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International Maize and Wheat Improvement Center

Australian Government
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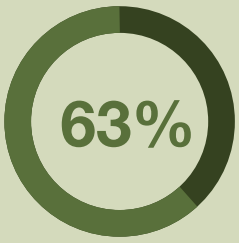
FROM FEW TO MANY:
Taking Conservation Agriculture Practices to Scale in Malawi

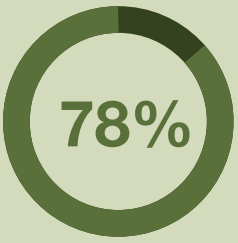
Key messages

In the sample of the farmers who were in the vicinity of the farm trial sites and who were contacted for this study, 90 percent reported that they were aware of technologies being promoted. Approximately 63 percent had actually tried the technologies. Farmer preference voting showed that zero or minimum tillage under maize as a sole crop were viewed favorably by most farmers. This was followed by zero/ minimum tillage in maize/legume rotation. The reduction in labor use seem to be a major driver of these preference leanings.

Reported that they were aware of technologies



Had actually tried the technologies



Had adopted the technologies (2013)

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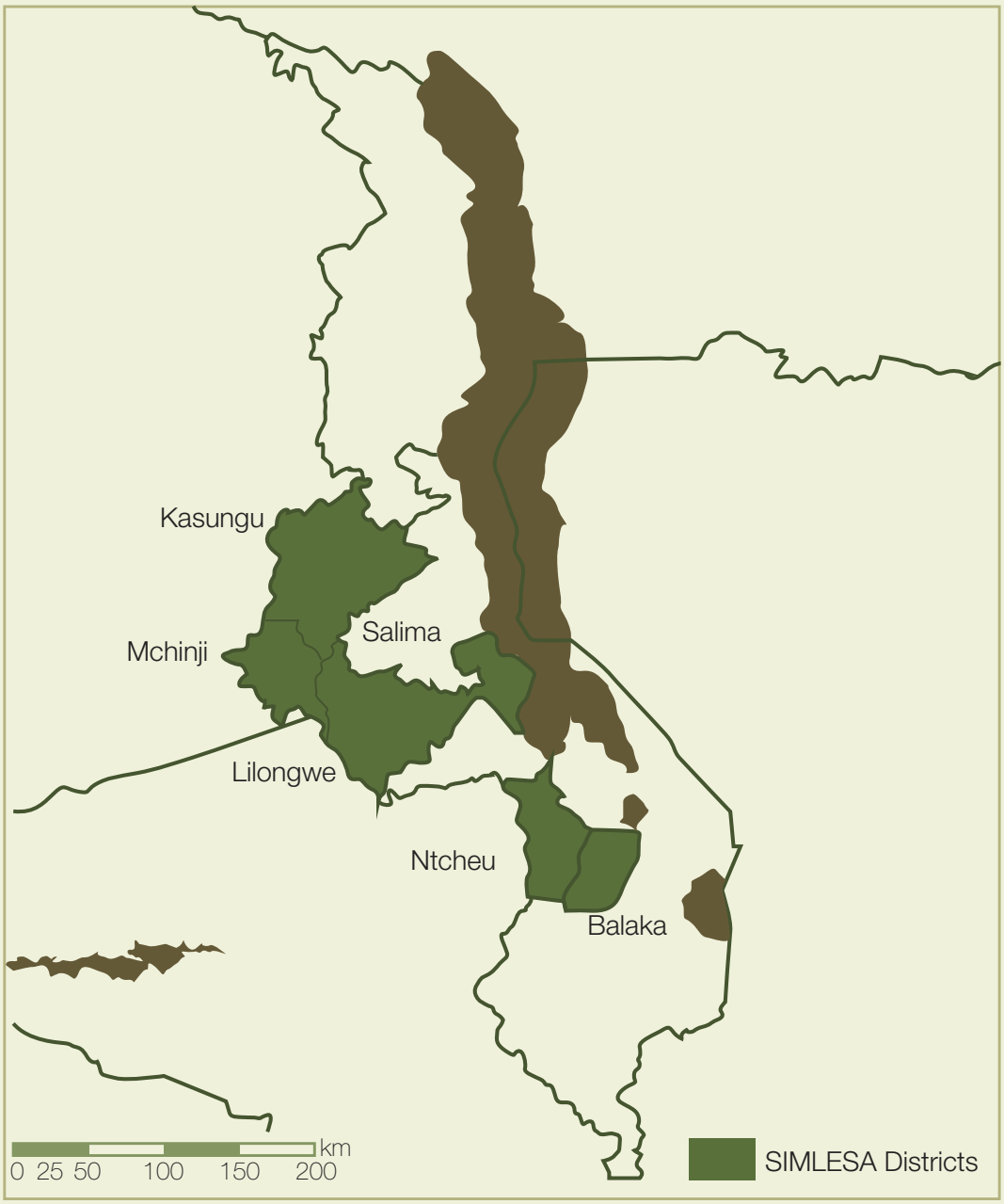
Introduction

The Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) is a project implemented in Malawi and four other countries in Eastern and Southern Africa. The project aims at increasing rural household food security and productivity, in the context of climate risk and change. Among the core aims of the project is testing and developing productive, resilient and sustainable smallholder maize/legume cropping systems and innovation systems for local scaling out. In this brief, we outline results from an adoption monitoring survey carried out in 2013 as a way of gauging the prospects for the spread of the practices and varieties that have been tested in the SIMLESA project.

In Malawi, the SIMLESA activities are implemented by Chitedze Research Station within the Ministry of Agriculture and Food Security as the lead implementing institution. Areas of implementation are six districts of Lilongwe, Mchinji, Kasungu, Salima, Balaka and Ntcheu, which are split into two main categories of lowlands and highlands based on some similar characteristics in agro-ecosystem. In each of the targeted districts, one Extension Planning Area (EPA) and one section is targeted.

In this brief some of the key questions answered are:

- How many farmers were found to be trying out different technologies tested under SIMLESA?
- What are the main socio-economic characteristics of farmers that are participating in SIMLESA?
- What seems to have worked best in reaching out to more farmers beyond the host farmers?

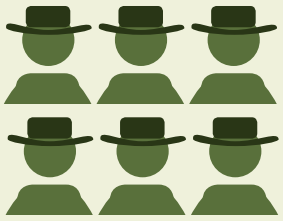


What are some main activities carried out under SIMLESA in Malawi?

SIMLESA in Malawi was designed to help in enhancing the testing of maize and legume varieties at the national research center and conducting exploratory trials of different conservation agriculture systems. The center of conservation agricultural trials is zero or no tillage split in different categories of zero tillage with a sole crop; zero tillage with intercrop; and zero tillage in maize/legume rotation. Since Malawi is one of the few countries where manual seeding method is used, maize and legume seed is planted on the ridges using a dibble stick except in one trial, under the lowlands where seed is planted in a basin system, as water conservation technology. Furthermore, there is also comparison on weed control where herbicides are either used or not on a sole maize crop.

Conservation agricultural technology that has been promoted is zero or no tillage split in different categories of zero tillage with a sole crop; zero tillage with intercrop; and zero tillage in maize legume rotation. Herbicides have also been tried out as weed control measures compared to weed hand picking method. In all these trials, varieties that have been used are MH 26 and 27 maize varieties; *mwaiwanthualimi* pigeon peas variety; *Chitala* groundnuts variety; and *Nasoko* soybean variety. Other varieties of maize and legume promoted outside trials included MH 28, ZM 623, ZM 721, ZM 309, ZM 523 for maize, *Nsinjiro, Chalimbana* 2005 for groundnuts, ICEAP1514/15 for pigeon peas and Kakoma, Makwacha for soybean.

In each of the targeted sections, a total of six host farmers were identified to run the different exploratory trial during the project period. These are considered as host or core farmers. Since one of the purposes of the project is to create a knowledge sharing platform, these host farmers have been sharing their exploratory results with fellow farmers in their section through field days and farmer exchange visits, among other ways. Through these means, other farmers have learned about the varieties being promoted by SIMLESA and general conservation agriculture systems. To further enhance knowledge sharing, the Chiteze Research Station also partnered with a number of NGOs and seed companies, in hosting demonstrations of conservation agriculture and seeds that SIMLESA project has been working on. This is considered as one way of enhancing the innovation platform for systems being promoted under SIMLESA.

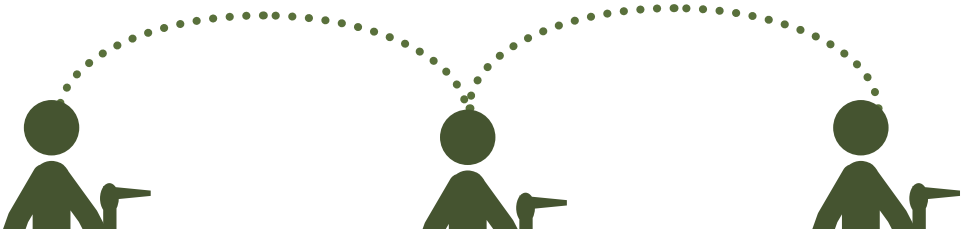


A total of six host farmers were identified to run the different exploratory trial during the project period

Sharing their exploratory results with fellow farmers in their section through field days and farmer exchange visits, among other ways

How was the monitoring done?

