Gender and the Legume Alliance: Integrating multi-media communication approaches and input brokerage

Intra-household survey report – Tanzania

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Martin Macharia[1], Monica Kansiime[1], Edward Baars[2] Deogratias Rutatora[3], Silvestri Silvia[1*]

[1] CAB International (CABI), Nairobi, Kenya
[2]International Institute for Tropical Agriculture (IITA), Nigeria
[3]Sokoine University of Agriculture, Tanzania
[*]Correspondence: s.silvestri@cabi.org

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Last but not least, authors acknowledge the respondents for thus study whose responses make this report. As much as possible, the authors have tried to ensure confidentiality of information provided by respondents, depicting only the general situation rather than individual responses.

Cover photo:
Left: A farmer in Mapogolo village, Mbeya rural displays soybean printed materials the farmer group has used during the training on soybean production. *Photo credit*: M. Kansiime (CABI).
Right: members of Mafanakiyo farmers' group in Mapogoro village participate in a soybean demonstration plot facilitated by AFAP under the ASHC/SILT partnership project. *Photo credit*: M. Kansiime (CABI).

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Summary

This study aimed to generate information to better understand effectiveness of different communication approaches in delivering actionable information to smallholder farmers on agricultural practices in general, and improved legume technologies in particular. Data were collected from 332 households (and 998 respondents) in 5 regions in Tanzania. An intra-household approach was used where up to 4 members, aged 15+ years per household were interviewed. Results show that farmers rely mainly on their own experience (67%) and on a limited array of sources of information represented mainly by extension agents, neighbours and radio. There were significant differences in farmers' sources of information by sex and age category. Men were more likely to receive information from radio while women relied on own experience and other household members for their information. In terms of age category, there were significantly low proportions of young people and older people accessing information from all sources. Farmers' awareness of practices was related to possible information sources they were exposed to. Demonstration plots and agro-dealers were important information sources in promoting production inputs and more recently introduce practices (such as soil testing, use of inoculants, use of lime and PICs storage), while farmers' experience was mainly used as information source for traditional practices e.g. early field operations. At least 82% of farmers declared that they shared information, but primarily traditional agricultural practices. Sharing topics on new practices such as use of lime, right varieties, quality seed, Rhizobia inoculants, soil testing and PICs storage bags was minimal. These also represent the practices that were least used by farmers citing limited awareness, limited access to inputs and high cost for obtaining the inputs. Overall, there is still margin for improving learning and knowledge of more recently introduced practices and facilitating input brokerage to enhance access by farmers. Given varied sources of information by household members, enhancing information sharing through integrated gender programing is a key strategy.

1 Introduction

1.1 Background to the study

Agriculture is the mainstay of the Tanzanian economy, accounting for about 45% of its gross domestic product (GDP) and provides full-time employment to over 70% of the population. Legume cultivation is widespread, with over half of households growing at least one legume crop (Stahley et al. 2012). Globally, Tanzania is ranked 7th in terms of common bean production[1]. Common bean is among the most important legume crop in Tanzania, with about 75% of farmers estimated be depending on bean for daily subsistence (Xavery et al., 2006). The main bean growing areas are in the north, the Great Lakes region and the Southern Highlands. In Iringa, Kilimanjaro and Arusha regions, it is common to find commercial bean production for export taking place, as the climate is suitable and there is access to an international airport. Sole crops of beans are therefore common in these regions. Although soybean production is still low compared to other countries, the area under soybean production has increased from less than 2000 ha in 2002/2003 to 7500 ha in 2007/2008 (NBS, 2012). This is due to deliberate efforts by the government to promote the crop. Areas with the greatest potential for soybean production include Ruvuma, Mbeya, Rukwa, Morogoro and Iringa, all in south western Tanzania.

However in the last years, yields of common beans have declined (Linus et al., 2015), whilst presently, the production and utilization of soybean in Tanzania is still very low when compared with other crops and with its potential, (Myaka et al., 2005; Malema, 2005). Yet, despite the high potential of soybean in Tanzania, production and utilization remains low. While proven and scalable sustainable agricultural intensification (SAI) legumes practices already exist, extent to which smallholder farmers can implement these new practices is limited by many factors, but primarily the lack of access to actionable information and the lack of appropriate linkages to factor markets (markets involving services such as labour, capital and resources are purchased and sold). Moreover, factor markets can also provide critically needed information on inputs, agronomic practices and output marketing if proper linkages are established between the service providers and farmers. Enhancing information flow along the value chain is therefore critical, as it would help generate recommendations for decision-makers to foster these linkages and for smallholder farmer integration into the value chains.

Although the relative importance of and demand for different types of information varies in different situations, there is a consistent demand for information on new varieties, pest and disease management, use of pesticides and fertilizer, as well as weather, credit and markets (e.g. Benard et al. 2014). Despite Africa having 1 billion mobile phone subscriptions by 2015 (Jidenma 2014) - traditional information sources prevail. Radio dominates as the main mass media source, as internet is hardly used by small-scale farmers (Spurk et al. 2013). Extension services, family, friends and neighbours, and agro-dealers are important face-to-face sources of information. Considerable investment by donors has extended and strengthened agro-dealer

[1] Own computation based on FAO data. Accessed at http://www.fao.org/faostat/en/#data/QC/visualize on 9th March 2017.

networks, including more emphasis on their role as sources of information and advice (Makinde 2011). They link advice to the supply of inputs for new technology uptake and some have a role in output markets. School-aged children and young adults have been acknowledged as conduits for information to farming families. They are usually more dynamic, open to new ideas and more at home with new communication technologies, which make them well suited to act as a link between new technologies and approaches, and older, less literate, or connected farmers.

In order to enhance the efficiency of legume value chains, it is important to understand: how information flows through the legume value chain; where information is concentrated or is deficient; how information flow could be changed to facilitate input supply from private sector parties and farmers in adopting productivity enhancing practices; and what communication channels are more suited for different gender groups.

1.2 Gender and Legume Alliance

The Gender and Legume Alliance (GALA) project, funded by the UK Department of International Development seeks to address the current opportunities for improving access to and capacity to use information and knowledge by poor smallholders to achieve sustainable intensification in legume production in Tanzania and Ghana. The project is developed under the umbrella of the Sustainable Agricultural Intensification Research and Learning in Africa (SAIRLA) programme that seeks to generate new evidence and design tools to enable governments, investors and other key actors to deliver more effective policies and investments in sustainable agricultural intensification (SAI) that strengthen the capacity of poorer farmers', especially women and youth, to access and benefit from SAI.

The GALA project is led by CAB International (CABI) in collaboration with the International Institute of Tropical Agriculture (IITA), Sokoine University of Agriculture, and the University of Development Studies in Tamale, Ghana. The project will leverage existing partnerships in the Legume Alliance supported by the B&MGF funded project Africa Soil Health Consortium (ASHC) in close collaboration with N2Africa and local partners. The Alliance promotes improved legume varieties combined with inputs and good agricultural practices by combining media and different communication approaches.

1.3 Study Objectives

1.3.1 Research questions

What strategies are most effective for improving access to and capacity to use market, agronomic and other information and knowledge by poorer smallholders, especially women and youth, to achieve sustainable intensification?

1.3.2 Research hypotheses

1. Different communication channels are more suited to different gender groups
2. Brokering linkages between input supply and demand through provision of information can address the link between input and information supply.

1.4 Justification

This study aims to distinguish between information flows (including feedback loops) between chain actors -knowledge providers, intermediaries and smallholder farming

households- and information flows within smallholder farming households. Based on results, public, private and NGO sectors will have increased opportunity to engage with evidence on which communication channels work and which support strengthening value chains and enabling poor smallholders in Tanzania, particularly women and youth, to profit from legume technologies that allow intensification without further land degradation.

