2 Objectives and scope of the study

In NURI, the adoption study will inform whether farmers are applying the different CSA practices as learnt from the demo fields. It will further provide a basis for assessing CSA training and make comparisons with farmer groups indigenous knowledge.

Purpose:

To determine the level of learning and adoption of CSA practices by CSA groups, since joining NURI programme and identify factors influencing adoption.

Objectives

1. To establish CSA practices learned by farmers as a result of participating in NURI training.
2. To assess the extent to which farmers are adopting CSA practices learnt from NURI trainings.
3. To identify factors influencing adoption of CSA practices learner by farmers participating in NURI training.
4. To capture lessons and receive feedback on unexpected outcomes of CSA training and extension service delivery by NURI

Scope of the study

The scope was limited to understanding adoption of CSA practices by farmer groups receiving support under intervention 1 of NURI programme. The groups must have started participation in the programme in 2019 and be in their second year of implementation. The investigation was done on second season production (season B) covering the strategic crop that the respondents are being trained on. Acholi sub-region and South West Nile started CSA activities with the new national groups earlier than North West Nile, therefore three districts in Acholi and four in South West-Nile were included in the study. Within the districts, the assessment was limited to only five sub-counties, but which encompassed the different production characteristics of high, medium and low. The sub-counties from which baseline data was collected were included. The areas to be covered are summarized in the table below:

District	Sub counties
Lamwo	Palabek-ogili, Lokung, Palabek-kal, Padibe West, Madi-Opei & Palabek settlement
Kitgum	Mucwini, Amida, Kitgum-Matidi, Namokora, Omiya-nyima
Agago	Omiya-pacwa, Lira-Palwo, Wol, Adilang, Kot-Omor
Nebbi	Errussi, Ndhew, Akworo, Nebbi, Kucwiny
Pakwach	Wadelai, Panyimur, Pakwach, Alwii
Zombo	Zeu, Abanga, Kango, Paidha, Attiak
Arua (including Madi-Okollo)	Logiri, Vurra, Katrini, Ajia Arivu, Okollo, Anyiribu, Pawor, Ogoko, Rigbo and Rhino camp settlement

1.3 Methodology

Overall Design

The study was carried out in 9 districts in the South West Nile and Acholi Sub Regions of Northern Uganda where NURI programme is being implemented. The districts include Nebbi, Pakwach, Zombo, Terego, Madi-Okello and Arua in the South West Nile subregion and districts of Agago, Lamwo and Kitgum were selected from Acholi sub-region. Three to seven sub-counties were selected from each district, leading to a total of 40 sub-counties participating in the study.

Indicators of study

S/N	Indicator name	Data collection method and tool	Comments
Objective for strategic intervention 1: <i>To increase the agricultural output of small-scale farmers</i>			
1.	Cumulative percentage of participating households adopting additional CSA practices.	HH interviews	
Main activities: Agricultural output of small-scale farmers including for refugees increased			

1.1	% of new national farmer groups and refugee groups reporting having learnt at least 3 new practices	HH interviews	
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Target respondents, Sample Size and Sampling Procedure

Respondents:

The study targeted the farmers participating in the implementation of activities under output 1 of NURI programme which is Climate Smart Agriculture. The groups are participating as new national groups and mixed groups. The pure refugee groups were not included because their CSA training does not require establishment of demo plots. The respondents started with NURI programme in 2019 and were in their second year of production.

Sample selection of respondents:

Agricultural production potential within a district normally varies from sub-county to sub-county and these are categorized as high, medium and low. During sample selection, this categorization was taken into consideration. All the sub counties had an equal chance of being selected in the sample. The sample size was based on the total number of farmer groups participating in the cultivation of the strategic crops in a district/sub-county. The sampling procedures used were purposive because of the start year with NURI, systematic for individual farmer interviews, and random for the farmer groups.

Because, of time and resource constraint, determining the sample size deviated from statistical principle however reliability and validity of results is guaranteed because the farmer groups are considered to be homogenous (similar demographic characteristics). Additionally, experience from previous DANIDA funded programmes in the region show that having conducting smaller but in-depth investigation of target communities provide reliable results for bench marking up take of improved agricultural technologies.

New national groups:

In each sub-county, the groups are randomly distributed in different parishes. Using the farmer group list as a sampling frame, groups undertaking a specific strategic crop were selected using systematic sampling procedure (at an interval of 2 data points, a group will be selected from the list of groups). Once the groups were selected, using the same sampling procedure group members were picked for interviews. At an interval of 5 data points (group members), a farmer/respondent was selected for the interviews from the group membership register.

The total number of farmer groups/farmer group population size differ across the eight districts with Agago having the highest. These factors were considered in sample selection to determine the total number of farmer groups and households/respondents.

Mixed groups (national and refugee)

Using systematic and random sampling procedure, the total number of respondents as specified were

selected. In the total sample, 60% will be refugees and 40% host communities. The mixed farmer group list was the sampling frame; at an interval of 2 data points a group was selected. From the selected groups, in each group five respondents were picked using the systematic procedure where at an interval of 5 data points a respondent was chosen. The application of this procedure took into consideration the proportion of refugee verses the host population in the groups.

Focus group discussion (FGD)

It was planned that in each sub-county only one FGD would be conducted. This is because the production characteristics for farmer groups in the sub-county is similar including their socio-demographic characteristics. One group could provide reliable data. Random sampling was applied to select a group for the exercise. In the refugee communities, 2 focus group discussions were conducted from each settlement; one with refugee women groups and another with mixed groups.

Key Informant Interviews (KII)

For KII, using purposive sampling three key sub-county leaders were selected. The use of this sampling procedure is to pick out the offices/departments that are relevant to NURI programme. The sample was calculated using a confidence level of 85% and 2% margin of error. A summary is provided in the table below:

Summary of number of groups per strategic crop type selected for the study

Onions	Beans	Potatoes	Soybeans	Rice	Sesame	Cassava	Maize	Sunflower
6	50	12	58	1	62	22	2	40

Summary of total number of interviews conducted

	Arua	Madi-Okollo	Nebbi	Pakwach	Zombo	Kitgum	Lamwo	Agago	Total
HH interviews	370	50	125	80	115	175	320	285	1,520
No. of FGD	5	3	5	5	5	5	5	5	38
No. of KII	15	9	15	15	15	15	15	15	114

Table 1: Sub-counties visited per district and number of households covered.

Name of District	Name of Sub-county	No. of HHS visited per Sub-county	Total No. of HHS covered in District
AGAGO	WOL	65	285
	KOTOMOR	60	
	LIRA PALWO	60	
	OMIA PACWA	55	
	ADILANG	45	

Name of District	Name of Sub-county	No. of HHs visited per Sub-county	Total No. of HHs covered in District
KITGUM	OROM	70	174
	AMIDA	35	
	MATIDI	35	
	MUCWINI	19	
	NAMOKORA	15	
LAMWO	PALABEK KAL	74	283
	AGORO	62	
	PALABEK OGILI	53	
	MADI-OPEI	39	
	PALOGA	32	
	PATIKA	15	
	PALABEK	8	
ARUA	LOGIRI	45	136
	VURRA	35	
	ARIVU	30	
	AJIA	25	
MADI-OKOLLO	EWANGA	45	45
NEBBI	AKWORO	30	125
	ERUSSI	30	
	KUCWINY	25	
	NDHEW	20	
	NEBBI	20	
PAKWACH	ALWI	25	80
	WADELAI	25	
	PANYIMUR	20	
	PAKWACH	10	
TEREGO	ODUPI	45	133
	OMUGO	41	
	KATRINI	25	
	AIVU	23	
ZOMBO	ABANGO	25	115
	ATYAK	20	
	KANGO	25	
	PAIDHA	20	
	ZEU	25	

Mixed Refugee Households

Table 2: Refugee settlements visited, and number of households covered.

Settlement	Number of HHs visited
PALABEK	33

Settlement	Number of HHs visited
RHINO CAMP	90

Methods of Data Collection

Data collection was conducted through quantitative and qualitative methods.

Structured interviewing: Structured direct interviews were carried out with new nationals, mixed refugees who were participating in implementation of NURI activities. Individual questionnaire was developed and used to collect data from each of the afore-mentioned category of respondents. Each questionnaire covered questions on a wide range of aspects including socio economic characteristics, farmer group establishment activities, CSA training attendance & learning new practices, strategic crop, and application of CSA practices on farmer fields and post-harvest handling.

Key informant interview: In-depth interviews were held with various key informants selected from key stakeholders. The key informants mainly included leaders of district local government (*Local council executive members, Chief Administrative Officers, Community Development Officers, Subcounty chiefs*), district agricultural Officials and refugee leaders. A key informant interview guide was used to collect the required data.

Focus group discussion; FGDs were organized and conducted with groups of farmers. These helped in providing insights and explanations on knowledge and practices by the farmers. Using a developed FGD guide, the discussions were held with various groups of farmers, each group with 15-30 people.

Data quality control: To ensure quality of data, the NURI recruited study research assistants among its field workers in each district. The identified staff were graduates, conversant with Luo language and had skills and experience in conducting data collection, in-depth interviewing, and moderating focus group discussions. A 4-days training workshop was held to equip all the identified research Assistants with the requisite skills and competences in both data collection procedures and correctly translating the tools in Lou language. All the study tools were pre-tested to ensure adequacy prior to the main field work exercise.

During field work, all the completed data collection tools were edited at the end of each day and identified errors were addressed the following day. All the filled tools were kept under lock and key to limit accessibility to prevent data tampering.

1.4 Data Processing and Analysis

All filled questionnaires were verified, edited (in the field and in office) and electronically captured using the statistical package, EpiData, a software enriched with data validation instruments to ensure minimal data entry errors. EpiData software was selected due to its capabilities; ease of use - especially during the development of data entry module and data cleaning, free of charge and versatility, with ability to export data to various statistical packages including SPSS. Double data entry system was used to ensure a high degree of accuracy of captured data. After data entry, data were cleaned and exported to SPSS software (Statistical Package for Social Scientists) for processing and analysis. SPSS was easily accessible and could handle the required analysis of the study with limited programming. Both univariate and bivariate analysis were performed based on the study objective.

2.0 RESULTS FOR NEW NATIONAL FARMER GROUPS

2.1 Socio-demographic Characteristics of Respondents

Gender of respondents

Both male and female members of the farmers' groups were interviewed for this CSA Adoption Study. Females were slightly more than the males at 56.2% and 43.8% respectively except in Madi-Okollo and Nebbi districts where males were slightly more than females. Although the results here is dependant on the sample size, there is a general observation from activity monitoring reports that there are more females than males in the NURI programme.

Age of respondents

About 80% of respondents were adults aged at least 29 years and the youth aged between 18 to 28 years constituted 21% of the sample. The distribution of participants by age was similar in Acholi region across the districts where the youth were slightly over 20% of the sample. For West Nile region, the proportion of the youth respondents was less than 20% in each of the 4 districts and over 20% in each of the 2 districts. Similarly, most heads of the households (about 90%) visited were adults aged above 28 years and only 10% of the household heads were youth, aged between 18-28 years. Note that the districts in West Nile regions had fewer youth household heads (less than 10%) than those in Acholi regions (over 10%). (See Table 3).

Household category

Results further reveal that 86.3% of the households were male headed, with only 13.7% headed by females. There was no child headed and female managed households registered during the study. The highest number of female headed households surveyed were found in Madi-Okollo and Pakwach comprising 22.2% and 22.5% of the sample.

Occupation of respondents

Nearly all persons who participated in this CSA Adoption study were farmers themselves; the main occupation for 94.3% of the respondents was farming, 3.2% were business people while 2.5% were engaged in other activities. About half the respondents whose main occupation is business were found in Terego district (newly gazetted and formerly covered under Arua district) while those in other activities other than farming and business were mostly found in Lamwo district.

Education status of respondents

The results show that farmers with formal and no formal education participated in this CSA Adoption Study. Overall, 13.9% of the respondents had no formal education, meaning that 86.1% had formal education. Slightly over half (55.9%) had Primary level education, 25.2% Secondary School level while those with post-secondary were only 5% in the sample. Across the nine (9) districts, the highest level of education attended by the respondents was Upper-level primary education that is P.5 – P.7, reported by 35.7% of all respondents. Study respondents with no formal education were mostly drawn from Kitgum (19.8%), Agago (17.4%), Pakwach (16.5%) and Madi-Okollo (15.6%). Terego district had the least number of study participants with no formal education at 7.9% (See Table 3 below).

Table 3: Socio-demographic characteristics of respondents from farmers' groups

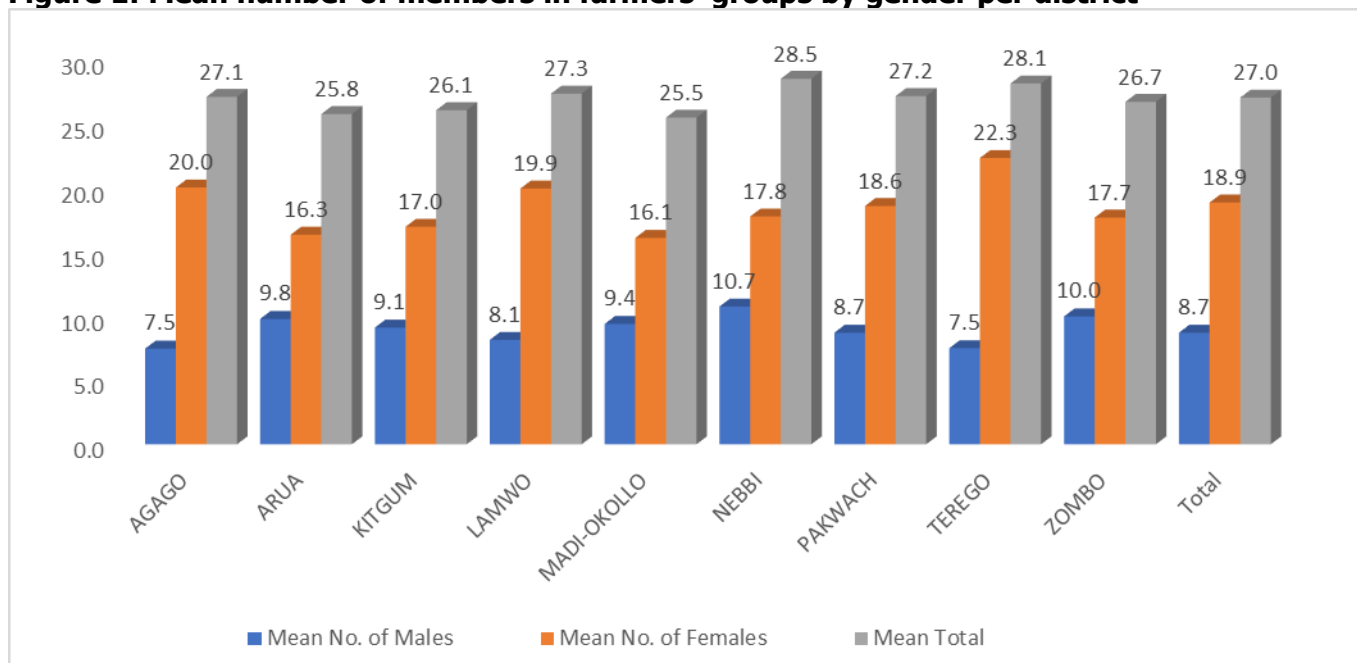
		AGAGO		ARUA		KITGUM		LAMWO		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
Sex of the respondent	Male	119	41.8	65	47.1	77	44.3	109	38.7	23	51.1	66	55.0	35	43.8	48	39.0	53	47.3	595	43.8
	Female	166	58.2	73	52.9	97	55.7	173	61.3	22	48.9	54	45.0	45	56.2	75	61.0	59	52.7	764	56.2
Age of the respondent	18-28	79	27.7	23	17.2	37	21.3	69	21.8	29	21.5	9	7.2	10	12.5	33	24.6	22	19.1	311	20.8
	29-38	69	24.2	48	35.8	66	37.9	120	38.0	51	37.8	26	20.8	21	26.2	55	41.0	28	24.3	484	32.3
	39-48	69	24.2	34	25.4	36	20.7	68	21.5	33	24.4	40	32.0	19	23.8	24	17.9	34	29.6	357	23.8
	49+	68	23.9	29	21.6	35	20.1	59	18.7	22	16.3	50	40.0	30	37.5	22	16.4	31	27.0	346	23.1
Highest level of education attended	No formal education	49	17.4	18	12.7	34	19.8	30	10.7	7	15.6	16	12.9	13	16.5	10	7.9	12	10.5	189	13.9
	Lower primary P1–4	57	20.3	35	24.6	28	16.3	65	23.2	6	13.3	20	16.1	18	22.8	19	15.1	27	23.7	275	20.2
	Upper primary P5 –7	95	33.8	54	38.0	50	29.1	94	33.6	19	42.2	58	46.8	24	30.4	42	33.3	51	44.7	487	35.7
	O-level	70	24.9	28	19.7	44	25.6	68	24.3	11	24.4	26	21.0	22	27.8	35	27.8	19	16.7	323	23.7
	A-level	3	1.1	2	1.4	4	2.3	3	1.1	2	4.4	1	0.8	0	0.0	4	3.2	2	1.8	21	1.5
	Tertiary Institution	7	2.5	4	2.8	12	7.0	19	6.8	0	0.0	2	1.6	2	2.5	16	12.7	3	2.6	65	4.8
University Education	0	0.0	1	0.7	0	0.0	1	0.4	0	0.0	1	0.8	0	0.0	0	0.0	0	0.0	3	0.2	
Main occupation of the respondent:	Farming	282	98.9	128	90.1	169	97.1	265	94.3	39	86.7	123	98.4	78	97.5	99	78.0	113	98.3	1296	94.3
	Business	2	0.7	8	5.6	4	2.3	6	2.1	3	6.7	1	0.8	0	0.0	20	15.7	0	0.0	44	3.2
	Others	1	0.4	6	4.2	1	0.6	10	3.6	3	6.7	1	0.8	2	2.5	8	6.3	2	1.7	34	2.5
Category of the household	Male headed	257	90.2	115	81.0	153	87.9	241	85.2	35	77.8	111	88.8	62	77.5	114	89.8	99	86.1	1187	86.3
	Female headed	28	9.8	27	19.0	21	12.1	42	14.8	10	22.2	14	11.2	18	22.5	13	10.2	16	13.9	189	13.7
Age of household head	18-28	51	17.9	12	9.0	21	12.1	33	10.5	13	9.8	6	4.8	7	9.0	12	9.0	10	8.7	165	11.1
	29-38	66	23.2	43	32.1	63	36.2	116	37.1	52	39.1	21	16.8	17	21.8	49	36.8	29	25.2	456	30.6
	39-48	81	28.4	39	29.1	36	20.7	77	24.6	42	31.6	35	28.0	22	28.2	34	25.6	36	31.3	402	27.0
	49+	87	30.5	40	29.9	54	31.0	87	27.8	26	19.5	63	50.4	32	41.0	38	28.6	40	34.8	467	31.3

2.2 Farmer Group Establishment

Group membership

On average each farmer group comprised of 25–30 members. By gender, majority of members in the farmer groups were female, with some groups having as many as 22 females and only 7 males. (see Figure 1 below). Within the farmer groups the number of youths (18-28 years) was notable with the highest numbers registered in Madi-Okollo and Terego having mean number of 10.3 and 10 youths per group respectively.

Figure 1: Mean number of members in farmers’ groups by gender per district



Group functionality before and after start of NURI

All these farmers’ groups were formed during the predecessor RDNUC programme and were expected to set up all the required governance structures, policies and guidelines but were not supported at the time. With the introduction of NURI, several trainings and other support was given to the farmers’ groups to ensure they function well including, but not limited to, helping them set clear goals, develop a Constitution that binds all group members, elect leadership and hold regular meetings. This CSA Adoption Study, therefore sought to establish, the number of respondents who belonged to groups that functioned well prior to the CSA training under the NURI programme. Results show that generally the farmers’ groups were functional even before the CSA training. For instance, 90.9% acknowledged that their groups had a clear goal and objectives even before start-up of the CSA trainings. Equally 88.3% affirmed that their groups had a constitution which was binding to all members prior to the CSA training. All respondents from Nebbi, Pakwach, Terego and Zombo revealed that even prior to the CSA training, their groups had leadership which was elected by the members. Although in the remaining districts not all respondents shared the same view, those who attested to having elected leadership even before NURI was more than 85%.

Results further show that all groups held regular meetings and kept proper records or documentation of

the group's activities. All participants from Nebbi (100%), Pakwach and Zombo acknowledged that their groups kept proper records/documentation of all their activities while over 88% from Agago, Kitgum, Arua, Madi-Okollo and Terego attested to the same. Only in Lamwo, were notable participants (22.3%) who said their groups were not keeping proper records prior to the CSA training by NURI (See Table 4).

Leadership of farmer groups

Regarding leadership, composition of the committees varied, whereas some groups had six (6) positions of leadership, others had four (4) positions, these include the Group Chairperson, Treasurer, Secretary and Publicity/Mobiliser. Those that had six (6) positions on the groups' leadership added on the position of Vice Chairperson and that of Security. Results show that whereas all respondents (1,372) acknowledged that their Group had a Chairperson, slightly fewer (1,291) acknowledged having a Group's Vice Chairperson. In terms of gender, majority of respondents (65.6%) reported having male Group Chairpersons while the position of Treasurer was nearly a preserve for women; 88.7% of all respondents across the nine (9) districts reported having a female Treasurer. For groups that had position of Vice Chairperson on their committee, the bearers of this position were mostly females, reported by 65.6% of respondents. See Table 4 below for detailed district analysis of gender filling of the leadership positions.

