Qualitative Assessment of the Key Drivers to Adoption, Dis-adoption and Non-Adoption of Conservation Agriculture among Smallholder Farmers in Zambia

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Figure 1: Fields of full CA in 2015/16 season

a) Nyimba district

b) Monze district

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LIST OF ACRONYMS AND ABBREVIATIONS

ADRA	Adventist Relief Agency
AEZ	Agro-ecological Zone
ASP	Agriculture Support Programme
CA	Conservation Agriculture
CASSP	Conservation Agriculture Scaling up for increased Productivity and Production
CASU	Conservation Agriculture Scaling Up
CBD	Central Business District
CCZ	Council of Churches in Zambia
CF	Conservation Farming
CFU	Conservation Farming Unit
CLUSA	Cooperative League of the United States of America
COMACO	Community Markets for Conservation
COMESA	Common Market for East and Southern Africa
CRS	Catholic Relief Services
CT	Conservation Tillage
DALSO	Diversified Agriculture and Livelihood Options
DANIDA	Danish International Development Agency
DAPP	Development Aid from People to People
EEOA	Economic Expansion in Outlying Areas
EFSP	Expanded Food Security Pack
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FGDs	Focused Group Discussions
FISP	Farmer Input Support Programme
FISRI	Farmer Input Support Response Initiative
GTZ	German Development Cooperation
HBC	Home Based Care
IAPRI	Indaba Agricultural Policy Research Institute
LWF	Lutheran World Federation
MoA	Ministry of Agriculture
NGOs	Non-Governmental Organisations
PRA	Participatory Rural Appraisal
PUSH	Peri – Urban Self help
RALS	Rural Agricultural Livelihoods Survey
SCAFE	Soil Conservation and Agroforestry Extension programme
WVZ	World Vision Zambia

ZNFU	Zambia national Farmers' Union
ZRCS	Zambia Red Cross Society

EXECUTIVE SUMMARY

Introduction

Despite nearly two decades of promotion and evidence of yield benefits associated with CA in Zambia, adoption rates by smallholder farmers at the national level using nation-wide representative survey data remain low, while dis-adoption is widespread. It has been proved beyond doubt that CA has potential to improve crop productivity, improve soil fertility, and mitigate against low and/or variable rainfall. It therefore offers one of the greatest promises for increased smallholder productivity for increased rural incomes and poverty reduction especially in the face of climate change in general and reduced rainfall amounts particularly in the central and southern parts of Zambia. Therefore, the European Union (EU) Delegation for Zambia and the Common Market for Eastern and Southern Africa (COMESA) commissioned a three part study with Indaba Agricultural Policy Research Institute (IAPRI) for the detailed assessment of determinants and impacts of smallholders CA adoption and dis-adoption. The first part was a descriptive analysis of the factors affecting CA adoption, dis-adoption and non-adoption using the nation-wide representative Rural Agricultural Survey (RALS) of 2015. The second part is the detailed qualitative assessment of these issues particularly those aspects that could not be captured from a quantitative survey, which is the core objective of this study. The two parts will ultimately feed into an econometric analysis based on the RALS data of the determinants and impacts of CA adoption and dis-adoption.

This qualitative assessment, covering Sesheke, Sinazongwe, Choma, Monze, Kaoma, Mumbwa, Nyimba, Petauke and Katete during the period February/March 2016, aimed at using participatory appraisal (PRA) techniques to bring up technical, socio-economic as well as traditional/cultural issues as they affect smallholder CA adoption, dis-adoption and non-adoption using as much as possible real quotes and examples.

Key findings

This assessment has shown that CA adoption in communities where it has been promoted has steadily increased over the years since the 1990s with the rate of increase at least tripping since the period 2006-2010. The benefits of CA adoption have been significantly felt in the farming communities. The most important of these benefits has been the increase in crop productivity especially in seasons characterised by dry spells due to increased soil moisture retention capacity. However, serious issues impede broad-based adoption of CA among smallholder farmers in Zambia. These issues can be characterised as:

- ✓ *Institutional issues:* Without discrediting the various CA promotional programmes that have been operating in the country, findings of this assessment suggest that local consultation and understanding on the purpose, rationale, modus operandi and period of the programme as well as expected inputs and benefits of all stakeholders like government extension workers,

lead farmers, follower farmers and even traditional leaders need to be clear in order to avoid a crisis of expectation of benefits. These consultations need to involve all community members and should be restricted to those selected to participate in the programme, and in need assistance of local traditional leaders could be sought to enhance this cooperation with regard to the aims and objectives of the programme and what is expected of community members after the programme ends. Where inputs are distributed as part of CA promotional activities, it is important that current and potential beneficiaries understand the reasoning behind this and that this will not continue forever.

In Zambia, the best institutional arrangement that can facilitate broad-based adoption of CA among smallholder farmers is the Ministry of Agriculture (MoA) extension service, provided sufficient operational funds are available for training of field extension workers as well as their field operations. Conservation agriculture would need to be adopted as the primary extension message of the ministry at all levels including national, provincial, district and sub-district levels such that other trainings and/or extension messages are supporting this primary objective of increased productivity in the face of climate change manifested mostly as declining season rainfall amounts and poor rainfall distribution. Depending on the field extension worker-farmer ratio, committed lead farmers could be selected and trained to be an interface between the extension worker and the farmers. In this case, the lead farmers would need to ably explain, not only the technical aspects of CA, but the objectives of the intervention, its duration and what is expected of the farmers and what benefits they can expect.

- ✓ *Technical issues:* This assessment has also established that one of the key technical issues impeding the increased adoption of CA is the problems of weed control. Our findings suggest that considerable time, effort and resources will need to be devoted to training farmers on the proper use of herbicides including dispelling a number of misguided beliefs such as it being detrimental to the soil. The private sector when involved would be willing to contribute towards this noble cause as they would demonstrate the use of their products through local representatives (agro-dealers) who would then go on to sell the products on their behalf. Sometimes these private companies even promote local entrepreneurs who could be spraying other farmers' field at a fee.

  Another training aspect that would need to be emphasised is that CA is superior to conventional farming whatever inputs farmers use. This is in order to avoid a situation where farmers switch back to conventional farming when they fail to access improved seed, say hybrid maize, especially when the promotional activities come to an end or when the particular farmer is weaned from free input distribution.

- ✓ *Market access issues:* The issue of smallholder farmer access to input and output markets is not peculiar to CA promotion but cuts across the whole spectrum of farming. It is recommended that marketing or farming as a business be one of the main topics that are

trained together with CA techniques. Community members who can, such as lead farmers or agro-dealers or assemblers should be encouraged to become local agents of main input and output market providers.

- ✓ *Socio-cultural issues:* With the involvement of local traditional leaders, area specific socio-cultural issues should also be tackled during CA training so that they do not impede its broad-based adoption.

1.0 INTRODUCTION

1.1 Background

Conservation agriculture (CA) has been actively promoted by various organisations among smallholders in most of parts of Zambia since the mid 1990's in the form of conservation farming (CF) that included precise digging of permanent planting basins and dry season land preparation based on the three main elements of minimum mechanical soil disturbance, permanent organic soil cover and crop rotation. Despite nearly two decades of promotion and evidence of yield benefits associated with CA in Zambia, adoption rates by smallholder farmers at the national level using nation-wide representative survey data remain low, while dis-adoption is widespread. It has been proved beyond doubt that CA has potential to improve crop productivity, improve soil fertility, and mitigate against low and/or variable rainfall. It therefore offers one of the greatest promises for increased smallholder productivity for increased rural incomes and poverty reduction especially in the face of climate change in general and reduced rainfall amounts particularly in the central and southern parts of Zambia.

That smallholder CA adoption rates are generally low in spite of these potential benefits is a source of great concern to various sector stakeholders in Zambia including the Government, Cooperating Partners, non-governmental organisations (NGOs) and development practitioners among others. This calls for a greater empirical understanding of the underlying reasons for smallholder CA adoption, dis-adoption and non-adoption in Zambia in order to chart a better way forward.

1.2 Objectives of the Study

In view of the above, the European Union (EU) Delegation for Zambia and the Common Market for Eastern and Southern Africa (COMESA) commissioned a three part study with Indaba Agricultural Policy Research Institute (IAPRI) for the detailed assessment of determinants and impacts of smallholders CA adoption and dis-adoption. The first part was a descriptive analysis of the factors affecting CA adoption, dis-adoption and non-adoption using the nation-wide representative Rural Agricultural Survey (RALS) of 2015. The second part is the detailed qualitative assessment of these issues particularly those aspects that could not be captured from a quantitative survey, which is the core objective of this study. The two parts will ultimately feed into an econometric analysis based on the RALS data of the determinants and impacts of CA adoption and dis-adoption.

This qualitative assessment aimed at using participatory appraisal (PRA) techniques to bring up technical, socio-economic as well as traditional/cultural issues as they affect smallholder CA adoption, dis-adoption and non-adoption using as much as possible real quotes and examples.