As a result of the evidence generated by the project decision-makers can deliver more effective policies and investments leading to better targeted communication of information on sustainable agricultural intensification and more effective value chain initiatives in Tanzania. In turn, this can lead to an increase in the participation of smallholder farmers, especially women and youth, in markets and to the implementation of SAI practices by farmers that will increase productivity of legumes.

2 Methods

2.1 Study design

An Intra-household survey approach was used for the study. Intra-household analysis aims to understand household dynamics in receipt, sharing and application of information from various sources. Up to 4 members of the same family were interviewed, reaching 332 households and 998 respondents in total. The targeted crops were common beans and soybeans.

2.2 Study area and sampling procedure

The study was undertaken in five regions in Tanzania covering eight districts. The districts were distributed along a transect from the North to the South of Tanzania (see Figure 1). The selected sites represented: i) districts where campaigns on beans or soybean have or are taking place by CABI projects (e.g. ASHC, SILT, UPTAKE); ii) districts where the target crops beans and/or soybeans are grown; iii) districts where other complimentary initiatives are taking place and have formal partnership implementation agreements with the N2Africa Project (e.g. BRiTEN, Faida MALI, ARI Slin (Selian), CRS-Soya ni Pesa Project, ARI Ilonga, Ari Uyole, Clinton Initiative, Rudi Agra); and (iv) sites where Scaling Seeds and Technologies Partnership in Africa is taking place. The regions also represent distinct agro-ecological zones and farming systems. Mbeya in the southern highlands is characterised by high rainfall (1000 – 2000mm per year) and moderate temperatures. Moving northwards, towards central Tanzania (Northern Iringa, Morogoro, Manyara), the area is characterised by semi-arid conditions; rainfall is unimodal and unreliable delivering 500-800mm per year, between December and March. Towards the north are Northern Highland areas (foot of Mt. Kilimanjaro and Mt. Meru) characterised by rich volcanic soils. Rainfall is bimodal and varies widely between 1000 and 2000mm per year.

The study sampled 332 households distributed as in Table 1. The sampling frame consisted of households in villages where campaigns on common bean and/or soy bean have taken place or will take place (especially for soybean). These households have been exposed or will be exposed to information delivered through radio, leaflets, comics, radio listening groups, demonstrations or village-based advisors, the key campaign channels. It's anticipated that farmers have also received information from other sources e.g. neighbours, extension workers or input dealers. The highest hierarchy of the sampling units were regions, followed by districts, wards and villages.

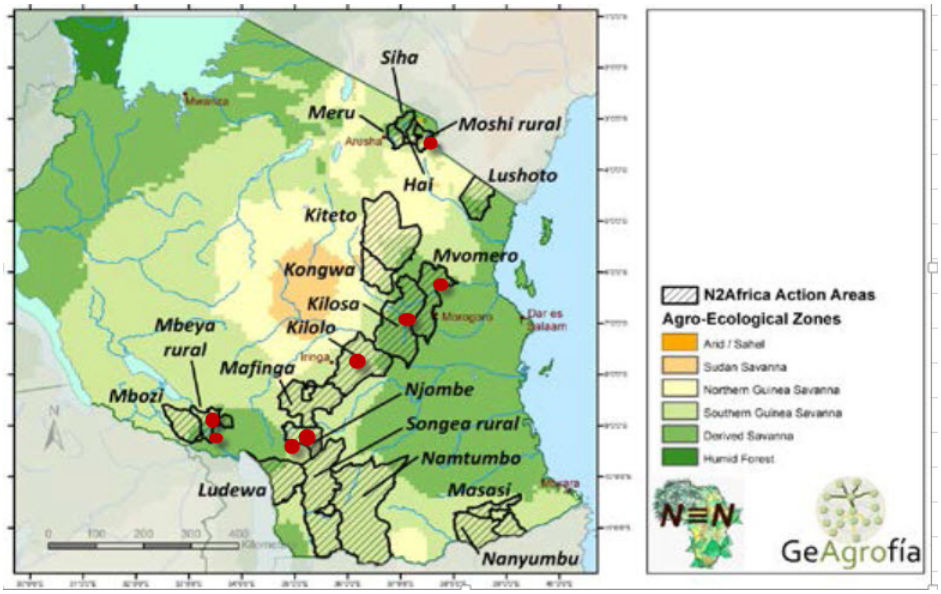

Figure 1: Study sites
Source: Farrow A., 2014.

Table 1: Sample districts, their biophysical characteristics and sampled households

Region	Biophysical characteristics	Sampled District	Parallel initiatives	CABI campaign	# of HHs
Kilimanjaro	Volcanic soils from lavas and ash, with deep fertile loams. Altitude is 1000- 2500masl. Rainfall is bimodal ranging from 1000-2000mm, cropping season is November to January and March-June.	Moshi Rural	BRAC, Faida Mali, Ari Selian	Common beans	77
Morogoro	Flat or undulating plains with rocky hills, moderate fertile loams and clay soils, altitude is 200- 600masl, rainfall is unimodal delivering 600-800mm per year during December – March.	Mvovelo, Kilosa	CSR, Ari Ilonga, AFAP	Common beans	129
Mbeya	Southern highlands with undulating plains, dissected hills and mountains. Moderately fertile clay soils with volcanic soils. Altitude is 1200- 1500masl, rainfall is bimodal delivering 1000- 2000mm per year during October-December and February –May.	Mbeya rural	BRiTEN, Ari Uyole	Soybean	63
Iringa	Semi-arid lands with undulating plains, rocky hills and low scarps. Well drained soils with low fertility. Altitude ranges from 1000 to 1500masl, rainfall is unimodal delivering 500-800mm per year during December – March.	Kilolo	Clinton Initiative,	Soybean	20
Njombe	Three distinct climate zones in the region - highlands (1,600 – 3,000 masl), midlands (700 – 1,700 masl) and lowlands (600 – 1,400 masl). Rainfall ranges 1,000 to 1,600 mm per annum, falling in a single season from November through May.	Wanging'ombe	BRiTEN, CRS	Soybean	43

HH = Households
Source: The United Republic of Tanzania (2007; 2013).

2.3 Data collection and analysis

Data collection was done electronically on tablets and face to face interviews. The tablets were pre-loaded with the survey questionnaire designed in ODK. The data entry application had in-built range and consistency checks to ensure good quality data. The Team Leader ran checks on data while still in the field thereafter electronically transmitting it to the online ODK database, managed by one of the Scientists at CABI who also conducted quality checks on the data. Training of enumerators for the intra-household survey was carried out by a team from CABI in early October 2016. First, enumerators were trained on aspects of data collection and data entry using tablets and mobile applications. Secondly, field testing of the questionnaire was done intended to give enumerators practical feel of mobile data collection and familiarize with the tool. Consent was sought from each household head or primary respondent before the interview was conducted. In the anticipation of some households declining to participate in the survey, a list of reserve households to interview was prepared.

The survey collected information on: household demographics, social and economic characteristics, household income sources, household assets (principally land and livestock ownership), crop production, sources of agricultural information, information sharing and decision making within a household, changes in knowledge attitudes and practices after receiving information, access to market information and access to credit.

Data were downloaded from ODK aggregate as csv files. Exploratory data analysis was done is both excel and R. Descriptive analysis were mainly used in this study to provide general understanding of the study results in terms of agricultural information sharing within a household and source, how information received and shared translates into awareness and adoption and the reach of bean and soybean campaign within the households in the study areas. The units of analysis were household and household members.

