

ANNEX 3

FISRI BENEFICIARY ASSESSMENT REPORT

Farmer Input Support Response Initiative (FISRI)

Beneficiary Assessment Report on Capacity Building for CA:

Expansion of the Farmer Input Support Response Initiative
(FISRI) to Rising Prices of Agricultural Commodities in
Zambia

Mukelabai NDIYOI

Mick MWALA

Shinga MUPINDU

Sepo Marongwe

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FARMER INPUT SUPPORT RESPONSE INITIATIVE (FISRI)

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List of Acronyms

| | |
|-------|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| BEO | Block Extension Officer |
| CA | Conservation Agriculture |
| CA/F | Conservation Agriculture or Conservation Farming |
| CAC | Camp Advisory Committees |
| CAP | Conservation Agriculture Programme |
| CASAD | Conservation Agriculture for Sustainable Agricultural Development |
| CASPP | Conservation Agriculture Scaling Up for increased Productivity and Production |
| CEO | Camp Extension Officer |
| CF | Conservation Farming |
| CFU | Conservation Farming Unit |
| DACO | District Agricultural Coordinator |
| EUFF | European Union Food Facility (EUFF) |
| FAO | Food and Agriculture Organization of the United Nations |
| FF/PF | Follower farmer or Participating farmer. Interchangeable |
| FFS | Farmer Field School |
| FHH | Female Headed Household |
| FGD | Focus Group Discussion |
| FISP | Farm Input Support Programme |
| FISRI | Farmer Input Support Response Initiative |
| GART | Golden Valley Agricultural Research Trust |
| HIV | Human Immunodeficiency Virus |
| LF | Lead Farmer |
| MACO | Ministry of Agriculture and Cooperatives |
| MAL | Ministry of Agriculture and Livestock |
| MHH | Male Headed Household |
| MSP | Mechanization Service Provider |
| NGO | Non Governmental Organization |
| PF | Participating Farmer |
| SAO | Senior Agricultural Officer |
| SMS | Subject matter specialists |
| ZCAA | Zambia CA Association |
| ZNFU | Zambia National Farmers Union |

Acknowledgements

The following report represents the views of the independent assessment mission on the performance and achievements of the FISRI Project. The report assesses to what extent the Project has contributed to the promotion of capacity building for continued support to CA promotion and food security in the farming communities of target areas

The Beneficiary Assessment mission is most appreciative of the efforts made by the staff and management of FISRI and Extension officers in each district from the DACO to the camp extension officers. We are also appreciative of a range of other individuals who provided information and discussed issues in a frank and constructive manner. The beneficiaries always gave a warm welcome to the mission and provided valuable insights into project activities. Through the Director of Agriculture we would like to thank MAL Extension staff and the CA Core Teams and partners of the project especially the camp officers in Chibombo, Kapiri Mposhi, Mumbwa, Mpongwe, Chipata, Petauke, Chongwe, Kalomo, Monze, Sinazongwe, and Kaoma. The staff of FAO Project Team it possible to construct the list of districts and availed reports within their reach. Without their input, the assignment would have been near impossible.

The Beneficiary Assessment Mission

Mukelabai NDIYOI, Mick MWALA, Shinga MUPINDU, and Sepo MARONGWE.

Summary

Beneficiary Assessment Evaluation of “Expansion of the Farmer Input Support Response Initiative (FISRI) to Rising Prices of Agricultural Commodities in Zambia”

1. The study was an input into the final evaluation of the FISRI and was meant to provide information at beneficiary level regarding the structures constructed to service the target farmers and how such were supported to deliver the services now and into the future.
2. A team of four consultants¹ undertook the study of “Beneficiary Assessment of FISRI” in the period 14 March 23 April 2012. The field visit was concentrated in the 11 districts namely Chibombo, Kapiiri Mposhi, Mumbwa, Mpongwe, Chipata, Petauke, Chongwe, Kalomo, Monze, Sinazongwe, and Kaoma. The districts were chosen on the basis of length of period they have been with the project, the agro-ecological regions of the country and the accessibility. Data used in the evaluation exercise were obtained through a participatory rural appraisal in selected project communities, complimented with records from the FAO project team and the district project offices
3. The camps within districts were randomly selected from the camp officers available at the district. Lead Farmers in selected camps were brought to a central place for focus group interviews. Three were selected for follow-up case studies. The Follower Farmers under one of the Lead Farmers were interviewed in a focus group at camp level. At most three of the follower farmers were visited to observe their field and interview them individually.
4. The FISRI project set out to improve food security at household level of farmers in the rural Zambia. To enhance this, the project selected agricultural production practices that had proven track record of increasing productivity and thus contribute to increased production. Against a background of long research on production practices in Zambia Conservation Agriculture technologies were identified and promoted. The specific practices that constituted the Best Agricultural Practices in CA were guided by three key principles: (i) Minimum soil disturbance, (ii) Crop residue management, (iii) Crop rotations.
5. Most of the beneficiaries have been involved in FISRI and the best practices for 3 years starting in 2009. Some districts came on board in 2010 and 2011. Both men and women were talked to during the study and women comprised 34% of respondents. Over the project period, the area under CA was 34% overall. Demonstration plots were used in the extension of CA among the beneficiaries. The demos were established by camp extension officers and by lead farmers.
6. However, the quality of the demonstrations compromised the message that was intended and may have led to the number of follower farmers being often less than the 15 that each lead