1.3 Methodology

The assessment mainly employed PRA tools in focus group discussion (FGD) arrangement of men and women in selected districts in agro-ecological zones (AEZ) I, IIA and IIB in which CA has primarily been promoted though recent promotional activities have also covered AEZ III (the high rainfall zone in the northern parts of the country). The FGDs were complemented by key informant interviews at the national, provincial, district and sub-district levels as well as direct observations.

The districts that were covered were Sesheke, Sinazongwe, Choma, Monze, Kaoma, Mumbwa, Nyimba, Petauke and Katete during the period February/March 2016. The relative location of these districts with respect to the AEZ in Zambia are shown in the map in Figure 2. In each district, about two communities were purposively sampled based on consultations of the field teams with local key informants who included staff of the Ministry of Agriculture (including the Conservation Agriculture Scaling Up (CASU) Project, Conservation Farming Unit (CFU)). Key factors used in their selection was participation in CA promotional activities, levels of adoption and the presence of either CFU or CASU. Table 1 shows the details of the sampled communities/areas by district as well as the distance to the central business district (CBD), key project promoting CA activities and number of participants in each FGD.

Figure 2: Location of sampled districts by AEZ

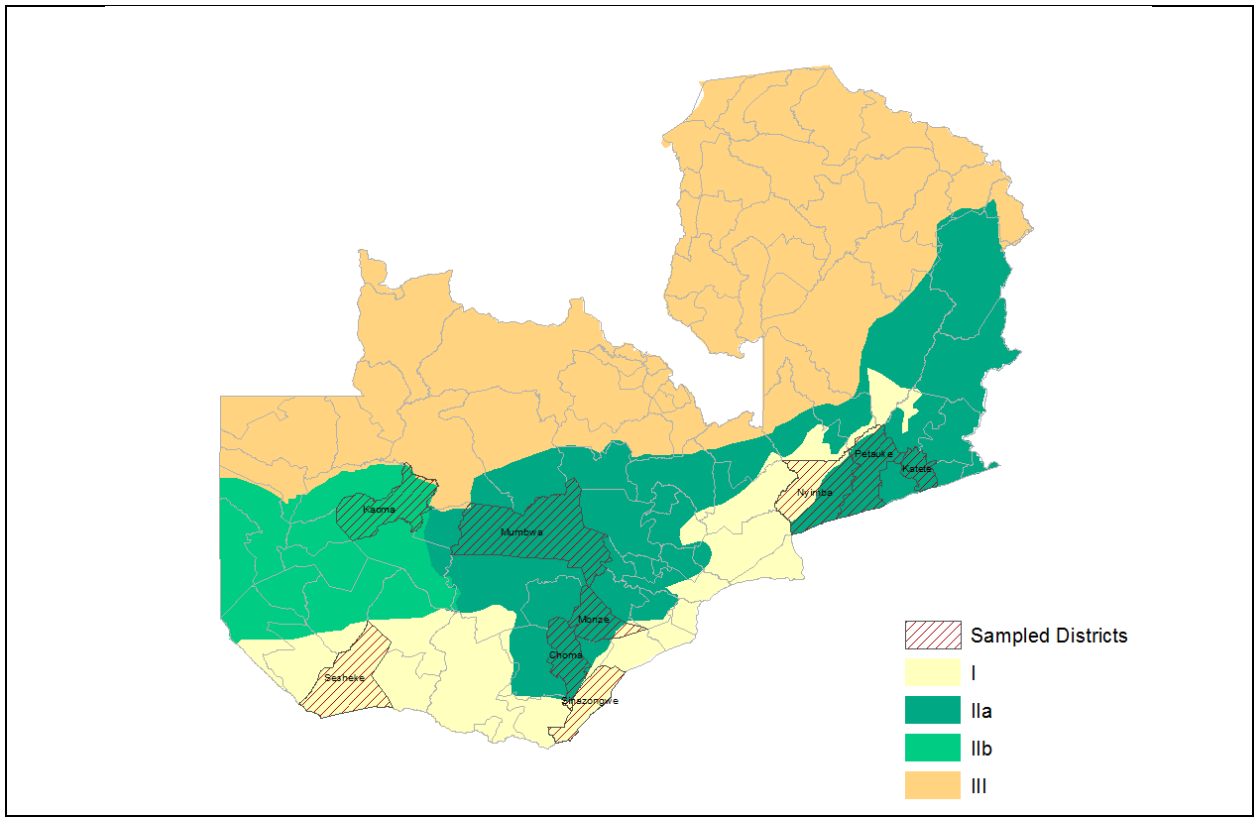


Table 1: Sampled areas by district and number of participants by gender

District	AEZ	Agricultural Camp/ Community	Km to CBD	Active CA Programmes	Number of Participants	
					Men	Women
Nyimba	I	Nyimba Central 2	8	CASU, EFSP, COMACO, WVZ	11	13
		Chipembe	22	CASU	8	15
Sinazongwe		Sinazeze	6	CASU	6	10
		Maamba	12	CASU	7	10
Sesheke		Maondo	25	CASU	7	3
		Katongo	21	CASU	8	3
		Lumbo	10	CASU	5	5
				Total	**52**	**61**
Choma	IIA	Mbabala	35	CFU, CASU	10	9
		Sidundwa	67	CFU, CASU	10	5
Monze		Hachaanga	12	CFU, CASU	6	10
		Nteme	7	CFU, CASU	7	10
Katete		Chinkombe	16	CFU, CASU	16	10
		Chimutende	45	CFU, CASU	29	11
Petauke		Lusowe - Maloba	10	CASU	11	14
		Lusowe - Yona	10	CFU	10	14
Mumbwa		Shikapoli	5	CFU, CASU	5	5
		Kashinka	12	CFU, CASU	6	4
		Kasalu	45	CFU, CASU	5	6
		Kabulwebulwe	30	CFU, CASU	7	6
				Total	**121**	**84**
Kaoma	IIB	Munkuye	3	CFU, CASU	6	8
		Kankwanda	35	CFU, CASU	6	5
		Naliyele	7	CFU, CASU	6	8
		Mwanche	9	CFU, CASU	7	6
				Total	**25**	**27**

In most cases matrix scoring and/or pairwise ranking was conducted (see examples in Figure 3) as a means to relatively weight the importance of issues brought out, in addition to being a tool to solicit group discussions during which interesting issues including quotes and examples were noted. As much as possible the participants were prompted for technical, economic, social, cultural and environmental aspects of CA adoption, dis-adoption and non-adoption. The detailed assessment guide is appended in Appendix 1 but the flow of key issues covered was as follows:

1) Matrix scoring of the general trends in CA adoption and dis-adoption and non-adoption at community level from the period 1990-2000 to date highlighting key drivers to adoption, dis-adoption and non-adoption;
2) Matrix scoring or pairwise ranking of key benefits of adoption of different CA practices;
3) Matrix scoring or pairwise ranking of key reasons for dis-adoption of different CA practices;

4) Matrix scoring or pairwise ranking of key reasons for non-adoption of different CA practices; and
5) Matrix scoring or pairwise ranking of suggestions to increase CA adoption.

The summary of the matrix ranking (scores) of the key benefits of smallholder adoption, key reasons for dis-adoption and non-adoption and suggestions to improve adoption of CA are shown by AEZ and gender in Appendix 2, 3, 4 and 5 respectively. The next chapter discusses the key findings focusing on trends and drivers of CA adoption, dis-adoptions and non-adoptions, and suggestions to increase adoption. This is then followed by one on some conclusions and recommendations.

Figure 3: PRA exercises in progress by groups of men and women

2.0 KEY FINDINGS

2.1 Trends in and Key Drivers of Smallholder CA Adoption

At the beginning of all the FGDs, as a way of breaking the ice immediately after introductions, participants were asked what they understood about CA. This was also meant to accord the facilitators an opportunity to see the extent to which the two parties could have a common understanding of the topic and explain what it really is in the case that the participants did not fully understand what CA is. The first main lesson learned from this exercise was that smallholder farmers generally understood what CA was. As shown in Table 2, about 80% of the groups worked with had a good working definition of CA.

Table 2: Community level understanding of CA

Understanding of CA	Frequency (number of sampled communities)	
Sustainable farming/ a combination of minimum tillage, crop rotations, crop residue retention and agro-forestry	√√√√√ √√√√√	10
A combination of minimum tillage, crop rotations, crop residue retention, manure application	√√√√√	5
A combination of minimum tillage, crop rotations and crop residue retention	√√√√	4
Minimum tillage	√√	2
Crop rotation and residue retention	√	1
Conserving the soil and everything in it	√	1

The second main thing learned, through matrix scoring and discussions that followed, was that smallholder adoption of CA in the study areas increased rapidly during the period 2006 to 2010 increasing further thereafter during the 2011-2015 period in all the AEZ as shown in Figure 4. Adoption was perceived to be highest in AEZ IIB during the period 1990-2000 while that of AEZ I caught up during the 2001-2005 period and that of AEZ IIB in the 2006-2010 period.