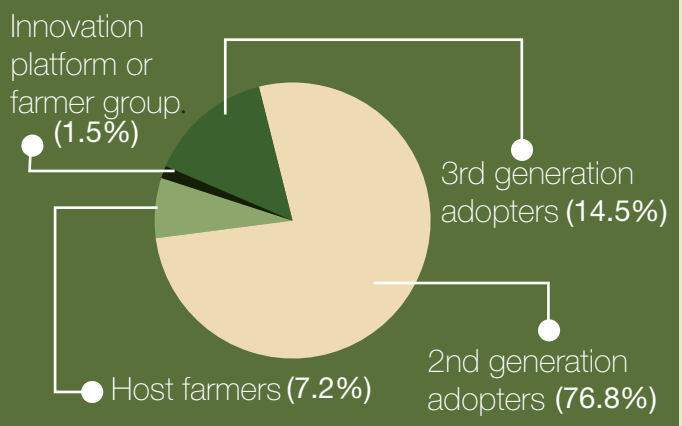
The 2013 adoption monitoring was done in all the targeted districts. In each district, the targeted section was visited to first engage the six host farmers. Since these farmers shared their knowledge with fellow farmers, other sections within the identified EPA were also interviewed using the snowball method of data collection. Since the core farmers are encouraged to share the knowledge with other farmers, more interviews were conducted with those whom the host farmers reported as having contacted. The farmers were regarded as second generation if they had direct contact with host farmers during field days conducted on host farmers' plots or informally. Other farmers were categorized as third generation farmers if their information on SIMLESA practices had come from second generation farmers. Apart from host farmers, extension officers were also able to identify other farmers who participated in SIMLESA as a way of promoting conservation agriculture beyond the core or host farmer group. Using a structured questionnaire, 543 farmers from the six districts were interviewed.



Six host farmers.
Encouraged to share the knowledge with other farmers

Second generation farmers
Had direct contact with host farmers

Third generation farmers
Their information on SIMLESA practices had come from second generation farmers



43 yrs

Mean age of SIMLESA farmers

THE AVERAGE EDUCATION LEVEL

6 yrs
For Male Farmers

5 yrs
For Female Farmers

Some characteristics of the farming populations

From the sample of 543, 7.2 percent were host farmers, 76.8 percent were second generation adopters while 14.5 percent were third generation adopters and 1.5 percent were identified as members of an innovation platform or farmer group. Of the respondents, 51.9 percent were female farmers and 48.1 percent male farmers. This was not merely a count of female headed households but involvement of females (whether in male or female headed households) in practicing SIMLESA technologies compared to men. For instance, in Mitundu EPA three of the host farmers were females in male headed households because they bore primary responsibility for farming in these households. The mean age of SIMLESA farmers was 43 years ranging from 18 to 84 years. Between female and male respondents, there was no significant difference in age. The average education level for male farmers who practiced SIMLESA technologies was six years against five years of female farmers. The average education level for male farmers who practiced SIMLESA technologies was six years compared to five years for female farmers. For Malawi this is primary education signifying that most farmers who used SIMLESA technologies had basic education that could allow them understand extension guidance.

...3 of the host farmers were females in male headed households because they bore primary responsibility for farming in these households.

Table 1: Distribution of SIMLESA farmers across the districts

	Type of farmer in SIMLESA technology adoption				
District	Host Farmer (%)	Second generation adopter (%)	Third generation adopter (%)	Innovation Platform (%)	Total N
Lilongwe	4.0	67.3	28.7	0.0	150
Mchinji	6.6	76.4	17.0	0.0	106
Kasungu	5.3	84.8	9.8	0.0	132
Salima	15.9	77.3	2.3	4.5	44
Balaka	14.6	79.2	6.2	0.0	48
Ntcheu	7.9	81.0	1.6	9.5	63
Total N	39	417	79	8	543

Land ownership

The average land holding size for SIMLESA farmers was 3.5 acres ranging between 0.25 to 26 acres. Kasungu had the highest average land holding size of 5 acres ranging between 1 and 20 acres while Lilongwe had the least land holding size of 2.08 acres while Ntcheu had 2.68 acres. Male farmers indicated to have cultivated a higher average land of 3.6 acres compared to female farmers who cultivated 2.8 acres. Compared to total land holding, farmers indicated that they rent in more land to add on the smallholding size. On amount of land allocated to legume cultivation, farmers allocated less than 37 percent of the land to legumes only. In Malawi, this is mainly applicable for groundnuts or soybean production but mainly in the highland districts. For other legumes like beans and pigeon peas, these are mostly intercropped with maize as a way of optimizing land. Among the farmer categories, female farmers allocated slightly a higher proportion of their land to intercrop than male farmers, (21 percent female and 19 percent of male). This can be attributed to the fact that most of the intercropped legumes are for home consumption and not market oriented.