Table 4: Respondents who belonged to farmers groups that had good governance structures prior to the CSA training

	AGAGO		ARUA		KITGUM		LAMWO		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total		
	HHs	(%)	HHs	(%)	HHs	(%)	HHs	(%)	HHs	(%)	HHs	(%)	HHs	(%)	HHs	(%)	HHs	(%)	HHs	(%)	
Existence of good governance measures before start of CSA training																					
Clear goal/objective/plan		238	88.5	131	92.3	153	92.7	209	77.7	39	86.7	124	100.0	80	100.0	126	99.2	115	100.0	1215	90.9
Constitution & if members abide by it		242	90.0	129	91.5	140	84.3	219	81.4	40	88.9	120	96.0	75	93.8	121	95.3	95	82.6	1181	88.3
Leadership & if they were elected		247	91.8	131	92.3	158	95.2	231	85.9	40	88.9	125	100.0	80	100.0	127	100.0	115	100.0	1254	93.7
Proper records/documentation of group activities		239	88.8	132	93.0	148	89.2	209	77.7	40	88.9	125	100.0	80	100.0	125	98.4	115	100.0	1213	90.7
Regular meetings & attendance by members		245	91.4	130	91.5	152	92.7	217	80.7	38	84.4	124	100.0	80	100.0	115	90.6	114	100.0	1215	91.1
The gender elected to fill the positions																					
Group Chairperson	Male	176	61.8	100	70.4	123	70.7	176	62.2	15	33.3	90	73.2	55	68.8	80	63.0	85	75.2	900	65.6
	Female	109	38.2	42	29.6	51	29.3	107	37.8	30	66.7	33	26.8	25	31.2	47	37.0	28	24.8	472	34.4
Vice Chairperson	Male	72	28.1	60	44.4	69	40.8	94	34.9	25	62.5	33	27.0	13	16.5	46	40.7	32	29.6	444	34.4
	Female	184	71.9	75	55.6	100	59.2	175	65.1	15	37.5	89	73.0	66	83.5	67	59.3	76	70.4	847	65.6
Treasurer	Male	27	9.5	20	14.1	22	12.6	25	8.8	0	0.0	21	17.1	6	7.5	19	15.0	15	13.3	155	11.3
	Female	258	90.5	122	85.9	152	87.4	258	91.2	45	100.0	102	82.9	74	92.5	108	85.0	98	86.7	1217	88.7
Secretary	Male	227	79.6	121	85.2	170	97.7	220	77.7	35	77.8	115	93.5	60	75.0	95	74.8	84	74.3	1127	82.1
	Female	58	20.4	21	14.8	4	2.3	63	22.3	10	22.2	8	6.5	20	25.0	32	25.2	29	25.7	245	17.9
Publicity/Mobiliser	Male	141	51.3	112	85.5	67	39.6	134	47.5	20	45.5	91	74.0	38	48.7	74	66.1	63	57.3	740	55.9
	Female	134	48.7	19	14.5	102	60.4	148	52.5	24	54.5	32	26.0	40	51.3	38	33.9	47	42.7	584	44.1
Security	Male	178	64.7	112	86.2	145	85.3	184	67.2	37	88.1	82	68.9	51	76.1	79	66.9	70	69.3	938	72.4
	Female	97	35.3	18	13.8	25	14.7	90	32.8	5	11.9	37	31.1	16	23.9	39	33.1	31	30.7	358	27.6
Others	Male	3	33.3	33	73.3	7	100.0	8	33.3	11	50.0	19	57.6	28	80.0	27	50.0	28	50.9	164	57.7
	Female	6	66.7	12	26.7	0	0.0	16	66.7	11	50.0	14	42.4	7	20.0	27	50.0	27	49.1	120	42.3

2.3 CSA Training and Learning New Practices.

Training by NURI and other sources

All members of the various farmer groups were given opportunity to benefit from the CSA training. Results show that all who participated in this CSA Adoption study except one (1) person from Terego district received training on CSA from NURI extension staff. This denotes a 99.9% participation in the CSA training. For the majority (84.3%), the CSA training they received from NURI extension staff was the first training their group had received since its establishment. Only 15.7% of the respondents had received such trainings before the start of the NURI programme, most of whom found in Arua (38.3%) and Madi-Okollo (28.9%). KIIs indicated a higher level of training in CSA prior to NURI than that expressed by farmers.

Attendance of training sessions by farmer groups

In 2019, NURI extension staff organized and conducted 10 CSA training sessions with each farmers' group. The sessions conducted include climate change and impact, CSA practices and technologies, enterprise selection for groups, seed bed preparation, planting intercropping and weeding, pests and disease control, soil fertility and water management, post-harvest handling and value addition, business skills as well as marketing.

Attendance for all the sessions conducted across the districts was generally high. More than 80% of the respondents acknowledged attending full sessions of the training each time they were organized. Amongst the different sessions/topics, small variations in attendance are observed. "Seed bed preparation, planting, intercropping and weeding" was by far the most popular session/topic, reportedly attended by 98.4% of all respondents covered in this survey. This means that only 1.6% did not attend this session. In terms of attendance this was followed by "Enterprise selection for groups" reported attended by 95.8% of all respondents. The session with least attendance was "Business skills" missed by 14.3% of the respondents and "climate change and impact" missed by 12.2%. Results show that notable proportions of those who never attended the "Business skills" training session were from Lamwo (19.8%), Kitgum (19%), Agago (13.7%), Arua (13.4%), Pakwach (12.5%) and Zombo (12.4%). Similarly, most farmers that never attended the session on "climate change and impact" were from Pakwach (18.8%), Lamwo (17.7%), Nebbi (15.2%) and Agago (14.7%). On a positive note, all farmers from Pakwach fully attended the session on "CSA practices and technologies".

Interviews with KIIs corroborated findings of the farmers' household survey; 49.1% and 47.3% of the KIIs that monitored the CSA training rated the attendance as good and very good respectively. Out of the 96 KIIs interviewed, 56.2% monitored the CSA trainings delivered by NURI extension staff.

CSA Training evaluation by participants

Majority of respondents that attended the CSA training sessions appreciated the organization of the sessions. Slightly over 90% acknowledged that the duration of the training sessions was appropriate. Only 6.7% felt the training sessions were too short while 2.8% said the sessions were too long.

About the timing of the CSA trainings in relation to the farming calendar, majority of respondents acknowledged it was good timing. Half of the respondents 50.3% and 41.3% rated the period in which

the training sessions were organized and conducted as “Good” and “Very good” respectively. This means 91.6% found the timing perfect; the various sessions were organized and conducted following the farming calendar. For instance, sessions on climate change and impact, CSA practices and technology as well as enterprise selection for groups were all conducted before the start of the planting season. Post-harvest handling and value addition were organized prior to harvesting.

Almost all (98.4%) of respondents that attended the training rated the training methods used in the sessions as good (47.6%) or very good (50.9%). Only 1.6% felt the methods used were not good enough and need improvement (See Tables 5 and 6 for respondents from Acholi sub-region and West Nile respectively). Similar views, and rating on the methods used to deliver the CSA training sessions, were held by KIIs that monitored the trainings (see Figure 3 below).

Figure 2: KIIs rating of the methodology used by NURI extension staff to deliver CSA trainings.

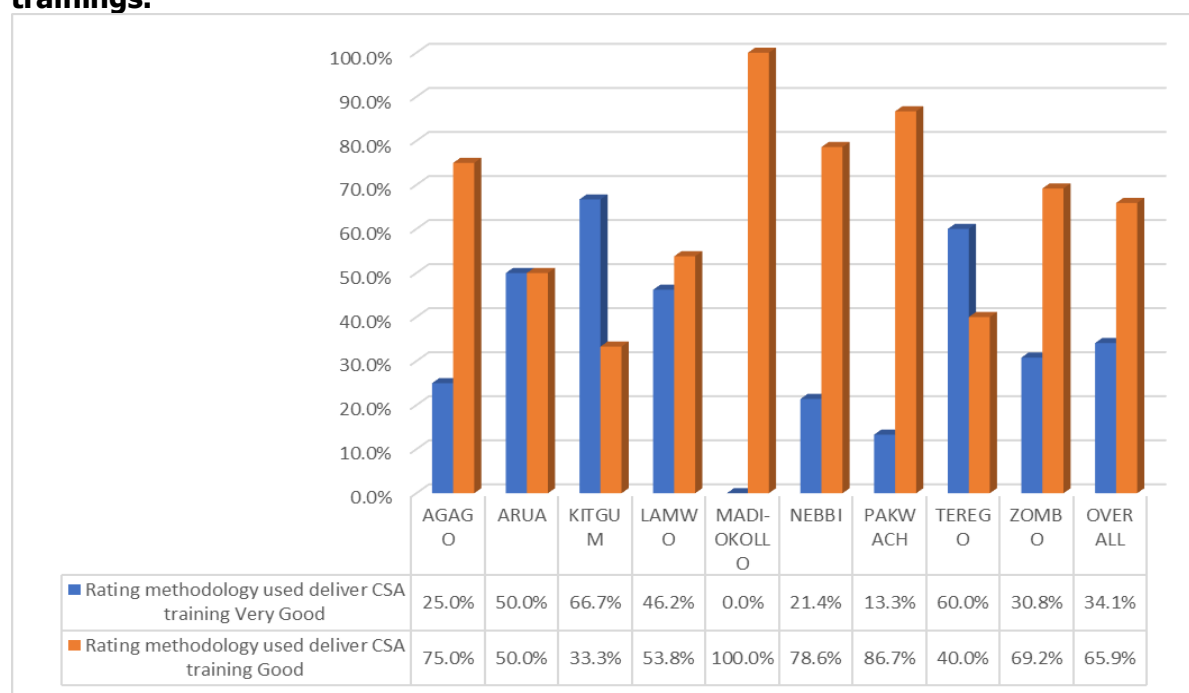


Table 5: Reported impact of CSA training on on-farm production activities by respondents from Acholi subregion

		AGAGO		KITGUM		LAMWO	
		HHs	(%)	HHs	(%)	HHs	(%)
% who received training on CSA from NURI extension staff	Yes	285	100.0	174	100.0	283	100.0
Was NURI CSA training the first extension training group received	Yes	269	94.4	156	89.7	242	85.8
	No	16	5.6	18	10.3	40	14.2
Reported sources of training on CSA							
	NGO	15		15		37	
	Government	1		9		0	
	Faith based	0		0		1	
	Peer learning	0		0		0	
	Others	0		0		0	
Sessions attended conducted by NURI in 2019							
Setting ground rules	Fully	234	82.1	145	83.3	231	81.9
	Partially	3	1.1	2	1.1	9	3.2
	Not at all	48	16.8	27	15.5	42	14.9
Climate, climate Change & impact	Fully	241	84.6	150	86.2	219	77.7
	Partially	2	0.7	5	2.9	13	4.6
	Not at all	42	14.7	19	10.9	50	17.7
CSA practices & technologies	Fully	246	86.3	153	88.4	243	85.9
	Partially	7	2.5	4	2.3	10	3.5
	Not at all	32	11.2	16	9.2	30	10.6
Enterprise selection for groups	Fully	270	95.1	162	93.6	261	92.6
	Partially	1	0.4	3	1.7	5	1.8
	Not at all	13	4.6	8	4.6	16	5.7
Seed bed preparation, planting, intercropping & weeding	Fully	280	98.2	166	96.0	272	96.1
	Partially	2	0.7	3	1.7	5	1.8
	Not at all	3	1.1	4	2.3	6	2.1
Pests & disease control	Fully	266	93.3	151	87.3	235	83.0
	Partially	3	1.1	4	2.3	7	2.5
	Not at all	16	5.6	18	10.4	41	14.5
Soil fertility & water management	Fully	271	95.4	149	86.1	220	78.0
	Partially	3	1.1	7	4.0	10	3.5

		AGAGO		KITGUM		LAMWO	
		HHs	(%)	HHs	(%)	HHs	(%)
	Not at all	10	3.5	17	9.8	52	18.4
Post-harvest handling & value addition	Fully	268	94.4	152	87.4	244	86.5
	Partially	3	1.1	6	3.4	6	2.1
	Not at all	13	4.6	16	9.2	32	11.3
Business skills	Fully	238	83.8	137	78.7	214	75.6
	Partially	7	2.5	4	2.3	13	4.6
	Not at all	39	13.7	33	19.0	56	19.8
Marketing	Fully	251	90.0	153	90.5	227	80.8
	Partially	6	2.2	3	1.8	10	3.6
	Not at all	22	7.9	13	7.7	44	15.7
Rating of the duration of training sessions	Too short	12	4.2	8	4.6	32	11.3
	Too long	5	1.8	12	6.9	12	4.2
	Appropriate	268	94.0	154	88.5	239	84.5
Rating of the period for the training sessions/days in relation	Very Good	81	29.5	24	14.2	52	18.5
	Good	177	64.4	121	71.6	175	62.3
	Fair	15	5.5	24	14.2	43	15.3
	Poor	2	0.7	0	0.0	11	3.9
Rating of the training methods used during the sessions	Very Good	75	26.8	50	28.9	117	41.5
	Good	201	71.8	121	69.9	156	55.3
	Fair	4	1.4	2	1.2	9	3.2
	Poor	0	0.0	0	0.0	0	0.0
Sessions considered relevant to daily on-farm production activities							
Climate, climate Change & impact	Very relevant	194	68.3	123	71.9	190	69.1
	Fairly relevant	36	12.7	19	11.1	48	17.5
	Not relevant	54	19.0	29	17.0	37	13.5
CSA practices & technologies	Very relevant	202	71.4	125	74.0	205	74.5
	Fairly relevant	38	13.4	26	15.4	45	16.4
	Not relevant	43	15.2	18	10.7	25	9.1
Enterprise selection for groups	Very relevant	240	85.1	145	84.8	226	81.3
	Fairly relevant	13	4.6	11	6.4	26	9.4
	Not relevant	29	10.3	15	8.8	26	9.4

		AGAGO		KITGUM		LAMWO	
		HHs	(%)	HHs	(%)	HHs	(%)
Seed bed preparation, planting, intercropping & weeding	Very relevant	274	96.5	164	94.3	267	94.7
	Fairly relevant	8	2.8	8	4.6	13	4.6
	Not relevant	2	0.7	2	1.1	2	0.7
Pests & disease control	Very relevant	189	66.8	124	72.5	202	73.7
	Fairly relevant	52	18.4	23	13.5	39	14.2
	Not relevant	42	14.8	24	14.0	33	12.0
Soil fertility & water management	Very relevant	198	70.0	120	70.6	191	69.7
	Fairly relevant	55	19.4	24	14.1	45	16.4
	Not relevant	30	10.6	26	15.3	38	13.9
Post-harvest handling & value addition	Very relevant	248	87.6	137	79.7	226	83.1
	Fairly relevant	17	6.0	22	12.8	30	11.0
	Not relevant	18	6.4	13	7.6	16	5.9
Business skills	Very relevant	232	82.6	128	74.4	193	70.7
	Fairly relevant	11	3.9	18	10.5	41	15.0
	Not relevant	38	13.5	26	15.1	39	14.3
Marketing	Very relevant	245	86.9	137	79.7	208	77.3
	Fairly relevant	12	4.3	24	14.0	35	13.0
	Not relevant	25	8.9	11	6.4	26	9.7
Reported extent to which training improved agricultural production knowledge	No change	0	0.0	1	0.6	1	0.4
	Little extent	5	1.8	11	6.4	13	4.6
	Moderate extent	126	45.0	67	38.7	110	39.1
	A large extent	149	53.2	94	54.3	157	55.9
% who would recommend other farmers in their community to attend a similar training	Yes	281	98.6	168	97.1	277	97.9
	No	4	1.4	5	2.9	6	2.1

Table 6: Reported impact of CSA training on on-farm production activities by respondents from West Nile districts

		ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
% who received training on CSA from NURI extension staff		141	100	45	100	125	100	80	100	126	99.2	115	100	1374	99.9
Was NURI CSA training the first extension training group received	Yes	87	61.7	32	71.1	102	81.6	75	93.8	91	72.2	104	90.4	1158	84.3
	No	54	38.3	13	28.9	23	18.4	5	6.2	35	27.8	11	9.6	215	15.7
Reported sources of training on CSA															
	NGO	52		10		13		5		27		6		180	
	Government	11		2		9		0		13		3		48	
	Faith based	0		0		0		0		0		0		1	
	Peer learning	5		0		0		0		2		0		7	
	Others	0		0		0		0		1		2		3	
Sessions attended conducted by NURI in 2019															
Setting ground rules	Fully	122	85.9	41	91.1	110	88.0	75	93.8	106	83.5	102	88.7	1166	84.8
	Partially	9	6.3	4	8.9	1	0.8	1	1.2	7	5.5	1	0.9	37	2.7
	Not at all	11	7.7	0	0.0	14	11.2	4	5.0	14	11.0	12	10.4	172	12.5
Climate, climate Change & impact	Fully	126	88.7	42	93.3	102	81.6	63	78.8	105	83.3	100	87.0	1148	83.6
	Partially	11	7.7	2	4.4	4	3.2	2	2.5	14	11.1	5	4.3	58	4.2
	Not at all	5	3.5	1	2.2	19	15.2	15	18.8	7	5.6	10	8.7	168	12.2
CSA practices & technologies	Fully	130	91.5	43	95.6	119	95.2	80	100	115	90.6	111	96.5	1240	90.2
	Partially	10	7.0	1	2.2	3	2.4	0	0.0	9	7.1	1	0.9	45	3.3
	Not at all	2	1.4	1	2.2	3	2.4	0	0.0	3	2.4	3	2.6	90	6.5
Enterprise selection for groups	Fully	125	88.7	42	93.3	123	98.4	78	97.5	107	84.9	112	97.4	1280	93.4
	Partially	11	7.8	2	4.4	2	1.6	0	0.0	10	7.9	0	0.0	34	2.5
	Not at all	5	3.5	1	2.2	0	0.0	2	2.5	9	7.1	3	2.6	57	4.2
Seed bed preparation, planting, intercropping & weeding	Fully	127	89.4	39	86.7	122	97.6	79	98.8	120	94.5	114	99.1	1319	95.9
	Partially	13	9.2	5	11.1	1	0.8	0	0.0	5	3.9	0	0.0	34	2.5
	Not at all	2	1.4	1	2.2	2	1.6	1	1.2	2	1.6	1	0.9	22	1.6
	Pests & disease control	125	88.0	38	84.4	120	96.0	73	91.2	111	87.4	112	97.4	1231	89.5

		ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
	Partially	10	7.0	7	15.6	1	0.8	3	3.8	7	5.5	0	0.0	42	3.1
	Not at all	7	4.9	0	0.0	4	3.2	4	5.0	9	7.1	3	2.6	102	7.4
Soil fertility & water management	Fully	132	93.0	42	93.3	122	98.4	76	95.0	105	82.7	109	94.8	1226	89.4
	Partially	6	4.2	2	4.4	0	0.0	2	2.5	12	9.4	0	0.0	42	3.1
	Not at all	4	2.8	1	2.2	2	1.6	2	2.5	10	7.9	6	5.2	104	7.6
Post-harvest handling & value addition	Fully	127	89.4	43	95.6	117	93.6	75	93.8	115	90.6	112	98.2	1253	91.3
	Partially	7	4.9	2	4.4	3	2.4	1	1.2	8	6.3	0	0.0	36	2.6
	Not at all	8	5.6	0	0.0	5	4.0	4	5.0	4	3.1	2	1.8	84	6.1
Business skills	Fully	104	73.2	36	80.0	107	85.6	69	86.2	95	74.8	98	86.7	1098	80.0
	Partially	19	13.4	6	13.3	6	4.8	1	1.2	21	16.5	1	0.9	78	5.7
	Not at all	19	13.4	3	6.7	12	9.6	10	12.5	11	8.7	14	12.4	197	14.3
Marketing	Fully	120	84.5	44	97.8	118	94.4	79	98.8	108	85.7	109	98.2	1209	89.0
	Partially	8	5.6	0	0.0	3	2.4	0	0.0	12	9.5	1	0.9	43	3.2
	Not at all	14	9.9	1	2.2	4	3.2	1	1.2	6	4.8	1	0.9	106	7.8
Rating of the duration of training sessions	Too short	12	8.5	1	2.2	6	4.8	6	7.5	10	7.9	5	4.3	92	6.7
	Too long	2	1.4	0	0.0	1	0.8	1	1.2	3	2.4	2	1.7	38	2.8
	Appropriate	127	90.1	44	97.8	118	94.4	73	91.2	114	89.8	108	93.9	1245	90.5
Rating of the period for the training sessions/days in relation	Very Good	87	64.9	29	67.4	81	65.9	50	62.5	74	58.3	76	68.5	554	41.3
	Good	38	28.4	13	30.2	39	31.7	30	37.5	48	37.8	34	30.6	675	50.3
	Fair	8	6.0	1	2.3	1	0.8	0	0.0	1	0.8	1	0.9	94	7.0
	Poor	1	0.7	0	0.0	2	1.6	0	0.0	4	3.1	0	0.0	20	1.5
Rating of the training methods used during the sessions	Very Good	102	73.9	36	80.0	83	66.4	52	65.0	84	67.7	94	81.7	693	50.9
	Good	34	24.6	9	20.0	42	33.6	27	33.8	38	30.6	20	17.4	648	47.6
	Fair	1	0.7	0	0.0	0	0.0	1	1.2	2	1.6	1	0.9	20	1.5
	Poor	1	0.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
Sessions considered relevant to daily on-farm production activities															
Climate, climate Change & impact	Very relevant	137	96.5	45	100	110	88.0	66	82.5	118	92.9	106	94.6	1089	80.0

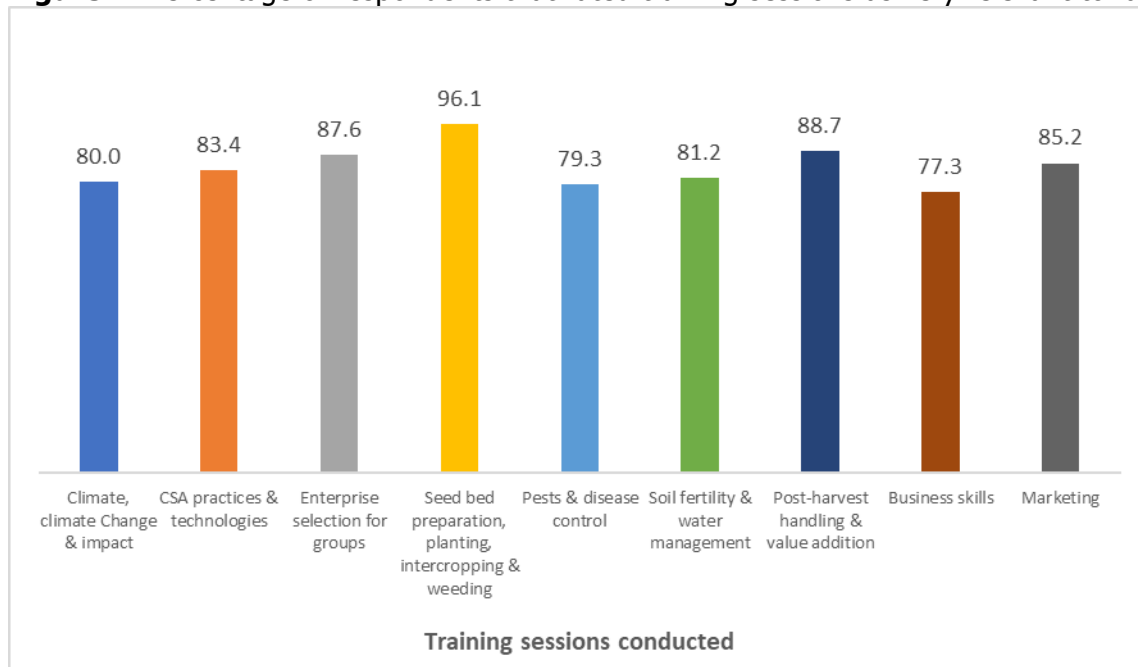
		ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total		
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	
	Fairly relevant	4	2.8	0	0.0	3	2.4	4	5.0	8	6.3	1	0.9	123	9.0	
	Not relevant	1	0.7	0	0.0	12	9.6	10	12.5	1	0.8	5	4.5	149	10.9	
CSA practices & technologies	Very relevant	131	92.3	44	97.8	117	94.4	76	96.2	120	94.5	112	98.2	1132	83.4	
	Fairly relevant	10	7.0	1	2.2	5	4.0	2	2.5	7	5.5	1	0.9	135	9.9	
	Not relevant	1	0.7	0	0.0	2	1.6	1	1.3	0	0.0	1	0.9	91	6.7	
Enterprise selection for groups	Very relevant	127	90.1	40	88.9	120	96.0	79	100	104	82.5	111	98.2	1192	87.6	
	Fairly relevant	14	9.9	5	11.1	3	2.4	0	0.0	20	15.9	0	0.0	92	6.8	
	Not relevant	0	0.0	0	0.0	2	1.6	0	0.0	2	1.6	2	1.8	76	5.6	
Seed bed preparation, planting, intercropping & weeding	Very relevant	136	95.8	40	88.9	123	98.4	79	100	124	97.6	111	97.4	1318	96.1	
	Fairly relevant	6	4.2	5	11.1	2	1.6	0	0.0	2	1.6	2	1.8	46	3.4	
	Not relevant	0	0.0	0	0.0	0	0.0	0	0.0	1	0.8	1	0.9	8	0.6	
Pests & disease control	Very relevant	115	81.0	39	86.7	121	96.8	77	97.5	96	77.4	113	99.1	1076	79.3	
	Fairly relevant	21	14.8	6	13.3	3	2.4	0	0.0	21	16.9	0	0.0	165	12.2	
	Not relevant	6	4.2	0	0.0	1	0.8	2	2.5	7	5.6	1	0.9	116	8.5	
Soil fertility & water management	Very relevant	129	90.8	40	88.9	122	97.6	74	93.7	117	94.4	110	96.5	1101	81.2	
	Fairly relevant	12	8.5	4	8.9	0	0.0	2	2.5	6	4.8	0	0.0	148	10.9	
	Not relevant	1	0.7	1	2.2	3	2.4	3	3.8	1	0.8	4	3.5	107	7.9	
Post-harvest handling & value addition	Very relevant	135	95.1	36	80.0	120	96.0	74	93.7	117	94.4	109	96.5	1202	88.7	
	Fairly relevant	5	3.5	9	20.0	2	1.6	3	3.8	6	4.8	1	0.9	95	7.0	
	Not relevant	2	1.4	0	0.0	3	2.4	2	2.5	1	0.8	3	2.7	58	4.3	
Business skills	Very relevant	106	74.6	30	66.7	107	85.6	70	88.6	82	66.1	99	86.8	1047	77.3	
	Fairly relevant	29	20.4	15	33.3	9	7.2	5	6.3	35	28.2	9	7.9	172	12.7	
	Not relevant	7	4.9	0	0.0	9	7.2	4	5.1	7	5.6	6	5.3	136	10.0	
Marketing	Very relevant	126	88.7	36	80.0	113	90.4	74	93.7	101	82.1	110	98.2	1150	85.2	
	Fairly relevant	15	10.6	9	20.0	4	3.2	4	5.1	19	15.4	1	0.9	123	9.1	
	Not relevant	1	0.7	0	0.0	8	6.4	1	1.3	3	2.4	1	0.9	76	5.6	
Reported extent to which training improved		No change	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.1

		ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
agricultural production knowledge	Little extent	1	0.7	1	2.2	0	0.0	0	0.0	8	6.3	2	1.7	41	3.0
	Moderate extent	33	24.4	5	11.1	27	21.6	26	32.5	24	19.0	30	26.1	448	32.9
	A large extent	101	74.8	39	86.7	98	78.4	54	67.5	94	74.6	83	72.2	869	63.9
% who would recommend other farmers in their community to attend a similar training	Yes	139	99.3	45	100	124	99.2	79	98.8	126	100	111	96.5	1350	98.4
	No	1	0.7	0	0.0	1	0.8	1	1.2	0	0.0	4	3.5	22	1.6

Relevance of training to daily on-farm production activities

All the CSA training sessions organized were well appreciated by the farmers in both West Nile and the Acholi sub-region. Over 70% of respondents generally considered all the sessions relevant to their daily on-farm production activities. The most appreciated was the session on “seed bed preparation, planting, intercropping and weeding”, results show that 96.1% said it was very relevant to their daily on-farm production activities. This was followed by the session on “post-harvest handling and value addition” cited by 88.7% as very relevant, enterprise selection for groups (87.6%) and marketing (85.2%). The sessions on business skills and the one on pests and disease control were not as highly appreciated especially by farmers from Madi-Okollo, Terego and Arua.