¹ Mr. Mukelabai Ndiyo Farming Systems Expert, Dr Mick Mwala, (Capacity building), Shinga Mupindo (Gender), Sepo Marongwe (Conservation Agriculture).

farmer was meant to have. The ultimate beneficiary of the FISRI is the follower farmer but the project has limited documentation of this beneficiary. This results from equating beneficiary to receiving vouchers.

7. Minimum Tillage and Crop Rotations were the two key CA principles that were practiced while mulching was almost absent. There was evidence of the knowledge of the reasons behind the practice of CA, although farmers could not isolate the CA concept from the regular good agronomic practices that are enhanced through practicing CA.
8. The management practices like weeding and plant population have direct impact on maize yields. A low plant population encourages weed growth and leads to decline in yield and increased expenditure on weed control. Herbicides have the advantage of killing the weeds before the crop emerges. The crop has potential to grow in a weed free environment thereby improving productivity. A lot more farmers have bought herbicides for cash. The vouchers have induced an interest in herbicides far beyond expectations. The weed management strategies used in the project have focused exclusively on the use of herbicides and manual weeding, leaving out other approaches. A more integrated approach could have been used to avoid over-reliance on herbicides and to provide alternatives for those farmers who cannot afford the herbicides.
9. The *extension model used was the Lead Farmer*. This model adds a layer of community extension workers called the lead farmer below the Camp officer. The camp officer interfaces with the ultimate target, the participating farmer, through the Lead Farmer. The appreciation of the role and responsibilities of the CEO was mixed. For example, the application of the voucher received by the camp officers varied between camps. This ambiguity about the role of the voucher is reflected in the quality of the demonstrations at their camps which, were not configured to cater for large number of visitors.
10. The performance of the lead farmer approach calls for closer scrutiny. There is a growing discontent between the lead and follower farmers, a consequence of vouchers received by lead and not follower farmers. The FISP and FISRI could be better synchronized so that follower farmers receive FISP inputs as is the case in some district. Given the discord between the lead farmer and the follower farmers, a careful examination is required to establish where the benefits of the e-voucher for lead farmer falls. If the benefits are the heightened appreciation of CA leading to adoption onto the full field, and the corresponding despondence of the follower farmer, then a system of rotation or graduation of the lead farmers is strongly recommended. In view of such a scenario, use of farmer field school in the project could enhance the learning for the lead farmers and also provide permanent CA fields that will provide long term data for CA development and adaptation and also provide evidence for best agriculture practices.
11. *Follower Farmers* are essentially “club members” without benefits. The project is seen as a source of support for members. There is a growing division between lead and follower farmers

because of this apparent exclusion from the perceived benefits of the project. The district extension has explained that the Lead Farmer demo is for all follower farmers to learn from.