Table 2: Total Cultivated Land in 2012/2013

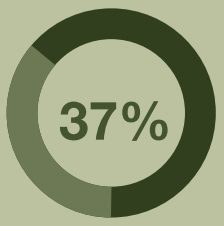
Type of farmer in SIMLESA technology adoption	Mean	N	Std. Deviation	Minimum	Maximum
Female	2.79	282	2.03299	0.00	12.50
Male	3.63	261	2.45239	0.00	20.00
Total	3.19	543	2.28225	0.00	20.00

Traditionally, Malawian farmers practice maize/legume rotation especially for groundnuts and soybeans. Due to limited land for cultivation, most farmers do not conduct full rotation except very few who have slightly more land and manage to allocate the crops in separate alternating plots. General results indicated that the average land under maize/legume rotation between 2011 and 2013 was 2 acres. Within the two years covered by the survey, the average land under rotation among female farmers was 1.7 acres against 2.4 acres among male farmers. At least 60 percent of the total cultivated land in 2012/2013 was under sole maize and sole legume rotation.

3.5 acres
Average land holding size

5 acres Highest - Kasungu

2.08 acres Least - Lilongwe

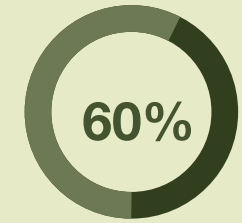


Land allocated to legumes

2 acres
Average land under maize legume rotation between 2011 and 2013

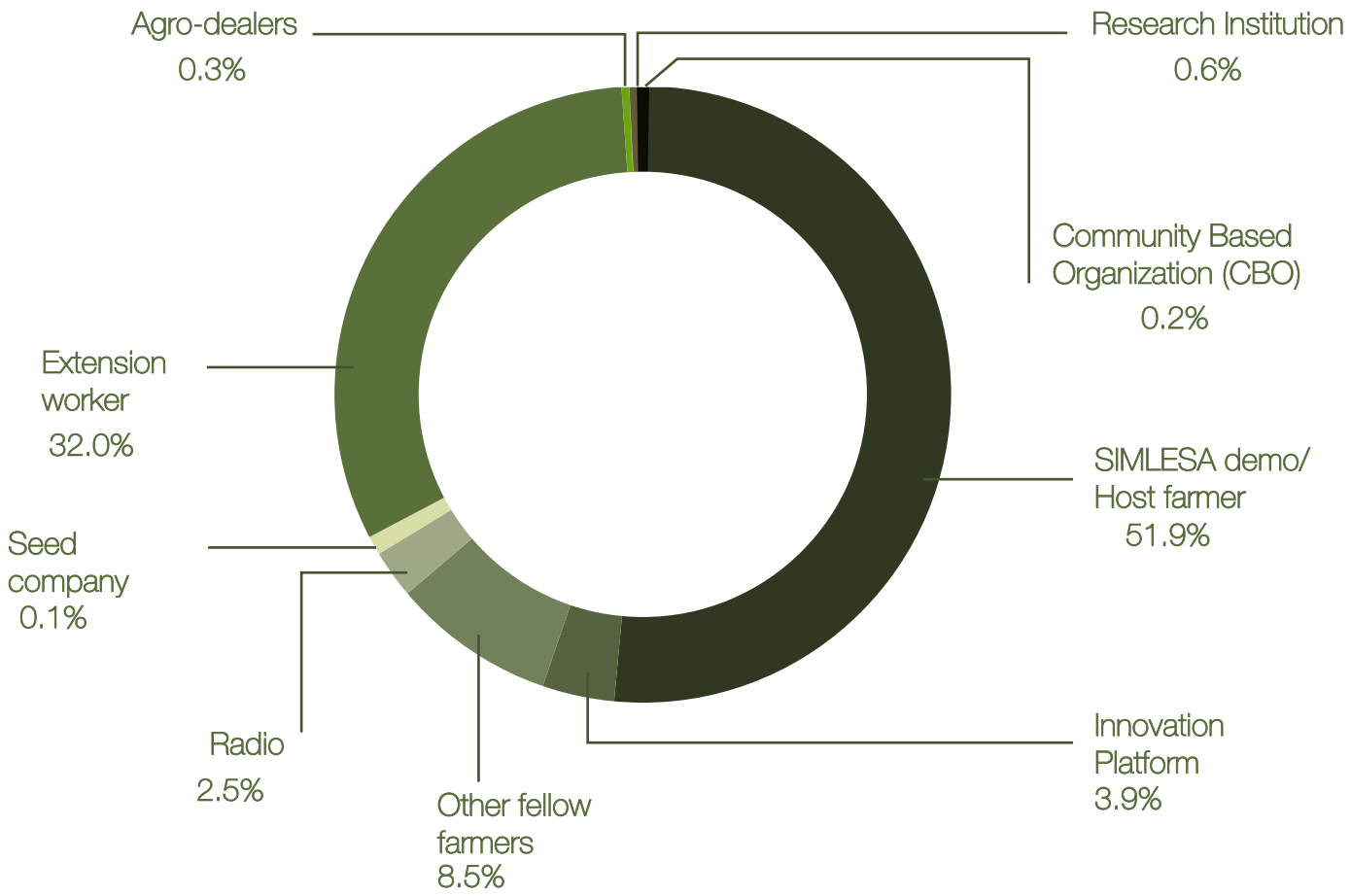
1.7 acres Female farmers

2.4 acres Male farmers.



Cultivated land under sole maize and sole legume rotation in (2012/2013)

Figure 1: Source of Information for SIMLESA technologies



Are you aware, have you heard?