Figure 2: Percentage of respondents that rated training sessions as very relevant to farm activities.



Farmer knowledge improvement through CSA training

Results further reveal that although relevance of the CSA sessions on the farmers’ daily on-farm production activities varied, all except 2 people which is equivalent to 0.1% attested to the fact that the CSA trainings improved their agricultural production knowledge. This means that 99.9% of the respondents acknowledged that the CSA trainings helped them improve their knowledge although the extent of improvement varied. For 63.9%, the CSA training sessions greatly improved their agricultural production knowledge. Those who said that to a moderate extent the training improved their knowledge were 32.9% while only 3% felt the contribution of the CSA training sessions to their knowledge was little. About 98% expressed that they would gladly recommend other farmers in their communities to attend the CSA training in the future if offered (see Tables 5 and 6 above).

They however suggested that the duration of training be increased to allow participants ample time to understand the subject of discussion, make follow-up of farmers to check how the knowledge imparted is being applied. They also suggested provision of training logistics such as books and pens to enable participants write critical points of learning, as well as provision of learning aids which are translated into the local language to enable participants sustain knowledge.

2.4. APPLICATION OF CSA PRACTICES ON FARMER FIELDS

Strategic crops and CSA practices assessed.

The strategic crops that were assessed were Sesame, Cassava, Soybeans, Sunflower, Beans, Rice, Potatoes and Onions. Only 30% of the respondents were growing strategic crops for the first time and about 70% had grown the crops before. Among those who acknowledged growing strategic crops for the first time, majority (53.7%) of them were from Nebbi district, followed by Kitgum (44.4%) and Lamwo (40.5%). A range of factors that motivated farmers to grow these strategic crops included early maturity (farmers were told those strategic crops mature in a short period of time), high yielding, and availability of a ready market for the produce.

The practices that farmer groups were trained on for up-take were: Seedbed preparation for crop production, use of improved agro-inputs/seeds, method of seed planting, Weed Control and Management, Pest and Disease control, Soil fertility and water management and Post-Harvest Handling. Farmers who participated in the study were asked how they have adopted these practices on their farms.

2.4.1 Seedbed preparation for production

In terms of preparation of land for planting, results show that majority of the farmers used slashing and cutting of shrubs/trees to clear their land before ploughing. None used chemicals. More than half mentioned slashing (58.7%) and cutting shrubs/trees (55.6%) while only 12.3% used bush burning to clear their land for ploughing for the 2020 planting season. Across the nine districts, bush burning was most notable in Kitgum (see Table 7 and 8). Majority of the farmers growing sunflower (81.3%), rice (80%), sesame (71.8%), and soyabeans (60.7%) used mainly cutting shrubs/trees to clear their land while slashing the land for cultivation was employed by most of the growers of onions (83.3%), Irish potatoes (86.3%), cassava (66.1%) and beans (82.4%).

For ploughing, most farmers mentioned use of the hand hoe and animal traction as the method of land tillage used in preparation for the 2020 planting season. The hand hoe was mentioned by 77.4% of respondents while 47.3% mentioned animal traction. Most farmers used animal traction in preparation of land for strategic crops including sunflower (95.1%), soyabeans (60%) and sesame (71.6%). Animal traction was mainly used by farmers from the Acholi subregion; for instance, whereas 92.6% in Agago, 83.9% in Kitgum and 80.6% in Lamwo cited using animal traction, only 8.8% in Nebbi and 2.5% in Pakwach reported using animal traction to plough their land in preparation for the planting season. In West Nile the hand hoe is almost universally used by farmers. Use of tractors was unheard of in nearly all districts. In the entire sample, only 7 farmers of the 1,355 interviewed reported using a tractor to plough their land in preparation for the 2020 planting season.

For number of times land was ploughed before planting the strategic crops, 73.7% reported to have ploughed twice. Those who ploughed the fields once were less than 20%, most of whom found in Lamwo, Kitgum and Agago (see Tables 7 and 8).

The practice of bush burning in the preparation of fields for planting was common among farmers in Kitgum, Madi-Okollo and Nebbi before they received training from NURI extension staff. Farmers with virgin fields would start with cutting of trees, then burn the bushes to clear the grass. After burning,

farmers planted seeds and cover with soil.

I used to cut trees, burn the field, remove tree stamps and then dig holes for planting my cassava cuttings (Farmers from Madi-Okollo).

Before the training, I would start with slashing, burning and then do the first ploughing before actual planting (Farmers from Nebbi).

The CSA training session organized by NURI extension staff on seed bed preparation in 2019 mainly emphasized six Dos and Don'ts, the first being "no burning of fields" as a method of clearing the land in preparation for planting, proper selection of site considering fertility, flood risk, topography, appropriate crop rotation, minimum soil disturbance for large seeded crops, minimal tree cutting, timing and importance of the first and second tillage, as well as good seedbed preparation for small seeded crops. The study sought to establish the level of recall of those Dos and Don'ts, and results show good recall on nearly all elements except on the recommendation for minimum soil disturbance for large seeded crops. Results show that less than half the respondents (48.1%), recall being cautioned against soil disturbance. But for bush burning, nearly everyone (93.7%) recalled being warned against burning as a method of clearing land for planting. Further, 87.4% most of whom were from West Nile recall being told about the importance of tilling their lands twice before planting and creating a good seedbed for small seeded crops. An equally big proportion (85.8%) again from West Nile also recalled being told about the importance of "good seedbed preparation" (see Tables 7 and 8 above).

For many of the farmers, the elements (i.e., the Dos and Don'ts) emphasized under seedbed preparation during the CSA training, such as no burning of fields, first and second tillage, were new. Results show that 85.9% acknowledged that it was the first time they were learning about those elements. In the entire sample, only 14.1% reportedly did not find any new elements of seedbed preparation during the training. Notable proportions of farmers who did not find any new elements were residents of Madi-Okollo, Terego, Lamwo and Arua districts. Indeed, in Madi-Okollo, elements of good seedbed preparation were observed in all the farmers' fields (100%). In Arua, these elements were observed on 98.6% of all farmers' fields visited. In Acholi subregion practice of the newly acquired knowledge from CSA trainings on good seedbed preparation was mostly evident in Lamwo where the review team observed use of good seedbed preparation measures on 70% of the farmers' fields visited compared to 61.3% in Agago and 53.6% in Kitgum (See Tables 7 and 8).

Adoption of elements of good seedbed preparation learnt from the CSA training was mostly influenced by the need for farmers to get good harvests, give seeds a healthy start, improve soil water holding capacity, conserve soil fertility while others simply wanted to put to test the teachings from the NURI extension staff and see how they resulted in higher productivity.

Table 7: On-farm production practices adopted by farmers in West Nile in the 2020 planting season.

		ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
% for whom it was the first time growing certain strategic crops	Yes	11	7.8	0	0.0	66	53.7	13	16.2	22	17.6	27	23.5	411	30.3
	No	130	92.2	45	100.0	57	46.3	67	83.8	103	82.4	88	76.5	944	69.7
Reported ways farmers cleared their land before ploughing this year															
	Burning field	12	8.5	3	6.7	10	8.0	6	7.5	7	5.5	8	7.0	169	12.3
	Slashing	132	93.0	40	88.9	90	72.0	32	40.0	98	77.2	100	87.0	808	58.7
	Cutting shrubs/trees	46	32.4	4	8.9	33	26.4	39	48.8	19	15.0	36	31.3	765	55.6
	Spraying with herbicides	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Others	1	0.7	1	2.2	15	12.0	10	12.5	21	16.5	7	6.1	134	9.7
% who used these methods of land tillage															
	Hoe	142	100.0	44	97.8	115	92.0	78	97.5	127	100.0	107	93.0	1065	77.4
	Animal traction	0	0.0	0	0.0	11	8.8	2	2.5	0	0.0	0	0.0	651	47.3
	Tractor	0	0.0	1	2.2	1	0.8	0	0.0	0	0.0	1	0.9	7	0.5
	Others	0	0.0	0	0.0	3	2.4	0	0.0	0	0.0	0	0.0	3	0.2
How many times did you plough your field before planting of your strategic crop	Once	2	1.4	1	2.2	7	5.7	12	15.0	5	3.9	6	5.6	245	18.2
	Twice	110	78.0	41	91.1	111	90.2	64	80.0	81	63.8	92	85.2	994	73.7
	Thrice	29	20.6	3	6.7	5	4.1	4	5.0	41	32.3	10	9.3	110	8.2
Elements of seedbed preparation farmers recall from NURI CSA training sessions															
	No burning of field	142	100.0	45	100.0	125	100.0	80	100.0	127	100.0	113	98.3	1288	93.7
	Proper selection of site considering fertility	126	88.7	40	88.9	122	97.6	79	98.8	116	91.3	113	98.3	1020	74.2
	Minimum soil disturbance	119	83.8	36	80.0	85	68.0	56	70.0	105	82.7	84	73.0	660	48.1
	Minimal tree cutting	137	96.5	45	100.0	98	78.4	67	83.8	120	94.5	98	85.2	1029	74.8
	First and second tillage	142	100.0	44	97.8	125	100.0	77	96.2	127	100.0	114	99.1	1199	87.4
	Good seedbed preparation	141	99.3	45	100.0	121	96.8	78	97.5	126	99.2	111	96.5	1178	85.8
% who experienced new elements under seedbed preparation during CSA training	Yes	113	81.3	35	77.8	115	92.0	76	95.0	97	79.5	105	92.1	1168	85.9
	No	26	18.7	10	22.2	10	8.0	4	5.0	25	20.5	9	7.9	192	14.1
Can the elements of good seedbed preparation be observed in the farms	Yes	136	98.6	45	100.0	109	92.4	74	96.1	120	95.2	91	91.0	1031	77.6
	No	2	1.4	0	0.0	9	7.6	3	3.9	6	4.8	9	9.0	298	22.4

Table 8: On-farm production practices adopted by farmers in the Acholi subregion in the 2020 planting season.

		AGAGO		KITGUM		LAMWO	
		HH	(%)	HH	(%)	HH	(%)
% for whom it was the first time growing certain strategic crops	Yes	84	30.2	75	44.4	113	40.5
	No	194	69.8	94	55.6	166	59.5
Reported ways farmers cleared their land before ploughing this year							
	Burning field	24	8.4	24	13.8	75	26.5
	Slashing	94	33.0	76	43.7	146	51.6
	Cutting shrubs/trees	220	77.2	144	82.8	224	79.2
	Spraying with herbicides	0	0.0	0	0.0	0	0.0
	Others	52	18.2	15	8.6	12	4.2
% who used these methods of land tillage							
	Hoe	212	74.4	99	56.9	141	49.8
	Animal traction	264	92.6	146	83.9	228	80.6
	Tractor	1	0.4	0	0.0	3	1.1
	Others	0	0.0	0	0.0	0	0.0
Number of times fields ploughed before planting of the strategic crop	Once	61	21.9	45	26.8	106	38.1
	Twice	208	74.6	120	71.4	167	60.1
	Thrice	10	3.6	3	1.8	5	1.8
Elements of seedbed preparation farmers recall from NURI CSA training sessions attended							
	No burning of field	266	93.3	156	89.7	234	83.0
	Proper selection of site considering fertility	142	49.8	95	54.6	187	66.3
	Minimum soil disturbance	51	17.9	35	20.1	89	31.8
	Minimal tree cutting	187	65.6	100	57.5	177	62.8
	First and second tillage	234	82.1	126	72.4	210	75.3
	Good seedbed preparation	216	75.8	126	72.4	214	76.4
% who experienced new elements under seedbed preparation during CSA training	Yes	256	90.1	146	84.4	225	80.9
	No	28	9.9	27	15.6	53	19.1
Can the elements of good seedbed preparation be observed in the farms	Yes	173	61.3	89	53.6	194	70.0
	No	109	38.7	77	46.4	83	30.0

2.4.2 Use of Improved Seeds

The study also examined the extent of use of improved seeds among farmers that benefited from the CSA trainings. Respondents were asked to compare the period before they enrolled for the NURI programme and after enrolling. Results show that nearly all (92.4%) used local seeds of the strategic crops they planted before they enrolled for the NURI programme. Only 3.2% were using improved seed varieties even before enrolling onto the NURI programme. A few others (4.5%) reported to have been using both local and improved seed varieties. However, following the CSA training in 2019, many farmers have changed and adopted new production technologies. Results show that more than two thirds (69.6%) of the farmers indicated to have used only improved seed varieties for the strategic crops they planted in the 2020 planting season. Another 14.3% used both local and improved, meaning that only 16.1% used local seed varieties only in the 2020 planting season. Comparison across districts shows it was mostly farmers from the Acholi subregion that used local seeds even after enrolling and attending the CSA training. For instance, 29.2% of farmers in Lamwo, 21.1% in Kitgum and 19.9% from Agago used local seeds in the 2020 planting season compared to 3.1% in Terego (see Table 11 and 12 below).

For farmers who planted improved seed varieties in the 2020 planting season, the biggest proportion (62.9%) obtained the seeds from a demonstration plot within their district. Several other sources of the improved seeds planted were cited including input dealers, the market, Operation Wealth Creation, other development partners while some used seeds they had saved in their homes from the previous season. Farmers who obtained their improved seeds from input dealers were mostly found in Zombo, Agago and Lamwo districts while those who used seeds saved at home from the previous season were found in Arua and Pakwach (see Table 11 and 12 below).

Like seedbed preparation, the CSA training session on use of improved seeds mainly emphasized seven (7) Dos and Don'ts, the first being that farmers should plant only "certified and viable" seed varieties. Other points of emphasis included ensuring that seeds are clean, pure and have uniform size and color, they are resistant to pests and diseases, drought tolerant, mature early, high yielding and that they pass the wholesomeness test i.e. without physical damage.

This study sought to establish the level of recall of those Dos and Don'ts, and results show excellent recall on nearly all elements except on wholesomeness of seeds. Results show that just about half (63.9%), recall being cautioned against buying seeds that have physical damage. Majority recalled the advice on planting high yielding seed varieties, cited by 95.9% of all respondents followed by the need to plant early maturing and/or varieties that have uniform maturity time; this was cited by 84.6%. Further, between 70% and 75% of respondents, most from West Nile, recall being told about the importance of planting certified and viable seed varieties, seeds that are clean/pure and uniform in size and color, seeds that are drought tolerant, and resistant to pests and diseases.

For many of the farmers, the elements highlighted in the session on improved seeds, were new to them. More than three quarters (86.6%) acknowledged that it was their first time to learn about those elements. Only 13.4% had ever been trained on those elements to observe while buying seeds. Notable proportions who did not find any new issues during the training were from Terego district (25.8%), Arua (23.9%) and Lamwo (19.9%). Before NURI training less than 5% of the farmers were using improved seed. The proportion of households using improved seeds, increased tremendously in the 2020, to over 69%. The West Nile districts especially Pakwach (91%), Nebbi (89%), and Madi-Okollo (88%)

registered the higher improvement in the use of improved seeds compared with Acholi subregion (See Tables 11 and 12 below). Regarding strategic crops, use of improved seeds significantly varied across all the strategic crops from less than 25% to over 58%. Notable improvement in the use of improved varieties from before NURI training compared to 2020 season was registered among farmers growing rice (0% to 100%), cassava (3% to 71%) and beans (1% to 65%) Refer to figure 5 and table 10.

Figure 3: Proportion of Households that used only improved seeds for strategic crops.

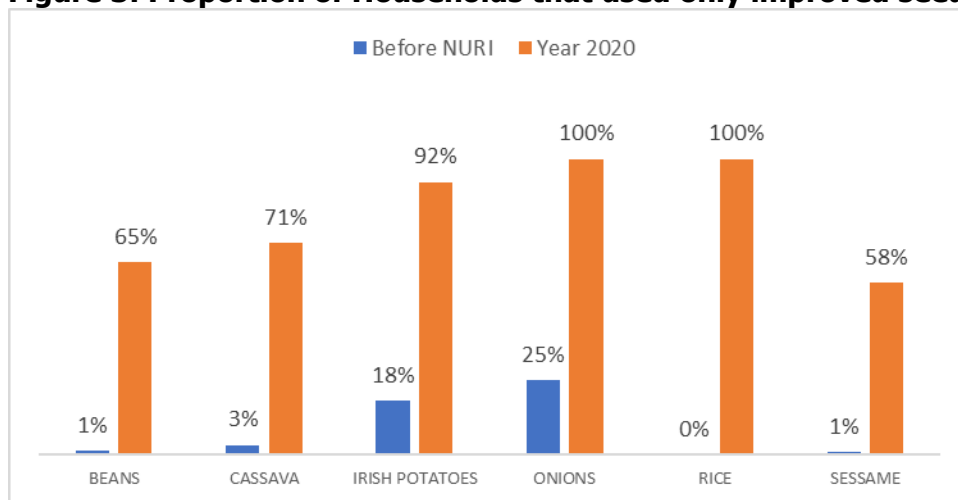


Table 9: USE OF IMPROVED SEEDS by Strategic Crops

		SUN-FLOWER		SOYA-BEANS		SESSAME		RICE		ONIONS		IRISH POTATOES		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Type of seed use before enrolling for the NURI programme	Improved	6	4%	6	3%	3	1%	0	0%	6	25%	11	18%	4	4%	3	1%
	Local	162	94%	189	94%	381	98%	5	100%	16	53%	42	69%	97	87%	260	92%
	Both	5	3%	6	3%	6	2%	0	0%	2	8%	8	13%	10	9%	20	7%
Type of seed you used this year	Improved	125	69%	234	86%	224	57%	5	100%	30	100%	47	92%	76	69%	183	65%
	Local	43	24%	25	9%	92	23%	0	0%	0	0%	2	4%	20	18%	29	10%
	Both	14	8%	14	5%	77	20%	0	0%	0	0%	2	4%	15	14%	70	25%
Any new element of CSA training under use of improved seeds		157	86%	239	88%	353	91%	4	80%	29	97%	51	88%	91	82%	227	82%
Use of improved seeds observed in the field		100	55%	148	54%	263	68%	3	60%	28	93%	45	87%	91	84%	235	87%

Table 10: Use of improved seed varieties among farmers that benefited from the CSA trainings in West Nile.

		ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
% that used the different types of seed of the strategic crop before joining NURI	Improved	1	0.7	2	4.4	4	3.4	2	2.5	1	0.8	15	13.4
	Local	125	89.3	37	82.2	110	93.2	75	93.8	108	86.4	90	80.4
	Both	14	10.0	6	13.3	4	3.4	3	3.8	16	12.8	7	6.2
% that used the different types of seed this year	Improved	88	62.0	40	88.9	105	89.0	73	91.2	91	71.7	86	81.1
	Local	9	6.3	0	0.0	10	8.5	5	6.2	4	3.1	16	15.1
	Both	45	31.7	5	11.1	3	2.5	2	2.5	32	25.2	4	3.8
Reported source of the improved seed type used in the field this year													
Home saved		16	11.3	1	2.2	2	1.6	9	11.2	11	8.7	7	6.1
Market		22	15.5	1	2.2	9	7.2	1	1.2	11	8.7	27	23.5
Demonstration plot		115	81.0	41	91.1	96	76.8	70	87.5	105	82.7	51	44.3
Operation Wealth Creation (OWC)		12	8.5	5	11.1	1	0.8	0	0.0	1	0.8	2	1.7
Other development partners		0	0.0	0	0.0	2	1.6	1	1.2	2	1.6	1	0.9
Input dealer		10	7.0	1	2.2	20	16.0	8	10.0	8	6.3	43	37.4
How farmers rated germination of the seeds	Very good	90	66.2	31	72.1	71	61.2	53	66.2	74	58.3	66	64.1
	Fair	4	2.9	0	0.0	10	8.6	5	6.2	3	2.4	9	8.7
	Poor	1	0.7	0	0.0	0	0.0	0	0.0	4	3.1	0	0.0

	ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		
	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	
Key elements farmers recall about use of improved seeds from the CSA training attended under NURI													
Certified and viable	135	95.7	45	100.0	114	91.2	73	91.2	114	89.8	101	87.8	
Clean/pure/uniform in size and colour	140	98.6	42	93.3	118	94.4	74	92.5	122	96.1	108	93.9	
Wholesomeness	129	90.8	39	86.7	102	81.6	61	76.2	118	92.9	91	79.1	
Pest and disease resistant	130	91.5	42	93.3	122	97.6	77	96.2	110	87.3	110	95.7	
Drought tolerant	131	92.3	42	93.3	117	93.6	77	96.2	112	88.9	106	92.2	
Early maturing and/or uniform in maturity	134	94.4	40	88.9	119	95.2	75	93.8	112	88.9	111	96.5	
High yielding	141	100.0	45	100.0	125	100.0	80	100.0	121	96.8	114	99.1	
% household that found new elements on use of improved seeds in the CSA training	Yes	105	76.1	38	86.4	116	94.3	77	98.7	92	74.2	104	92.9
	No	33	23.9	6	13.6	7	5.7	1	1.3	32	25.8	8	7.1
Use of improved seeds observed in the field	Yes	134	97.1	43	100.0	104	88.9	72	92.3	116	94.3	78	78.0
	No	4	2.9	0	0.0	13	11.1	6	7.7	7	5.7	22	22.0

Table 11: Use of improved seed varieties among farmers that benefited from the CSA trainings in Acholi sub-region.