3 Results

3.1 Descriptive characteristics

3.1.1 Household characteristics

The survey reached 332 households, and up to 4 household members (15+ years old) per household were interviewed. The total number of respondents was 998[2], of which 50% were female. The proportion of young people (15-25years) to the total respondents was 23%. Average household size was 5, ranging between one and 11 members (Table 2). Young dependency ration was less than 45% in all districts, with higher ratio in Kilolo and lower ratio in Moshi rural compared to other districts.

The average total land owned by a household was 5.22 acres. The ownership however varied from 0.25 to 150 acres. Only 8% of the households had total land ownership of more than 10 acres. On average households farmed 4 acres of land although this was observed to vary from 0.5 to 97 acres. Considering only land owned directly by the household (not rented for cash, rented in kind or borrowed) the average land farmed

[2] Data analysis focused on the first four household respondents per household. This brought the analyzed number of respondents to 885, with female respondents representing 53% of respondents.

was 3.5 acres with a minimum of 0.25 acres and a maximum of 97 acres. Only 4% of the households farmed more than 10 acres of the total land owned. About 5% of the households (15 households) rented out their land to others at a fee. The average land rented out among the households was slightly above an eighth of an acre with a spread of 1 to 22 acres. Only four households (1%) gave out their land under a sharecropping agreement (to receive payment in kind), and the same number of households gave out their land to others for free. In both arrangements, the minimum and maximum land size was 0.5 and 3 acres respectively.

Table 2: Farm household characteristics across sample districts

District	HH size	Young dep. ratio (%)†	Labour cons. ††	TLU	Av. farm size (acres)	Cropping (% HH)‡	Main crops
Kilolo	4.90 (1.52)	43.79	0.59 (0.45)	2.73 (1.61)	2.33 (1.44)	65.0	Maize, common bean, soybean, sunflower
Kilosa	5.07 (2.00)	39.48	0.71 (0.68)	1.64 (1.32)	2.84 (1.93)	79.7	Maize, common beans, soybean, rice, sunflower
Mbeya Rural	4.98 (1.76)	38.29	0.90 (0.75)	1.17 (1.48)	3.77 (2.48)	74.6	Maize, common bean, coffee, soybean
Moshi rural	4.58 (1.88)	27.14	1.07 (2.72)	1.01 (1.57)	4.64 (10.81)	72.7	Maize, common beans, rice, coffee, soybean
Mvomero	5.88 (1.91)	42.16	1.02 (0.73)	0.82 (1.18)	5.27 (2.99)	75.0	Maize, rice, common beans, soybean
Wanging'ombe	4.93 (1.53)	37.43	0.92 (0.74)	0.37 (0.81)	4.17 (2.30)	69.8	Maize, common beans, soybean
Overall Sample	5.06 (1.86)	36.87	0.90 (1.44)	1.15 (1.46)	4.01 (5.65)	74.1	

‡ crop farming contributes more than 60% of household incomes.
†Young dependency ratio, taken as the ratio of dependants aged 14years and below to the total household size.
††Labour constraint computed as a ratio of the total land farmed by a household and the number of household members
Note: Figures in parentheses are standard deviations

The primary agricultural activity was crop farming from which majority of households derived their livelihood. Farmers grew mainly annual crops dominated by maize, common bean and soybean. Bananas and coffee represented the main perennial crops. In addition to these were various niche crops that were grown such as sunflower and high value vegetables (tomatoes, onions and pepper), grown mainly for the market. Households also kept livestock, albeit in very small numbers, dominated by poultry and small ruminants (goats and sheep).

Labour availability at the household level was computed as a ratio of the total land farmed by a household to the number of household members. In determining the number of household members to supply labour, number of household members between the age of 14 and 65 were considered. It is assumed that one individual within this age bracket was capable of cultivating 1 ha of land in a season. A ratio equal to 1 indicated labour balance: farm labour is exactly enough for the cultivated land. A ratio less than 1 indicated labour shortage and a ratio greater than 1 indicated labour surplus at the household level. Higher labour deficit was found in those households who rely more than 90% on crop farming (Table 3). The less farmers rely on crop farming, the lower is their deficit in labour.

Table 3: Household livelihood strategies and labour availability

Importance of crop farming	Balance	Deficit	Surplus	Grand Total
Farm produce (crop only) contributes entirely (> 90%) of the household income	15	94	44	153
Farm produce (crop only) contributes a major part (60% to 90%) of household income	14	62	17	93
Farm produce (crops only) Contributes about half (40% to 60%) of the household income	10	29	13	52
Farm produce (crop only) contributes a minor part (10% to 40%) of household income	3	10	18	31
Farm produce (crop only) is not a source (<10%) of household income			3	3
Grand Total	42	195	95	332

3.1.2 Crop production and cropping systems

Crop production in the study districts was diversified. Farmers grew crops mainly in two distinct rain seasons; *vuli* – short rains which normally ranges from October to January, and *masika* – long rains which normally range from mid-February to early June, with some minor variations in different regions. The largest proportion of farmers grew crops during *vuli*. *Masika* was important for production of soybean, rice and vegetables.

Maize, common bean and soybean were the most important crops in the sample districts, both in terms of the proportion of farmers growing them and proportion of land allocation relative to other crops (Figure 2A). Land allocation to common bean, soybean and pigeon peas was represented in almost equal proportions, about 30% of total farmed land (Figure 2B). Farmers allocated more land during *vuli* for almost all crops except maize and vegetables. Rice, though grown by a small proportion of farmers, enjoyed bigger land allocation that was comparable to maize.

Average plot size was 1.3 and 1.2 acres during *masika* and *vuli* seasons respectively (Figure 2C). Though the proportion of farmers growing rice was small compared to maize and common legumes, farmers growing rice generally allocated larger proportions of their land to rice cultivation. Average plot size for rice was also higher than the commonly grown legumes, but comparable to maize, the key staple.