2.1.1 Institutional Promotional Activities

Across all the districts covered in the study, the most important driver of CA adoption during this period was presence of organisations promoting the practice. The communities have had significant interactions with different organisations promoting CA starting from the 1990s and increasing over time to date as shown in Table 3. Table 4 shows a historical trends perspective of the introduction and increase in the adoption of CA in Eastern Province, as an example, clearly showing the significance of this institutional interaction with the farming communities.

Most of these organisations provided as part of their promotional activities inputs for farmers' use in CA fields in addition to providing sensitisation and training on CA through demonstration plots, field days and exchange visits. In most cases these trainings were at local level driven by lead farmers. While most projects supporting CA were carrying out these activities together with input provision/distribution as noble responses to some adverse effects on the farmers' ability to procure own inputs, it may have led to the farmers developing a wrong belief that only improved inputs or those distributed by such projects can be used under CA. As a result there is a general tendency to only practice CA when such inputs are provided or when they are able to procure such inputs on their own. One such example is the belief that only hybrid and not local maize can be grown under CA.

Figure 4: Matrix scoring of perceived trends in Smallholder CA adoption by agro-ecological zone

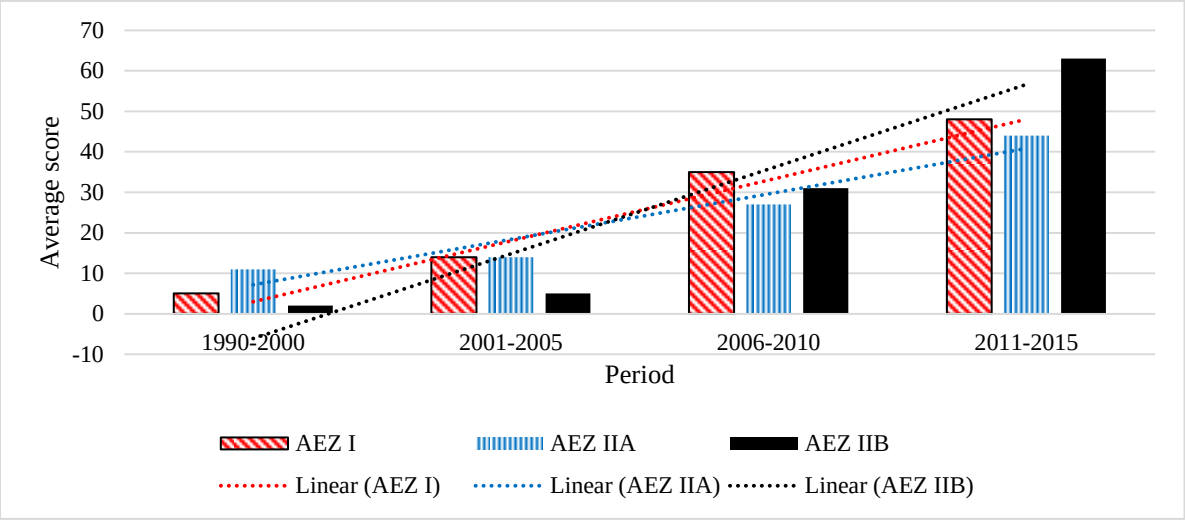
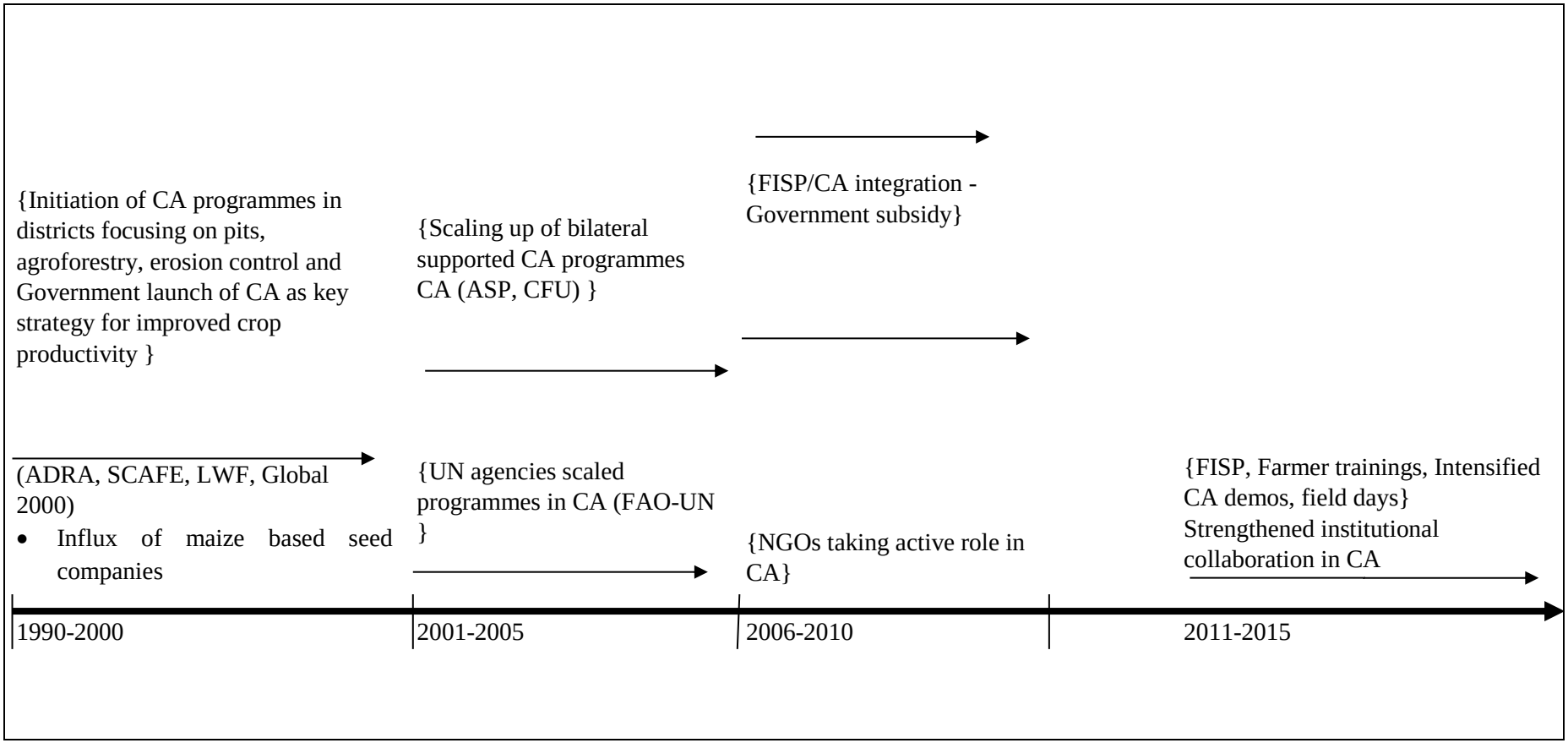


Table 3: Inventory of organisations promoting CA by period and AEZ

Period	Organisations[1] by agro-ecological zone		
	I	IIA	IIB
1990-2000	ADRA, SCAFE, Global 2000, MoA	CLUSA, EEOA, LWF, Every Home for Christ, ADRA	Home Based Care (HBC)
2001-2005	ADRA, ASP, PUSH	GTZ, DANIDA, CLUSA, CARE International, CFU, WVZ	CFU
2006-2010	FISRI, CCZ, DAPP, ASP, CRS, PUSH	CFU, CASSP, FISRI, ASP, COMACO	CFU, CASSP, FISRI
2011-2015	FISRI, CASU, DAPP, EFSP, COMACO, WVZ, ZRCS, Zambezi River Initiative, ZNFU, Land O Lakes, Action Aid, DALSO	COMACO, CFU, CASU	CFU, CASU, Concern Worldwide