The main sources of information about SIMLESA technologies and practices were the farmers hosting SIMLESA demonstration and the extension workers, constituting 84 percent (see in Fig. 1). The results show that all the farmers that were interviewed were aware (had some information) of zero/minimum tillage concepts. The common concept was mulching using crop residues or thatching grass and planting using a dibble stick. Mulching was used across different crop patterns like sole maize production, maize/legume rotation and intercrop.

Table 3: Farmer awareness

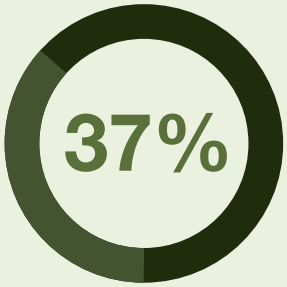
Gender of Respondent		Percent
Female (N = 282)	Zero/Minimum Tillage	100.0
	Herbicides Only	67.7
	Improved maize varieties	54.3
	Improved legume varieties	62.1
Male (N = 261)	Zero/Minimum Tillage	100.0
	Herbicides Only	76.6
	Improved maize varieties	59.0
	Improved legume varieties	68.2

Have you ever tried any of these?

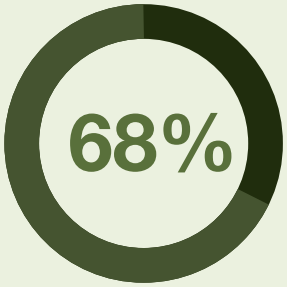
Since SIMLESA promotes use of sustainable intensification technologies, from those who were aware of different SIMLESA technologies, an average of 63 percent indicated that they tried at least one component of these technologies. For minimum tillage, 79 percent of those who were aware tried the technology. Only 37 percent of those who knew of herbicides tried. At most, 68 percent of the farmers tried out the varieties that were being tested (Fig. 2). More female farmers practiced minimum tillage compared to male farmers. This agrees with Fig. 1 where more female farmers were aware of minimum tillage compared to men who practiced use of herbicides more.