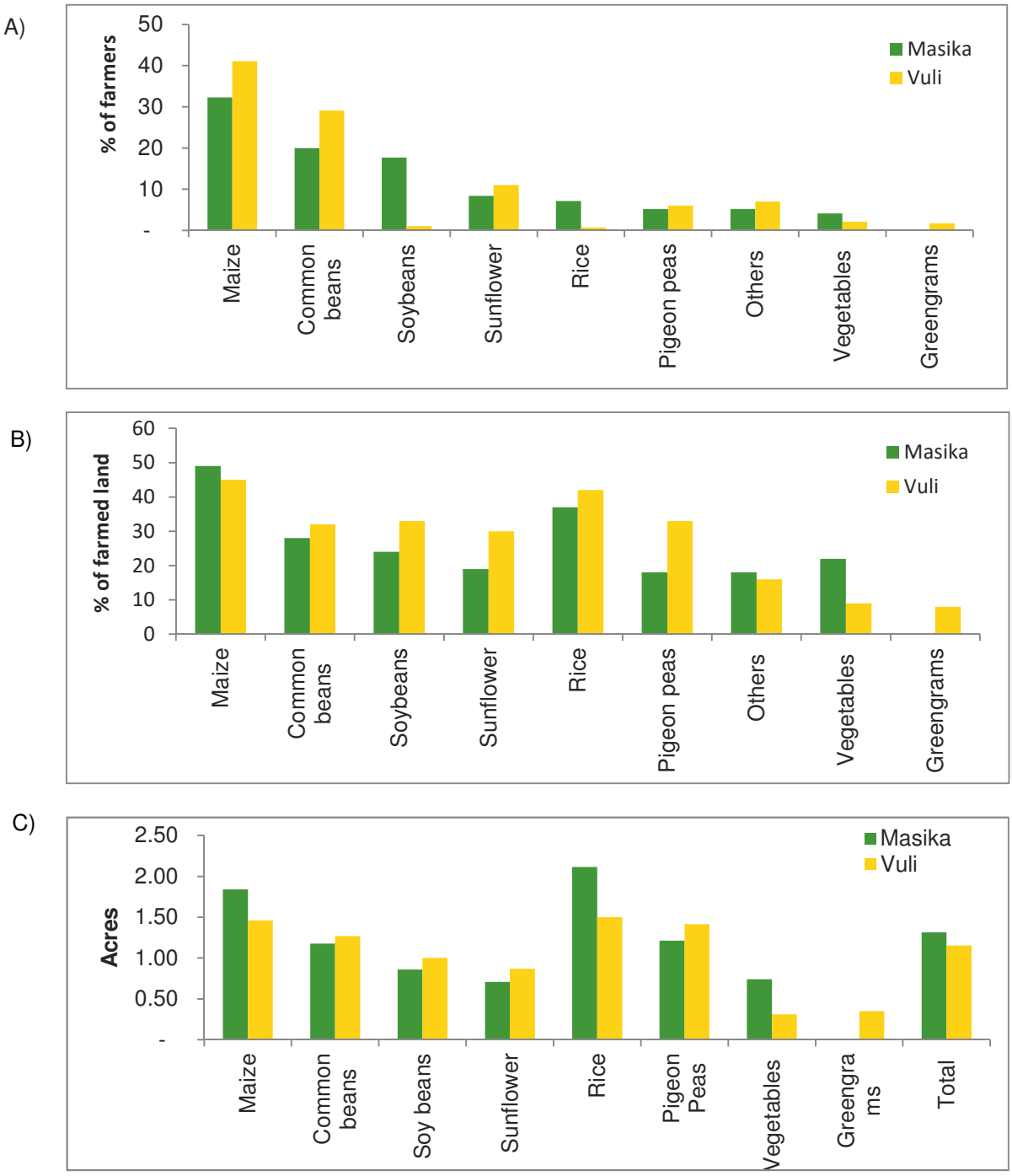

Figure 2: Frequency of crops grown (A), proportion of land allocation to various crops (B) and average plot size per crop (C) in study districts

3.2 Sources of agricultural information

3.2.1 Major sources of agricultural information

Across the entire sample, farmers primarily relied on own experience and knowledge of agricultural practices to manage their farming activities (Figure 3). Extension agents, neighbours and radio were other important sources of information for farmers. Newspapers, mobile SMS and leaflets were represented in very small proportions as farmers' sources of information.

A larger proportion of farmers receiving information from various sources were male compared to women (Figure 4A). Radio, demonstration and leaflets were represented in larger proportions as information sources for men compared to women. On the other hand, own experience, other household members and Village-based Advisors (VBA) were represented in large proportions as information sources for women compared to men.

In terms of age distribution, middle bracket farmers, 25 – 64 years were more likely to receive information from various sources (Figure 4B). There were proportionately more farmers in this category receiving information compared to young people and elderly people. It might be because they are the most active in farming and therefore targeted by information dissemination.

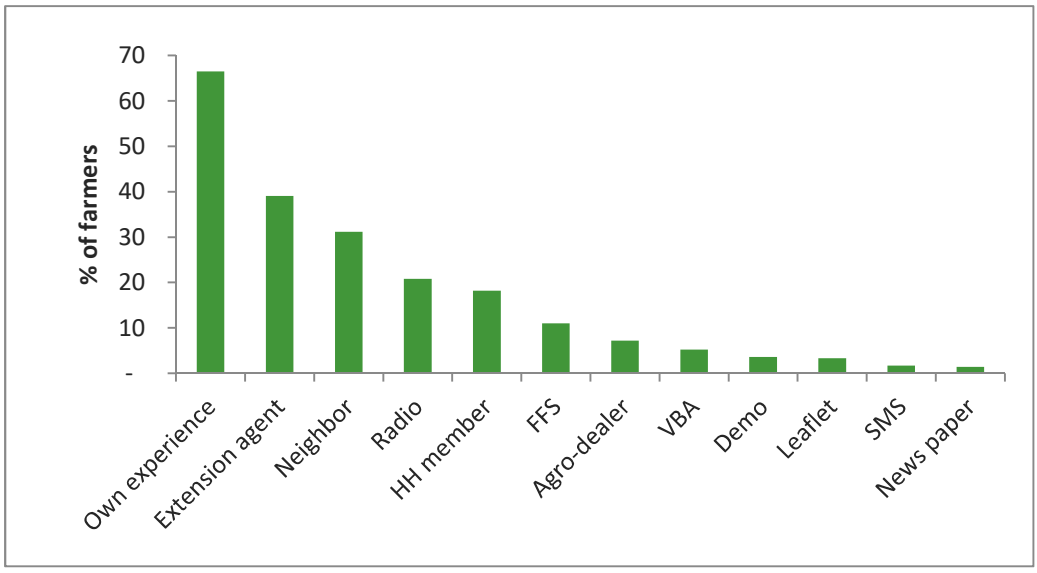

Figure 3: Farmers' most common sources of information, by proportion of farmers

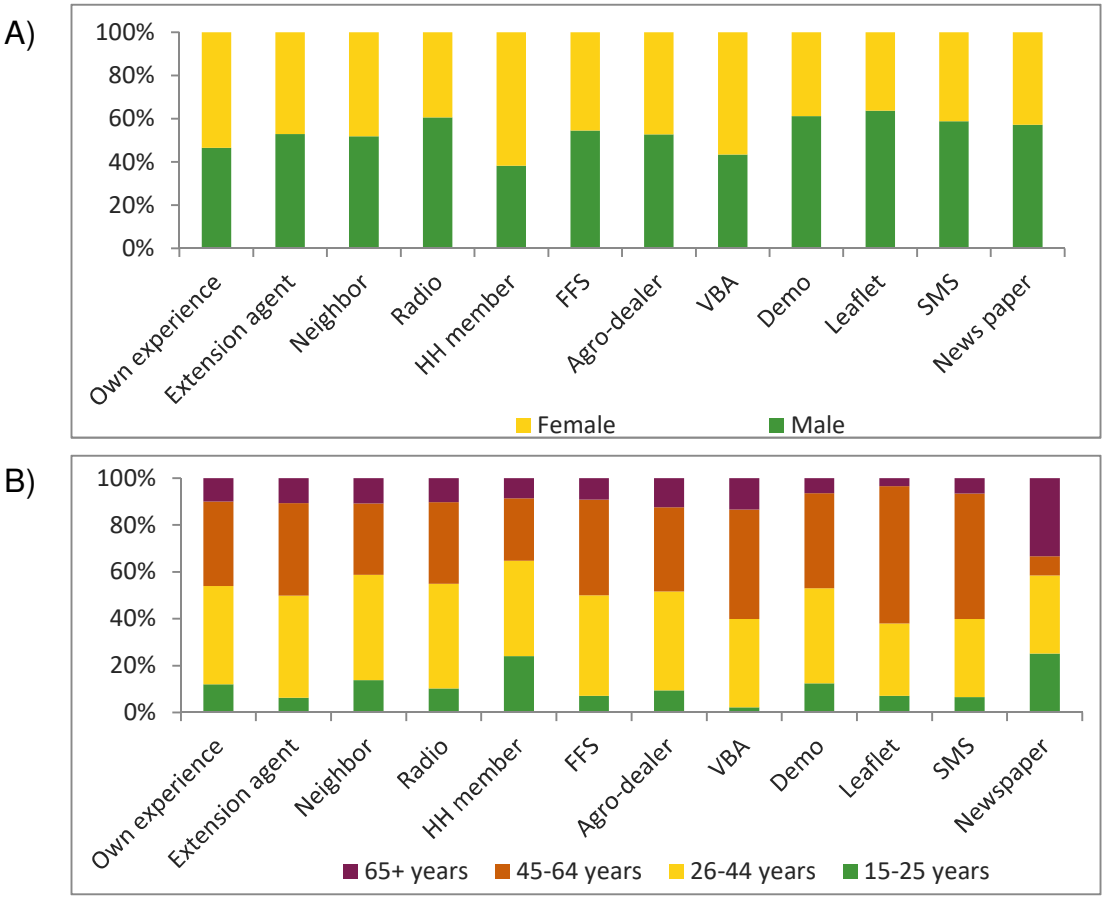

Figure 4: Farmers using various information sources by gender (A) and age category (B) as a proportion of total sample

There was a striking significant difference in access to information by gender and age category (Tables 4 and 5). Women were more likely to use own experience, and information shared by other family members compared to men. Men on the other hand were more likely to use radio as source of information compared to women. There was no significant difference between women and men's access to information from other sources such as extension agents, demonstrations, farmer field schools and other mass media. In terms of age category, there were significantly low proportions of young people and older people accessing information from all sources. Though represented in small proportions, farmers aged 45 years and above were more likely to obtain information from FFS, agro-dealer and VBAs.