	AGAGO		KITGUM		LAMWO		Total		
	HH	(%)	HH	(%)	HH	(%)	HH	(%)	
% that used the different types of seed of the strategic crop before joining NURI	Improved	5	2.0	3	2.1	7	2.7	40	3.2
	Local	242	96.0	137	97.9	248	96.5	1172	92.4
	Both	5	2.0	0	0.0	2	0.8	57	4.5
% that used the different types of seed this year	Improved	185	66.8	110	66.3	153	55.2	931	69.6
	Local	55	19.9	35	21.1	81	29.2	215	16.1
	Both	37	13.4	21	12.7	43	15.5	192	14.3
Reported source of the improved seed type used in the field this year									
Home saved	8	2.8	5	2.9	22	7.8	81	5.9	
Market	11	3.9	5	2.9	23	8.1	110	8.0	
Demonstration plot	137	48.1	120	69.0	131	46.3	866	62.9	
Operation Wealth Creation (OWC)	2	0.7	0	0.0	1	0.4	24	1.7	
Other development partners	2	0.7	0	0.0	7	2.5	15	1.1	
Input dealer	82	28.8	15	8.6	56	19.8	243	17.7	
How farmers rated the seed germination	Very good	81	30.0	56	35.9	110	43.8	632	49.3
	Fair	28	10.4	5	3.2	17	6.8	81	6.3
	Poor	10	3.7	3	1.9	16	6.4	34	2.7

		AGAGO		KITGUM		LAMWO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)
Key elements farmers recall about use of improved seeds from the CSA training attended under NURI									
	Certified and viable	135	47.5	83	48.0	164	59.0	964	70.5
	Clean/pure/uniform in size and colour	145	50.9	91	52.6	187	67.3	1027	75.0
	Wholesomeness	113	39.6	75	43.4	147	52.9	875	63.9
	Pest and disease resistant	123	43.3	87	50.3	160	57.6	961	70.2
	Drought tolerant	149	52.5	92	53.8	159	57.2	985	72.1
	Early maturing and/or uniform in maturity	221	78.1	127	73.8	217	78.1	1156	84.6
	High yielding	265	93.3	161	93.1	259	92.8	1311	95.9
% who say, there were new elements on use of improved seeds in the CSA training	Yes	258	91.5	157	91.3	224	80.3	1171	86.6
	No	24	8.5	15	8.7	55	19.7	181	13.4
Can use of improved seeds be observed in the field	Yes	130	46.3	76	45.8	164	59.0	917	69.3
	No	151	53.7	90	54.2	114	41.0	407	30.7

2.4.3 Planting of Seed

The study also examined the extent to which farmers that benefited from the CSA trainings had adopted modern planting methods. Respondents were asked to compare the period before they enrolled for the NURI programme and after enrolling. Results show that prior to joining the NURI programme, 78.5% used the broad casting method of planting seeds. They would not dig holes for the seeds; those who planted in lines were only 16%. However, following the CSA training in 2019, many farmers have changed and adopted the modern planting methods of line planting. Results show that slightly over two thirds (68.1%) of the farmers planted their seeds in line/rows during the 2020 planting season. Another 7% used both line planting and broad casting, meaning that the proportion that used broad casting dropped from 78.5% in 2019 to only 24.9% in the 2020 planting season.

Comparison across districts shows it was mostly farmers from the Acholi subregion that continued using the broad casting method of planting seeds even after enrolling and attending the CSA training (see Table 13 below). Figure 6 below shows that the proportion of farmers who adopted the modern planting methods of line planting increased in 2020 season across all strategic crops after NURI training. The prevalence of line planting increased from less than 15% among growers of beans, rice, soya beans and sunflower before NURI training to over 75% in 2020 season. Sesame was associated with the least change in the prevalence of line planting from 1% before NURI training to 26% in 2020. The proportion of households practicing line planting for the other strategic crops increased to 98% from 31% for Onions, 53% for Irish potatoes and 84% for Cassava (refer figure 6).

It was also observed that high proportions of farmers growing onions (93%), cassava (93%), Irish potatoes (90%) and Beans (88%), rice (60%) and sunflower (52%) practicing line planting and correct spacing in the field. But majority of the farmers growing sesame (70%) and sunflower (56%) were not using line planting nor correctly spaced their crops. Correct weeding was observed mainly among farmers growing strategic crops including onions (93%), cassava (92%), beans (87%), and Irish potatoes (79%). Refer to table 14.

For farmers who planted in lines, the spacing commonly reported used between rows was 50 centimeters while between plants, (from one plant to another) was 10 centimeters. On the state of recall of the content in the CSA training session on planting seeds, results show that nearly all respondents still remembered the discussions on planting in lines and correct spacing. Ninety nine percent (99.1%) remembered that NURI extension staff advised them to always plant in lines. An almost equally big proportion (89.8%) recalled the discussion on correct spacing. It was only the discussion on "intercropping" that notable proportions could not recall; nearly half (41.1%) could not recall a recommendation on intercropping.

About exposure, 87.8% of the farmers reported to have found most of the matters discussed in the session on planting as new. For these farmers, it was the first time to learn about planting in lines and using correct spacing between rows and between plants. Notable proportions who said that planting in lines, spacing and recommended intercropping was not new were from Madi-Okollo (26.7%), Arua (18%) and Terego (15.6%). Indeed, in all the West Nile districts of Madi-Okollo, Arua, Terego, Pakwach, Nebbi and Zombo, line planting and correct spacing were observed on nearly all farmers' fields visited. Line planting and correct spacing was nearly non-existent in Kitgum as they were observed among only 6.6% of all farmers' fields visited. Equally in Agago and Lamwo, farmers' fields where line spacing and correct spacing of crops was observed in only about a third of the farms visited. Similarly,

recommended intercropping was observed on very few farmers' fields. Across the districts, the recommended intercropping was observed among only a third (34.4%) of all farmers' fields visited (See Table 13 below).

Figure 4: Proportion of farmers that planted their strategic crops in line.

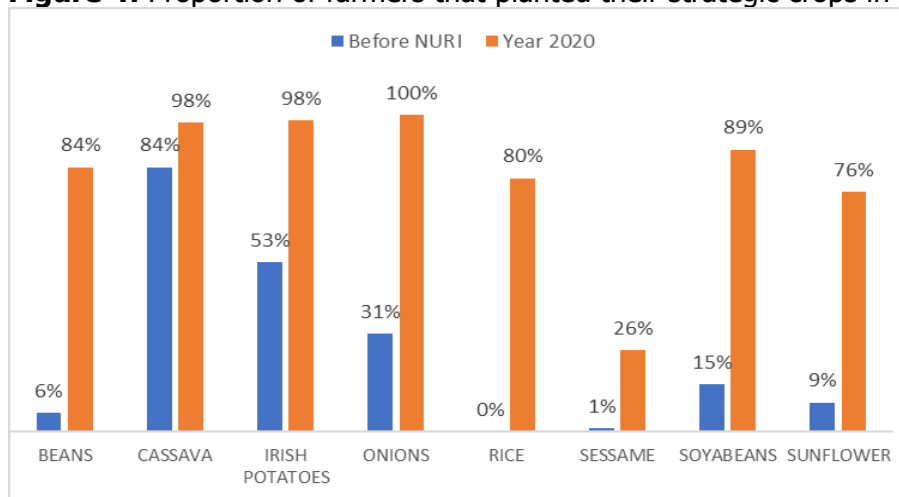


Table 12: Reported methods of planting seeds prior and after start of the NURI programme

		AGAGO		ARUA		KITGUM		LAMWO		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
Planting methods farmers used before enrolling for NURI CSA training	Line planting	36	14.2	33	23.2	3	2.1	19	7.3	29	64.4	23	18.5	12	15.8	16	12.7	34	31.5	205	16.0
	Broad casting	215	84.6	92	64.8	143	97.9	238	91.5	13	28.9	81	65.3	63	82.9	94	74.6	66	61.1	1005	78.5
	Both	3	1.2	17	12.0	0	0.0	3	1.2	3	6.7	20	16.1	1	1.3	16	12.7	8	7.4	71	5.5
Seed planting method currently used by farmers	Line planting	185	68.0	122	85.9	51	31.7	115	41.7	39	92.9	114	93.4	74	92.5	107	85.6	98	89.9	905	68.1
	Broad casting	72	26.5	5	3.5	98	60.9	132	47.8	0	0.0	7	5.7	2	2.5	5	4.0	10	9.2	331	24.9
	Both	15	5.5	15	10.6	12	7.5	29	10.5	3	7.1	1	0.8	4	5.0	13	10.4	1	0.9	93	7.0
Key elements about planting of seeds farmers recall from the CSA training done by NURI																					
Planting in lines		282	98.9	139	97.9	171	98.8	279	98.6	45	100.0	125	100.0	80	100.0	127	100.0	114	99.1	1362	99.1
Correct spacing		264	92.6	110	77.5	146	84.4	242	85.5	42	93.3	124	99.2	80	100.0	113	89.0	114	99.1	1235	89.8
Recommended Intercropping		114	40.6	124	87.3	78	45.3	115	41.4	43	95.6	98	79.0	60	75.0	116	91.3	55	47.8	803	58.9
% who say, there were new elements in the CSA training on line-planting, intercropping and spacing	Yes	251	88.4	114	82.0	151	87.3	243	86.8	33	73.3	118	94.4	74	92.5	103	84.4	109	95.6	1196	87.8
	No	33	11.6	25	18.0	22	12.7	37	13.2	12	26.7	7	5.6	6	7.5	19	15.6	5	4.4	166	12.2
Gardens where line planting and correct spacing was observed	Yes	103	36.5	134	95.7	11	6.6	93	33.8	42	100.0	100	86.2	70	90.9	119	94.4	81	81.0	753	56.8
	No	179	63.5	6	4.3	156	93.4	182	66.2	0	0.0	16	13.8	7	9.1	7	5.6	19	19.0	572	43.2
Gardens where recommended intercropping was observed	Yes	46	16.3	93	66.4	55	32.9	70	25.1	20	44.4	53	46.1	27	34.6	80	63.5	15	14.9	459	34.4
	No	236	83.7	47	33.6	112	67.1	209	74.9	25	55.6	62	53.9	51	65.4	46	36.5	86	85.1	874	65.6

Table 13: Planting methods for strategic crops

		SUNFLOWER		SOYA BEANS		SESSAME		RICE		ONIONS		IRISH POTATOES		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Planting method were you using before enrolling for NURI CSA training	Line planting	16	9%	32	15%	1	0%	0	0%	8	31%	31	53%	91	85%	17	6%
	Broad casting	153	88%	161	75%	386	99%	5	100%	13	50%	23	40%	9	8%	241	85%
	Both	4	2%	21	10%	3	1%	0	0%	5	19%	4	7%	7	7%	26	9%
Seed planting method used in the field this year	Line planting	136	76%	235	89%	94	24%	4	80%	30	100%	55	98%	106	97%	236	83%
	Broad casting	35	19%	24	9%	251	64%	0	0%	0	0%	0	0%	1	1%	20	7%
	Both	9	5%	5	2%	47	12%	1	20%	0	0%	1	2%	2	2%	27	10%
Any new element under line planting, recommended intercropping and correct spacing during CSA training		154	85%	236	85%	360	92%	4	80%	29	97%	58	95%	89	80%	245	89%
Line planting and correct spacing be observed in the field		93	52%	122	44%	117	30%	3	60%	28	93%	47	90%	102	93%	238	88%
Any new element under weed control during CSA training		126	70%	198	72%	274	70%	3	60%	18	60%	47	77%	82	75%	227	82%
Correct weeding was observed in the field		92	51%	132	48%	225	58%	3	60%	28	93%	41	79%	103	92%	235	87%

2.4.4 Weeding as a Farming Practice

Weeding of farm fields and its importance was part of the session on seedbed preparation, planting and intercropping. The CSA training highlighted the importance of weeding, the number of times a farmer should weed his/her field and when to do it. Consequently, this study sought to examine the extent of use of the knowledge farmers acquired from the CSA trainings. Respondents were asked to compare the period before they enrolled for the NURI programme and after enrolling. Specifically, 95.3% of farmers had removed unwanted plants from their fields in the 2020 planting season and only 4.7% did not weed their fields. For those that weeded their fields, results show that all of them (100%) used the hand hoe and did it twice in the season. No farmer among those visited in this study used chemicals to remove unwanted plants from their fields in the 2020 planting season (see Table 16).

During CSA training in 2019, the issue of timely weeding was ably discussed. Other elements of weed control covered included application of alternative measures and use of a combination of methods. To assess the influence those discussions have had on the farmers, the study sought to establish the level of recall of those elements of weed control. Based on the results, recall for some weed control measures was high; nearly all farmers (98.3%) still recall timely weeding, while application of alternative measures was recalled by 53.4% of all farmers visited. Over 73% of the farmers reported that the training exposed them to new weed control elements which they had never trained on. During field observations, adoption of the acceptable weeding control measures/correct weeding was observed on 65% of the farmers' fields. The remaining proportion (35%) were not using the recommended weed control measures. Farmers who were not using correct weeding were mostly in Kitgum and Agago, observed absent on 64.1% and 59.9% of the farmers' fields, respectively (See Table 16 below). While all farmers growing rice and/or onions used correct weeding practices, correct weeding was observed among over 50% of the farmers growing other strategic crops including Irish potatoes (79%), Beans (87%), Sesame (58%) and Sunflower (51%). Refer to table 15.

Table 14: Weeding practices according to strategic crops

Strategic crop	Method of weeding used		Weeding after planting crop COMPLETED				Correct weeding observed in the field	
	Hand hoe		First Weeding		Second weeding		HHs Percent	
	HHs	Percent	HHs	Percent	HHs	Percent		
SUNFLOWER	176	100.0%	174	99.4%	57	41.6%	92	50.8%
SOYABEANS	252	100.0%	252	97.3%	180	75.3%	132	47.8%
SESSAME	386	100.0%	387	99.0%	110	34.1%	225	57.8%
RICE	5	100.0%	5	100.0%	1	33.3%	3	100.0%
ONIONS	29	100.0%	29	100.0%	26	89.7%	28	100.0%
IRISH POTATOES	44	100.0%	42	93.3%	19	55.9%	41	78.8%
CASSAVA	110	100.0%	110	100.0%	95	89.6%	103	92.0%
BEANS	260	100.0%	257	98.1%	193	81.4%	235	87.0%

Table 15: Farmers that practice weeding of fields in conformity to the CSA training

		AGAGO		ARUA		KITGUM		LAMWO		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
% that weeded their field this season	Yes	261	96.7	137	98.6	158	94.6	265	95.7	45	100.0	113	95.0	78	97.5	125	100.0	84	79.2	1266	95.3
	No	9	3.3	2	1.4	9	5.4	12	4.3	0	0.0	6	5.0	2	2.5	0	0.0	22	20.8	62	4.7
Reported methods farmers used for weeding in their fields																					
Hand hoe (Mechanical)		266	100.0	138	100.0	158	100.0	267	100.0	44	100.0	113	100.0	76	100.0	124	100.0	86	100.0	1272	100.0
Chemical		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
No. of times farmers were weeding gardens before enrolling for CSA training.																					
Once		248	92.2	87	65.4	145	92.4	241	92.7	16	36.4	54	43.5	28	37.3	100	76.3	57	51.4	976	74.8
Twice		21	7.8	29	21.8	11	7.0	16	6.2	14	31.8	54	43.5	19	25.3	26	19.8	45	40.5	235	18.0
Thrice		0	0.0	13	9.8	1	0.6	3	1.2	12	27.3	16	12.9	9	12.0	2	1.5	9	8.1	65	5.0
None		0	0.0	4	3.0	0	0.0	0	0.0	2	4.5	0	0.0	19	25.3	3	2.3	0	0.0	28	2.1
Types of weeding done in your field after planting your crop this season																					
First Weeding Completed		263	99.6	139	100.0	159	97.0	267	97.1	44	100.0	113	98.3	78	98.7	120	99.2	84	94.4	1267	98.2
Second weeding Completed		113	49.8	108	80.6	62	44.0	81	35.8	41	95.3	85	83.3	38	64.4	116	96.7	44	63.8	688	61.4
Key elements about weeding farmers recall from the CSA training attended																					
Timely weeding		283	99.6	137	96.5	168	96.6	274	96.8	44	97.8	125	100.0	80	100.0	125	98.4	115	100.0	1351	98.3
Application of alternative measures		82	28.9	120	84.5	50	28.7	95	33.6	41	91.1	101	80.8	56	70.0	98	77.2	91	79.1	734	53.4
Combination of methods		57	20.1	114	80.3	35	20.1	80	28.3	37	82.2	89	71.2	47	58.8	87	68.5	77	67.0	623	45.3

2.4.5 Pest and Disease Control

Pests and diseases are common problems for crop farmers including in Acholi subregion and West Nile. Study results show that slightly over half (56.6%) reported registering some pests and diseases. Over 60% of farmers who grew Sunflower, Soya beans and/or Irish potatoes (see table 17). In Kitgum, the pests commonly cited include wild birds and rabbits that eat plant shoots of seedlings, termites, web-worm, gall midge and aphids. In Madi-Okollo, the pests observed by farmers included rats, nematodes, aphids and termites, and diseases like cassava mosaic and groundnuts rosette, while in Nebbi, farmers commonly reported seeing the gall midge, termites, flower beetles and diseases like potato blight, bacterial wilt diseases and necrotic lesions on the pods. To control the pests, farmers adopted various measures including spraying pesticides or ash, spraying ant-killers such as "Rocket", weeding fields early, using traps on rodents and applying protective chemicals on seeds before planting them. To control spread of diseases, farmers of cassava, for instance, uprooted the affected plants and used crop rotation.

NURI pests and disease control training highlighting different pests and diseases management measures, include use of cultural methods like crop rotation and fallowing, use of organic methods like tobacco, soap and chilly, use of chemical control as a last resort and use of a combination of methods. To assess the influence those discussions have had on the farmers, this study sought to establish the level of recall. The study found that recall of pests and disease management was highest for the cultural method, cited by 82.9% of those interviewed. An equally large group (80%) reported recalling the discussion on using chemicals as a last resort. When asked, if there were any elements taught in the CSA sessions on pests and disease management that were new to the farmers, 74.2% answered in affirmative. During field observations, correct pest and disease control measures were observed on less than half of the farmers' fields visited (45.5%). This means that slightly over half (54.5%) especially from Kitgum, Agago and Lamwo, were not using the correct pest and disease control measures as guided during training. (See Table 18 below). Over 58% of the growers of strategic crops including Onions (89.7%), Irish potatoes (69.2%), cassava (58.2%) and beans (71%) were found with correct control measures. Majority (over 50%) of farmers growing sunflower, soyabeans and sesame did not have the correct pest and diseases control measures in place by the time of the study (see table 17).

Some of the reasons for not adopting pest and disease control measures included lack of money, other farmers claimed that the pests had only attacked small portions of their fields which did not necessitate undertaking control measures, while some claimed not to have seen the pests.

Table 16: Pest and disease occurrence and control per strategic crop

Strategic crop	Did not register any pests and diseases in field since started		Correct pest and disease control observed in the	
	Hhs	Percent	Hhs	Percent
SUNFLOWER	67	38.7%	42	23.7%
SOYABEANS	90	33.5%	77	28.1%
SESSAME	196	50.6%	160	41.2%
RICE	3	60.0%	0	0.0%
ONIONS	20	66.7%	26	89.7%
IRISH POTATOES	19	31.1%	36	69.2%
CASSAVA	51	46.8%	64	58.2%
BEANS	120	43.5%	193	71.0%

Table 17: Pest and Disease Control among beneficiaries of the CSA Training

		AGAGO		ARUA		KITGUM		LAMWO		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
% that registered any pests and diseases in their fields since they started growing their crops	Yes	155	56.8	73	53.3	99	59.6	167	60.7	18	43.9	72	58.1	23	29.1	87	71.3	59	51.8	753	56.6
	No	118	43.2	64	46.7	67	40.4	108	39.3	23	56.1	52	41.9	56	70.9	35	28.7	55	48.2	578	43.4
Key elements farmers recall about pest and disease management from the CSA training attended under NURI																					
Cultural methods like crop rotation, fallowing		199	71.1	137	96.5	119	69.2	216	77.4	44	100.0	115	92.0	73	92.4	120	95.2	106	92.2	1129	82.9
Use of organic methods like tobacco, soap, chilly		81	28.6	110	79.1	94	54.7	159	57.0	44	97.8	79	63.7	39	48.8	97	76.4	95	82.6	798	58.5
Chemical control as a last resort		196	69.3	129	92.8	128	73.6	172	61.4	44	97.8	124	99.2	76	95.0	114	89.8	112	97.4	1095	80.0
Use of a combination of methods		80	28.5	100	71.9	44	25.6	83	29.9	37	84.1	84	67.7	51	63.8	91	72.2	77	67.0	647	47.6
% who say, there were new elements in the CSA training on pest and disease management	Yes	153	56.5	115	85.2	113	66.1	182	65.7	35	81.4	120	96.0	69	89.6	95	80.5	106	93.0	988	74.2
	No	118	43.5	20	14.8	58	33.9	95	34.3	8	18.6	5	4.0	8	10.4	23	19.5	8	7.0	343	25.8
Correct pest and disease control can be observed in the field	Yes	59	21.4	96	68.6	31	18.6	88	32.0	41	93.2	91	78.4	41	52.6	90	72.0	65	63.7	602	45.5
	No	217	78.6	44	31.4	136	81.4	187	68.0	3	6.8	25	21.6	37	47.4	35	28.0	37	36.3	721	54.5

2.4.6 Soil Fertility and Water Management

Fertility of soils is a very critical factor in agricultural productivity; besides the vagaries of weather, poor crop yields are mostly attributed to poor soil fertility. Given that NURI seeks to support farmers increase agricultural productivity, it was imperative in this study to establish the state of fertility of the soils in the fields used by members of the farmers groups under NURI. All farmers were asked to rate the fertility of the soil in the fields they used for cultivating their strategic crops and more than 80% were happy with the fertility of their soils. Among them, 60% rated the fertility of their soils as good and 27.5% as very good. Those who felt that the fertility of their soils was poor were 5.1% while those who said it was just fair were only 7.4%. Over 85% of the households growing the 6 strategic crops felt that the fertility of their soils was either good or very good (table 18). A comparison between regions shows that slightly more farmers from the Acholi subregion expressed satisfaction with the fertility of their soils. High rating of fertility of soils in Kitgum could be attributed to the fact that some farmers were using virgin/fresh fields. Results further reveal that it was mostly farmers in the West Nile districts that experienced a lot of soil fertility and water management challenges in their fields before attending the NURI training on soil fertility and water management. For instance, in Agago only 44.7% of farmers reported experiencing challenges with soil fertility and water management prior to the NURI training compared to 70.7% in Arua (see Tables 20 and 21 below).