12. The expansion or replication pathway for the lead farmer model of extension has stalled. The discord between the lead farmer and follower farmer is palpable. New camps on to which the programme has expanded do not have follower farmers due to the conflict over e-vouchers and bicycles which lead farmers have and follower farmers do not. Overall, the number of follower farmers is lower than planned as often only 8 out of the 15 are actively or purposively involved in the project activities. In this regards, the e-voucher does not sit well with the lead farmer concept and may be an obstacle to the linkages between the Lead Farmer and the follower farmer, quite the opposite of what it was meant to be.
13. Agro-dealers and the e-voucher scheme have given rise to an emerging competition amongst agro-dealers which is contributing to an environment of fair prices for farm the inputs. Despite this positive development, there are concerns about reported differences in prices between voucher and non-voucher shops during the voucher season.
14. E-vouchers have greatly facilitated access to inputs and CA implements thereby making it possible for farmers to experience the application of CA at scale. The vouchers have also stimulated the agro-dealers to increase their network and grow their business thereby bringing inputs closer to the farmers. The e-voucher was cost effective compared to the project distributing the inputs directly.
15. *Conservation agriculture mechanization pilot* was key to up scaling of CA. Mechanization in conjunction with herbicides has changed the way constraints are viewed on smallholder farms. If we are going to promote mechanization, we ought to do so at scale. The first season with 10 tractors has demonstrated that the demand far outstrips supply and that queuing up for the service resulted in some reverting to conventional farming. We recommend that the number of tractors in the district be increased while the operators remain profitable.
16. The introduction of mechanization has usually resulted in advantages such as (a) - The average area under cultivation increasing dramatically, (b) - Average total production of maize among oxen owners doubling. As in the beginning of mechanization in 1900, there have not been enough oxen for every farmer even in cattle owning regions of the country. Late planting was experienced this year due to waiting for the tractor or other mechanization options. The use of the chaka hoe for basin making has come up against the constraint of the hoe in general which “oxenization” programmes have been trying to solve since the 20th Century. FISRI is one in line of projects that are promoting faster, larger and earlier land preparation. Planting basins may be earlier but they are not faster or lighter on the practitioner. The tractor drawn ripper and planter improve upon the ox-drawn implements. This stage, however, is accessible largely by hire, leaving the control of time in the hands of the operator exposing the farmer to late planting, constraint first addressed by making basins.

17. The per capita availability of Farm Implements such as a ripper or plough is still at the same or lower rate as in the 1980s or from the time the plough became part of smallholder agriculture in Zambia. In the interim, before all farmers own their own draft power or can afford to hire, we shall experience delays in crop establishment. The solution in the interim is the chaka hoe until such time that the per capita income rises to permit independence in draft power.
18. Project M&E system in place was not able to avail sufficient data and information from the farmer to the national level. The new methods of land preparation have not been well studied on farm yet the data reaching the headquarters does not attend to variables that may permit understanding the contribution of these new methods to productivity. Given that FISRI is promoting new methods of planting, it is an omission that no data is available on plant population density. As farmers still plant large tracts under conventional ploughing practices, the above should also be collected on plots not under CA.
19. A major opportunity was missed to establish meaningful CA best-practice demonstration effect and a foundation for on-going research (through GART, ZARI) as a result of delayed and/or ineffective M&E and data collection/analysis. In most of the FISRI documentation, it is implicitly assumed that the Senior Agricultural Officer's (SAOs) office is able to employ complete enumeration. However, this is not possible and we may be getting far less information than we would if a statistically valid sample were taken. Much effort should be expended to achieve acceptable sample surveys so that conclusions from such surveys may be accepted with a known degree of reliability. Because it is costly and practically impossible to attain 100% enumeration of all households in the district, sampling should be an important component of the FISRI monitoring system. The sampling process should recognize and take into account inherent variations in farming systems and agro-ecological conditions. The exact stratification scheme is likely to differ from district to district, depending on each district's specific characteristics. Data should be available at the smallest unit, which in FISRI is the sub-plot of the participating farmer, the lead-farmer, and the camp officer. This is a rare opportunity to collect rich data at the farm level which can contribute to CA research and progression.
20. Capacity building was meant to enable the extension system from the headquarters in Lusaka to the lead farmer to function to support the promotion of CA now and in the future. Depending on the level in the chain, Capacity Building; training conducted at all levels was taking place outside a documented plan. Expression of the knowledge acquired was difficult to discern at follower farmer level due to limited access to inputs. The type of training received by the beneficiaries appears to be activity-based and thus resulting in the farmers lacking in appreciation of the full CA concept. This may be a result of the absence of a comprehensive training guideline on CA, which meant that trainers focused only on specific activities that were relevant at any given time during the season. Regular monitoring of the training could have allowed the trainers to make adjustments to the training to fit the demand.