Table 4: Information sources by gender

Source of information	% of farmers receiving information			Chi square	P value
	Overall sample	Male	Female		
Own experience	67	62	71	8.344	0.004
Extension agent	39	41	37	2.038	0.153
Neighbour	31	32	30	0.591	0.442
Radio	21	25	16	10.602	0.001
Household member	18	14	22	10.689	0.001
Farmer field school	11	12	10	1.198	0.274
Agro-dealer	7	8	7	0.289	0.591
Village-based advisor	5	4	6	1.430	0.232
Demonstrations	4	5	3	2.112	0.146
Leaflet	3	4	2	1.779	0.182
SMS	2	2	1	0.624	0.430
News paper	1	2	1	0.347	0.556

Table 5: Information sources by age category

Information source	% of farmers receiving information					Chi square	P value
	Overall sample	15-25 years	26-44 years	45-64 years	65+ years		
Own experience	66	27	80	89	76	271. 396	0.000
Extension agent	39	8	50	58	47	157.178	0.000
Neighbour	31	14	40	35	38	51.147	0.000
Radio	21	7	27	27	24	43.651	0.000
Household member	18	15	22	18	18	4.546	0.337
Farmer field school	11	3	14	17	12	29.307	0.000
Agro-dealer	7	2	9	10	10	20.355	0.000
Village-based advisor	5	0	6	9	8	20.355	0.000
Demonstrations	4	2	4	5	3	6.313	0.177
Leaflet	3	1	3	7	1	17.696	0.001
SMS	2	0	2	3	1	6.839	0.145
News paper	1	1	1	0	5	10.005	0.040

3.2.2 Ranking information sources

Farmers were asked to rank information sources according to the perceived importance. Farmers ranked sources of information according to importance on a scale of 1 to 7, where 7 was most important and 1 least important. Importance was subjective based on whether farmers perceive information received to be useful and relevant. Both men and women had similar ranking of own experience, other household member, neighbours, radio and extension and important sources of information (Figure 5A). VBAs, FFS and agro-dealers received an average score, though with wide variability between scores. Across age categories, own experience was ranked highest followed as an important source of information. Young people and

elderly people ranked other household members as an important source of information for them, while middle aged farmers appreciated more their neighbours, radio and extension agents as sources of information (Figure 5B).

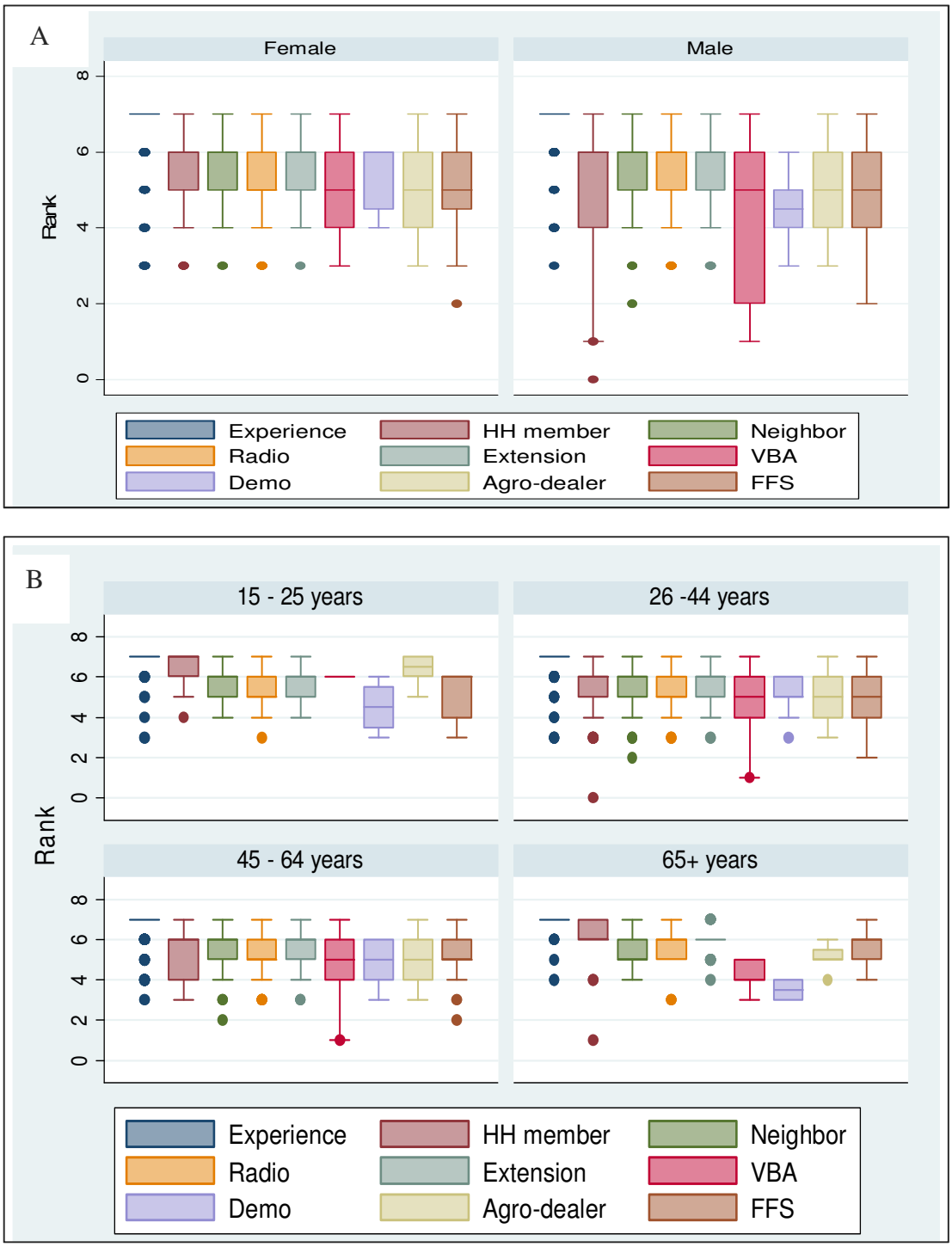

Figure 5: Box plot of farmers' ranking of importance of information sources by gender (A) and age group (B).
Boxes show the mean (middle line), quartiles (boxes) and variability the upper and lower quartiles (whiskers).

3.2.3 Agricultural information sources by crop

Farmers rely on own experience mainly for production of common beans and maize (Table 6). These are often grown in intercrop. For some crops, farmers don't seem to have regular information sources, e.g. cassava and other root crops, plantain and non-food cash crops (cotton, tobacco). Of those receiving information from mass media – radio and SMS, maize, beans and soybean top the list. Agro-dealers are critical in providing information for maize crop and to a small extent beans and soybean. For soybean, farmers seemed to rely principally on demonstrations.