To manage fertility and water challenges in their fields, farmers in Kitgum have turned to crop rotation. In Madi-Okollo farmers were digging trenches to channel run-off rainwater into their fields, using contours in fields on hill slopes, mulching and applying organic fertilizers while in Nebbi, in addition to crop rotation, trenching and mulching, they were adopting intercropping and fallowing of the land.

During the CSA training session on soil fertility farmers were introduced to various elements of soil fertility and water management. These included mulching, use of cover crops, inoculation of legumes with rhizobia, crop rotation, constructing terraces, bands, trenches, fallowing of land, as well as application of manures and inorganic fertilizers. To assess the influence of training, the study sought to establish the level of recall. Elements that farmers recalled most include mulching of soils cited by 87% of all respondents, using crop rotation cited by 86.3%, constructing terraces as well as fallowing of land. Very few (i.e., only 27.9%) recalled inoculation of legumes with rhizobia as a measure for managing fertility of the soil. Application of manures and inorganic fertilizers were remembered by 68% and 48% of respondents, respectively.

When asked, if there were elements taught in the sessions on management of soil fertility and water that were new to the farmers, 83.2% answered in affirmative. During field visits, measures to ensure proper soil fertility and water management was observed on 63.9% of the farmers' fields. The remaining proportion (36.1%) had no measures for ensuring that soil fertility and water in the fields is preserved. Comparison between regions shows that it was mostly farmers in Kitgum, Lamwo and Agago who took no measures on their farm fields to conserve soil fertility. Measures to conserve soil fertility and water were observed in only 32.9% of farmers' fields in Kitgum, 38.7% in Agago and 48.9% in Lamwo (See Tables 20 and 21 below). Some farmers in Kitgum and Nebbi who did not adopt soil and water management practices in their fields attributed their inability to lack of time due to too much work in the fields. Table 19 shows that soil and water management practices were observed in the fields for farmers who mainly grew the following strategic crops; onions (100%), beans (93%), Irish potatoes (85%), cassava (84%), rice (67%), and sesame (59%). More than 50% of the households growing the remaining strategic crops did not have soil and water management measures.

Table 18: Soil Fertility and Water Management practices by strategic crops

		SUN-FLOWER		SOYA BEANS		SESSAME		RICE		ONIONS		IRISH POTATOES		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Rating of the fertility of the soil in the field used for cultivating the selected strategic crop	Poor	15	8%	21	8%	14	4%	0	0%	1	3%	1	2%	1	1%	15	5%
	Fair	11	6%	19	7%	28	7%	0	0%	1	3%	1	2%	11	10%	28	10%
	Good/Very good	155	86%	232	85%	350	89%	5	100%	28	93%	52	96%	100	89%	241	85%
Experienced soil fertility & water management challenges in the field before training under NURI		65	36%	148	53%	219	56%	2	40%	20	67%	42	69%	66	60%	213	76%
Any new element under soil fertility and water management during CSA training		130	72%	225	82%	338	86%	4	80%	28	97%	55	93%	90	82%	234	86%
Soil fertility management measures was observed in the field		68	39%	125	46%	229	59%	2	67%	29	100%	44	85%	91	84%	252	93%

Table 19: Soil Fertility and Water Management on Farmers' fields in West Nile

		ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
Rate for the fertility of the soil in the field you used for cultivating the selected strategic crop	Very poor	4	2.8	1	2.2	4	3.3	1	1.2	3	2.4	2	1.9
	Poor	1	0.7	0	0.0	2	1.6	0	0.0	6	4.7	0	0.0
	Fair	17	12.1	1	2.2	12	9.8	6	7.5	11	8.7	4	3.7
	Good	63	44.7	22	48.9	70	57.4	32	40.0	66	52.0	35	32.7
	Very good	56	39.7	21	46.7	34	27.9	41	51.2	41	32.3	66	61.7
% that experienced soil fertility & water management challenges in their fields before training under NURI	Yes	99	70.7	23	52.3	95	76.0	49	61.2	106	83.5	79	68.7
	No	41	29.3	21	47.7	30	24.0	31	38.8	21	16.5	36	31.3
Key elements farmers recall about soil fertility and water management from the CSA training attended under NURI													
Mulching		136	96.5	43	95.6	120	96.0	77	96.2	119	93.7	113	98.3
Use of cover crops		131	92.3	40	88.9	96	76.8	70	87.5	112	88.2	99	86.1
Inoculation of legumes with rhizobia		91	64.1	33	73.3	27	21.6	18	22.5	76	59.8	15	13.0
Crop rotation		139	97.9	45	100.0	120	96.0	72	90.0	120	94.5	106	92.2
Constructing terraces, bands, trenches		140	98.6	45	100.0	124	99.2	79	98.8	119	93.7	114	99.1
Fallowing of land		133	93.7	45	100.0	117	93.6	70	87.5	118	92.9	110	95.7
Application of manures		137	97.2	45	100.0	111	88.8	70	87.5	116	91.3	103	89.6

	ARUA		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		
	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	
Application of inorganic fertilizers	123	87.2	42	93.3	56	45.2	35	43.8	106	83.5	66	57.4	
% who say, there were new elements in the CSA training on soil fertility and water management	Yes	105	77.2	42	93.3	122	98.4	78	98.7	98	81.7	107	94.7
	No	31	22.8	3	6.7	2	1.6	1	1.3	22	18.3	6	5.3
Can soil fertility management be observed in the field	Yes	126	89.4	45	100.0	106	89.1	65	83.3	119	98.3	88	86.3
	No	15	10.6	0	0.0	13	10.9	13	16.7	2	1.7	14	13.7

Table 20: Soil Fertility and Water Management on Farmers' fields in the Acholi subregion

		AGAGO		KITGUM		LAMWO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)
How would you rate the fertility of the soil in the field you used for cultivating the selected strategic crop	Very poor	12	4.3	4	2.4	9	3.3	40	3.0
	Poor	2	0.7	5	3.0	12	4.3	28	2.1
	Fair	10	3.6	13	7.8	25	9.1	99	7.4
	Good	212	76.8	119	71.7	185	67.0	804	60.0
	Very good	40	14.5	25	15.1	45	16.3	369	27.5
% that experienced soil fertility & water management challenges in their fields before training under NURI	Yes	127	44.7	68	39.5	144	52.4	790	58.0
	No	157	55.3	104	60.5	131	47.6	572	42.0
Key elements farmers recall about soil fertility and water management from the CSA training attended under NURI									
	Mulching	209	73.3	146	84.4	230	81.9	1193	87.0
	Use of cover crops	67	23.5	40	23.1	120	42.7	775	56.4
	Inoculation of legumes with rhizobia	39	13.7	23	13.3	61	21.6	383	27.9
	Crop rotation	238	83.5	136	78.6	210	74.5	1186	86.3
	Constructing terraces, bands, trenches	189	66.5	125	72.3	220	78.0	1155	84.1
	Fallowing of land	215	75.4	111	64.2	188	66.7	1107	80.6
	Application of manures	125	43.9	71	41.0	157	55.9	935	68.1
	Application of inorganic fertilizers	82	28.9	50	29.1	97	34.5	657	48.0
% who say, there were new elements in the CSA training on soil fertility and water management	Yes	227	80.5	132	76.3	211	76.2	1122	83.2
	No	55	19.5	41	23.7	66	23.8	227	16.8
Can soil fertility management be observed in the field	Yes	105	38.7	55	32.9	136	48.9	845	63.9
	No	166	61.3	112	67.1	142	51.1	477	36.1

2.4.7 Post-Harvest Handling and Value Addition

Many farmers translated the knowledge acquired from CSA trainings on post-harvest handling into practice. Results in table 22 show that 72% of the farmers covered in the study applied some post-harvest handling measures during and after harvesting their crops in 2019. Table 23 below shows that high proportions of households applied some post-harvest handling measures during and after harvesting their strategic crops including rice (100%), Beans (94.5%), Sessame (80%), Onion (78.6%) and Irish potatoes (72.9%). Only 28%, mostly from Madi-Okollo, Agago and Kitgum did not apply any post-harvest handling measures. For the majority from Terego, Zombo, Arua, Pakwach, Nebbi and Lamwo that applied some post-harvest handling measures, they reported to have harvested at physiological maturity, harvesting only mature crops, used improved methods of drying produce, constructed drying platforms, threshed on tarpaulins, sorted, and graded the grain, cleaned the grain to remove soil, packed dried grain or cassava chips in clean bags and kept them in leak proof stores. Refer to table 22.

The level of recall on the topic of post-harvest handling was very high. Results show recall of above 70% on almost all aspects of post-harvest handling; even the least cited among aspects remembered i.e., "storage pests and their control" was mentioned by 62.2% of the respondents. Farmers correctly recalled being told about the indicators of crop maturity, causes of post-harvest handling losses, the various methods to use in harvesting, threshing/shelling, proper drying, cleaning the harvested crops, and how to grade/sort and store crop produce. Notable proportions also recalled being told about pests that attack produce in storage and the importance of a clean store as well as a non-leaking roof (see Table 22 below).

About value addition, results show that not many farmers added value to their produce. Only 29.8% of all farmers reported to have added value on their produce before marketing it or before storage. The bigger proportion (70.2%) did not carry out any value addition to their crops before marketing or storage. Majority of the households growing onions (64.3%), Irish potatoes (61%) and beans (53.6%) as their strategic crops added value on their produce before marketing (table 23). Most farmers in Agago (97.2%) and Kitgum (92.8%) did not carry out any value addition to their crops before marketing or storage. Similarly, marketing of crop produce was mostly done individually not collectively as promoted by the NURI programme. Results show that only 29.3% of all farmers reported to have marketed their produce collectively in 2019. The bigger proportion (70.7%) sold their produce individually (see Table 16). However, a notable proportion of households collectively marketed some strategic crops including Onion (45.8%), sunflower (41.5%) and cassava (33%) (table 23). Some of the reasons given for selling individually include absence of bulking; some groups had not identified any bulk buyers nor had bulking stores, so they let members market their produce individually. Others reported to have urgent need for money and/or emergencies that could not allow them to wait for collective marketing.

I could not wait for the time of collective marketing; the family needed the money urgently (Farmer in Madi-Okollo).

No bulking or collection store, quantity produced was little (Farmers from Madi-Okollo).

Crops did not mature at the same time; could not wait for others to harvest, last year there was a lot of crop failure; many had not harvest, marketing committee delayed finding a buyer, because of school fees problem (Farmers from Nebbi).

Table 21: Application of post handling measures, value addition and marketing of produce

		AGAGO		ARUA		KITGUM		LAMWO		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		Total	
		HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)	HH	(%)
% that applied post-harvest handling measures in the 2019 season	Yes	133	55.0	109	81.3	82	62.1	181	74.5	16	35.6	90	77.6	58	80.6	115	94.3	92	82.9	876	72.0
	No	109	45.0	25	18.7	50	37.9	62	25.5	29	64.4	26	22.4	14	19.4	7	5.7	19	17.1	341	28.0
Major elements farmers recall about post-harvest handling from the CSA training attended																					
Indicators of crop maturity		215	75.7	123	86.6	139	80.3	210	75.5	44	97.8	121	96.8	78	98.7	119	93.7	113	98.3	1162	84.9
Causes of PHH losses		102	36.2	121	85.2	74	43.3	128	45.9	41	91.1	113	90.4	72	91.1	113	89.0	104	90.4	868	63.6
Methods of harvesting		187	65.8	136	95.8	105	60.7	192	68.8	45	100.0	118	94.4	75	94.9	118	92.9	110	95.7	1086	79.3
Threshing/shelling		209	73.6	132	93.0	132	76.7	202	72.4	40	88.9	107	89.2	74	93.7	122	96.1	100	87.0	1118	82.0
Proper drying		271	95.8	136	95.8	162	93.6	245	87.8	45	100.0	114	95.0	76	96.2	121	96.0	106	92.2	1276	93.7
Cleaning		249	88.0	135	95.1	152	88.4	256	92.1	45	100.0	120	96.0	76	96.2	122	96.1	108	93.9	1263	92.5
Grading/sorting (staked on pallets or raised stones)		151	53.4	124	87.3	92	53.2	182	65.2	41	91.1	124	99.2	73	92.4	116	91.3	111	96.5	1014	74.1
Storing of produce and methods		129	45.6	134	94.4	77	44.8	177	63.4	44	97.8	117	93.6	72	91.1	121	95.3	108	93.9	979	71.6
Storage pests and their control		85	30.2	129	90.8	60	34.7	145	52.0	40	88.9	107	85.6	64	81.0	114	89.8	105	91.3	849	62.2
Clean store or none leaking roof		179	63.0	134	94.4	119	69.2	202	72.9	45	100.0	116	92.8	73	92.4	121	96.0	111	96.5	1100	80.6
% that carried out any value addition on crop before marketing or storage	Yes	7	2.8	57	41.0	11	7.6	47	18.1	14	31.1	74	63.8	43	61.4	53	42.1	69	62.7	375	29.8
	No	240	97.2	82	59.0	133	92.4	213	81.9	31	68.9	42	36.2	27	38.6	73	57.9	41	37.3	882	70.2
% who say, there were new elements in the CSA training on PHH	Yes	179	66.3	89	66.4	105	64.4	166	61.5	24	57.1	116	95.1	65	91.5	77	64.7	89	81.7	910	70.0
	No	91	33.7	45	33.6	58	35.6	104	38.5	18	42.9	6	4.9	6	8.5	42	35.3	20	18.3	390	30.0
Indicate how you marketed your produce in 2019	Collectively	47	26.4	31	33.7	28	26.9	54	24.9	10	55.6	15	21.7	32	57.1	21	25.9	24	30.0	262	29.3
	Individually	131	73.6	61	66.3	76	73.1	163	75.1	8	44.4	54	78.3	24	42.9	60	74.1	56	70.0	633	70.7

Table 22: Post handling practices for strategic crops

	SUNFLOWER		SOYABEANS		SESSAME		RICE		ONIONS		IRISH POTATOES		CASSAVA		BEANS		
	HHs	Percent	HHs	Percent	HHs	Percent	HHs	Percent	HHs	Percent	HHs	Percent	HHs	Percent	HHs	Percent	
Applied some post-harvest handling measures during and after harvesting	99	65.6%	116	54.2%	299	81.0%	5	100.0%	22	78.6%	43	72.9%	24	23.3%	257	94.5%	
Carried out value addition to crop before marketing or storage	22	13.8%	46	20.4%	80	21.1%	2	40.0%	18	64.3%	36	61.0%	18	17.5%	149	53.6%	
New element under PHH during the CSA training	108	61.7%	190	72.8%	255	68.0%	5	100.0%	25	86.2%	49	83.1%	68	65.4%	195	73.3%	
Ways produce were marketed in 2019	Collectively	56	41.5%	31	27.2%	93	26.9%	0	0.0%	11	45.8%	10	26.3%	9	33.3%	49	25.1%
	Individually	79	58.5%	83	72.8%	253	73.1%	4	80.0%	13	54.2%	28	73.7%	18	66.7%	146	74.9%

The strategic crop that was planted by the highest number of farmers in 2019 was Sesame (35%) followed by beans (25%), sunflower (12%) and soya beans (12%). Less than 10% of the farmers planted strategic crops including rice (0.5%), onion, Irish potatoes, and cassava. Farmers that planted Sesame on average harvested 181.2 kgs/acre, most of whom were from Lamwo district. For beans, most farmers on average harvested 191.9 kgs/acre, sunflower (368.6kgs/acre) and soya beans (223kgs/acre). The land cultivated varied greatly by type of strategic crop grown and by district from as low as about half (0.4) acre to 572 acres. Cassava farmers in Madi-Okollo planted the largest chunks of land measuring 572.1 acres on average. Farmers who planted Irish potatoes and Rice used the least land at 0.4 and 0.5 acres, respectively. Those who grew Sesame on average used 16.6 acres of land, sunflower (1.4 acres) and soyabeans (1.2 acres). See Table 24 below.

Table 23: Quantity of harvest received, sold, and consumed from strategic crops planted in 2019 per district.

District	Strategic crop	Land size (in)		Quantity of seed		YIELD PER ACRE		%age of harvest		%age of harvest	
		HHs	Mean	HHs	Mean	HHs	Mean	HHs	Mean	HHs	Mean
AGAGO	SUNFLOWER	94	1.5	94	2.4	93	368.2	90	85.6	39	40.3
	SOYABEANS	32	1.3	32	13.0	31	225.7	28	88.8	12	34.8
	SESSAME	55	1.9	54	3.7	55	156.2	48	64.3	48	47.3
	CASSAVA	16	1.0	16	290.	11	2938.	6	68.0	10	64.9
ARUA	SOYABEANS	10	5.9	10	38.8	10	254.7	9	74.7	7	16.3
	SESSAME	5	0.6	5	4.5	5	170.1	5	58.4	5	23.0
	CASSAVA	27	0.5	27	430.	6	1485.	6	57.9	6	35.1
	BEANS	91	1.4	91	27.8	89	207.5	63	111.9	72	5594.8
	Total	133	1.5	133	109.	110	279.8	83	100.8	90	4480.8
KITGUM	SOYABEANS	17	0.8	17	10.1	17	197.5	15	86.8	6	39.8
	SESSAME	95	1.9	95	7.5	93	154.4	87	64.5	87	41.3
LAMWO	SUNFLOWER	43	1.1	43	3.0	42	369.5	40	90.3	14	30.7
	SOYABEANS	13	1.5	13	9.4	12	156.2	8	86.0	5	52.3
	SESSAME	156	38.0	156	5.3	152	210.5	148	68.5	144	35.0
	CASSAVA	4	0.5	4	7.9	3	2922.	2	65.0	2	85.0
	BEANS	6	20.8	6	36.2	6	167.5	5	75.3	5	40.7
MADI-OKOLLO	SESSAME	15	1.0	15	4.5	15	186.2	15	71.7	15	37.3
	CASSAVA	28	572.	27	368.	12	2211.	2	80.0	6	81.7
NEBBI	SOYABEANS	33	0.4	33	19.9	29	149.3	18	74.3	25	44.1
	ONION	10	25.3	10	229.	10	335.4	10	90.9	7	11.3
	IRISH	7	0.5	7	294.	6	1035.	5	66.9	6	38.7
	BEANS	44	0.4	44	29.1	44	153.4	31	62.0	43	39.9
PAKWACH	SESSAME	43	1.1	43	3.6	43	169.7	43	74.8	38	25.3
	RICE	5	0.5	5	52.0	5	752.0	4	66.3	5	45.3
	CASSAVA	14	1.4	12	224.	10	1496.	8	56.0	9	36.0
TEREGO	SOYABEANS	29	0.6	29	27.7	29	325.6	17	58.5	21	30.4
	SESSAME	10	0.7	10	4.1	10	169.5	7	54.3	10	46.8
	CASSAVA	6	1.7	5	144.	5	913.9	5	61.4	5	42.0
	BEANS	89	45.8	88	35.0	89	180.9	44	42.5	66	48.1
ZOMBO	ONION	12	0.4	12	251.	12	890.7	12	95.7	5	4.0
	IRISH	45	0.4	45	271.	42	951.8	33	73.4	39	31.1
	BEANS	43	0.9	43	40.3	43	225.2	32	64.0	39	42.4
Total	SUNFLOWER	137	1.4	137	2.6	135	368.6	130	87.1	53	37.8
	SOYABEANS	134	1.2	134	19.1	128	223.0	95	78.8	76	36.5
	SESSAME	379	16.6	378	5.4	373	181.2	353	67.4	347	37.5
	RICE	5	0.5	5	52.0	5	752.0	4	66.3	5	45.3
	ONION	22	11.7	22	241.	22	638.3	22	93.5	12	8.2
	IRISH	52	0.4	52	274.	48	962.3	38	72.6	45	32.1
	CASSAVA	95	169.	91	325.	47	2044.	29	62.1	38	54.0
	BEANS	273	16.1	272	32.5	271	191.9	175	75.8	225	1820.3
Total	1097	25.0	1091	58.0	1029	347.9	846	74.2	801	538.3	

The most sold crop by farmers in 2019 was Sesame. Results show that the mean value of Sesame sold was on average worth Ugx 792,420/=. Farmers in Lamwo sold the most quantities earning on average Ugx. 1,105,200/= while the least quantities sold were registered in Terego at a mean value of Ugx. 271,200/=. The second most sold crop was beans at a mean value of Ugx. 240,000/=, again mostly sold by farmers in Lamwo earning an average of Ugx. 384,000/=. Sunflower was in third place among the crops sold by many farmers at a mean value of Ugx. 406,400/=. Generally, farmers in West Nile did not engage in selling of produce, the few that sold, mostly sold cassava generating between Ugx. 400,000/= and 1,440,000/=. Farmers in Madi-Okollo sold the most cassava earning them a mean value of Ugx. 1,440,000/= (see Table 25 below).