The farmers who were aware and tried the technologies

The farmers who were aware and tried minimum tillage

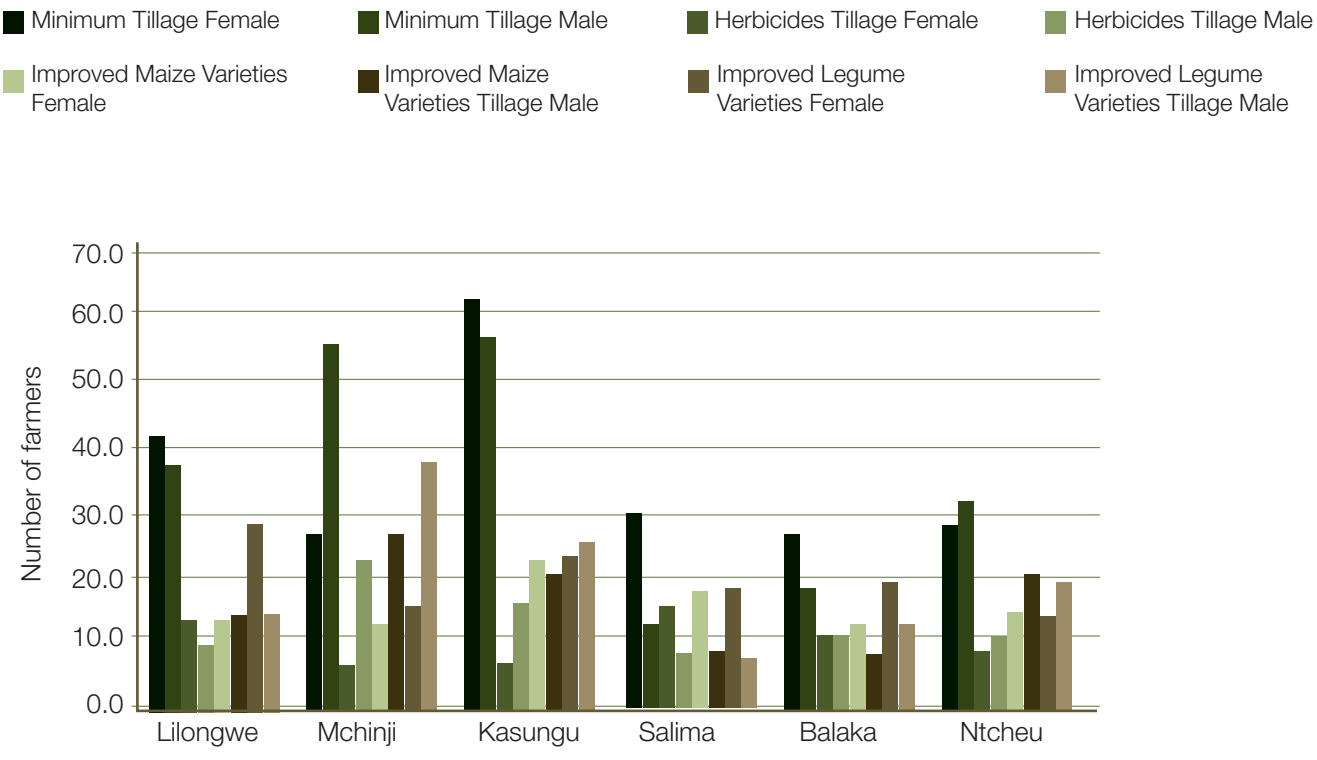


The only farmers who knew and tried herbicides.



The farmers who tried out the varieties that were being tested

Figure 2: Number of farmers who tried technologies by gender



Who adopted, who quit?

The results showed that an average of 78 percent of those who tried the technologies adopted (in the sense that they were implementing the practices in the fields beyond demonstration plots as at the time of the interview, which was three years after project inception). Results by gender indicate that there was no significant difference between men and female farmers who adopted minimum tillage and use of improved varieties while use of herbicides was higher among male farmers.