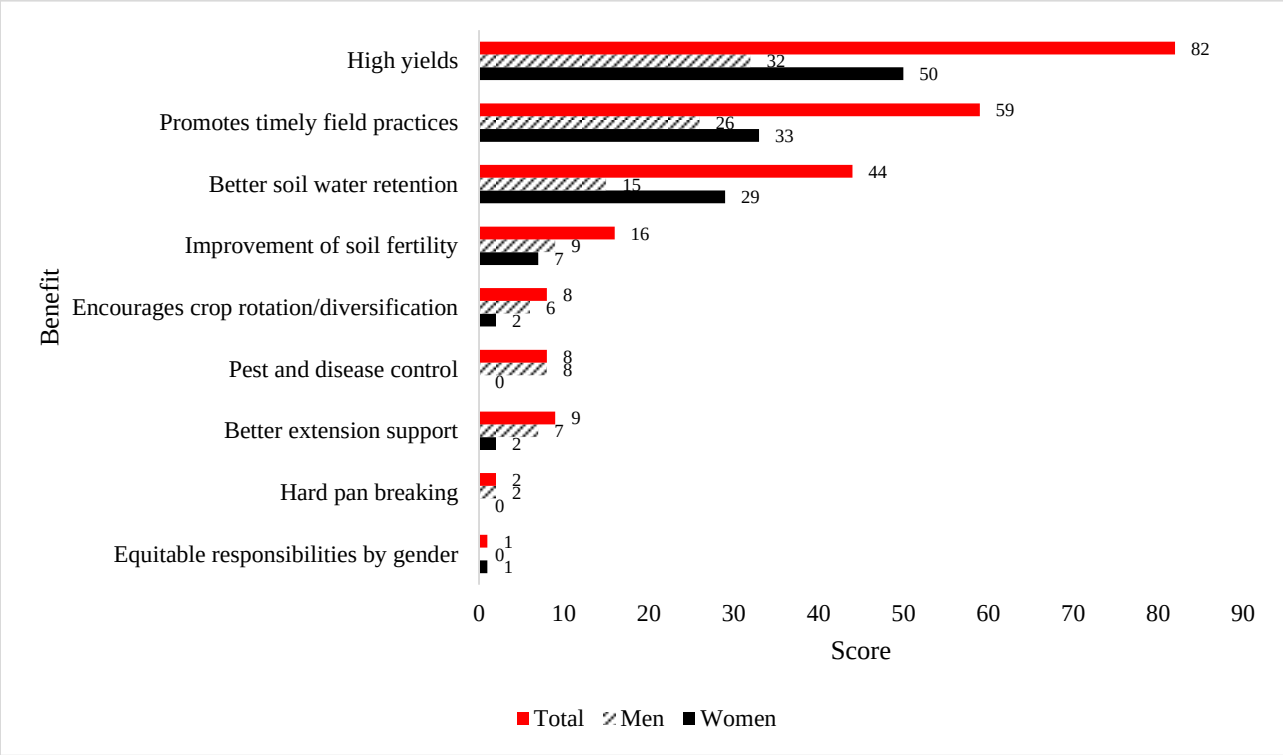
[1] See List of Abbreviations and Acronyms for full names.

Figure 5: Institutional roles in conservation agriculture outreach and scaling up – A historical trend perspective in Eastern Province



In addition to institutional CA promotional activities benefits accruing from CA adoption were pointed out as further driving factors for the adoption of the practice. The FGD participants were asked to bring out and rank the key benefits that accrue from smallholder adoption of CA. The matrix scoring of these benefits by AEZ and gender are presented in Appendix 2. A summary of these by gender are presented in Figure 6. The main benefits are high yields, timely field practices, better soil water retention, improvement of soil fertility, encouraged crop rotation/diversification, better pest and disease control, better extension support, soil hard pan breaking and promotion of equitable gender responsibilities in undertaking field activities in that order.

Figure 6: Matrix scoring of benefits from CA adoption by gender



2.1.2 Enhancement of Crop Yields

All communities visited indicated that the most important benefit smallholder farmers obtained from adopting CA was increased yields. Furthermore, it was learned, it is particularly from these increased yields that other farmers are encouraged to adopt even if they are not directly involved in the CA promotion activities (see Figure 7 for an example of superior crop stands of maize under CA compared to conventional farming during the 2015/16 season which was a relatively dry season).

Participants in the FGDs mentioned that they obtained high yields even from small portions of land such as 1 lima. For example, one woman in Mumbwa district said: *"in 1 lima, I am able to harvest food that lasts my family the whole year".* Another farmer said: *"In 1 lima I am able to harvest as much as someone who cultivated 1 acre under conventional farming, so hunger is no longer an issue for my family".* Actually, most groups were unanimous that they were able to support their families from the high yields they get from practising CA. They added that they no longer faced hunger and were able to pay for their children's education.

Figure 7: Performance of CA and non-CA maize in Eastern Province – 2015/16 season

a) CA field *b) Conventional field*

2.1.3 Facilitation of Timely Field Cultural Practices

A number of FGD participants also noted that they have been spending less time in their fields since they adopted CA than when they used conventional farming. This has enabled them to have more time for other activities such as non-farm income generating activities or just resting. For example, a woman in Sinazongwe said: *"I spend less time in the field with ripping. I finish planting within 1 week and go back quickly to spray the herbicides and within 2 days I am done.*

I used to take up to 2 months with conventional farming because by the time I reach the other end of the field, the weeds would have grown where I had already cultivated". A man in the same district said: *"Farming using ripping is pretty quick and takes less time such that I can plant 20 kg of seed in a day. Someone who uses a plough takes longer. I am able to plant a bigger area within a short time compared to someone who uses a plough."*

Furthermore, the groups observed that with CA they start working in their fields in June and plant within a day when the first rains come. Those who practice conventional farming would need not less than 4 days to plough and plant a similar piece of land. In the following season, the same hand basins can be used to plant another crop, so as the years go by it becomes easier to make the basins as one just needs to repair the damaged ones.

Farmers considered CA as being less labour intensive because they did not need to have very big fields in order to have a good harvest, which means less work. They stated that a small piece of land would get them good yields if they were using CA practices. One woman in Kaoma district said: *"You can cultivate a big field on your own because we start making basins in June, easily and slowly, up until it is time to plant".* Farmers also observed that they took about 4 hours to rip an acre but 2 days to plough it. The women farmers in Mumbwa district made the same observation that adopting CA practices was hardest in the first year, particularly when making basins or rip lines. Thereafter, they said it was easier because they used the same basins and lines so you only had to lightly remove the soil and plant seed.

2.1.4 Enhancement of Soil Water Retention

All participants in the FGDs agreed that the enhancement of soil water retention by CA was becoming more and more important especially with the ever declining rainfall amounts received season after season. The farmers are aware that the use of basins and crop residue retention helped in retaining soil moisture. They also noted that the crop residues protected the basins from direct sunlight which in turn prevented evaporation of all moisture from the soils and basins. They observed that crops under CA did better even when there were dry spells as it was evident in the current season. The participants actually hoped that more community members will adopt CA as they have seen the good yields in the face of increasing dry spells. For example, a female farmer in Sinazongwe district noted: *"Crops under ripping do not shrivel like those under conventional farming during dry spells because of moisture retention". A* woman in Katete had this to say: *"... farmers who did not use CA this season are suffering because their crops have withered while ours are looking good. Because of the drought we are experiencing, many actually now want to join CA because they have seen that the crops do better compared to conventional farming."* One non-adopter in the group stated that: *"....am seeing the benefits of CA so I want to start".*

2.1.5 Improvement of Soil Fertility

Practicing CA improves soil fertility first and foremost by preventing soil erosion. A women's group in Sinazongwe district noted that: *"With ripping I only rip where I want to plant rather than digging all over the field. Therefore, when it rains, my soil is not washed away".* Other notable ways in which soil fertility was improved by CA according to the FGD participants was through crop rotation, intercropping and planting soil fertility trees such as *Acacia albida* (Musangu tree).

2.1.6 Better Extension Support

As part of CA promotion farmers are taught various necessary skills including use of herbicides. The FGD participants stated that better understanding of the use of herbicides encouraged more and more farmers to adopt CA and this is enhanced further when the herbicides are easily accessible in the farming areas. Using herbicides (correctly) in weed control is actually more cost effective than manual weeding. A woman in Sinazongwe explained: *"With the herbicides, I spend less money to control weeds compared to what I used to spend under conventional farming. I used to spend up to ZMW 1,000 in employing people to help me with the manual weeding but now I only spend about ZMW 460 on the two herbicides that I use. I spend less time in the field when using herbicides, only 1 day, but manual weeding used to take 2 or more weeks".*

2.1.7 Other Benefits

The communities further reported that CA:

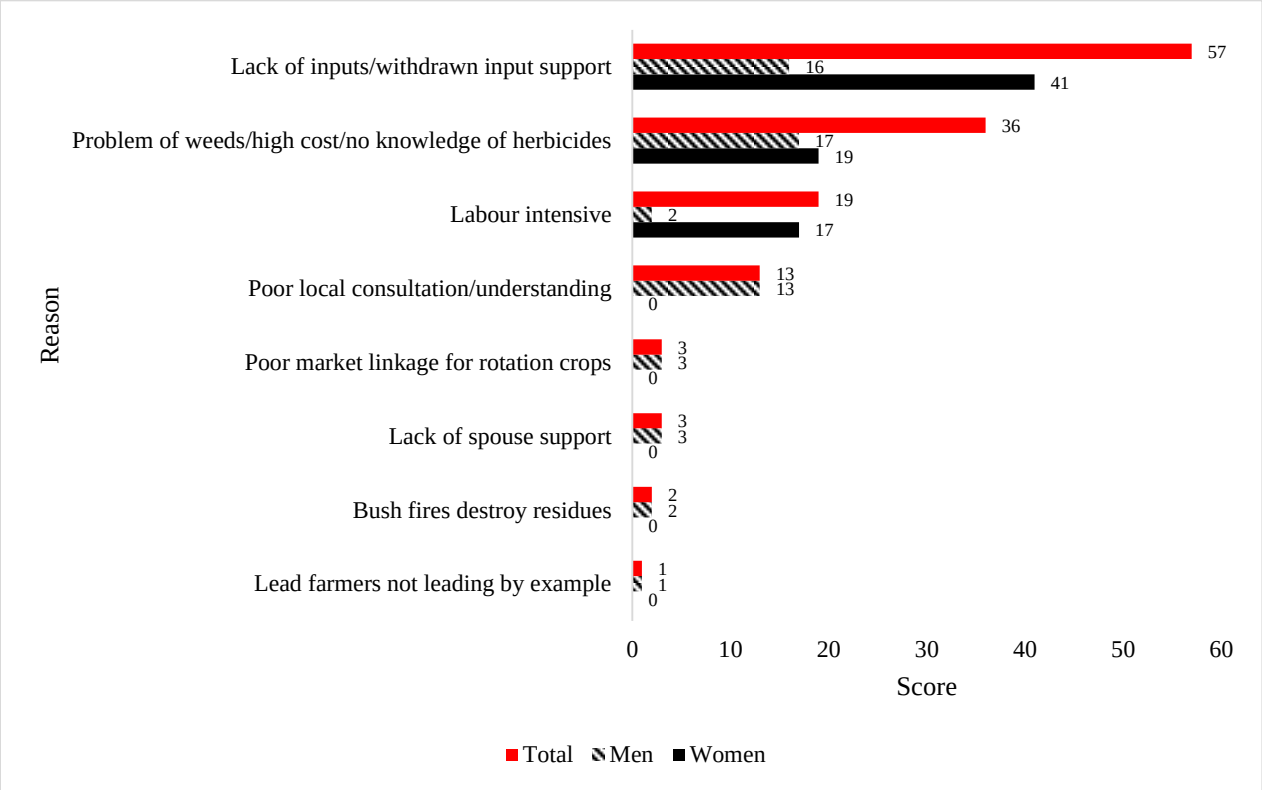
- ✓ *Encourages crop rotation/diversification:* Rotational crops encouraged under CA not only increase soil fertility but have become additional important sources of income such as cotton and cowpeas;
- ✓ *Enhances pest and disease control:* Crop rotation as well as better cultural practices increase pest and disease control;
- ✓ *Facilitates soil hard pan breaking*: Tractors and oxen where available are used for ripping breaking the soil hard pan which otherwise impedes crop root growth and development; and
- ✓ *Enhances equitable responsibilities by gender:* Quite often most CA promotional activities have a gender equity component which enhances the equitable sharing of field responsibilities by gender.

2.2 Key Drivers of Smallholder CA Dis-adoption

The foregoing section clearly shows that smallholder farmers that have been exposed and have adopted CA have seen the benefits. Yet the national overall rates of adoption are still low while dis-adoption is known to be widespread. Therefore FGD participants were asked to bring out and rank using matrix scoring or pairwise ranking what they see as the key reasons that made smallholders dis-adopt CA. Figure 8 shows the summary matrix scoring of these reasons by gender while the scoring by AEZ and gender are shown in Appendix 3.

Figure 8 shows that the main reasons are lack of inputs/withdrawal of input support by projects supporting CA activities, followed by problems with weed control coupled with poor access to herbicides through either lack of knowledge on their use or unavailability or high cost or a combination of any of these, labour intensive, and poor local community understanding of CA project promotional rationale coupled with limited CA project promoters cooperation among themselves. Others are poor market linkages for rotational crops, intra-household differences, bush fires destroying crop residues and some lead farmers not leading by example. Each of these are discussed in turn below using as much as possible real quotes and examples from the field.

Figure 8: Matrix scoring of key drivers to CA dis-adoption by gender



2.2.1 Lack of/Withdrawn Input Support

As alluded to earlier, the fact that projects promoting CA have been associated with providing inputs for these activities have made farmers to erroneously believe that these activities can only be continued with continued distribution of such inputs. This suggests that local consultation as well as community level understanding of the rationale of providing start-up inputs to demonstrate the benefits of CA are generally lost among most farmers. Cases of farmers dis-adopting just because they could not get for example hybrid maize seed are quite common. Yet the principle of CA is that productivity in terms of yield should increase regardless of whether the farmer uses local or hybrid maize seed. In other words, when the farmer cannot access hybrid maize seed and only has local maize, planting this under CA should still result in superior performance compared to conventional farming. The following are some of the examples where farmers dis-adopted from CA just because they were not able to receive CA project inputs and/or they failed to obtain inputs demonstrated in the CA plots (mostly hybrid seed):

1) "*At the beginning inputs were provided to farmers for use after trainings but since that stopped people have lost interest as they do not see the use of being trained when they would not be given what to use afterwards"* was a common explanation of why farmers dis-adopted CA from almost all the districts sampled;
2) A lead farmer in Sinazongwe complained that some farmers wanted to share the inputs they received for demonstrations: *"When I receive seed and fertilizer as a lead farmer, some follower farmers want me to share these with them. But when I tell them that these inputs are only for demonstration purposes so that they can see the difference between CA and conventional farming, they get upset and quit CA group";*
3) Another lead farmer in Sinazongwe lamented: *"After training my 15 follower farmers, they ask me questions like now you have finished teaching us about how to do CA what are you going to give us to use? When I tell them that the training is meant to give them knowledge that will lead to benefits in the future when they adopt CA, they start dropping out of the group saying that they are not benefiting anything". In a certain year, we were given bicycles as lead farmers to aid us in visiting and monitoring our follower farmers. But that did not go well with the follower farmers. They said, look you have been given bicycles but we have not been given anything. We should have been given something also";*
4) One key informant in the same districts noted: *"Under FISRI, we enrolled about 28 farmers, but about 15 dropped out when the project ended since they did not want to start buying the inputs themselves. Some of the farmers complained that some of the lead farmers received bicycles when there was nothing for them. How were they expected to be travelling long distances to the lead farmers to learn CA? They even argued that the bicycles should be parked at the village headman's home for use by everyone";*

5) A Woman in Nyimba district, concerning why people tend to dis-adopt CA, said*: "In the past years when we used to practice CA, we used to find benefits because the promoters of CA used to give us inputs. That way you could even get 2 bags of maize from a small portion of land. But starting from last year we have not found any benefits because we have not been given any seed or fertilizer so people have stopped practicing CA";*
6) Among the farmers in a FGD that stopped practicing CA in Sinazongwe district, a woman had this to say: *"We are sweet-talked to join CA by lead farmers so as to impress the promoters of CA with large membership numbers"*. She explained that the information that was given to her to join the CA group was wrong and misleading as she was promised seed and fertiliser, yet none was given. Furthermore, she has not received any training for the two years she was a member of the group. She further explained that demonstration inputs and any benefits or incentives are only meant for lead farmers which made her mad and withdraw from the CA group;
7) Some farmers have reportedly dis-adopted for not being able to find the recommended inputs especially seed to plant under CA. A man in Sinazongwe district who has been growing maize, soya beans, groundnuts and cowpeas had this to say: ***"****I went to Choma district to look for legume seed only to find that it was out of stock. Our desire is to rotate crops but it is very hard to find seed especially soybeans";* and
8) Some farmers dis-adopted from CA because of lack of implements to use such as the chaka hoes, rippers, etc. while the cost of hiring rippers is prohibitive for some farmers.

2.2.2 Problems with Weeds/Poor Access to Herbicides

Another key finding on why farmers dis-adopt CA is the problem of controlling weeds especially when the farmers are not able to use herbicides. It was reported that to control weeds in a CA field, the farmers have to weed about 3 times. One farmer complained that: *"….the lead farmers usually do not have weed problems because they are given herbicides and spray their fields soon after planting. Other farmers without the chemical have to think of how they are going to clean their fields, toiling while the lead farmers are relaxing at home".* In addition, most farmers cannot afford herbicides and find weed management laborious. Hence most of them choose to dis-adopt because weed infestation under conventional farming is not as bad as under CA farming. Sometimes farmers lack information on the use of herbicides. It was reported that farmers may forget how to dilute the chemicals with disastrous consequences of their crop being scotched when under diluted. Sometimes the herbicides are over diluted and fail to kill the weeds.

2.2.3 Labour Intensive

There was consensus among some FGD participants that there was still a perception of CA being labour intensive, particularly when making hand basins. It was learned that using the chaka hoe which is recommended for making the basins is a challenge for women because it is very heavy compared to a regular hoe. This is more so in areas where the soil structure demands that these basins or rip lines are made every year because they collapse before the following season. In some areas these basins and rip lines are actually destroyed by livestock grazing in the crop residues. One of the female farmers in Sesheke district asked: *"How many times do I have to re-dig the basins with our sandy soils which collapses because it is not firm and the free range livestock move all over the basins?"*

2.1.4 Limited Local Consultation/Understanding

Though it's neither the wish nor mandate of this study to assess the level of local consultation and understanding of the CA promotional projects, the fact that a significant proportion of farmers do not appreciate the rationale of start-up input distribution, distribution of demonstration plot inputs and other benefits to lead farmers among other issues suggests that there is limited local consultation and understanding of these project and/or activities at the local level. This is a very important driver to dis-adoption even if the issue did not rank highly among other issues. At least it was good that some FGDs were able to bring it up.