21. Food Security issues are not comprehensively addressed in the project design. The project design is focused on food production and availability however other important food security components such as food storage, nutrition, food safety, food conservation, food consumption and value addition have not been covered.
22. FISRI has contributed towards attaining of some strategic and practical gender needs of women. Gender mainstreaming was however, not systematically incorporated in the project design, implementation, monitoring and evaluation processes. There were no gender outcomes and indicators that were defined, no gender analysis were carried out prior to formulating the different phases of the project. There are no clear staff gender mainstreaming responsibilities and accountability systems. CA capacity building for extension staff has been focused at technical issues at the exclusion of social and gender sensitive issues. There was differential utilization, access and control of mechanization and herbicide spraying for women and men.

Recommendations

1. To improve monitoring and evaluation, the people who collect data must have the use for it. It is unlikely that data will be collected if the capacity or the need to use it does not exist. Until recently, there was no single person designated to lead Monitoring and Evaluation function in the project. Although staff at various levels report of monitoring and backstopping visits, these visits do not fall in any defined framework and it is difficult to document the results of such “monitoring visits”. The FISRI management should designate a member of the core team at each level, from the national to the district, who should coordinate the M&E. The data availed to the team was often aggregated at district level or camp level with rare disaggregation into gender, for example. The capacity to integrate gender concerns at implementing level is required.
2. In the face of alienation of the follower farmers and the loss of the demo at out scaling in farm, the justification for keeping the lead farmer is diminished. Instead the best performing follower farmer should be picked every two years so that members of a group know they have a chance to access the e-voucher. Or better still the each member of a study group may have an equal chance of hosting the voucher by randomly selecting a voucher recipient every two years. Under such a scenario, farmer field schools could enhance the learning for the lead farmer and also provide long term data sources for CA development and adaptation.
3. The participating farmer in this project represents the ultimate impact of the project. As such, it is important to monitor the uptake processes of the various components of CA and other project elements among the participating farmers. Long term monitoring guidelines for these farmers are important as they provide indicators for the sustainable adoption of the CA technologies and other project elements that were promoted. There is need to identify the successful participating farmers and use them as platforms for lesson learning and understanding of adoption issues.

4. The FSIRI should attend to market access for crops other than maize. Crops grown in rotation are perceived not to have a market, leading to putting them on a low priority in farmer's activities. To encourage crop rotations, crop buyers should flag their intentions early in the season so that farmers can plan their cropping. Market access is integral to on-farm practice. FISRI should link up with other programmes attending to crop marketing such as Dunavant.
5. To improve the understanding and appreciation of the CA concept, to ensure sustainable adoption and to encourage innovation, a comprehensive CA training guideline should be put in place. This will enhance the beneficiaries' understanding of CA and avoid referring to general agronomic practices as CA.
6. Other forms of non-voucher incentives should be considered. For instance the farmer could receive certification to prove they have attained a yield level above 5 tons per hectare while using CA. Such certification would indicate the farmer is less vulnerable to weather changes and, therefore attractive to finance institutions who may find it safe to extend seasonal loans to such farmers. The fact that CA practice should confer preference for loans should be a stronger but neutral incentive limited only by the level a farmer dedicates to CA practice.
7. As long as the barrier to entry is the cost of the tractors, operators will enter the business until profits become zero. To avoid over-concentration in the hands of a few the financing institutions should vary the repayment period from 3 years when the demand is high to 6 years when the demand is in equilibrium with supply. Keeping the number of operators high in this manner will open access to more farmers. In scaling up to meet the demand, more tractors per operator is to be preferred to many one-tractor operators. Such tractors working in series will serve all clients effectively.
8. The graduation from the ox to 4-wheel tractor is too steep; the FISRI may consider other power sources in between. The project teams should ensure there is equitable access to mechanization services to women given the factors that may limit that access such as social assets.
9. Since FISRI aims to increase productivity (i.e. yield etc), it is necessary to pay attention to yield components. Monitoring data should be collected on a sample of farmers covering the following:
 - a. Plant population at emergence
 - b. Plant population at harvest
 - c. Weed score at 2 months after planting.
10. During the 12/13 season, FISRI M&E should establish the factors that determine plant population under the various seedbed preparation methods. To achieve that, the camp officers need a tape measure to be part of their field kit.
11. Once the advantages of the animal drawn no-till/mulch planter are clearly documented (i.e. plant population, accurate fertilizer application, speed etc) farmers should be encouraged to

buy their own animal drawn no-till/mulch planter or team up in groups of 5 or more to share the cost of one unit.