Figure 3: Technology adoption by gender

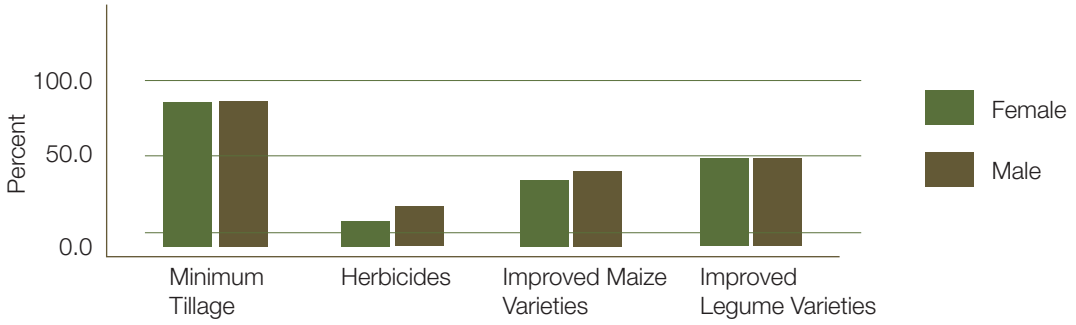
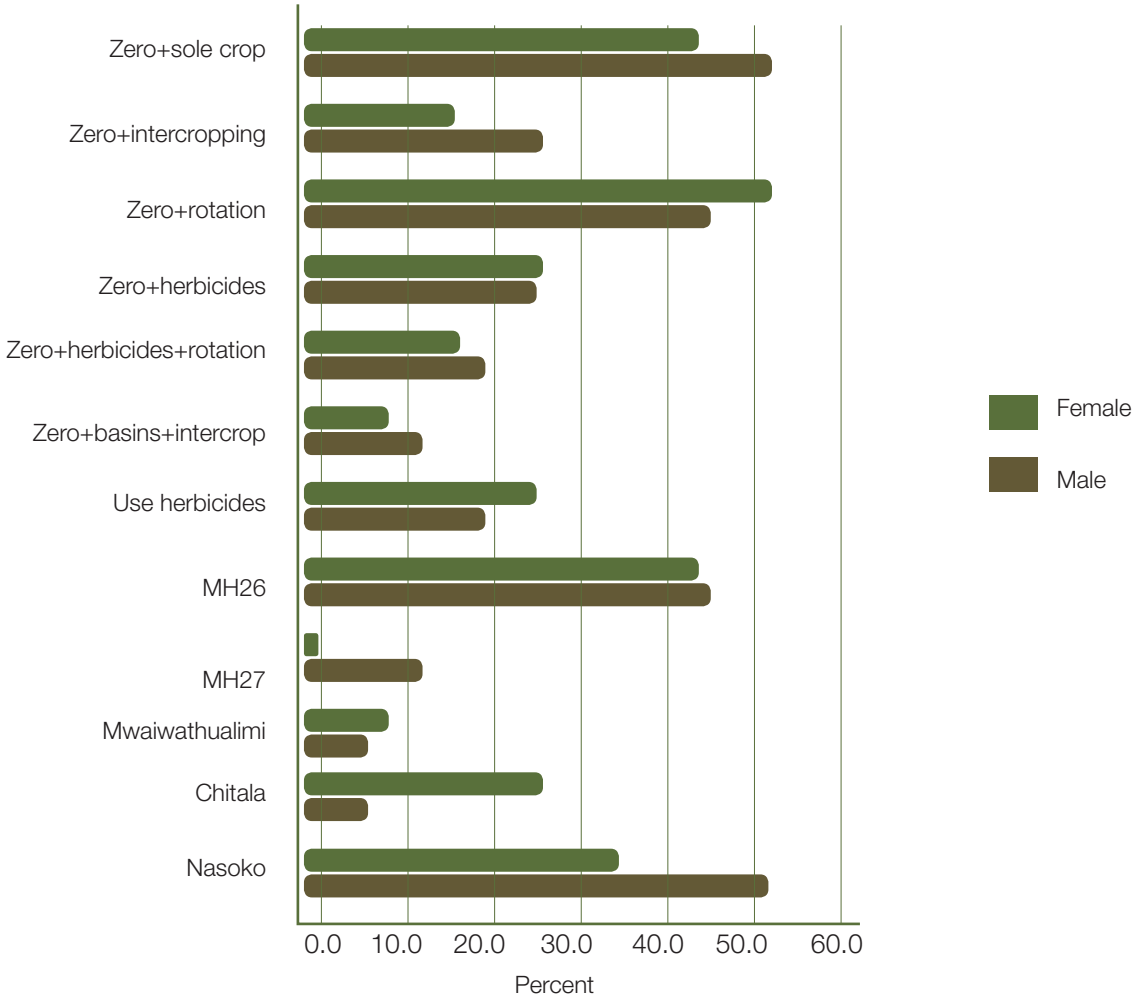
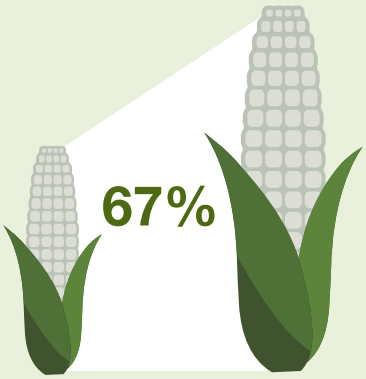


Figure 4: Expansion of plot beyond hosting demo by gender

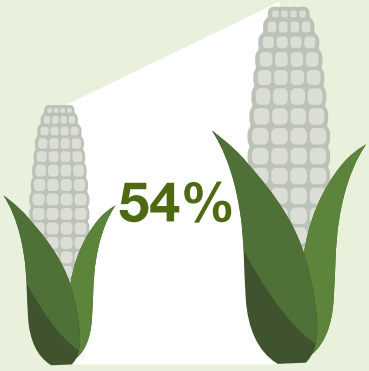


Did using any of these practices improve your yields?

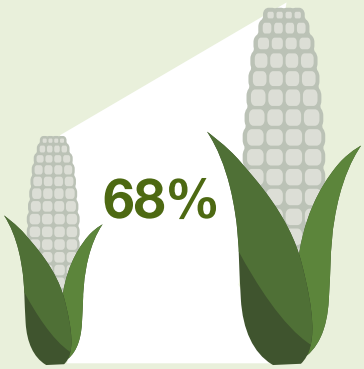
Results from farmer reported yield calculations show that yield increased by an average of 67 percent from adopting zero/minimum tillage, 68 percent and 67 percent from adopting improved maize and legume varieties, respectively. Figure 5 further shows that use of herbicides plus zero/minimum tillage in sole crop, intercrop and rotation, increased yield by an average of 54 percent.