Table 24: Mean value of produce/strategic crops marketed per district in 2019

Crop	AGAGO		ARUA		KITGUM		LAMWO		MADI-OKOLLO		NEBBI		PAKWACH		TEREGO		ZOMBO		TOTAL	
	HH	Mean	HH	Mean	HH	Mean	HH	Mean	HH	Mean	HH	Mean	HH	Mean	HH	Mean	HH	Mean	HH	Mean
CASSAVA	6	944	3	746			2	347	2	1,440	2	425	9	1,069	5	750			29	886
SESAME	43	631	5	87	84	632	138	1,105	10	446			37	434	5	271			322	792
SOYABEANS	27	376	10	484	12	175	8	144			13	80			17	1,039			87	425
SUNFLOWER	93	447					41	313											134	406
BEANS			65	280			5	384			24	151			50	190	30	281	174	240
IRISH POTATOES											5	881					30	617	35	654
ONIONS											9	276					9	439	18	358
RICE													3	287					3	287
TOTAL	172	497	88	311	103	576	214	1,050	17	524	68	215	56	537	86	394	79	452	883	589

2.4.8 Land access and yield for the strategic crops.

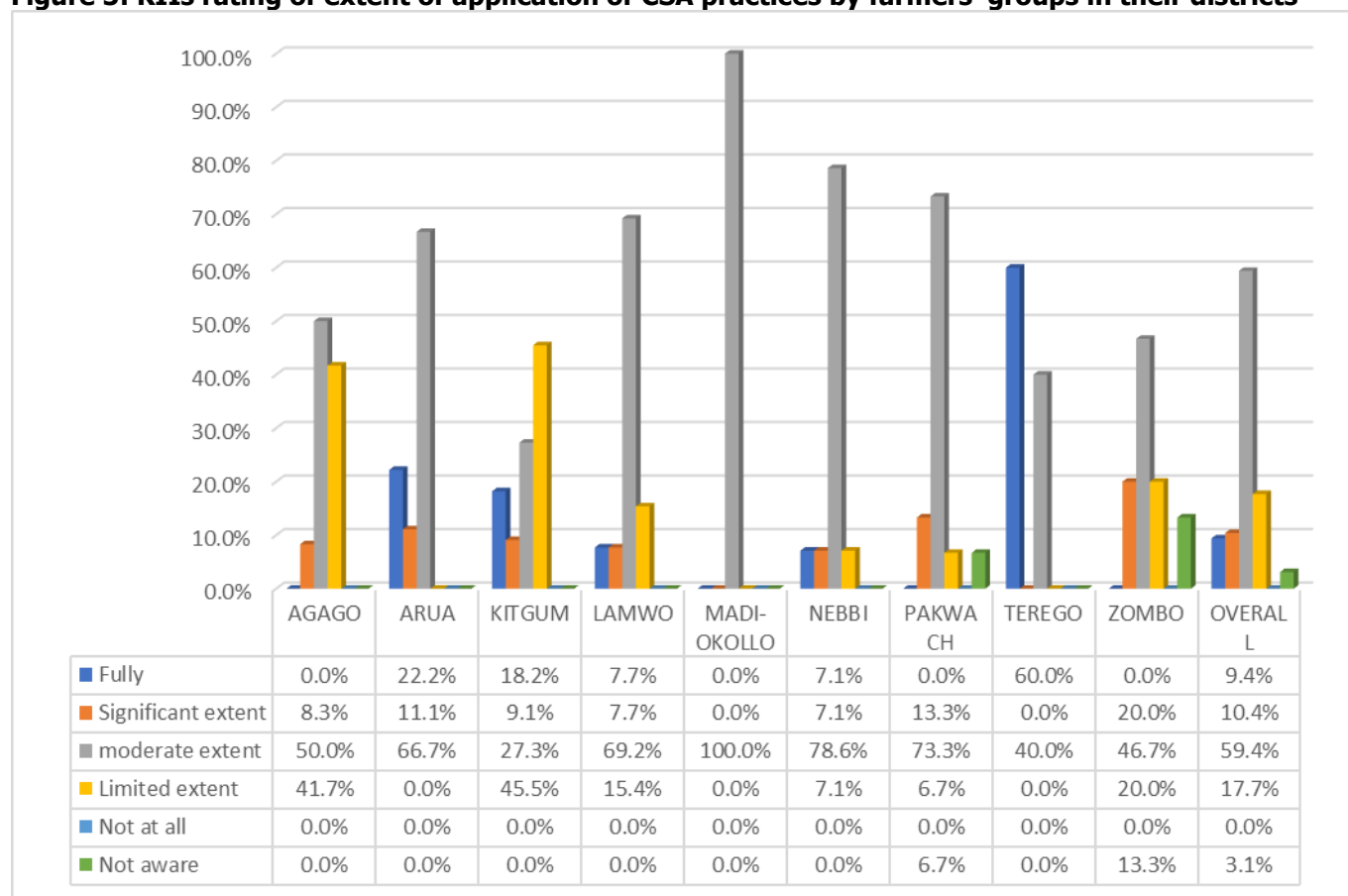
The crops that were planted included Beans, Cassava, Onion, Sesame, Soyabeans and Sunflower. Generally, the yield (Harvests per acre) of the Strategic crops increased between 2019 (refer to table 24 above) and 2020 (table 26). For instance, the yield for Sesame increased to 284.6 kgs/acre in 2020 from 181.2 kgs/acre in 2019 registering a 36% yield increase. Similarly, the yield per acre for beans rose from 193.8 kgs/acre in 2019 to 248 kgs/acre in 2020, representing a 28% change in the yield per acre earned.

Table 25: Quantity of harvest received, sold and consumed from strategic crops planted in 2020

District	Crop	Land size (in acres)		Quantity of seed used PER ACRE		YIELD PER ACRE (kgs/acre)		%age of harvest sold		%age of harvest consumed	
		HHs	Mean	HHs	Mean	HHs	Mean	HHs	Mean	HHs	Mean
AGAGO	SOYABEANS	5	1.1	5	17.0	5	170.7	3	88.9		
	SUNFLOWER	3	1.7	3	2.5	3	540.0	3	100.0		
ARUA	BEANS	25	2.1	24	19.8	11	212.1	1	16.7	5	40.4
	CASSAVA	3	0.8	3	11.5						
KITGUM	SESAME	1	4.0	1	3.8	1	180.0	1	138.9	1	16.7
	SOYABEANS	1	1.0	1	5.0	1	240.0	1	75.0	1	50.0
LAMWO	SESSAME	9	2.5	9	6.1	9	296.3	10	63.8	10	33.5
	SUNFLOWER	1	1.0	1	1.5	1	300.0	1	100.0		
MADI-OKOLLO	SESAME	10	1.0	10	4.0						
NEBBI	BEANS	6	0.6	6	36.8	6	176.7	2	66.1	6	23.8
	SOYABEANS	1	0.5	1	6.0						
PAKWACH	CASSAVA	2	1.0								
	SESAME	1	0.5	1	3.0						
TEREGO	BEANS	21	0.6	19	38.9	18	271.9	2	21.1	6	38.3
	SESAME	5	0.7	5	2.7						
	SOYABEANS	6	1.0	6	24.1	1	320.0	1	50.0		
ZOMBO	BEANS	4	0.3	4	53.5	1	640.0			1	12.5
	ONION	1	1.0	1	150.0	1	1170.0	1	100.0		0.0
Total	BEANS	56	1.3	53	31.1	36	248.0	5	38.2	18	32.6
	CASSAVA	5	0.9	3	11.5						
	ONION	1	1.0	1	150.0	1	1170.0	1	100.0		
	SESAME	26	1.5	26	4.4	10	284.6	11	70.6	11	32.0
	SOYABEANS	13	1.0	13	18.5	7	201.9	5	78.3	1	50.0
	SUNFLOWER	4	1.5	4	2.3	4	480.0	4	100.0		

Overall, results show efforts of applying the knowledge and skills gained from the CSA trainings and this was corroborated by leaders that monitored delivery of the CSA trainings in the respective districts. The KIIs, interviewed across the nine (9) districts assessed the extent farmers' groups in their communities had applied the climate smart practices on their farms during production as mostly moderate. Fifty nine percent (59.4%) said farmers had to a moderate extent applied the CSA practices. Slightly over a tenth (17.7%), most of whom found in Agago district, felt the farmers' groups had not significantly embraced the CSA practices. See figure 7 below.

Figure 5: KIIs rating of extent of application of CSA practices by farmers' groups in their districts



3.0 RESULTS FOR THE MIXED REFUGEE GROUPS

3.1 Socio-Demographics of Mixed Refugee Respondents

Gender of respondents

The mixed refugee groups interviewed for this CSA Adoption Study consisted members of host community/nationals (35%) and refugees (65%). Majority of the group members were female comprising 62.8% of the sample. Males were about a third (37.2%). Among the refugees, the female respondents were 65.8% while the host/national female were 57.1%. The sampled female respondents were almost the same in the districts of Lamwo (66.7%) and Madi-Okollo (61.4%).

Gender of household heads

Further, results show that a third of households were female headed (32.5%). Female headed households were reported by 43.8% of the refugees and 11.6% of the national respondents. The districts of Lamwo and Madi-Okollo had similar rates of female headed households, 36.4% and 31.1%, respectively.

Age of respondents

The sample was dominated (68.8%) by respondents aged between 29 to 48 years. Youth respondents (18-28 years) were 19.5%, 9.1% from Lamwo district and 23.3% from Madi-Okollo district. About 15% of the respondents were aged above 49 years. The sampled showed that there were higher numbers of youth amongst the refugees (23.8%) by slightly more than double their counterparts among the nationals/host (11.6%).

Age of household heads

The age distribution for the household head closely matched that of respondents although the respondents were not necessarily household heads. Results show that high proportion of interviewed households (46.8%) were headed by people aged at least 39 years. The youth household heads (18-28 years) were 9.2% while a significant group (44.2%) were aged between 29 and 38 year. Regarding group membership categories, the household heads for refugee respondents were younger than their counterparts among the refugee respondents. Most of the household heads for the national respondents were aged at least 39 years (60.9%) while only 39.3% of the household heads for refugee respondents were in the same age group. The youth household heads (18-28 years) were reported by 11.4% of refugees and 4.9% of the nationals/hosts.

Highest Educational level of the respondent

In terms of education, the highest level attained by most of the members of mixed refugee groups interviewed was upper primary. Results show that 35.8% were upper primary level (P.5-P.7) graduates. Those who had reached O-level (S.1-S.4) were 23.6%, A-level (2.4%), tertiary (1.6%) while none had University level education. Almost the same distribution across highest level of education attained was observed in each of the group membership categories although slightly more national/host (20.9%) had no formal education than the refugees (12.5%). Notable proportions (15.4%), from both districts, had no formal education.

Main occupation of the respondent

By occupation, results show that most of the respondents (87.7%) their main occupation was farming. Very few (5.7%) were in business and 6.6% in other activities. It is also observed that almost proportion of respondents involved in farming is almost the same for nationals (88.4%) and refugees (87.3%). For nearly all persons interviewed in Lamwo, their main occupation was farming (90.9%) compared to 86.5% in Madi-Okollo. Despite the small variations across the two districts, this shows that the selection of study participants was very good to enable inclusion in the sample people who can authoritatively speak about CSA Adoption (see Table 27).

Table 26: Socio-demographics of respondents from mixed refugee groups

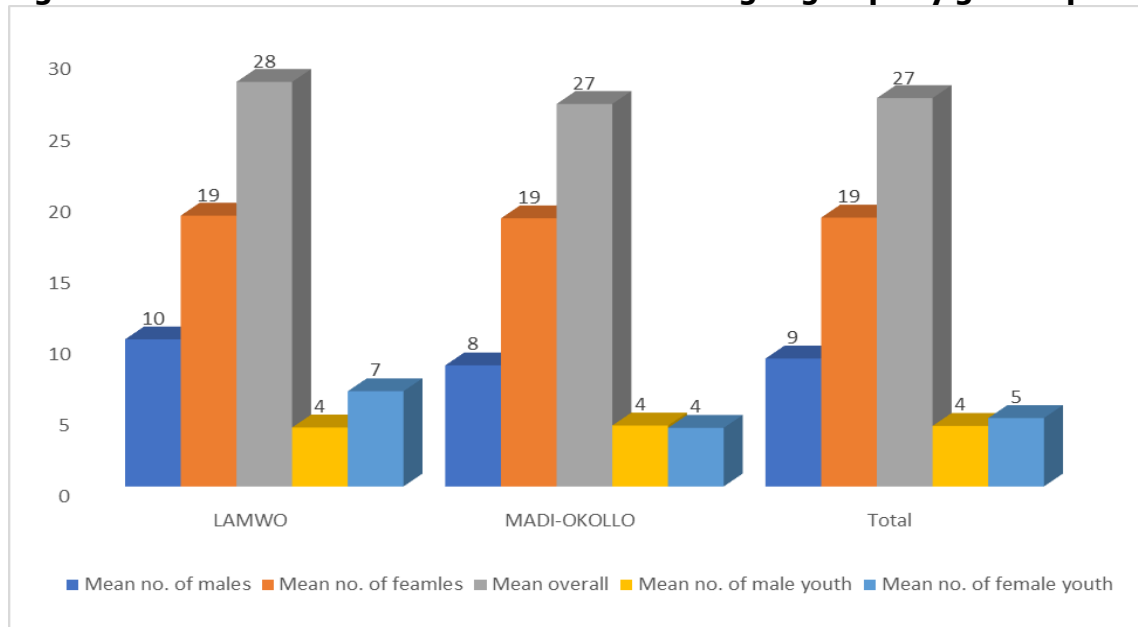
		Group membership category				District				Total	
		Refugee		Nationals/Hosts		Lamwo		Madi-Okollo			
		HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Sex of the respondent:	Male	27	34.2	18	42.9	11	33.3	34	38.6	45	37.2
	Female	52	65.8	24	57.1	22	66.7	54	61.4	76	62.8
Age (years) of the respondent	18-28	19	23.8	5	11.6	3	9.1	21	23.3	24	19.5
	29-38	38	47.5	17	39.5	20	60.6	35	38.9	55	44.7
	39-48	14	17.5	12	27.9	5	15.2	21	23.3	26	21.1
	49+	9	11.2	9	20.9	5	15.2	13	14.4	18	14.6
Highest level of education for the respondent	No formal education	10	12.5	9	20.9	5	15.2	14	15.6	19	15.4
	Lower primary (P1 -4)	16	20.0	10	23.3	5	15.2	21	23.3	26	21.1
	Upper primary (P5 -7)	30	37.5	14	32.6	14	42.4	30	33.3	44	35.8
	O-level (S1-S4)	23	28.8	6	14.0	7	21.2	22	24.4	29	23.6
	A-level (S5-S6)	1	1.2	2	4.7	1	3.0	2	2.2	3	2.4
	Tertiary Institution	0	0.0	2	4.7	1	3.0	1	1.1	2	1.6
University Education	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Main occupation of the respondent	Farming	69	87.3	38	88.4	30	90.9	77	86.5	107	87.7
	Business	6	7.6	1	2.3	2	6.1	5	5.6	7	5.7
	Others	4	5.1	4	9.3	1	3.0	7	7.9	8	6.6
Household Category	Male headed	45	56.2	38	88.4	21	63.6	62	68.9	83	67.5
	Female headed	35	43.8	5	11.6	12	36.4	28	31.1	40	32.5
Age of the household head	18-28	9	11.4	2	4.9	3	9.4	8	9.1	11	9.2
	29-38	39	49.4	14	34.1	17	53.1	36	40.9	53	44.2
	39-48	21	26.6	14	34.1	7	21.9	28	31.8	35	29.2
	49+	10	12.7	11	26.8	5	15.6	16	18.2	21	17.5

3.2 Mixed refugees' group establishment

Group membership

On average each mixed refugees' group comprised 27–28 members. By gender, majority of members in the groups were female. In both Lamwo and Madi-Okollo, the mean number of females reported per group was 19 while that of males ranged between 8 and 10. Within the groups the number of youths (18-28 years) was notable, constituting about a quarter of the membership (see Figure 8 below).

Figure 6: Mean number of members in mixed refugee groups by gender per district



Group functionality before and after start of NURI

All mixed refugee groups were formed prior to the end of the predecessor RDNUC programme with clear governance structures and instruments. Indeed, majority of respondents (83.5%) attested that groups had a clear plan, goal, and objectives even before the start of the CSA training. Equally big proportions reported having leadership elected by members of the group (85.1%) and maintained proper records for groups activities (82.6%) prior to the CSA training. Further, results show that 78.5% belonged to groups that had a Constitution and held regular meetings (78.5%) prior to the start of CSA training by NURI. A similar distribution is observed in both national/host and refugees (See Table 28).

Leadership of farmer groups

Leadership of each mixed refugee group comprised six (6) persons including, Chairperson, Vice Chairperson, Treasurer, Secretary, Publicity/Mobiliser and Security. Both males and females were elected to leadership positions. This CSA Adoption Study sought to establish the gender elected to the different positions and results show that nearly all positions except that of Treasurer were dominated by men. For instance, 74% reported that their Group Chairpersons were male, 69.9% also had male Vice Chairpersons while only 4.9% reported male Treasurers. Nearly all respondents (95.1%) reported having females in the position of Treasurer in their groups (see Table 28).

Table 27: Mixed refugee groups that had good governance structures prior to the CSA training.

	Group membership category				District				Total	
	Refugee		National/Host		LAMWO		MADI-OKOLLO			
	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Functional aspects of your group before start-up of CSA training by NURI										
Clear goal/objective/plan	65	83.3	36	83.7	18	58.1	83	92.2	101	83.5
Constitution & if members abide by it	62	79.5	33	76.7	16	51.6	79	87.8	95	78.5
Leadership & if they were elected	68	87.2	35	81.4	20	64.5	83	92.2	103	85.1
Proper records/documentation of group activities	66	84.6	34	79.1	17	54.8	83	92.2	100	82.6
Regular meetings & attendance by members	59	75.6	35	81.4	20	64.5	74	82.2	94	77.7
Gender elected to fill the positions										

Group Chairperson	Male	61	76.2	30	69.8	24	72.7	67	74.4	91	74.0
	Female	19	23.8	13	30.2	9	27.3	23	25.6	32	26.0
Vice Chairperson	Male	58	72.5	28	65.1	18	54.5	68	75.6	86	69.9
	Female	22	27.5	15	34.9	15	45.5	22	24.4	37	30.1
Treasurer	Male	4	5.0	2	4.7	4	12.1	2	2.2	6	4.9
	Female	76	95.0	41	95.3	29	87.9	88	97.8	117	95.1
Secretary	Male	61	76.2	37	86.0	27	81.8	71	78.9	98	79.7
	Female	19	23.8	6	14.0	6	18.2	19	21.1	25	20.3
Publicity/Mobiliser	Male	42	55.3	26	60.5	18	54.5	50	58.1	68	57.1
	Female	34	44.7	17	39.5	15	45.5	36	41.9	51	42.9
Security	Male	63	91.3	31	73.8	25	75.8	69	88.5	94	84.7
	Female	6	8.7	11	26.2	8	24.2	9	11.5	17	15.3

3.3 CSA Training and Learning new practices.

Training by NURI and other sources

All respondents (100%) in this CSA Adoption study reportedly received training on CSA from NURI extension staff and slightly over half (62.3%) indicated that it was their first extension training since the establishment of NURI. This means that about a third (37.7%) of the respondents had received such trainings before the start of the NURI programme. Most of the respondents who had never received such training before were from Lamwo (97%). Slightly more nationals/host (65.1%) received the training for the first time than the refugees (60.8%). All respondents (100.0%) who had ever received similar training before were trained by NGOs. (see Table 29).

Attendance of training sessions by farmer groups

All mixed refugee groups in Lamwo and Madi-Okollo benefited from various CSA training sessions. In 2019, NURI extension staff organized and conducted 10 CSA training sessions with each mixed refugees' group. The sessions conducted include climate change and impact, CSA practices and technologies, enterprise selection for groups, seed bed preparation, planting intercropping and weeding, pests and disease control, soil fertility and water management, post-harvest handling and value addition, business skills as well as marketing. Attendance for the sessions conducted was generally high. More than 80% of the respondents acknowledged attending full sessions of the training each time they were organized. The session on seed bed preparation, planting, intercropping, and weeding was attended by the highest number of people; 98.4% of all respondents reported to have attended that session. Matching high attendance was reported for the session on "Enterprise selection for groups" and "soil fertility and water management". The least attended, was the sessions on "Business skills" missed by 17.1%, these did not attend it at all while 20.3% attended partially; only 62.6% attended this session fully. Majority of respondents who did not attend the "Business skills" session, were from Lamwo (32.3%) and nationals/Host (26.2%). See Table 29.

Table 28: Reported impact of CSA training on on-farm production activities for mixed refugee groups

	Group membership category				District				Total		
	Refugee		Nationals/ Hosts		Lamwo		Madi-Okollo				
	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	
Receive training on CSA from NURI extension staff	80	100.0	43	100.0	33	100.0	90	100.0	123	100.0	
NURI CSA training received was the first extension training since its establishment	48	60.8	28	65.1	32	97.0	44	49.4	76	62.3	
Reported source of similar trainings received by the groups before NURI	NGO	34	100.0	16	100.0	1	100.0	49	100.0	50	100.0
	Government	0	0.0	0	0.0	0	0.0	0	0.0	0.0	0.0

	Faith based	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Peer learning	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Others	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sessions attended conducted by NURI in 2019.											
Setting ground rules	Fully	58	72.5	37	86.0	25	75.8	70	77.8	95	77.2
	Partially	12	15.0	4	9.3	3	9.1	13	14.4	16	13.0
	Not at all	10	12.5	2	4.7	5	15.2	7	7.8	12	9.8
Climate, climate Change & impact	Fully	64	80.0	38	88.4	25	75.8	77	85.6	102	82.9
	Partially	9	11.2	2	4.7	3	9.1	8	8.9	11	8.9
	Not at all	7	8.8	3	7.0	5	15.2	5	5.6	10	8.1
CSA practices & technologies	Fully	69	86.2	40	93.0	27	81.8	82	91.1	109	88.6
	Partially	9	11.2	2	4.7	3	9.1	8	8.9	11	8.9
	Not at all	2	2.5	1	2.3	3	9.1	0	0.0	3	2.4
Enterprise selection for groups	Fully	73	91.2	40	93.0	29	87.9	84	93.3	113	91.9
	Partially	2	2.5	1	2.3	0	0.0	3	3.3	3	2.4
	Not at all	5	6.2	2	4.7	4	12.1	3	3.3	7	5.7
Seed bed preparation, planting intercropping & weeding	Fully	79	98.8	42	97.7	33	100.0	88	97.8	121	98.4
	Partially	1	1.2	1	2.3	0	0.0	2	2.2	2	1.6
	Not at all	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Pests & disease control	Fully	65	81.2	40	93.0	27	81.8	78	86.7	105	85.4
	Partially	12	15.0	0	0.0	3	9.1	9	10.0	12	9.8
	Not at all	3	3.8	3	7.0	3	9.1	3	3.3	6	4.9
Soil fertility & water management	Fully	74	92.5	39	90.7	29	87.9	84	93.3	113	91.9
	Partially	3	3.8	1	2.3	1	3.0	3	3.3	4	3.3
	Not at all	3	3.8	3	7.0	3	9.1	3	3.3	6	4.9
Post-harvest handling & value addition	Fully	71	88.8	37	86.0	31	93.9	77	85.6	108	87.8
	Partially	6	7.5	1	2.3	1	3.0	6	6.7	7	5.7
	Not at all	3	3.8	5	11.6	1	3.0	7	7.8	8	6.5
Business skills	Fully	50	62.5	27	62.8	18	54.5	59	65.6	77	62.6
	Partially	24	30.0	1	2.3	4	12.1	21	23.3	25	20.3
	Not at all	6	7.5	15	34.9	11	33.3	10	11.1	21	17.1
Marketing	Fully	66	82.5	32	76.2	24	72.7	74	83.1	98	80.3
	Partially	11	13.8	2	4.8	3	9.1	10	11.2	13	10.7
	Not at all	3	3.8	8	19.0	6	18.2	5	5.6	11	9.0
Rating the duration of the training sessions	Too short	14	17.5	6	14.0	7	21.2	13	14.4	20	16.3
	Too long	1	1.2	1	2.3	1	3.0	1	1.1	2	1.6
	Appropriate	65	81.2	36	83.7	25	75.8	76	84.4	101	82.1
Rating of the period for the training sessions/days in relation	Very Good	33	44.0	26	63.4	9	28.1	50	59.5	59	50.9
	Good	37	49.3	12	29.3	17	53.1	32	38.1	49	42.2
	Fair	3	4.0	3	7.3	5	15.6	1	1.2	6	5.2
	Poor	2	2.7	0	0.0	1	3.1	1	1.2	2	1.7
Rating of the training methods used during the sessions	Very Good	38	49.4	30	71.4	14	42.4	54	62.8	68	57.1
	Good	36	46.8	11	26.2	19	57.6	28	32.6	47	39.5
	Fair	2	2.6	1	2.4	0	0.0	3	3.5	3	2.5
	Poor	1	1.3	0	0.0	0	0.0	1	1.2	1	0.8
Sessions considered relevant to daily on-farm production activities											
Climate, climate Change & impact	Very relevant	63	79.7	33	76.7	17	53.1	79	87.8	96	78.7
	Fairly relevant	11	13.9	8	18.6	9	28.1	10	11.1	19	15.6
	Not relevant	5	6.3	2	4.7	6	18.8	1	1.1	7	5.7
CSA practices & technologies	Very relevant	66	82.5	39	90.7	19	57.6	86	95.6	105	85.4
	Fairly relevant	14	17.5	3	7.0	13	39.4	4	4.4	17	13.8
	Not relevant	0	0.0	1	2.3	1	3.0	0	0.0	1	0.8
Enterprise selection for groups	Very relevant	72	90.0	35	81.4	26	78.8	81	90.0	107	87.0
	Fairly relevant	6	7.5	7	16.3	4	12.1	9	10.0	13	10.6
	Not relevant	2	2.5	1	2.3	3	9.1	0	0.0	3	2.4
Seed bed preparation, planting, intercropping & weeding	Very relevant	77	96.2	43	100.0	33	100.0	87	96.7	120	97.6
	Fairly relevant	3	3.8	0	0.0	0	0.0	3	3.3	3	2.4
	Not relevant	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Pests & disease control	Very relevant	63	78.8	29	67.4	24	72.7	68	75.6	92	74.8

	Fairly relevant	12	15.0	13	30.2	6	18.2	19	21.1	25	20.3
	Not relevant	5	6.2	1	2.3	3	9.1	3	3.3	6	4.9
Soil fertility & water management	Very relevant	69	86.2	35	81.4	22	66.7	82	91.1	104	84.6
	Fairly relevant	7	8.8	4	9.3	7	21.2	4	4.4	11	8.9
	Not relevant	4	5.0	4	9.3	4	12.1	4	4.4	8	6.5
Post-harvest handling & value addition	Very relevant	71	88.8	35	83.3	28	87.5	78	86.7	106	86.9
	Fairly relevant	6	7.5	4	9.5	4	12.5	6	6.7	10	8.2
	Not relevant	3	3.8	3	7.1	0	0.0	6	6.7	6	4.9
Business skills	Very relevant	57	72.2	26	61.9	16	51.6	67	74.4	83	68.6
	Fairly relevant	16	20.3	5	11.9	5	16.1	16	17.8	21	17.4
	Not relevant	6	7.6	11	26.2	10	32.3	7	7.8	17	14.0
Marketing	Very relevant	70	87.5	31	73.8	26	81.2	75	83.3	101	82.8
	Fairly relevant	10	12.5	6	14.3	3	9.4	13	14.4	16	13.1
	Not relevant	0	0.0	5	11.9	3	9.4	2	2.2	5	4.1
Reported extent to which training improved agricultural production knowledge	No change	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Little extent	5	6.3	3	7.0	1	3.0	7	7.9	8	6.6
	Moderate extent	17	21.5	12	27.9	9	27.3	20	22.5	29	23.8
	A large extent	57	72.2	28	65.1	23	69.7	62	69.7	85	69.7
Would recommend other farmers in the community to attend a similar training	Yes	79	98.8	41	97.6	32	97.0	88	98.9	120	98.4
	No	1	1.2	1	2.4	1	3.0	1	1.1	2	1.6

CSA Training evaluation by participants

Majority of respondents (82.1%) that attended the CSA training sessions appreciated the duration noting that they were neither too short nor too long but rather appropriate. Only 16.3% felt the training sessions were too short while another 1.6% said the sessions were too long. The timing of the CSA trainings in relation to the farming calendar was also appreciated. Majority (93.1%) said it was spot-on, i.e., 42.2% said it was good and 50.9% very good. Only 2 people felt the timing of some sessions was poor. Similarly, the training methods used in the sessions were highly appreciated; 39.5% rated the methods used as good and 57.1% as very good. This means only 3.3% were not satisfied the methods used. There was no significant variation in evaluation of training by participants across districts and Group membership categories. Refer to table 29 above.