12. For future programming carry out gender analysis; develop clear gender equity outcomes and indicators and establish clear gender mainstreaming responsibilities and accountability within project staff and the extension delivery systems. Appoint project Gender Focal Person (GFP) with clear terms of reference from within current staff and include gender and social issues in CA capacity building for extension staff.
13. Develop gender mainstreaming strategy and information, educational and communication (IEC) material, on CA should positively reflect gender dimensions.
14. Consider integration of diverse food products with value addition and market linkages to provide increased incomes for women. Consider inclusion of potential female lead farmers for ownership of mechanised services, develop a gender sensitive model for providing support for herbicide spraying...

1. Introduction

1.1. Background to the project

The Zambian Government has endorsed Conservation Agriculture (CA) as one means to ensure sustainable agricultural development for the country. Against this backdrop, the Farmer Input Support Response Initiative (FISRI) project started in May 2009 to promote environmentally-friendly farming approaches leading to increased productivity and production. By contributing to a better and more sustainable use of resources, FISRI also intended to mitigate the impact of soaring agricultural input prices on resource poor farmers.

Between 2009 and 2011, FISRI went through two phases and in total targeted 11,872 Lead Farmers (of which 3,920 in FISRI I and 7,952 in FISRI II) in 28 districts (originally 12 districts under FISRI I).

The final project phase (FISRI III) was approved in July 2011 and was scheduled to end by 30 April 2012. FISRI III supported an additional 7,700 Lead Farmers and 62 Camp Extension Officers, bringing the total number of beneficiaries to 19,572 Lead Farmers and 486 Camp Extension Officers. In addition to building capacity among farmers and CEOs, FISRI III was also designed to further contribute to improved input supply arrangements by expanding the electronic voucher system introduced in previous phases, and also by up-scaling CA equipment hire schemes.

This project has largely been a capacity building support programme directed through private sector agro dealers so that the supply of CA and other inputs find permanent channels outside government or project structures. Among others, the project aimed at complementing existing efforts aimed at scaling up CA among small scale farmers in Zambia.

Sustainable farm productivity improvement depends on proper and efficient use of land and water resources and especially the use of expensive agricultural inputs. CA was seen as the “package of best agricultural practices” that could reduce waste and greatly improve efficiency of subsidized or freely distributed inputs.

1.2. Purpose

The Beneficiary Assessment is intended to feed into the full-fledged evaluation of FISRI scheduled for April/May 2012. The evaluation will examine FISRI according to the established evaluation criteria of relevance, efficiency, effectiveness, impact and sustainability. The Beneficiary Assessment constitutes a preliminary stage in this exercise, and investigated in particular the performance of FISRI at (and close to) the farmer level.

The main focus of the beneficiary assessment was to analyse how FISRI has brought about changes in agricultural production (with particular emphasis on CA), how knowledge, attitudes and practices have changed among beneficiaries, whether delivery and availability of agricultural inputs and services have improved, and have eventually led (or will lead) to an improved food security situation.

In particular, the Beneficiary Assessment the levels of participation by farmers and extension agents at the project sites, and analysed whether farmers have benefited from the project according to their varying needs and resources (labour, land, and equipment), personal situation and gender.

The beneficiary assessment sought to establish to what extent the input supply model (fertilizers, seed, mechanization, herbicides, and other services) using e-vouchers and the use of Lead Farmers have become institutionalized, and could be used as a model for future up scaling and replication.

2. The FISRI project

The overall objective of FISRI is to contribute to greater food security due to increased food production and more sustainable use of environmental resources.

The **purpose** of the project is to increase food production through improved access to agricultural inputs and promotion of CA principles in order to help mitigate the effects of soaring food and input prices. By implementing conservation agriculture, it was intended that the target group would increase food production by a minimum of 20 percent.

2.1. Background

Food security in the Republic of Zambia is largely dependent on rain fed agriculture, with maize as the primary food crop. Over 80 percent of the national food requirement is produced by small-scale farmers. The challenges faced by small-scale farmers include low farm productivity and continuing yield decline as a result of soil degradation associated with inappropriate farming practices. HIV/AIDS, together with high costs of external inputs and the vagaries of climate change continue to negatively impact on the agriculture landscape.

The implementation of the Farmer Input Support Response Initiative (FISRI I to III) was expected to increase adoption of environmentally-friendly farming systems leading to improved production from given inputs, increased food supply, reduced hunger and improved responses to food emergency crisis by extending the area of land under CA practices.

All projects related to CA fall within the framework of the Government's Conservation Agriculture for Sustainable Agricultural Development (CASAD). The European Union Food Facility (EUFF) FISRI project worked in the same framework as the CAP and CASPP. The FISRI III project intended to contribute to the Government's stated policy of arriving at 600 000 farmers practicing CA by 2015.