Yield increased from adopting zero/ minimum tillage



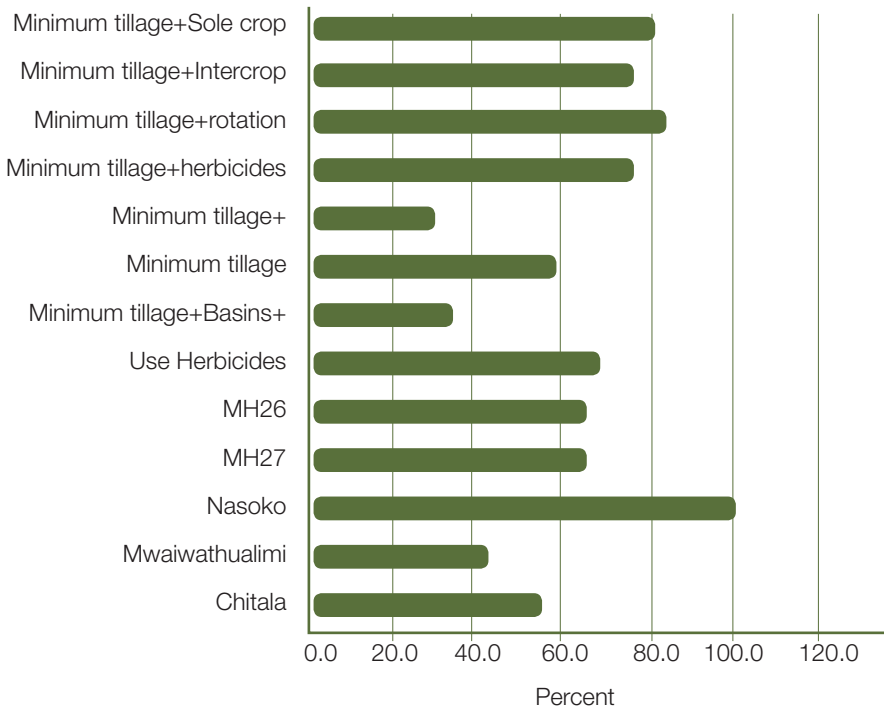
Increase yield from use of herbicides plus zero/minimum tillage in sole crop, intercrop and rotation



Yield increased from adopting improved maize varieties

Yield increased from adopting improved legume varieties

Figure 5: Average percent change in yield



What did farmers like about CA-based practices?

The results showed that most farmers adopted zero or minimum tillage under sole maize production followed by zero/minimum tillage in maize/legume rotation. Farmers indicated that they preferred these technologies because they were labour saving. Other reasons given included the fact that these farmers thought that minimum tillage would improve their soils and reduce soil erosion. The preference of zero/minimum tillage in sole plot was high among male farmers. Female farmers indicated a high preference of zero/minimum tillage applied on inter cropped plots. This preference among gender groups comes from farmers with land allocation shown in Table 3 above where female farmers were allocating a high mean average land to intercrop than male farmers. The preference of herbicides was high among male farmers mainly considering the result that male farmers are more aware of use of herbicides than their counterparts.

Table 4: Preferred Technology

Technology	District						Total %
	Lilongwe %	Mchinji %	Kasungu %	Salima %	Balaka %	Ntcheu %	
Zero/Minimum tillage + Sole crop	20.7	23.6	47.0	43.2	41.7	52.4	35.0
Zero/Minimum tillage + Legume/Maize rotation	8.7	25.4	15.2	22.7	8.3	20.6	16.1
Zero/Minimum tillage + Legume/Maize intercropping	7.3	0.9	2.3	4.5	6.3	7.9	4.6
Zero/Minimum tillage + Herbicides + Legume/Maize rotation	2.7	10.4	5.3	9.1	4.2	3.2	5.6
Zero/Minimum tillage + Herbicides	2.7	3.8	3.0	6.8	8.3	4.8	4.1
Use Herbicides only	1.3	1.9	0.8	4.5	4.2	3.2	2.0
Zero/Minimum tillage + Basins + Legume/Maize Intercrop	0.7	0.0	1.5	0.0	2.1	0.0	0.7
Total Sample	150	106	132	44	48	63	543

What then?

The results from this adoption monitoring survey suggest that more than 90 percent of the farmers contacted were aware of technologies being promoted by the project, and about 63 percent had actually tried the technologies on their plot or field. Of those that had tried, 78 percent had adopted the technologies (in the sense of implementing the practices on their regular farm plots and not just on trial plots). Overall, farmers' preferences among the technologies were zero or minimum tillage under sole maize production followed by zero/minimum tillage in maize/legume rotation. This was mainly because the minimum tillage component reduced labour demand.

Acknowledgments

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