Relevance of training to daily on-farm production activities

The results show that over 70% of respondents generally considered all the sessions relevant to their daily on-farm production activities. The most appreciated session (97.6%) as very relevant was "seed bed preparation, planting, intercropping and weeding". This was followed by the sessions on "Enterprise selection" (87%) and "post-harvest handling and value addition" (86.9%). The sessions on business skills and climate change were not as highly appreciated as others particularly by respondents from Lamwo. Further, results show that the trainings helped farmers improve their knowledge in agricultural production. About 70% of the respondents reported that the training had greatly improved their agricultural production knowledge. About 24% rated the impact on their knowledge as moderate. Although 6.6% felt the CSA training had little impact on their agricultural production knowledge, all respondents found the training to have changed their knowledge and about 98% were more than willing to recommend other farmers in their communities to attend a similar training if offered in future. Refer to table 29 above.

3.4 Application of CSA Practices on fields

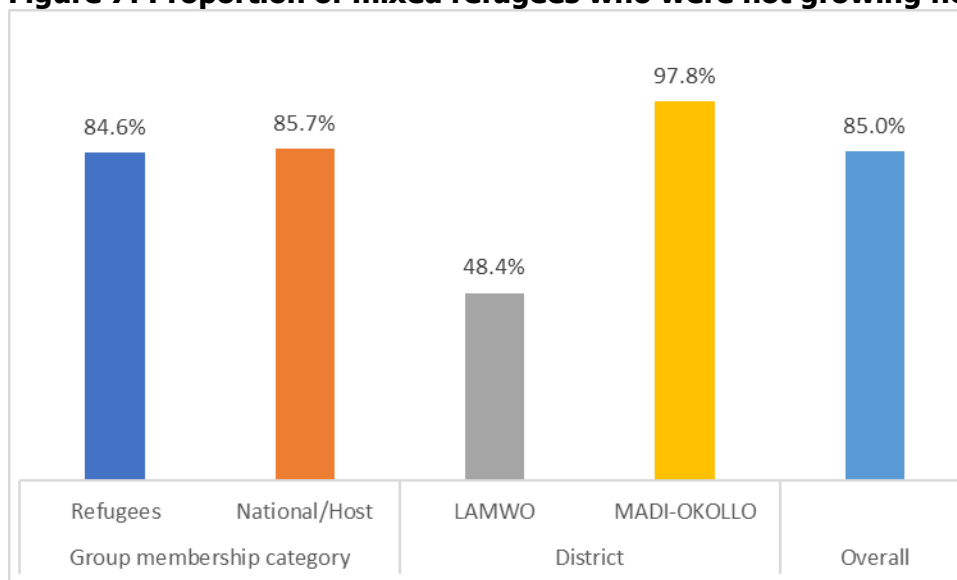
Strategic crops and CSA practices assessed.

For the mixed groups, what is referred to as strategic crops in their case are known as field crops. They are similar and the crop types assessed are Groundnuts and Sesame. Members of the mixed refugee groups have been growing these field crops for some time. This was confirmed when respondents in this study were asked whether they were growing the field crops for the first time; 85% said it was not the first time. They had grown those field crops before the 2020 planting season. Only 15% of the respondents reported to have grown the field crops for the first in the 2020 planting season. A comparison between districts shows that slightly less than half (48.4%) of respondents in Lamwo had grown the field crop for the first time while nearly everyone (97.8%) in Madi- them Okollo had grown before. There was a very slight difference between the nationals/host (85.7%) and refugees (84.4%) who were not growing the crops for the first time. See Figure 9 below.

Members of mixed refugee groups who were growing the field crops for the first time, cited various reasons/factors that motivated them to start growing those crops. Some of them reported to have been motivated by the better/high yields associated with those crop varieties, early maturity, high revenues associated with especially groundnuts and ability to resist pests and diseases as well as their adaptation to drought prone areas.

The training I received from NURI about groundnuts motivated me to plant them; they have better yields; groundnuts generate a lot of money; have high market (Mixed refugees).

Figure 7: Proportion of mixed refugees who were not growing field crops for the first time.



Like for the new national farmer groups, the practices assessed were seedbed preparation, use of improved seeds, planting of seeds, weeding, Pest and Disease control, soil fertility and water management and Post-Harvest handling.

3.4.1 Seedbed Preparation for Production by Mixed Refugee Groups

Preparation/clearing of land for production is a must among farmers. But the way it is done, can support

improved productivity or damage the soils. During the CSA training sessions on seedbed preparation farmers were taught the best ways to clear land before ploughing, so this study sought to establish how mixed refugee households cleared their land for the 2020 planting season. Results show that majority of the farmers used slashing and cutting of shrubs/trees to clear their land before ploughing. All of them avoided spraying herbicides on grass to dry while only 14.6% used burning. Slashing as a method of clearing the fields was cited by 76.4% of all members of the mixed refugee groups while cutting shrubs/trees was cited by 35.8%. While the proportions of nationals (74.4%) and refugees (77.5%) who reportedly slashed their fields were almost equal, the nationals (51.2%) who cut shrubs/trees was almost twice the refugees (27.5%) who used the same method to clear their fields. About strategic crops, apart from beans (2 farmers), slashing and hand hoe were used by equal proportions of farmers to prepare fields for planting sesame and cassava. More farmers used cutting shrubs to prepare the fields for cassava (33%) than for sesame (22%). More farmers in Madi-Okollo (81.1%) than Lamwo (63.6%) reported to have slashed their fields in preparation for planting while those who used cutting of shrubs as a method of clearing their fields were mostly in Lamwo. About farming tool used, results show that 88.6% used a hand hoe and ploughed their fields twice before planting. See Table 30 below.

Table 29: On-farm production practices adopted by mixed refugees in the 2020 planting season.

		Group membership category				District				Total	
		Refugee		Nationals/Host		LAMWO		MADI-		HHs	%
		HHs	%	HHs	%	HHs	%	HHs	%		
First time growing the strategic crop	1. Yes	12	15.4	6	14.3	16	51.6	2	2.2	18	15.0
	2. No	66	84.6	36	85.7	15	48.4	87	97.8	102	85.0
Reported ways farmers cleared their land before ploughing this											
	Burning field	10	12.5	8	18.6	6	18.2	12	13.3	18	14.6
	Slashing	62	77.5	32	74.4	21	63.6	73	81.1	94	76.4
	Cutting shrubs/trees	22	27.5	22	51.2	22	66.7	22	24.4	44	35.8
	Spraying with herbicides	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Others	1	1.2	1	2.3	2	6.1	0	0.0	2	1.6
Methods of land tillage used											
	Hoe	73	91.2	36	83.7	21	63.6	88	97.8	109	88.6
	Animal traction	7	8.8	10	23.3	17	51.5	0	0.0	17	13.8
	Tractor	0	0.0	1	2.3	0	0.0	1	1.1	1	0.8
	Others	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Number of times the field was ploughed before planting strategic crop	Once	9	11.4	5	11.6	10	30.3	4	4.5	14	11.5
	Twice	69	87.3	37	86.0	23	69.7	83	93.3	106	86.9
	Thrice	1	1.3	1	2.3	0	0.0	2	2.2	2	1.6
Elements of seedbed preparation farmers recall from NURI CSA training sessions											
	No burning of field	78	97.5	41	95.3	31	93.9	88	97.8	119	96.7
	Proper selection of site	67	83.8	32	74.4	20	60.6	79	87.8	99	80.5
	Minimum soil disturbance	59	73.8	28	65.1	15	45.5	72	80.0	87	70.7
	Minimal tree cutting	73	91.2	39	90.7	25	75.8	87	96.7	112	91.1
	First and second tillage	76	95.0	39	90.7	25	75.8	90	100.0	115	93.5
	Good seedbed preparation	75	93.8	33	76.7	20	60.6	88	97.8	108	87.8
Experienced new elements under seedbed preparation during CSA	Yes	69	86.2	33	78.6	30	90.9	72	80.9	102	83.6
	No	11	13.8	9	21.4	3	9.1	17	19.1	20	16.4
Elements of good seedbed preparation observed in the farms	Yes	72	90.0	39	90.7	21	63.6	90	100.0	111	90.2
	No	8	10.0	4	9.3	12	36.4	0	0.0	12	9.8

Table 30: On-farm production practices adopted by refugees in the 2020 across strategic crops.

		SESAME		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%
Ways of clearing land before ploughing this year	Burning field	2	11.1	1	6.7	0	0.0
	Slashing	12	66.7	10	66.7	2	100.0
	Cutting shrubs/trees	4	22.2	5	33.3	1	50.0
	Spraying with						
	Others			1	6.7		

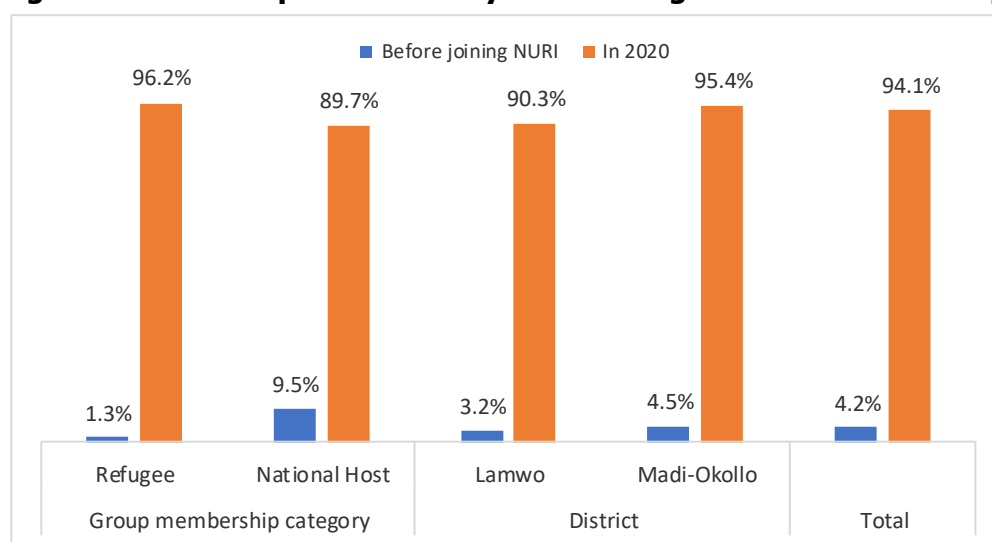
Method of land tillage used	Hoe	16	88.9	13	86.7	1	50.0
	Animal traction	2	11.1	1	6.7	1	50.0
	Tractor						
	Others						
Number of times a field was ploughed before planting	Once	2	11.1	1	7.1	1	50.0
	Twice	14	77.8	13	92.9	1	50.0
	Thrice	2	11.1	0	0.0	0	0.0
Any new element during CSA training under seedbed preparation	Yes	16	88.9	12	85.7	2	100.0
	No	2	11.1	2	14.3	0	0.0
Elements of good seedbed preparation was observed in the farmers' field	Yes	15	83.3	15	100.0	0	0.0
	No	3	16.7	0	0.0	2	100.0

During the CSA training session on seed bed preparation, farmers were told to abandon burning of fields as a method of clearing the land in preparation for planting. Other aspects discussed in the session included proper selection of site considering fertility, flood risk, topography, rotation, minimum soil disturbance, minimal tree cutting, timing and the importance of the first and second tillage as well as good seedbed preparation for small, seeded crops. With just a year after the training, this study sought to establish farmers' level of recall. Results show generally good recall on all elements discussed in the session on seedbed preparation. Translation of the knowledge acquired into practice was also high; elements of good seedbed preparation were observed in 90.2% of all farmers' fields visited. Table 31 above shows that all farmers (100%) growing cassava and 83% of those growing sesame were found elements of good seedbed preparation in the field. (see Table 26 above).

3.4.2 Use of Improved Seeds before and after the CSA Training by NURI

Use of local seeds was nearly universal among mixed refugees in both Lamwo and Madi-Okollo prior to the NURI programme. Use of improved seeds was almost unheard of, but after joining the NURI programme and attending trainings on importance of planting improved seeds, almost all farmers abandoned use of local seeds. From the chart below, 95.4% in Madi-Okollo and 90.3% in Lamwo planted improved seeds in 2020. Furthermore, slightly more refugees (96.2%) planted improved seeds than nationals/host (89.7%). Overall, less than a tenth used local seeds in the 2020 season (see Figure 10 below). Table 33 also shows that 100%, 93.3% and 83.3% of the farmers growing beans, cassava, and sesame, respectively used improved seeds after NURI training.

Figure 8: Use of improved seed by mixed refugees before and after joining NURI



Demonstration Gardens were the commonly cited source of the improved seeds used in the 2020 planting season. Eighty-five percent (85.6%) in Madi-Okollo and 66.7% in Lamwo reported to have obtained their seeds from demonstration plots. Similarly, 85% of the refugees and 72.1% of the nationals got the seeds from demonstration gardens. The remaining proportion that used improved seeds reported to have either obtained them from “other development partners” (17.9%), home reserves (7.3%) or from the market (6.5%). None of the members of the mixed refugee groups reported to have got their seeds from input dealers or from the Operation Wealth Creation Team. On the extent of recall, results show that more than three quarters of all mixed refugee farmers had excellent recall of the various CSA elements on improved seeds. For instance, 97.6% acknowledged recall of the advice on planting high yielding seed varieties, importance of planting early maturing seeds (88.6%), and disease resistant varieties. About 80% recalled being cautioned against buying seeds that have physical damage, but rather plant seeds which are clean and uniform in size and color, certified and viable, and drought resistant.

Translation of knowledge on planting improved seeds into practice was widespread though not universal. Use of improved seed varieties was observed on 87% of the farmers’ fields visited. This means only 13% of farmers’ fields were found without improved seeds, most of whom from Lamwo. Results show that 39.4% of the farmers’ fields observed in Lamwo had not used improved seeds compared to 3.3% in Madi-Okollo. Slightly more nationals (13%) than refugees (10%) were observed not to have used improved seeds at the time of the study. See Table 32 below. Use of improved seeds was observed in the fields for 77.3% and 93.3% of farmers growing sesame and cassava, respectively and no use of improved seeds was observed in fields for beans. Use of improved seeds was found to be very high among both refugees (90%) and the nationals (81.4%).

Table 31: Use of improved seed varieties by mixed refugee farmers trained on CSA.

		Group membership category				District						
		Refugee		National/		LAMWO		MADI-		Total		
		HHS	%	HHS	%	HHS	%	HHS	%	HHS	%	
Reported source of the improved seed type used in the												
Home saved		4	5.0	5	11.6	1	3.0	8	8.9	9	7.3	
Market		3	3.8	5	11.6	2	6.1	6	6.7	8	6.5	
Demonstration plot		68	85.0	31	72.1	22	66.7	77	85.6	99	80.5	
Operation Wealth Creation (OWC)		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Other development partners		12	15.0	10	23.3	6	18.2	16	17.8	22	17.9	
Input dealer		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Farmers’ rating of germination of the seeds		Very good	40	51.3	20	50.0	11	36.7	49	55.7	60	50.8
		Good	29	37.2	15	37.5	17	56.7	27	30.7	44	37.3
		Fair	8	10.3	5	12.5	2	6.7	11	12.5	13	11.0
		Poor	1	1.3	0	0.0	0	0.0	1	1.1	1	0.8
Key elements recalled about use of improved seeds from the CSA training												
Certified and viable		68	85.0	32	74.4	16	48.5	84	93.3	100	81.3	
Clean/pure/uniform in size and colour		67	83.8	36	83.7	15	45.5	88	97.8	103	83.7	
Wholesomeness		65	81.2	33	76.7	20	60.6	78	86.7	98	79.7	
Pest and disease resistant		71	88.8	35	81.4	25	75.8	81	90.0	106	86.2	
Drought tolerant		67	83.8	31	72.1	19	57.6	79	87.8	98	79.7	
Early maturing and/or uniform in maturity		68	85.0	41	95.3	28	84.8	81	90.0	109	88.6	
High yielding		77	96.2	43	100.0	30	90.9	90	100.0	120	97.6	
New elements on use of improved seeds in the CSA training		Yes	62	77.5	32	74.4	26	78.8	68	75.6	94	76.4
		No	18	22.5	11	25.6	7	21.2	22	24.4	29	23.6
Use of improved seeds observed in the field		Yes	72	90.0	35	81.4	20	60.6	87	96.7	107	87.0
		No	8	10.0	8	18.6	13	39.4	3	3.3	16	13.0

Table 32: Use of improved seeds across strategic crops.

		SESSAME		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%
Type of seed use before enrolling for the NURI programme	Improved	0	0.0	0	0.0	0	0.0
	Local	18	100.0	14	100.0	2	100.0
Type of seed used this year	Improved	15	83.3	14	93.3	2	100.0
	Local	3	16.7	1	6.7	0	0.0
Any new element of CSA training under use of improved seeds		17	94.4	11	73.3	2	100.0
Use of improved seeds be observed in the field		14	77.8	14	93.3	0	0.0

3.4.3 Planting Seeds before and after the CSA Training by NURI

Before attending the CSA training in 2019, members of the mixed refugee groups were using two methods of planting in equal measure. Results show that 44.2% used the broadcast method while 36.7% used line planting, with the remainder using both methods. Following the CSA training, nearly all farmers, that were using either the broadcast method or both broadcast and line planting, abandoned broadcasting and adopted the modern planting methods of line planting. Results show that only 7.5% continued to use the broadcast method, the rest (92.5%) used line planting in the 2020 planting season. On the extent of recall, results show that all mixed refugee group members recalled being trained about planting in lines (100%). Correct spacing was recalled by 82.9% while training on “recommended intercropping” was recalled by 87%. On whether the information shared was new to the farmers or not, results show that for 84.2% of the mixed refugee group members, matters discussed were new to them; only 15.8% had learnt about planting in lines, correct spacing and intercropping prior to the CSA training.

Translation of knowledge on planting in lines, correct spacing and using the recommended intercropping into practice was generally high in both Lamwo and Madi-Okollo as well as among refugees and nationals. Results show that planting in lines and correct spacing were observed on 86.1% of farmers’ fields visited. Mixed refugee farmers who planted in lines, the spacing commonly reported used between rows was 57 centimeters while between plants, it was 33.4 centimeters in Madi-Okollo. Those in Lamwo reported using 44 centimeters between rows and 23.6 between plants. Similarly, recommended intercropping was observed on 78.9% of farmers’ fields most of whom found in Madi-Okollo. The correct spacing between rows and use of recommended intercropping practices was found to be more common among refugees (88.8% and 80%, respectively) than the nationals (81% and 76.7%). (See Table 34 below).

Table 33: Reported methods of planting seeds prior and after start of the NURI programme

		Group membership category				District				Total	
		Refugee		National Host		LAMWO		MADI-OKOLLO			
		HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Planting methods farmers used before enrolling for NURI CSA training	Line planting	27	35.1	17	39.5	9	28.1	35	39.8	44	36.7
	Broad casting	33	42.9	20	46.5	22	68.8	31	35.2	53	44.2
	Both	17	22.1	6	14.0	1	3.1	22	25.0	23	19.2
Seed planting method currently used by farmers	Line planting	76	97.4	35	83.3	27	87.1	84	94.4	111	92.5
	Broad casting	2	2.6	7	16.7	4	12.9	5	5.6	9	7.5
	Both	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Key elements about planting of seeds farmers recall from the CSA training done by NURI											
Planting in lines		80	100.0	43	100.0	33	100.0	90	100.0	123	100.0
Correct spacing		67	83.8	35	81.4	30	90.9	72	80.0	102	82.9
Recommended Intercropping		71	88.8	36	83.7	20	60.6	87	96.7	107	87.0
New elements in the CSA training under line-planting, intercropping and spacing	Yes	68	87.2	33	78.6	28	90.3	73	82.0	101	84.2
	No	10	12.8	9	21.4	3	9.7	16	18.0	19	15.8
Gardens where line planting and correct spacing was observed	Yes	71	88.8	34	81.0	20	60.6	85	95.5	105	86.1
	No	9	11.2	8	19.0	13	39.4	4	4.5	17	13.9
Gardens where recommended intercropping was observed	Yes	64	80.0	33	76.7	18	54.5	79	87.8	97	78.9
	No	16	20.0	10	23.3	15	45.5	11	12.2	26	21.1
Spacing in centimetres between	Rows	53.8		54.4		44.2		57.1		54.1	
	Plants	31.4		30.8		23.8		33.4		31.1	

Table 34: Reported methods of planting seeds across strategic crops.