2.2. Problems addressed and objectives of FISRI

The strategy and methodology of FISRI followed closely the methodology used in the CAP, and CASSP projects to ensure a consistent message and approach. The project built on the model of the FISRI I and II by building capacity in farmers through trainings and enhancement of the private sector participation. The project also supported expansion of CA within the existing camps by adding numbers of lead farmers and expanding the technology (mechanization).

Initial efforts of the project focused on land preparation involving reduced tillage, correct timing of planting, correct spacing of plants, correct application of fertilizer, weed management (including herbicide use) and

use of at least two crops (staple and legume). These efforts were supported with extension and an input package for 0.5 ha for lead farmers and access to FISP subsidy for farmer beneficiaries as an incentive for training.

2.3. Result Areas

Result 1: Capacity of MACO, lead farmers and beneficiaries to manage and implement Conservation Agriculture developed.

The focus of this component is to increase the capacity of MACO to effectively provide future extension support in CA to the beneficiaries in the country and to increase the capacity of lead farmers to provide future extension support in CA to the beneficiaries in their localities.

Result 2: Productive capacity of small-scale farmers strengthened through improved input subsidy electronic voucher system

Through this component, inputs and equipment will be made available to lead farmers and farmer beneficiaries, including through use of electronic vouchers and subsidies and used in line with the training and extension provided.

Result 3: Conservation Agriculture scale up platforms supported

Through this component the CA platforms will be supported to strengthen the evidence based knowledge sharing to embrace all players in the CA agenda; Government, private sector, non-governmental organizations and the farmers.

Result 4: Conservation Agriculture mechanization and system of equipment hire schemes supported

This component involved provision of agricultural mechanization - tractors (60 HP), tractor drawn CA implements and other similar equipment to carefully selected and trained operators who are willing to become commercial agricultural contractors. The contractors provided a range of services in their localities such as ripping of land, planting, spraying of weeds and pests, transport and other services necessary to increasing the scale of agricultural production.

3. Objectives of the Beneficiary Assessment

The overall objective of Beneficiary Assessment is to provide detailed understanding of the manner the project delivered benefits to the target groups. Specifically, the BA aimed to understand the FISRI through the following objectives:

1. Building capacity of MACO, *lead farmers* and beneficiaries to manage and implement Conservation Agriculture.
2. Capacitating small-scale farmers through improved input subsidy *electronic voucher system*
3. Establishment and supporting of Conservation Agriculture *mechanization and system of equipment hire schemes*.
4. Establishment and supporting Conservation Agriculture scale up *platforms*

3.1. Project Structure

The project was implemented jointly by MoAL, FAO and other stakeholders and strengthened efforts that seek to lay the groundwork for enhancing the capacity of MoAL's Department of Agriculture and lead farmers in the lead farmer extension model –in anticipation of a longer term investment in CA expansion countrywide. At the national level, the National Project Coordinator sits at Ministry of Agriculture and Livestock supported by a team of experts. At district, a CA Core Team is constituted by the Senior Agricultural Officer and a few of his district staff. The core team oversees the implementation of the project at the district level. Under the Core Team are Camp officers each of whom is in charge of 28 to 56 lead farmers. The lead farmer is recruited from the village to assist the camp officer in project implementation especially by demonstrating the CA practice, in turn the lead farmer recruits 15 Follower Farmers (FFs) who he or she can mentor to adopt CA. The demonstration established by the lead farmer is used during the mentoring. Thus the follower farmers are the main target of the project, all other levels above the follower farmers is capacity building to ensure the follower farmers change their production system to one with high productivity and stable in the face of vagaries of climate, see Figure 1 for the relationship between the structures the project strengthened to deliver CA extension to the follower farmers.