Table 6: Information sources by crop

Crops	% of respondents receiving information from the respective information sources by crop							
	Experience	Extension	HH member	Neighbour	Radio	Demo	Agro-dealer	SMS
Common beans	66	60	52	57	45	31	40	33
Soya beans	12	36	22	16	21	78	22	46
Maize	94	88	73	78	80	25	87	39
Other cereals (rice, sorghum, etc.)	15	14	14	11	11	9	2	13
Cassava	2	1	1	1	1	-	-	-
Other roots / tubers (yam, potato, etc.)	2	0	1	1	4	-	-	-
Plantain	7	7	3	5	3	-	2	-
Other beans/peas	11	9	14	10	6	6	2	13
Vegetables	9	13	11	12	12	12	9	13
Tree crops (coffee, cashew, cocoa, etc.)	7	10	2	8	10	-	3	13
Other food cash crops	13	12	3	9	13	3	14	-
Non-food cash crop (cotton, tobacco)	1	3	2	2	2	-	2	7

3.2.4 Awareness of Agricultural practices

The study explored farmers' awareness of various agricultural practices (irrespective of crop). Awareness of practices was related to possible information sources farmers were exposed to. Farmers were aware of various practices as shown in Table 7. Early land preparation, timely planting, manual weeding and insect pest scouting, were the most commonly mentioned agricultural practices by majority of farmers, though they were largely based on their own experience. Information on these same practices was received from household members and neighbours. Radio mainly provided information on manure use, timely planting, use of right varieties and spacing. Leaflets were useful in passing on information on early land preparation, spacing and timely planting. Demonstrations were important for sharing information on early field preparation and timely planting, manual weeding, pest and disease scouting, pest and disease management using registered control products. Agro-dealers played a role in informing farmers about varieties – right varieties and new ones on the market. Information on other novel practices such as use of inoculants was received mainly through demonstrations.

Table 7: Awareness of agricultural practices by information source

Practices	% of respondents receiving information from the respective information sources								
	Own experience	Extension agent	HH member	Neighbour	Radio	Leaflets	News paper	Demo	Agro-dealer
Earlier land preparation	**100**	49	43	69	74	**71**	40	**81**	28
Timely planting	**100**	49	40	61	**65**	68	32	**99**	31
Do manual weeding	**96**	34	33	44	40	30	16	**99**	16
Regular field scouting for pest and disease attacks	**93**	41	33	40	47	37	24	**99**	25
Spacing	57	52	32	54	**69**	**85**	56	93	40
Soil testing before fertilizer use	47	27	25	35	42	34	16	31	11
Manure use	45	44	30	49	**65**	57	24	78	67
Crop rotation	42	26	19	18	24	10	8	19	8
Remove pest damaged crop residues	42	25	22	19	24	10	40	**50**	19
Use right variety	34	39	33	50	**73**	41	-	**68**	**74**
New crop varieties	33	37	23	45	55	51	32	**68**	**71**
Intercropping	33	24	18	22	23	30	8	9	8
Use registered pest & disease control products	23	34	21	34	53	37	24	**81**	51
Chemical fertilizer use	21	30	15	22	31	**51**	-	47	40
Treat seeds with recommended pesticides	20	16	17	13	18	7	16	31	20
Maintain high soil fertility	16	19	11	44	16	3	16	43	8
Use herbicides for weeding	11	23	16	19	33	10	8	40	25
Use local pest sprays e.g. soap, pepper, etc.	10	8	8	13	19	3	8	9	9
Use lime in acidic soils	7	4	2	2	6	-	-	-	5
Use rhizobium inoculants	5	14	6	9	13	10	-	**53**	12
Use PICs bags for storage	5	21	7	16	16	7	8	**19**	**19**
Use quality seeds	1	27	20	38	**54**	41	32	62	57
No till or zero till practices	0	3	1	1	17	34	-	-	9
Fertilizer rates / blends	0	1	0	-	2	-	-	-	5

3.2.5 Information sharing within the household

Respondents were asked if they shared information they received from various sources, and if so with whom they shared the information. Overall, At least 82% of respondents indicated that they shared information with their household members

(Table 8). Household members above 45 years had a higher likelihood of sharing information with their household members compared to younger persons. Men were more likely to share information than their female counterparts.

Respondents shared information mainly on maize, common beans and soybean. This corresponds with earlier information where other household members played a key role as information sources for these crops beside neighbours and other sources. Other crops such as vegetables, other food cash crops, plantain and tree crops were also discussed albeit by a small proportion of farmers. Older family members above 65 years had a high proportion of respondents sharing information on tree crops and plantain. It was noted that farmers hardly shared information within the household regarding cassava and other roots and tuber crops, and non-food cash crops (cotton and tobacco).

Table 8: Percent of respondents who shared information on respective crops by age category and gender

Variable	Total	Age category (years)				Gender	
		15-25	26-44	45-64	65+	Female	Male
Information sharing							
% of respondents sharing info.	82	78	77	86	100	75	91
Crops discussed							
Maize	91	89	90	92	91	91	91
Common beans	71	57	72	70	87	72	70
Soybeans	27	32	29	30	6	27	26
Other food cash crops	16	6	15	20	9	15	16
Other cereals (rice, sorghum)	13	13	15	13	6	13	13
Other beans/peas	11	9	13	10	4	10	12
Vegetables	11	9	16	8	-	11	11
Tree crops (coffee, cashew, etc.)	10	2	11	6	**25**	8	11
Plantain	9	4	3	10	**30**	8	9
Non-food cash crop (cotton, tobacco)	2	2	2	2	2	1	3
Cassava	1	-	0	2	2	1	1
Other roots / tubers (yam, potato)	1	-	0	1	-	0	1

Beside crops, farmers also shared information regarding agricultural practices. Overall, farmers shared information on timely planting, early land preparation, spacing, pest monitoring and manual weeding (Table 9). Proportion of farmers sharing this information is comparable across age category and gender. There was minimal sharing of information on practices such as soil testing, use of lime, use of PIC storage bags. The most commonly shared practices are those whose information is primarily based on own experience or information from within the farmer networks. The least shared practices are largely learned through external information sources e.g. demonstrations, radio, leaflets and agro-dealers.

Table 9: Percent of respondents who shared information on respective agricultural practices by age category and gender

Practices	Total	Age category (years)				Gender	
		15-25	26-44	45-64	65+	Female	Male
Timely planting	83	80	86	83	71	80	85
Earlier land preparation	82	83	84	81	74	84	80
Spacing	81	83	83	80	74	85	78
Field scouting for pest & disease damage	70	77	74	70	48	71	69
Do manual weeding	64	63	62	72	45	68	61
Use of chemical fertilizer	58	77	63	52	45	58	60
Introduced new varieties of crops	56	53	57	54	61	56	56
Use right variety (long term, short term, etc.)	53	63	53	52	48	53	54
Use registered products for pest & disease mgt.	46	50	55	40	29	42	49
Remove pest damaged crop residues	45	53	47	40	45	46	44
Use of manure	42	53	42	38	45	42	42
Use quality seeds (either certified or QDS)	42	57	42	41	32	40	44
Crop rotation	41	30	43	45	32	40	43
Intercropping	29	23	39	22	23	23	36
Use chemical methods (herbicides) for weeding	29	50	27	27	19	26	31
Use rhizobium inoculants	29	40	35	26	6	31	27
Treat seeds with recommended pesticides	26	47	28	21	13	26	25
Maintain high soil fertility	19	20	21	17	16	18	20
Use of fertilizer rates / blends	19	13	17	19	29	17	22
Manage pests by spraying soap, pepper, etc.	16	30	20	13	3	15	18
Use PICs bags for storage	15	10	19	13	13	14	16
Use no till or zero till practices	5	-	8	4	-	6	3
Use lime in acidic soils	1	-	1	2	-	1	1
Test soil before fertilizer application	0	-	-	1	-	1	-

3.3 Bean and soybean campaign

3.3.1 Sources of information on common bean and soybean

Respondents were asked specifically if they have received information on common bean or soybean in the previous year. The intention was to assess awareness of common bean and soybean campaign messages provided during CABI scale up campaigns as well as other partners in the legume alliance. Only 53% of the respondents indicated that they have received information on common bean and soybeans.