2.1.5 Other Reasons

- ✓ *Poor market linkages for rotational crops:* Market linkages both on the output and input side tend to spur CA dis-adoption. Farmers practicing CA are expected to grow at least three crops including a legume. Some have reported facing challenges with marketing their legume harvests. For example, a man in Sinazongwe district explained: *"I had a good harvest for soybeans I have had nowhere to sell the crop. I felt like I just wasted my time, effort and resources in planting the crop. When market is available, low prices discourage farmers from growing those crops".*
- ✓ *Lead farmers not leading by example:* A few farmers said that some lead farmers did not lead by example. They said that some of them only had a demonstration plot showing CA practices with the remainder of their fields still under conventional farming. This has discouraged the followers from using CA practices throughout their entire fields because if the lead farmer does not see the need to practice CA in totality, why should the follower do so.
- ✓ *Bush fires destroy residues:* Because of the existing socio-economic practices in some areas, some farmers are not able to practice all the CA practices. One of the women in Mumbwa

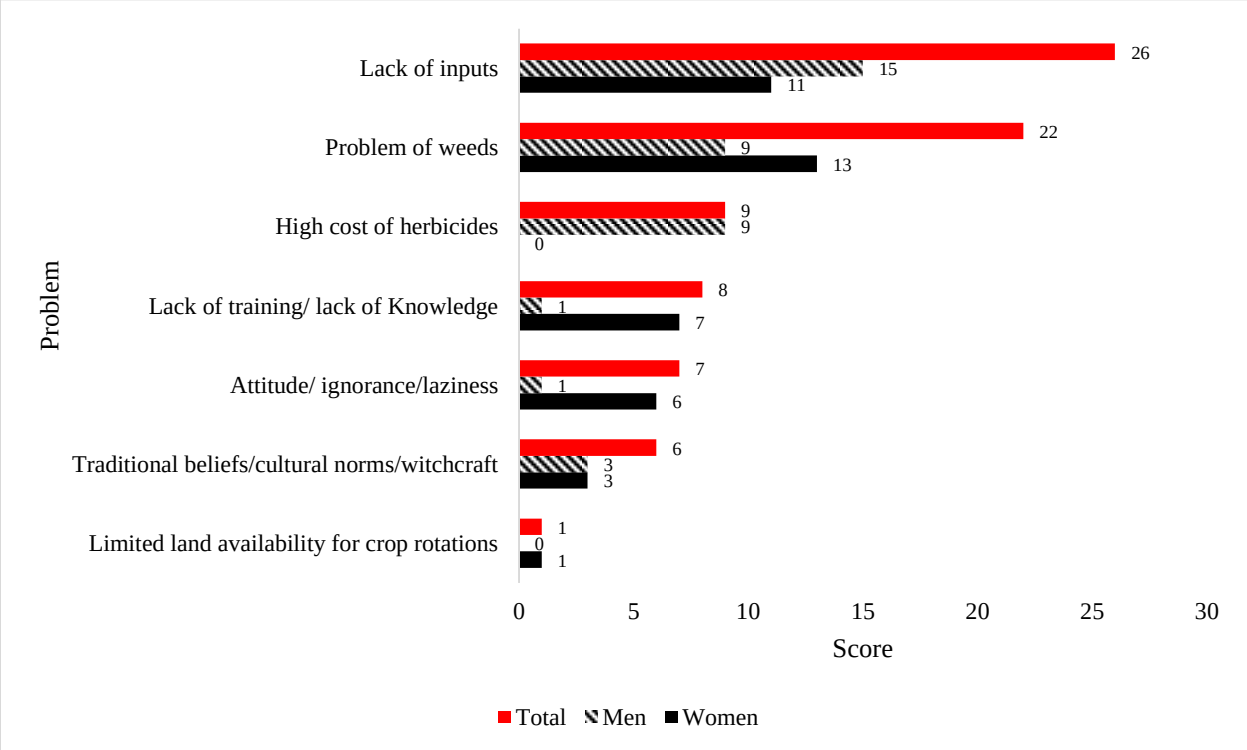
district stated that: *"the people who hunt wild mice are the biggest problem. Even if you retain crop residues in your field, they burn it in search of the mice".*

- ✓ *Lack of spouse support:* The issue of spousal support was especially noted by the men saying engaging in CA was a source of tension because if one spouse used conventional methods and the other used CA, there was no way of reaching a compromise with which fields to use. They said it was issues such as these that led to some people dis-adopting because they wanted peace in their homes.

2.3 Key Drivers of Smallholder CA Non-Adoption

As was the case with reasons for CA dis-adoption, FGD participants were asked to bring out and rank the key reasons why some smallholder farmers did not adopt CA despite its many advantages over conventional farming. The matrix scoring of these reasons by AEZ and gender is presented in Appendix 4 while the summary by gender only is shown in Figure 9. The main reasons are lack of inputs, problems with weed control, high cost of herbicides, lack of training and hence lack of knowledge, poor attitude traditional beliefs/cultural norms, and limited land availability for crop rotations. These are discussed in turn focusing mostly on quotes and examples that were obtained during the FGDs.

Figure 9: Matrix scoring of key drivers to CA non-adoption by gender



2.3.1 Lack of Inputs

One of the main reasons for the low CA adoption rates is that CA promotional activities by projects and programmes rarely spill over to farmers who are not directly involved in the programmes because most farmers have developed a dependency syndrome to only adopt when they are provided with inputs. Those farmers given inputs are the ones who are mostly practicing CA. Farmers also wrongly believe that only inputs provided or recommended by the CA promotional programmes are the ones to use in CA. For example, farmers who see the benefits of CA could still adopt the practice with local seed if they cannot access hybrid seed.

It was also reported that some farmers believe that the high yields of CA adopters like under CASU are due to the use of fertiliser which the non-adopters cannot access and not due to the practice itself.

2.3.2 Problems of Weed Control

The increased weed control problem under CA when there is no herbicide use has already been discussed. This also discourages some farmers to adopt CA especially when they lack information on the use of herbicides. It was further reported that the untrained farmers do not even clearly understand how herbicides work and fear that their residues may damage the soil. A male farmer in Sinazongwe district typified this lack of knowledge by saying: *"People say with these ripping lines you are making, the seedlings will not be deep rooted in the soil and your crops will die. And these herbicides you are using they damage the soil".*

2.3.3 Poor Access to Herbicides

Some farmers who appreciate the usefulness of the herbicides may not have access to them on account of actual availability and/or high cost. A male participant from Sinazongwe district had the following to say: "*The herbicides are sometimes not found in the shops. When I go to Choma, the recommended herbicides are usually not in supply and only one type is found. You find that within the first week of the onset of rains before we even prepare to plant, the weeds start growing and by then we do not have herbicides in stock. Therefore, we just resort to using a plough in order to remove the weeds."* Furthermore, the FGD participants also explained that in as much as they would like to adopt CA, some herbicides for the rotation crops like cowpeas were difficult to find.

2.3.4 Lack of Information or Knowledge

It was clear from all the FGDs that farmers generally lack the knowledge that CA is superior to conventional farming whatever inputs the farmers were able to access and use. One woman in Petauke district said: *"…. I have seen around that people are doing well with CA and I also want to try it. But the problem is that I only have local maize".* Another woman in same district said: *".....So if I start CA what am I going to put in there? The promoters of CA told us that only a few can participate because inputs are limited."*

2.3.5 Traditional beliefs/cultural norms:

It was learned, also, during the FGDs that adoption of CA is also influenced by people's traditional or cultural beliefs. One of the examples given was that of traditional leader in Sesheke who did not participate in CA activities saying it was not proper for him, as an *induna*, to learn from the field of lead farmer who is a subordinate. In some cases, adherence to the traditional agricultural practices which farmers learned from their forefathers through their parents is another reason for resistance to change to CA. One woman in Mumbwa district stated: *"My parents taught me how to farm so there is no reason why I should try something else because this works".* Another woman in Katete district said: *"... What kind of lessons are these. How have we been farming since time immemorial?"*

Some community members believe that the farmers who are doing well in terms of yield are practicing witchcraft. One woman in Katete said: *"... we both planted at the same time but how come they have good maize." "....It can only be witchcraft".*