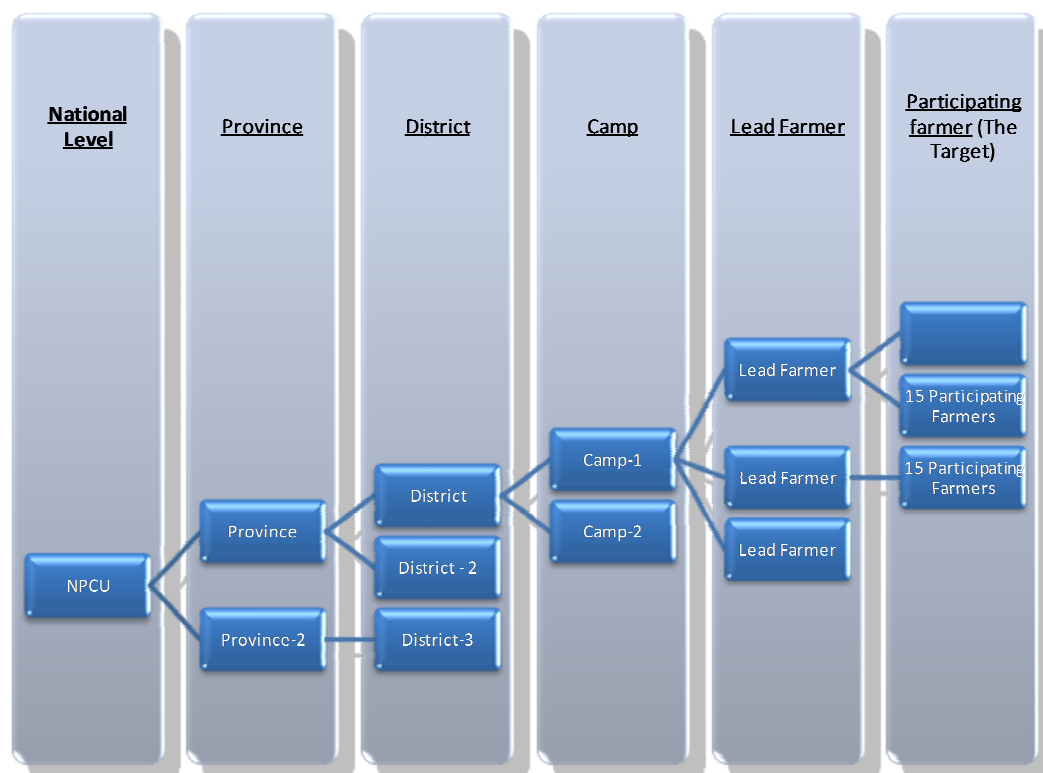


Figure 1 Structure of the Lead Farmer Model of Extension

4. Methodology

The assessment methodology was largely qualitative, complemented by quantitative information collected from structured interviews and review of relevant literature. During the inception, an assessment approach was developed which guided the data collection process. The approach structured the assessment according to the key categories of informants and assessment method to be used. Checklists/Question guides for focus group and in-depth individual discussions were made for the district extension staff, camp officers, lead farmers, participating farmers and non participating farmers. In addition a structured questionnaire was developed to collect specific responses from lead farmers, camp officers and participating farmers. A checklist was also made for the agro dealers and mechanization providers. Two teams each composed of two consultants and two research assistants collected data in eleven districts. Data collection was made as per assessment work plan.

4.1. Review of Documents

Relevant project documents were reviewed throughout the assessment period. Some of the documents which were reviewed included the project documents and log frames for the three phases, Project reports including district reports, project data base including for the specific districts visited, research reports; training reports and other relevant CA documents. A review of documents provided project background information, context; major areas of focus; project outcomes, implementation process, progress, project performance and impact. Chapter 15 shows the list of documents reviewed.

4.2. Sampling

The field data was collected in eleven districts. Purposive sampling of the eleven districts was done taking into consideration factors such as district's length of experience with FISRI to enable capturing of short term and evolutionary trends on CA. Agro-ecological factors, remoteness and physical isolation of districts were considered in the sampling. The districts that were visited are shaded and shown in the Map below.