Extension and demonstration plots were the main sources of campaign messages on common beans and soybean (Table 10). Other sources of information not listed in the table that were popular among the 77 respondents (19% of the respondents) were: farmer groups, other household members and NGOs (see table below). Only male respondents had contact with seed companies

Table 10: Information sources on common bean and soybean by age category and gender

Source of information	Proportion of farmers receiving information through respective channel							
	15-25 years		26-44 years		45-64 years		65+ years	
	Female	Male	Female	Male	Female	Male	Female	Male
Extension officers	43	38	42	56	52	51	50	57
Other	36	38	33	16	33	18	30	35
Demonstrations	21	-	27	35	26	31	10	13
Village based advisors (VBAs)	14	-	11	10	11	19	20	9
Radio program	14	13	7	15	6	13	10	9
Agro-dealers	7	13	4	10	4	10	20	-
Phone SMS	7	-	1	3	-	1	-	-
Shujaaz comic	-	-	1	-	-	-	-	-

3.3.2 Awareness of common bean and soybean practices

Respondents who received messages on common bean and soy bean campaign were asked the specific messages they received. Corresponding to farmers' general awareness of agricultural practices, spacing, timely field operations and pest management were the most commonly mentioned practices on common bean and soybean received through various dissemination approaches (Table 11). Contrary to previous section on farmers' general awareness on agricultural practices, a large proportion of farmers received information on use of chemical fertiliser (68%), use of new varieties (66%), use of registered pest control products (61%) and use of right varieties (57%). This represents information that may not necessarily be inherent with farmers due to its nature (new research advances in the same area). This underscores the need for alternative information dissemination to pass on information of these novel practices.

However, awareness of some common bean and soybean practices was represented in very small proportions. Notable, very few farmers mentioned receiving any information on use of lime in acid soils (2%), use of no till or zero tillage (4%), soil testing (9%), and using local pest management sprays e.g. pepper (18%). Unlike the earlier mentioned practices, these practices represent new knowledge to farmers and which requires more structured information dissemination approaches.

Table 11: Common bean and soybean practices received by farmers through various information sources (aggregate) (n=258)

Practice	Frequency	Percentage
Spacing	222	86
Timely planting	219	85
Earlier land preparation	212	82
Field scouting for pest & disease damage	179	69
Use of chemical fertilizer	176	68
Do manual weeding	174	67
Introduced new varieties of crops	171	66
Use registered products for pest & disease mgt.	157	61
Use right variety (long term, short term, etc.)	148	57
Use quality seeds (either certified or QDS)	132	51
Remove crop residues damaged by pests & disease	118	46
Use of manure	108	42
Crop rotation	96	37
Use of fertilizer rates / blends	95	37
Use chemical methods (herbicides) for weeding	92	36
Use rhizobium inoculants (only soybean)	87	34
Intercropping	73	28
Maintain high soil fertility	70	27
Treat seeds with recommended pesticides	70	27
Use PICs bags for storage	59	23
Manage pests and diseases by spraying soap, pepper, etc.	46	18
Test soil before fertilizer application	22	9
Use no till or zero till practices	10	4
Use lime in acidic soils	5	2

3.3.3 Common bean and soybean practices applied by farmers

Farmers were asked which common bean and soybean practices they applied in the previous cropping season. Results show that majority of farmers practiced early land preparation, manual weeding, timely planting, regular field checks for pests and disease infestation, and appropriate spacing (Tables 12 and 13). Proportion of users across age category and gender were comparable, with minimal difference.

Despite reported high level of awareness of practices such as use of chemical fertiliser, use of new varieties, use of registered pest control products and use of right varieties, utilisation of these same practices was below average across age and gender. Utilisation of some practices such as soil testing, zero tillage, use of PIC bags, use of local pest control measures, and fertiliser blends was represented in small proportions (<20% of farmers). This may not be surprising since the level of awareness of these practices was equally low across the sample.

Utilisation of practices for common bean and soybean is comparable to overall agricultural practices employed by farmers in this study. Practices commonly used by

farmers are based on own experience and informal information sharing through family members and neighbours. This may partly imply farmers' reliance on own knowledge / experience, and/or the role of local farmer / family networks for information dissemination. The low utilisation of practices where farmers have prior knowledge is explored in the next section (3.4.4).

Table 12: Proportion of farmers using learned common bean and soybean practices by age category

Practices used by respondents	Proportion of farmers using practices				
	15-25 years (n=60)	26-44 years (n=262)	45-64 years (n=201)	65+ years (n=53)	Total (n=576)
Earlier land preparation	98	100	99	98	99
Do manual weeding	92	97	96	100	96
Field scouting for pests and diseases	93	97	95	91	94
Timely planting	93	97	94	92	94
Spacing	60	70	73	64	67
Remove pest damaged crop residues	55	56	53	60	56
Crop rotation	43	50	54	40	47
Use right variety (long term, short term)	47	47	42	43	**45**
Use of chemical fertilizer	45	48	37	47	**44**
Use registered pest control products	48	44	39	38	**42**
Intercropping	28	39	36	51	39
Introduced new varieties of crops	40	39	39	36	**39**
Use of manure	32	32	35	58	39
Use quality seeds	37	33	32	26	32
Maintain high soil fertility	27	32	33	21	28
Seed treatment	35	27	19	11	23
Use chemical methods for weeding	28	21	17	17	21
Use rhizobium inoculants (only soybean)	23	27	25	9	21
Use of fertilizer rates / blends	12	22	21	25	20
Manage pests by spraying soap etc	23	15	14	19	18
Use PICs bags for storage	12	15	15	13	14
Use no till or zero till practices	0	5	7	8	5
Test soil before fertilizer application	0	0	2	2	1

Table 13: Proportion of farmers using learned common bean and soybean practices by sex

Practices used by respondents	Proportion of farmers using practices		
	Female (n=304)	Male (n=270)	Total (n=574)
Earlier land preparation	100	99	99
Field scouting for pests and diseases	95	96	96
Do manual weeding	97	96	96
Timely planting	95	97	96
Spacing	72	67	70
Remove crop residues damaged by pests or diseases	54	57	55
Crop rotation	48	52	50
Use right variety (long term, short term)	46	44	45
Use of chemical fertilizer	45	43	44
Use registered pest control products	44	40	42
Introduced new varieties of crops	40	37	39
Intercropping	34	43	38
Use of manure	34	37	36
Use quality seeds	32	33	32
Maintain high soil fertility	29	33	31
Seed treatment	23	24	24
Use rhizobium inoculants (only soybean)	25	23	24
Use of fertilizer rates / blends	22	20	21
Use chemical methods for weeding	19	21	20
Manage pests and diseases by spraying soap, pepper, etc.	15	17	16
Use PICs bags for storage	13	16	15
Do post-harvest tillage	6	7	6
Use no till or zero till practices	5	6	6
Test soil before fertilizer application	1	1	1

3.3.4 Reasons for failure to use known common bean and soybean practices

Figure 6 (see also Annex 1) shows farmers' reasons for not applying specific improved legume practices. In general farmers report on lack of knowledge for most of the practices they were asked for. However, the practices that scored the most in terms on not being known by the farmers were: soil testing, use of right variety, use of inoculant and use of PIC storage bags. Lack of access to inputs was another key reason given by farmers particularly for seed treatment chemicals, PIC bags and new varieties. It's also important to note that a reasonable proportion of farmers indicated lack of knowledge on how to do things differently, particularly on fertility management and fertilizer blends. The high cost of inputs was more prominent for chemical fertiliser, purchased pesticides and herbicides.