2.3.6 Other Problems

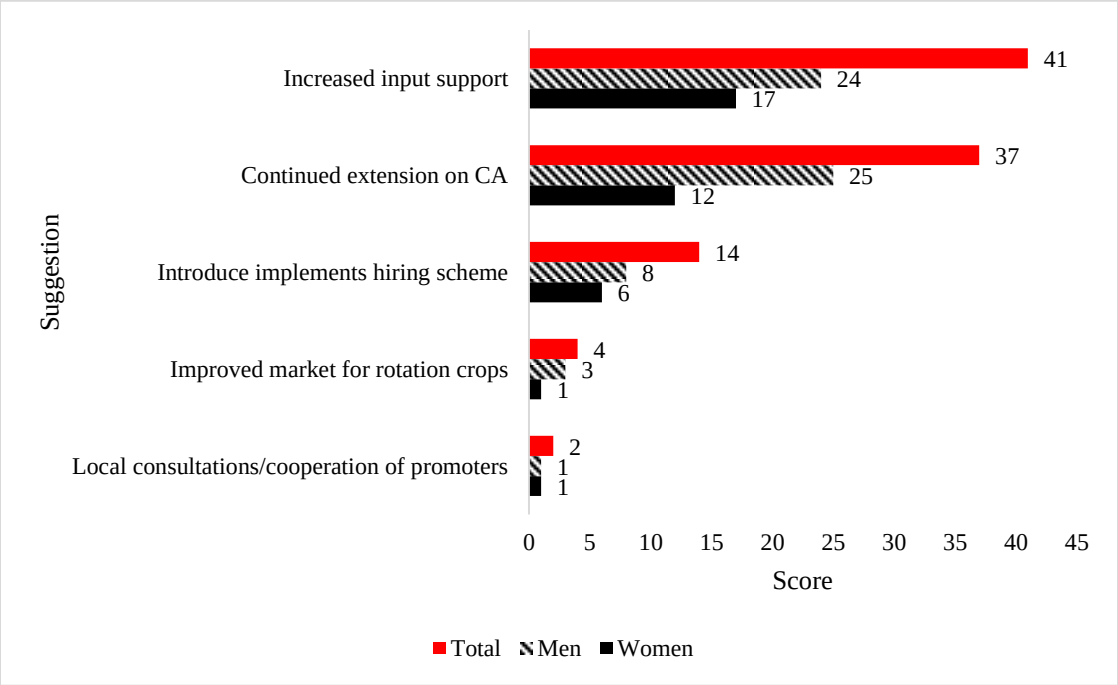
- ✓ *Attitude/ ignorance/laziness:* For farmers that do not own cattle or tractors, the only minimum tillage method option available to them is planting basins. However, some farmers feel lazy to do the basins. Use of basins is perceived as difficult and most farmers are reluctant to use the practice. Someone even suggested that if you could make the basins after the rains had started then it would not be as labour intensive. But then another woman in the group said that for you to practice CA correctly you need to do it when the land is hard: *"…so that you remove the hardness that is there."*
- ✓ *Limited land availability for crop rotations:* FGD participants also alluded to land constraints that most farmers face which makes it difficult for them to practice crop rotation which is a requirement when practicing CA.

2.4 Suggestions on Ways to Increase Smallholder CA Adoption

Having discussed key benefits accruing from CA adoption as well as key reasons for its dis- and non-adoption, FGD participants were asked to bring out and rank key suggestions that they thought would enhance CA adoption in their communities. The matrix scoring of these suggestions by AEZ and gender is presented in Appendix 5 but a summary by gender is shown in Figure 10.

The most important suggestion to increase CA adoption was increased input support followed by increased extension on CA, increased facilitation of local level CA equipment hiring, increased market facilitation of market linkages for rotation crops (especially legumes), and increased local consultation and cooperation among CA promoters.

Figure 10: Matrix scoring of suggested ways to improve CA adoption by gender



2.4.1 Increased Input Support

Farmers still believe that increased input support preferably in line with original CA promotional activities/programmes would help enhance CA adoption. However, it is our considered view that this problem is not peculiar to CA but cuts across all farming endeavours among smallholder farmers in Zambia. The problem is actually twofold: First is the actual availability for which there is need to increase in some parts of the country. Second is the issue of affordability for which input programmes such as the electronic voucher of the Farmer Input Support Programme (FISP) and other programmes targeting vulnerable but viable farmers can help address.

2.4.2 Increased Extension on CA

In addition to increased input support, farmers feel that there is still a lot to be done terms of training on CA especially reaching those farmers that have not yet participated in CA promotional activities. It is cardinal that this training demonstrates that CA is superior to conventional farming whatever inputs that a farmer uses (e.g. hybrid vs local maize seed). It is also important that this training focuses on herbicide use including its handling to enhance safety to the user and the environment, not forgetting forging linkages to agro-dealers supplying the chemicals, sometimes on agreed terms.

2.4.3 Increased Facilitation of Local CA Implement Hiring

Similar to input support, availability of equipment hiring facilities in the communities need to be increased through the development of local agro-businesses or entrepreneurs. Programmes supporting local based farm equipment hiring facilities need to include equipment that is used for CA such as rippers.

2.4.4 Increased Facilitation of Market Linkages for Rotation Crops

This is also not peculiar to CA but the whole farming spectrum. In order to help in this regard, training in this regard should include training in marketing and/or farming as a business in order to equip the farmers with the much needed input sourcing output market seeking skills.

2.4.5 Increased Local Consultation and Cooperation of CA Promoters

It is important that farmers feel that local consultation and cooperation between CA promoters and the communities as well as among the promoters themselves need to be increased in order to increase CA adoption. The local communities need to understand from the onset the rationale of the CA promotional programmes and what is expected of the promoters, lead and follower farmers. This in order to put community expectations of benefits from the programme in its proper perspective and avid a crisis of expectation later on. Preferably this consultation and understanding should from the onset be sought from all community members and not only selected programme participants.

3.0 CONCLUSIONS AND RECOMMENDATIONS

This assessment has shown that CA adoption in communities where it has been promoted has steadily increased over the years since the 1990s with the rate of increase at least tripping since the period 2006-2010. The benefits of CA adoption have been significantly felt in the farming communities. The most important of these benefits has been the increase in crop productivity especially in seasons characterised by dry spells due to increased soil moisture retention capacity. However, serious issues impede broad-based adoption of CA among smallholder farmers in Zambia. These issues can be characterised as institutional, technical, market access, and socio-cultural issues.

a) Institutional issues

Without discrediting the various CA promotional programmes that have been operating in the country, findings of this assessment suggest that local consultation and understanding on the purpose, rationale, modus operandi and period of the programme as well as expected inputs and benefits of all stakeholders like government extension workers, lead farmers, follower farmers and even traditional leaders need to be clear in order to avoid a crisis of expectation of benefits. These consultations need to involve all community members and should be restricted to those selected to participate in the programme, and in need assistance of local traditional leaders could be sought to enhance this cooperation with regard to the aims and objectives of the programme and what is expected of community members after the programme ends. Where inputs are distributed as part of CA promotional activities, it is important that current and potential beneficiaries understand the reasoning behind this and that this will not continue forever.

In Zambia, the best institutional arrangement that can facilitate broad-based adoption of CA among smallholder farmers is the Ministry of Agriculture (MoA) extension service, provided sufficient operational funds are available for training of field extension workers as well as their field operations. Conservation agriculture would need to be adopted as the primary extension message of the ministry at all levels including national, provincial, district and sub-district levels such that other trainings and/or extension messages were supporting this primary objective of increased productivity in the face of climate change manifested mostly as declining season rainfall amounts and poor rainfall distribution. Depending on the field extension worker-farmer ratio, committed lead farmers could be selected and trained to be an interface between the extension worker and the farmers. In this case, the lead farmers would need to ably explain, not only the technical aspects of CA, but the objectives of the intervention, its duration and what is expected of the farmers and what benefits they can expect.

b) Technical issues

This assessment has also established that one of the key technical issues impeding the increased adoption of CA is the problems of weed control. Again, without discrediting organisations that have been promoting CA, our findings suggest that considerable time, effort and resources will

need to be devoted to training farmers on the proper use of herbicides including dispelling a number of misguided beliefs such as it being detrimental to the soil. The private sector when involved would be willing to contribute towards this noble cause as they would demonstrate the use of their products through local representatives (agro-dealers) who would then go on to sell the products on their behalf. Sometimes these private companies even promote local entrepreneurs who could be spraying other farmers' field at a fee.

Another training aspect that would need to be emphasised is that CA is superior to conventional farming whatever inputs farmers use. This is in order to avoid a situation where farmers switch back to conventional farming when they fail to access improved seed, say hybrid maize, especially when the promotional activities come to an end or when the particular farmer is weaned from free input distribution.

c) Market access issues

The issue of smallholder farmer access to input and output markets is not peculiar to CA promotion but cuts across the whole spectrum of farming. It is recommended that marketing or farming as a business be one of the main topics that are trained together CA techniques. Community members who can such as lead farmers or agro-dealers or assemblers should be encouraged to become local agents of main input and output market providers.

d) Socio-cultural issues

With the involvement of local traditional leaders, area specific socio-cultural issues should also be tackled during CA training so that they do not impede its broad-based adoption.

APPENDICES

Appendix 1: Qualitative Assessment Guide (Tools)

Instructions to facilitators: After a round of introductions from both yourself and the participants (different groups of men and women) explain the purpose of the visit using the background below. Remember, this is a qualitative assessment and there it is important that you capture key **quotes and examples** as well as **case studies** as the focus group discussion is going on. In certain cases you will be required to conduct matrix scoring and/or pairwise ranking the results of which you should record, but, keep in mind that these merely tools meant to assist you with collecting information. Therefore the discussion going on while the participants are scoring/ranking is even more important than the scores/ranks themselves. When asking the participants for reasons and/or benefits think outside the box, that is, prompt for technical, economic, social, cultural and environmental issues as well which the might be existing but the participants may feel are not important to you. Furthermore, you are encouraged to look out for the unexpected from your direct observations as well as what the participants say and adequately follow these leads to enrich the information you will collect.