		SESSAME		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%
Planting method were you using before enrolling for NURI CSA training	Line planting	3	16.7	10	71.4	0	0.0
	Broad casting	12	66.7	2	14.3	2	100.0
	Both	3	16.7	2	14.3	0	0.0
Seed planting method used in the field this year	Line planting	11	61.1	15	100.0	2	100.0
	Broad casting	7	38.9	0	0.0	0	0.0
	Both	0	0.0	0	0.0	0	0.0
Any new element under line planting, recommended intercropping and correct spacing during CSA training		16	88.9	10	76.9	2	100.0
Line planting and correct spacing be observed in the field		11	61.1	15	100.0	0	0.0
Any new element under weed control during CSA training		11	61.1	9	81.8	0	0.0
Correct weeding was observed in the field		13	72.2	11	78.6	0	0.0

3.4.4 Weeding as a Farming Practice

Translation of knowledge on weeding acquired from the CSA training into practice was universal; all (100%) reported weeding their fields in this 2020 planting season using the hand hoe. None of the farmers among those visited in this study reported to have used chemicals to remove unwanted plants from their fields. All farmers in Madi-Okollo (100%) completed both the first and second weeding as recommended. In Lamwo most farmers (90.9%) completed the first weeding but only about half

(51.6%) reported to have completed the second weeding during the 2020 planting season. Regarding the group membership categories, while almost all the refugees (97.4%) and nationals (97.6%) completed the first weeding, slightly more refugees (88%) than the nationals (83.8%) completed the second weeding during the 2020 planting season.

Examination of the level of recall revealed universal recall for timely weeding; all farmers (100%) ably remembered being told about timely weeding. Application of alternative measures and use of a combination of methods was recalled by 79.7% and 69.9% of farmers, respectively. Recall for these two elements was highest in Madi-Okollo compared to Lamwo. However, recall of the 2 elements was found to be almost the same (about 80% and about 70%, respectively) among the refugees and nationals. For 71.6% of the mixed refugees interviewed, the elements taught in the CSA sessions under weed control, were new to them. During field observations, adoption of the acceptable weeding control measures/correct weeding was observed on 83.6% of the farmers' fields. Only 16.4% were not using the recommended weeding control measures (See Table 36 below).

Table 35: Farmers that practice weeding of fields in conformity to the CSA training.

	Group membership category				District					
	Refugee		National Host		LAMWO		MADI-OKOLLO		Total	
	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
that removed unwanted plants from their field this season	77	100.0	42	100.0	30	100.0	89	100.0	119	100.0
Reported methods farmers used for weeding in their fields.										
Hand hoe (Mechanical)	78	100.0	42	100.0	30	100.0	90	100.0	120	100.0
Chemical	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
No. of times farmers were weeding gardens before enrolling for CSA training										
Once	39	49.4	21	50.0	18	56.2	42	47.2	60	49.6
Twice	32	40.5	16	38.1	12	37.5	36	40.4	48	39.7
Thrice	7	8.9	4	9.5	2	6.2	9	10.1	11	9.1
None	1	1.3	1	2.4	0	0.0	2	2.2	2	1.7
Types of weeding done in the field after planting the crop this season										
First Weeding Completed	76	97.4	41	97.6	30	90.9	87	100.0	117	97.5
Second weeding Completed	66	88.0	31	83.8	16	51.6	81	100.0	97	86.6
Key elements about weeding farmers recall from the CSA training attended										
Timely weeding	80	100.0	43	100.0	33	100.0	90	100.0	123	100.0
Application of alternative measures	63	78.8	35	81.4	17	51.5	81	90.0	98	79.7
Combination of methods	56	70.0	30	69.8	13	39.4	73	81.1	86	69.9
Elements in session on weeding were new	55	74.3	28	66.7	17	54.8	66	77.6	83	71.6
Correct weeding observed in the fields	69	87.3	33	76.7	18	54.5	84	94.4	102	83.6

3.4.5 Pest and Disease Control among beneficiaries of the CSA Training

Pests and diseases are a common occurrence on farmers' fields. Seventy percent (70.1%) of mixed refugee group members interviewed acknowledged that their fields had ever been attacked by pests and diseases. Only 29.9% had never registered any pests and diseases on their fields since they started growing their field crops. Among the Group membership categories, more nationals/hosts (76.7%) than refugees (66.2%) experienced pests and diseases in their fields. The commonly reported pests registered included the fall army worm, nematodes, aphids, cut worms, termites, crickets, squirrels and rodents, while for the diseases, it was mostly groundnut rosette and maize streak. Measures taken to control the pests and diseases that attacked their fields, members of refugee groups sprayed pesticides, sprinkled sand to control aphids and chilly to kill the fall army worm, used crop rotation, set rodent traps and uprooted infected plants among others.

Members of mixed refugee groups were taught, in the CSA training conducted in 2019, how to control pests and diseases on their fields. Some of the ways pests and diseases are controlled include use of cultural methods like crop rotation and fallowing, use of organic methods like tobacco, soap and chilly, and chemical control as a last resort. Recall was generally high for the various control measures. Use of cultural methods such as crop rotation and fallowing stood out as the most recalled; remembered by 90.2% of the respondents. This was followed by use of chemicals (85.4%) and use of organic materials such as tobacco, cited by 82.9%. When asked, if there were any elements taught in the CSA sessions on pests and disease management that were new to the farmers, 82.6% answered in affirmative.

Translation of acquired knowledge into practice was notably high. During field observations, correct pest and disease control measures were observed on more than two-thirds (69.7%) of mixed refugee farmers' fields. This means only about a third (30.3%) were not using the correct pest and disease control measures as had been guided during the CSA training. There was very slight variation in availability of these measures in the farmers' fields between the categories of group membership (refugees and nationals). (See Table 37 below).

Table 36: Pest and Disease Control among beneficiaries of the CSA Training.

	Group membership category				District					
	Refugee		National Host		LAMWO		MADI-OKOLLO		Total	
	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Registered pests and diseases in the fields since growing the crops started	49	66.2	33	76.7	24	72.7	58	69.0	82	70.1
Elements farmers recall about pest and disease management from the CSA training attended										
Cultural methods like crop rotation	72	90.0	39	90.7	27	81.8	84	93.3	111	90.2
Use of organic methods	67	83.8	35	81.4	26	78.8	76	84.4	102	82.9
Chemical control as a last resort	67	83.8	38	88.4	20	60.6	85	94.4	105	85.4
Use of a combination of methods	50	63.3	27	62.8	7	21.9	70	77.8	77	63.1
New elements in the CSA training on pest and disease management	71	89.9	29	69.0	27	84.4	73	82.0	100	82.6
Correct pest and disease control observed in the field	55	69.6	30	69.8	12	36.4	73	82.0	85	69.7

3.4.6 Soil Fertility and Water Management

Soils in Lamwo and Madi-Okollo are generally considered to be fertile. Members of the mixed refugee groups when asked to rate the fertility of the soils in their fields, majority (79.2%) found the soil fertility to be good or very good. Majority of the farmers growing beans (100%), sesame (94.4%) and cassava (73.3%) rated their soil fertility as either good or very good (table 39). Results in table 38 show that 81.2% of farmers in Lamwo rated the level of soil fertility as good while 78.4% in Madi-Okollo rated them as good/very good. Likewise, more refugees (79.7%) rated the level of soil fertility as good/very good than the nationals (78%). Overall, 79.2% rated the fertility of their soils to be above just being fair. Those who felt that the fertility of their soils was poor were only 7.5% while those who said it was just fair were 13.3%. This means the combined percentage for farmers who were unhappy with the fertility of the soils in their fields were less than a third of the sample i.e., 20.8%. However, more than two-thirds (69.1%) reported experiencing challenges with the fertility of the soils in their fields and water management before they attended the CSA training organized by NURI. Only about a third (30.9%) had not experienced soil fertility and water management challenges before the NURI training. To control further eroding of soils, members of refugee groups used terraces, planted bands around their fields, dug trenches in the fields, used mulching and cover crops, crop rotation and fallowing. They also applied manure and buried grass in the fields to enable it to decompose underground.

Examination of the level of recall revealed good memory for most soil fertility and water control measures. For instance, 95.1% recall being taught about mulching their fields. The most cited topic recalled was on control of soil erosion through constructing terraces, bands, and trenches, cited by 96.7%. Use of crop rotation, application of manures, use of crop covers and fallowing of the land as means of increasing fertility of the soils were cited by 89.4%, 87%, 78% and 77.2% of farmers respectively (see Table 38).

Table 37: Soil fertility and water management on mixed refugees' fields

		Group membership category				District				Total	
		Refugee		National Host		LAMWO		MADI-OKOLLO			
		HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Rating of fertility of the soil in the field used for cultivating the selected crops	Poor	7	8.9	2	4.9	5	15.6	4	4.5	9	7.5
	Fair	9	11.4	7	17.1	1	3.1	15	17.0	16	13.3
	Good/very good	63	79.7	32	78.0	26	81.2	69	78.4	95	79.2
Experienced soil fertility & water management challenges in their fields before training under NURI	Yes	57	71.2	28	65.1	16	48.5	69	76.7	85	69.1
	No	23	28.8	15	34.9	17	51.5	21	23.3	38	30.9
Key elements farmers recall about soil fertility and water management from the CSA training attended under NURI											
Mulching		76	95.0	41	95.3	29	87.9	88	97.8	117	95.1
Use of cover crops		63	78.8	33	76.7	15	45.5	81	90.0	96	78.0
Inoculation of legumes with rhizobia		45	56.2	23	53.5	9	27.3	59	65.6	68	55.3
Crop rotation		69	86.2	41	95.3	25	75.8	85	94.4	110	89.4
Constructing terraces, bands, trenches		78	97.5	41	95.3	30	90.9	89	98.9	119	96.7
Fallowing of land		63	78.8	32	74.4	17	51.5	78	86.7	95	77.2
Application of manures		72	90.0	35	81.4	20	60.6	87	96.7	107	87.0

Application of inorganic fertilizers		57	71.2	29	67.4	13	39.4	73	81.1	86	69.9
New elements in the CSA training on soil fertility and water management	Yes	74	93.7	31	75.6	26	78.8	79	90.8	105	87.5
	No	5	6.3	10	24.4	7	21.2	8	9.2	15	12.5
Soil fertility management was observed in the field	Yes	64	81.0	36	83.7	16	48.5	84	94.4	100	82.0
	No	15	19.0	7	16.3	17	51.5	5	5.6	22	18.0

Table 38: Soil fertility and water management across strategic crops

		SESAME		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%
Rating of the fertility of the soil in the field used for cultivating the selected strategic crop	Poor	0	0.0	1	6.7	0	0.0
	Fair	1	5.6	3	20.0	0	0.0
	Good/very good	17	94.4	11	73.3	2	100.0
Experienced any soil fertility & water management challenges in the field before training under NURI		14	77.8	14	93.3	1	50.0
Any new element under soil fertility and water management during CSA training		16	94.1	12	80.0	2	100.0
Soil fertility management was observed in the field		13	72.2	12	80.0	1	50.0

In terms of land holding, results show that overall, majority (53.7%) of the respondents rented land of 1.1 acres on average. Most of them were residents of Madi-Okollo districts (63.3%) and belong to the category of refugees (72.5%). Only 18.6% of nationals/host (18.6%) rented land. Nearly half (48.8%) of the mixed refugees owned land, measuring 5 acres on average. Majority of those that own land were residents of Lamwo (54.5%) with 6.3 acres on average and/or nationals (81.4%) owning 6.8 acres of land on average. Slightly over 20% of respondents acknowledged to have borrowed land of an average size of 0.9 acres. A higher percentage of respondents who borrowed land was in Lamwo district (45.5%) and among nationals/hosts (28.8%) than their counterparts. Very few respondents (10.6%) reportedly lent land to others. (see table 39b below).

Table 9: Land holding among members of mixed refugee groups.

Land holding characteristics	Group Membership Category						District						Total		
	Refugee			Host			LAMWO			MADI-OKOLLO			HHs	% of HHs	Mean
	HHs	% of HHs	Mean	HHs	% of HHs	Mean	HHs	% of HHs	Mean	HHs	% of HHs	Mean			
Land owned	25	31.3	2.4	35	81.4	6.8	18	54.5	6.3	42	46.7	4.4	60	48.8	5.0
Land rented	58	72.5	1.0	8	18.6	1.4	9	27.3	2.1	57	63.3	0.9	66	53.7	1.1
Land borrowed	23	28.8	0.8	2	4.7	1.8	15	45.5	1.0	10	11.1	0.8	25	20.3	0.9
Land borrowed out	4	5.0	1.0	9	20.9	2.5	7	21.2	2.1	6	6.7	2.0	13	10.6	2.0
Cultivated land	51	63.8	1.3	35	81.4	4.2	20	60.6	2.5	66	73.3	2.5	86	69.9	2.5

3.4.7 Post-Harvest Handling and Value Addition

Most losses in agriculture are due to poor post-harvest handling. In the CSA training done by NURI in 2019, farmers in the mixed refugee groups were trained on proper post-harvest handling. Results of this study reveal notable translation of knowledge into practice; 78.3% of the farmers applied some post-harvest handling measures during and after harvesting their crops in the 2019 season. Groups in Madi-Okollo reported the highest number of farmers that applied post-harvest handling measures; 90.5% applied post-harvest handling measures compared to 45.2% in Lamwo. More than half (54.8%) in

Lamwo did not apply any post-harvest handling measures after the 2019 season. More Refugees (81.1%) applied post-harvest handling measures than the nationals (73.2%). The post-harvest handling measures applied include, among many others, harvesting at physiological maturity, shelling, and threshing while produce is still fresh, proper drying on tarpaulins, sorting and grading, packaging well sorted and graded produce, and storing/keeping packed produce on wood pellets.

The level of recall on the topic of post-harvest handling was very high. Results show recall of above 70% on all aspects of post-harvest handling. Farmers correctly recalled being told about the indicators of crop maturity, causes of post-harvest handling losses, the various methods to use in harvesting, threshing/shelling, proper drying, cleaning the harvested crops, and how to grade/sort and store crop produce. Notable proportions also recalled being told about pests that attack produce in storage and the importance of a clean store as well as a non-leaking roof (see Table 40 below).

Table 39: Application of post handling measures, value addition and marketing of produce

		Group membership category				District					
		Refugee		National/ Host		LAMWO		MADI-OKOLLO		Total	
		HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Applied post-harvest handling measures in the 2019 season	Yes	60	81.1	30	73.2	14	45.2	76	90.5	90	78.3
	No	14	18.9	11	26.8	17	54.8	8	9.5	25	21.7
Major elements farmers recall about post-harvest handling from the CSA training attended											
Indicators of crop maturity		70	88.6	35	81.4	26	78.8	79	88.8	105	86.1
Causes of PHH losses		63	79.7	29	67.4	16	48.5	76	85.4	92	75.4
Methods of harvesting		70	88.6	35	81.4	22	66.7	83	93.3	105	86.1
Threshing/shelling		64	82.1	34	79.1	19	59.4	79	88.8	98	81.0
Proper drying		77	97.5	40	93.0	32	97.0	85	95.5	117	95.9
Cleaning		72	91.1	37	86.0	26	78.8	83	93.3	109	89.3
Grading/sorting (stacked on pallets or raised stones)		64	81.0	32	74.4	18	54.5	78	87.6	96	78.7
Storing of produce and methods		67	84.8	34	79.1	20	60.6	81	91.0	101	82.8
Storage pests and their control		64	81.0	30	69.8	21	63.6	73	82.0	94	77.0
Clean store or none leaking roof		75	94.9	39	90.7	29	87.9	85	95.5	114	93.4
Carried out value addition on crop before marketing or storage	Yes	32	54.2	6	15.8	3	9.7	35	53.0	38	39.2
	No	27	45.8	32	84.2	28	90.3	31	47.0	59	60.8
New elements in the CSA training on PHH	Yes	38	58.5	22	55.0	19	57.6	41	56.9	60	57.1
	No	27	41.5	18	45.0	14	42.4	31	43.1	45	42.9
Ways produce was marketed in 2019	Collectively	7	13.5	3	11.1	2	9.5	8	13.8	10	12.7
	Individually	45	86.5	24	88.9	19	90.5	50	86.2	69	87.3

Table 40: Post handling measures, value addition and marketing of produce across strategic crops.

		SESAME		CASSAVA		BEANS	
		HHs	%	HHs	%	HHs	%
Applied some post-harvest handling measures during and after harvesting		11	73.3	8	57.1	1	50.0
Carried out value addition to crop before marketing or storage		6	37.5	4	30.8	0	0.0
Any new element under PHH during the CSA training		9	50.0	7	53.8	2	100.0
Ways produce were marketed in 2019	Collectively	1	6.7	1	12.5	0	0.0
	Individually	14	93.3	7	87.5	1	100.0

Selling of produce in its raw form was still high among farmers from mixed refugee groups. Results show that only 39.2% of all farmers added value on their produce before marketing it or before storage. More than half (60.8%) did not carry out any value addition to their produce before marketing or storage. Table 42 shows that more households growing cassava (69.2%) than those growing sesame (62.5%) did not carry out value addition to the produce. From table 40 above, it is revealed that mostly farmers in Lamwo (90.3%) that did not carry out any value addition. Among the categories of group membership, majority of the nationals/hosts (84.2%) and less than half (45.8%) of the refugees did not added any value to the produce before marketing. Similarly, marketing of crop produce was mostly done individually not collectively as promoted by the NURI programme. Results show that only 12.7% reported to have marketed their produce collectively in 2019, the rest (87.3%) sold their produce individually (see Table 41 above). Various reasons were given for selling individually and not collectively as had been expected. Some of them are illustrated in the quotation below.

There was no collective market for my produce; I wanted to solve other problems that urgently needed money; the harvest was small; colleagues opted to consume their produce instead of sales; no bulking store; there was no bulk buyer for the groundnuts... (Mixed refugee farmers from Lamwo and Madi-Okollo).

Results further show that collective marketing was partly constrained by the small proportion of members in the mixed refugee groups that wanted to sell their produce; majority just consumed their produce. The most sold crop by farmers in mixed refugee groups in 2019 was groundnuts by 41 households in Madi-Okollo and 11 in Lamwo as well as 21 nationals' households and 31 refugees' households; and the mean value sold was worth Ugx 616,000/=. The second most sold crop was Sesame with quantities sold worth mean value of Ugx. 382,000/=, marketed by 16 households of which 11 households were for refugees and 5 households belonged to nationals. Important to note is that the nationals received more income (Ugx685,000) in the marketing of their produce across all the 4 crops than the refugees (Ugx427,00) got. (see Table 42 below).

Table 41: Mean value of produce/strategic crops marketed per district in 2019.

Crop	Group membership category				District					
	Refugee		National Host		LAMWO		MADI-OKOLLO		Total	
	HHs	Mean (Ugx)	HHs	Mean (Ugx)	HHs	Mean (Ugx)	HHs	Mean (Ugx)	HHs	Mean (Ugx)
Sesame	11	182,000	5	822,000	4	142,000	12	461,000	16	382,000
Groundnuts	31	567,000	21	686,000	11	1,360,000	41	410,000	52	616,000
Cassava	7	300,000	1	85,000	2	124,000	6	322,000	8	273,000
Beans	2	128,000	2	600,000	3	285,000			4	285,000
Total	51	427,000	29	685,000	20	833,000	60	412,000	80	520,000

Quantities sold match with harvest; the crop sold by most farmers also doubles as one that generated the highest yields. On average, farmers harvested 301.5 kgs of groundnuts per acre. For Sesame, most farmers on average harvested 157.2 kgs/acre while the least was beans (140kgs/acre). See Table 43 below.

Table 42: Quantity of harvest received, sold, and consumed from strategic crops planted in 2019 per district.

	District	Crop	Land size (in acres)		Quantity of seeds used PER ACRE		YIELD PER ACRE (kgs/acre)		Proportion (%) of harvest sold		Proportion (%) of harvest consumed	
			HHs	Mean	HHs	Mean	HHs	Mean	HHs	Mean	HHs	Mean
Group membership category	Refugee	SESSAME	12	0.8	12	4.6	12	151.1	12	59.2	12	41.7
		MAIZE	6	0.8	6	9.6	6	215.7	6	30.0	6	62.1
		GROUNDNUTS	45	5.0	45	27.9	45	276.2	45	51.6	45	54.1
		CASSAVA	10	0.7	10	186.9	10	507.5	10	61.5	10	52.1
		BEANS	3	1.5	3	2.7	3	66.7	3	45.8	3	69.4
	Nationals/Host	SESSAME	5	1.6	5	15.2	5	170.8	5	60.3	5	30.8
		GROUNDNUTS	28	0.7	28	24.1	28	341.7	28	59.5	28	38.5
		CASSAVA	4	0.6	4	315.3	4	680.0	4	50.0	4	29.4
District	LAMWO	BEANS	3	0.8	3	2.7	3	213.3	3	75.0	3	66.7
		SESSAME	5	0.9	5	3.2	5	105.3	5	51.8	5	53.6
		GROUNDNUTS	17	13.2	17	17.8	17	195.1	17	52.5	17	61.3
		CASSAVA	2	0.8	2	202.5	2	1468.8	2	31.1	2	52.2
	MADI-OKOLLO	BEANS	5	1.2	5	2.2	5	156.0	5	55.6	5	61.7
		SESSAME	12	1.1	12	9.6	12	180.8	12	62.5	12	31.3
		MAIZE	6	0.8	6	9.6	6	215.7	6	30.0	6	62.1
		GROUNDNUTS	56	0.5	56	28.9	56	330.5	56	55.7	56	43.7
		CASSAVA	12	0.6	12	227.1	12	157.5	12	71.3	12	44.4
	Total	BEANS	1	1.0	1	5.0	1	60.0	1		1	100.0
		SESSAME	17	1.0	17	7.7	17	157.2	17	59.6	17	38.3
MAIZE		6	0.8	6	9.6	6	215.7	6	30.0	6	62.1	
GROUNDNUTS		73	3.4	73	26.4	73	301.5	73	55.0	73	47.7	
CASSAVA		14	0.6	14	223.6	14	532.1	14	59.8	14	47.6	
	BEANS	6	1.2	6	2.7	6	140.0	6	55.6	6	68.1	

It has been observed that only 7 farmers in mixed refugee groups provided credible data on grown crops in 2020 after attending the NURI training. These have been found to provide inadequate sample for comparison of their production and marketing with 114 farmers that planted crops in 2019 before NURI training programme.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The study reveals that adoption of additional CSA practices are noticeable in farmer group members field and demo sites visited. All the CSA training activities for farmer groups that joined the programme in 2019 have been successfully implemented and farmers report having learnt at least three new practices. Efforts to apply the knowledge and skills gained from the CSA trainings were evident and corroborated by leaders that monitored delivery of the CSA trainings in the respective districts. However, not all farmers that were trained have fully adopted all the CSA elements. Many appreciate and acknowledge that all the CSA elements are relevant in their daily on-farm production activities, they attest it improved their knowledge but translation of knowledge into practice still requires concerted efforts of both NURI extension staff and the farmers themselves. Further, the size of acreage of land cultivated compared to land owned was still small with the hand hoe still dominating the methods of ploughing land.

4.2 Recommendations

Drawing from the findings, the following suggestions are made to ensure the Programme attains all its objectives.

- Intensify visits to farmers' fields to observe and encourage adoption of the various CSA practices right from seedbed preparation to post-harvest handling.
- Members of farmers' groups in particular districts should be encouraged and supported to grow a common strategic crop to ensure the quantities that support collective marketing are readily available.
- Support members of the farmers' groups with marketing information to enable them to identify and secure bulk buyers of their produce
- Allocate resource towards construction of bulking stores.
- Support farmers to adopt modern methods of tilling land reducing reliance on the hand hoe. This could lead to increased acreage of land cultivated and hence volume of produce.