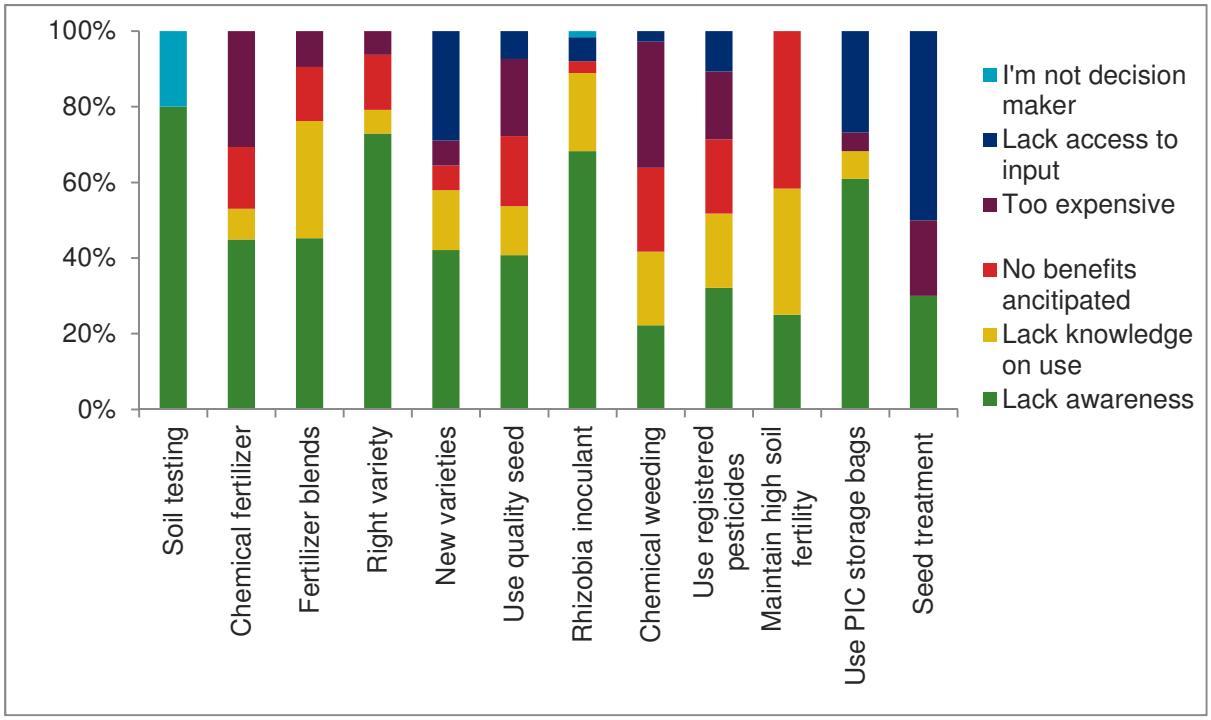

Figure 6: Reasons for not applying specific legume practices

4 Insights from the study

This study explores sources of agricultural information for beans and soybean in Tanzania and how agricultural information is shared within the household. Farmers seem to rely mainly on their own experience and on a limited array of sources of information represented primarily by extension agents, radio and neighbours. When looking at potential differences in information sources between men and women, we find out that, not surprisingly, men have access to more different sources of information. In particular there are some sources that seem to be prerogative of the men, such as radio and demos. This can be explained with the fact that men have usually control over radio and that demos are mostly attended by men. For this last one recruitment of farmers attending demo is usually done by contacting the head of household and / or through phone, whose use if mainly managed by the men within the household. Left with less sources of information, women learn from their experience and share their own experience with other family members, more frequently than men do.

Interesting to see that both younger and older people refer to the members of the household to learn information. Youth might want to learn from members with more experience, whilst older people might want to learn new technologies from the younger household members. Although a high number of farmers declare to share the information with the other household members, household members are not listed as the main source of information, meaning that the information is mainly sought outside the household. For what concerns sources of information and topic promoted through the source, new technologies are better promoted through demos. In fact, demos provide a more tangible way of learning and following directly results and impact of

practices that are promoted. This explains also why relatively new practices such as for example the use of inoculants for soybean is better promoted through demos.

Sharing of information was frequent for more traditional practices, whilst topics such as use of lime, soil testing and PICs storage are not yet mastered enough by farmers to make them feel confident to share information about. This is also confirmed by the results about the practices that are the least used by the farmers. In fact among the least applied legumes practices there are testing the soil before the application of fertilizer, the application of inoculant to soybean, the use of long and short term varieties and the availability of quality seeds. The limited use of these practices was mainly the lack of awareness, limited access to inputs and high cost especially for agrochemicals.

All in all this study shows that there is still margin for improving learning and knowledge of more recently introduced practices, that trust on these practices is something that has to be build and that important would be also to link promotion of specific practices with targeted and suitable information sources.

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Annex 1: Reasons for not applying specific legume practices

Practice	Reason	Frequencies
Test soil before fertilizer application	I do not know about it	4
	It is not up to me to make decisions to do things differently	1
Use chemical fertilizer	I do not know about it	22
	Did not understand how I can do things differently	4
	Did not think it was necessary/ no benefits anticipated	8
	Too expensive to implement	15
Use of fertilizer rates / blends	I do not know about it	19
	Did not understand how I can do things differently	13
	Did not think it was necessary/ no benefits anticipated	6
	Too expensive to implement	4
Use right variety (long term, short term, etc.)	I do not know about it	35
	Did not understand how I can do things differently	3
	Did not think it was necessary/ no benefits anticipated	7
	Too expensive to implement	3
Introduced new varieties of crops	I do not know about it	32
	Did not understand how I can do things differently	12
	Did not think it was necessary/ no benefits anticipated	5
	Too expensive to implement	4
	Did not know where to obtain the new inputs	22
Use quality seeds (either certified or QDS)	I do not know about it	22
	Did not understand how I can do things differently	7
	Did not think it was necessary/ no benefits anticipated	10
	Too expensive to implement	11
	Did not know where to obtain the new inputs	4
Use rhizobium inoculants (only soybean)	I do not know about it	43
	Did not understand how I can do things differently	13
	Did not think it was necessary/ no benefits anticipated	2
	Did not know where to obtain the new inputs	4
	It is not up to me to make the decision to do things differently	1
Use chemical methods (herbicides) for weeding	I do not know about it	8
	Did not understand how I can do things differently	7
	Did not think it was necessary/ no benefits anticipated	8
	Too expensive to implement	12
	Did not know where to obtain the new inputs	1
Manage pests and disease by use of registered control products	I do not know about it	18
	Did not understand how I can do things differently	11
	Did not think it was necessary/ no benefits anticipated	11
	Too expensive to implement	10
	Did not know where to obtain the new inputs	6
Manage pests and diseases by spraying soap, pepper, etc.	I do not know about it	4
	Did not understand how I can do things differently	2
	Did not think it was necessary/ no benefits anticipated	2
Maintain high soil fertility	I do not know about it	3
	Did not understand how I can do things differently	4
	Did not think it was necessary/ no benefits anticipated	5
	I do not know about it	25

Use PICs bags for storage	Did not understand how I can do things differently	3
	Too expensive to implement	2
	Did not know where to obtain the new inputs	11
Treat seeds with recommended pesticides	I do not know about it	3
	Too expensive to implement	2
	Did not know where to obtain the new inputs	5