6) Background

- ✓ Conservation agriculture (CA) consists of a package of farming practices based on three main principles namely: 1) minimum mechanical soil disturbance; 2) permanent organic soil cover; and 3) crop rotation.
- ✓ CA has been actively promoted among smallholders in most of parts of Zambia since the mid 1990's in the form of conservation farming (CF) that included precise digging of permanent planting basins and dry season land preparation to the above-mentioned core elements.
- ✓ Despite nearly two decades of promotion and evidence of yield benefits associated with conservation agriculture in Zambia, adoption rates by smallholder farmers remain low, while dis-adoption is widespread.
- ✓ CA has potential to improve crop productivity, improve soil fertility, and mitigate against low and/or variable rainfall.
- ✓ Given these potential benefits, agricultural development stakeholders (Government, NGOs, donors, etc.) need to have a greater empirical understanding of the underlying reasons for CA adoption, dis-adoption and non-adoption in Zambia in order to chart a better way forward.
- ✓ This discussion with you today is part of wider effort to understand these issues better. Your community/village has been selected to represent other villages as it is not possible to visit all the villages. Therefore, you would be doing a good service to the whole farming sector in Zambia by being open and truthful in this discussion giving us as much information as you can so that together we can chart a better and sustainable way forward.

7) General trends in CA adoption and dis-adoption and non-adoption at community level

- ✓ Explain that we would like to know in general terms the trends in the use of CA by farmers in this area starting from the 1990s to now. Draw a table on a flip chart as shown below, put a heap of 50 stones or beans in the middle and ask the participants through a volunteer to distribute the stones/beans across the periods, putting more stones/beans in the periods where more farmers practiced CA and relatively less where less farmers did so. Encourage the group to discuss as they distribute the stones/beans. Take note of important issues being mentioned especially pertaining to CA promotion (when by who what activities), adoption, dis-adoption and non-adoption.

1990-2000	2001-2005	2006-2010	2010-2015

- ✓ After the stones/beans have been distributed, count the number in each box and record it. Interpret the meaning of the numbers in each box (more farmers practiced CA where that number is larger and vice versa) and let them change the numbers if they want to until they agree the numbers are correct.
- ✓ For changes in the numbers across the periods, ask what happened, why, what were the consequences, etc. paying attention to socio-cultural as well as technical and economic issues noting down interesting quotes and examples.

8) Trends in specific adoption, dis-adoption and non-adoption of CA practices

- ✓ From the discussion above, list the CA practices that have been practiced in the community and ask who among the participants:
    - Have at least used that practice and record the number;
    - Are still using the practice and record the number; and
    - Have never used the practice and record the number.
- ✓ Remember to take note of interesting things being discussed as this is going on (quotes and examples, socio-cultural as well as economic and technical issues)

9) Key benefits of adopting different CA practices

- ✓ Explain to the participants that CA practices are being adopted by different farmers because of the different good things or benefits or advantages that they see in them;
- ✓ For each CA practice, going one practice at time:
    - Ask the participants to list the different benefits over conventional farming *(in the same category e.g. ploughing with oxen and ripping using oxen, conventional hand hoeing and hand basins, tractor ploughing and tractor ripping)* that they have seen or heard about the practice;
    - Do a pair-wise ranking of these;

- Reflect the results of the pair-wise ranking to the participants and ask them for their concurrence; and
- During the whole exercise, take note of what they say (quotes and examples, etc.).

10) Key reasons for of non-adoption or dis-adoption different CA practices

- ✓ Explain to the participants that CA practices are not being adopted or dis-adopted by different farmers because of the different issues that these farmers see in using these practices;
- ✓ For each CA practice, going one practice at time:
  - Ask the participants to list the different problems (compared to conventional farming) that they have seen or heard about the practice *(in the same category e.g. ploughing with oxen and ripping using oxen, conventional hand hoeing and hand basins, tractor ploughing and tractor ripping);*
  - Do a pair-wise ranking of these;
  - Reflect the results of the pair-wise ranking to the participants and ask them for their concurrence;
  - During the whole exercise, take note of what they say (quotes and examples, etc.).

11) What can be done to achieve sustained adoption different CA practices

- ✓ Explain to the participants that CA practices have technically been proved to improve crop yields and general productivity especially in the face of uncertain weather patterns that are becoming prevalent and that it's imperative that these practices are broadly adopted for sustainable agricultural development and rural income growth. To achieve this, the various issues/problems will need to be tackled in order to move the practices forward.
- ✓ For each CA practice, going one practice at time:
  - Ask the participants to list what needs to be done in order to sustainably increase adoption of the CA practice;
  - Do a pair-wise ranking of these;
  - Reflect the results of the pair-wise ranking to the participants and ask them for their concurrence;
  - During the whole exercise, take note of what they say (quotes and examples, etc.).

12) Concluding remarks

- ✓ As you come to the end of the discussion, ask the participants for any questions or additional comments on the issues that were discussed;
- ✓ When no further issues are coming out:
  - Thank the participants for their time and especially the information shared;
  - Assure them the information will be anonymously used on behalf of other farming communities to help move CA forward; and

- Inform them, you will now go back and synthesise the information you have obtained from them together with that from other communities/villages to make a summary of key issues and what needs to be done to increase CA adoption in the country:
- This information will be used by Government, NGOs, donors, etc. as they design programmes to help increase their agricultural activities and consequently livelihoods.

Appendix 2: Matrix Scoring of Key Benefits from Practising CA by AEZ and Gender

Benefit	Total score by gender and ecological zone								Overall
	Women				Men				
	AEZ I	AEZ IIA	AEZ IIB	Total	AEZ I	AEZ IIA	AEZ IIB	Total	
High yields	12	32	6	50	7	19	6	32	82
Promotes timely field practices	2	28	3	33	3	19	4	26	49
Better soil water retention	6	20	3	29	4	10	1	15	44
Improvement of soil fertility	2	4	1	7	2	3	4	9	16
Pest and disease control	0	0	0	0	2	4	2	8	8
Encourages crop rotation/diversification	0	2	0	2	3	3	0	6	8
Better extension support	0	2	0	2	0	7	0	7	9
Hard pan breaking	0	0	0	0	2	0	0	2	2
Equitable responsibilities by gender	0	1	0	1	0	0	0	0	1

Appendix 3: Matrix Scoring of Key Reasons for CA Dis-Adoption by AEZ and Gender

	Score by gender and AEZ								
	Women				Men				
Problem	**AEZ I**	**AEZ IIA**	**AEZ IIB**	**Total**	**AEZ I**	**AEZ IIA**	**AEZ IIB**	**Total**	**Overall**
Problem of weeds/high cost/no knowledge of herbicides	10	9	0	19	7	10	0	17	36
Lack of inputs	8	8	4	20	4	4	3	11	31
Withdrawn inputs benefits	10	11	0	21	1	4	0	5	26
Labour intensive	1	11	1	13	0	2	0	2	15
Poor local consultation/understanding	0	0	0	0	5	5	3	13	13
Lack of spouse support	0	0	0	0	0	0	3	3	3
Poor market linkage for rotation crops	0	0	0	0	1	2	0	3	3
Inappropriate soil/terrain	0	2	0	2	0	0	0	0	2
Destruction by livestock	1	1	0	2	0	0	0	0	2
Bush fires destroy residues	0	0	0	0	0	2	0	2	2
Lead farmers not leading by example	0	0	0	0	0	0	1	1	1

Appendix 4: Matrix Scoring of Key Reasons for CA Non-Adoption by AEZ and Gender

Problem	Score by gender and AEZ								Overall
	Women				Men				
	AEZ I	AEZ IIA	AEZ IIB	Total	AEZ I	AEZ IIA	AEZ IIB	Total	
Lack of inputs	4	7	0	11	4	10	1	15	26
Problem of weeds	4	9	0	13	3	6	0	9	22
High cost of herbicides	0	0	0	0	3	6	0	9	9
Lack of training/ lack of Knowledge	4	2	1	7	0	0	1	1	8
Attitude/ ignorance/laziness	4	2	0	6	0	1	0	1	7
Traditional beliefs/cultural norms/witchcraft	0	1	2	3	0	0	3	3	6
Limited land availability for crop rotations	1	0	0	1	0	0	0	0	1

Appendix 5: Matrix Scoring of Suggestions to Improve CA Adoption by AEZ and Gender

Suggestion	Score by gender and AEZ								Overall
	Women				Men				
	AEZ I	AEZ IIA	AEZ IIB	Total	AEZ I	AEZ IIA	AEZ IIB	Total	
Increased input support	5	10	2	17	7	12	3	24	41
Continued extension on CA	5	6	1	12	9	13	3	25	37
Introduce implements hiring scheme	4	2	0	6	4	4	0	8	14
Improved market for rotation crops	0	1	0	1	3	0	0	3	4
Local consultations/cooperation of promoters	0	1	0	1	1	0	0	1	2