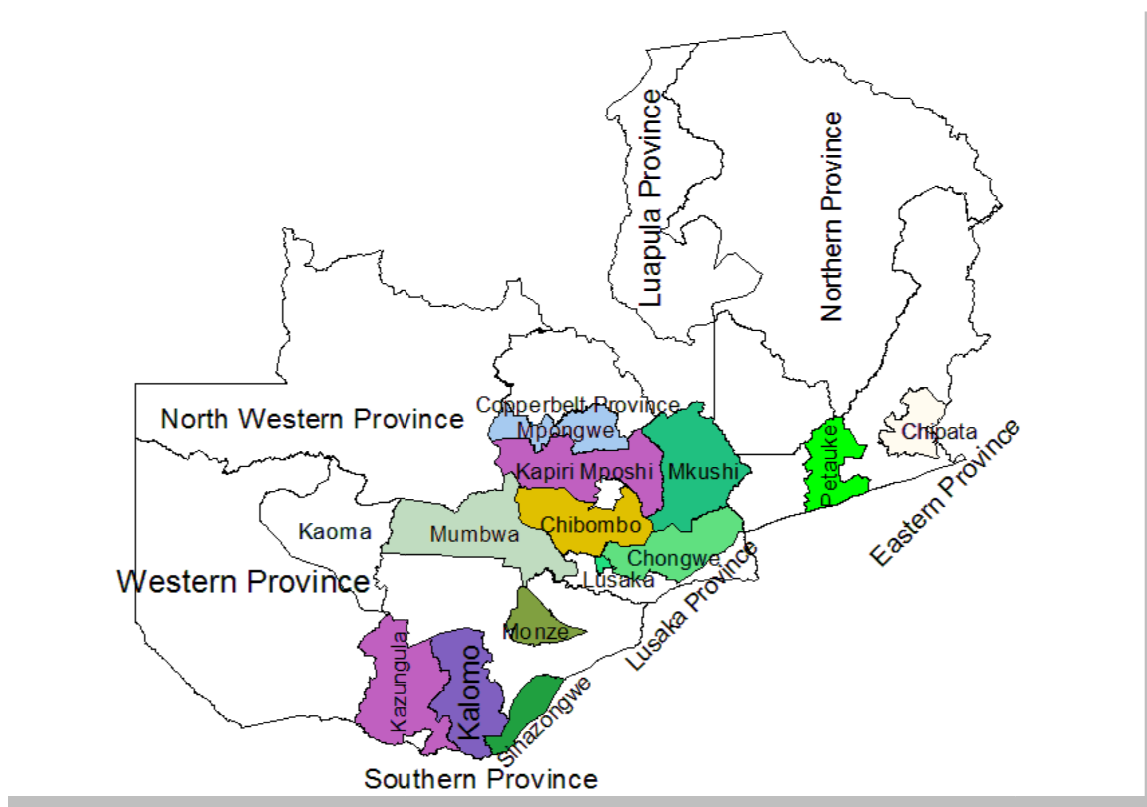


Figure 2. Districts visited during the beneficiary assessment

Within each sampled district there was purposive sampling of camps with new and old FISRI CA farmers. Distance and accessibility of the camps were considered in the sampling process. The focus was to get a better understanding of the FISRI CA farmers, practices, productivity, knowledge, changes, gender dimensions, challenges and experiences based on a range of district characteristics that would enable generalisation of results.

4.3. Focus Group Discussions

Focus Group Discussions were conducted with groups of respondents. A minimum of 3 FGDs were held in each camp. FGDs were held with lead farmers, follower farmers, agricultural extension officers and camp officers. In order to capture gender dimensions some FGDs were held with separate groups of women and men. FGDs for CEOs were only feasible where facilitation for their transport was possible. It was reported in most districts that Project funding to support logistical costs such as fuel was not yet received.

The FGDs assisted in getting the respondents' CA understanding, knowledge, attitudes, perceptions, gender issues and how they have benefited from the project.

4.4. Direct Observations

The assessment team observed a few of farmer field schools, lead farmer plots and participating farmer plots in 23 camps visited in the eleven districts. The team assessed through observation the extent to which CA principles had been practiced and the state of the field. The teams observed the physical assets

that had been realised from CA proceeds. The team observed and assessed the Agro-dealer shops and their stocks. A minimum of 2 agro dealer shops in each district were visited. The mechanisation component was observed regarding the state of machines and equipment being used. The motorbikes and bicycles that were given to staff, camp officers were also checked.

4.5. Structured Interviews

A structured guide was used to get details of individual respondent household and their experiences with CA. All the camp officers, lead farmers and follower farmers who were interviewed using the focus group were interviewed in an in-depth individual interview using a structured guide. Others interviewed as key informants were the district level extension officers, mechanization operators and agro dealers.

4.6. Data Analysis

Two types of data analysis methods were used; the qualitative data analysis was used for information obtained through FGDs, in-depth interviews and observations. During the field the team members analysed their data qualitatively going through all the key variables sought and synthesising findings from each of the team members. This allowed for sharing and conclusive harmonisation of analysis and findings from all the team members.

A statistical package SPSS version 16 was used in analysing quantitative data. Excel was also used especially to handle the MTZ data sets and to render graphs for the report.

4.7. Limitations

As the sample was purposive, the conclusions are limited to the FISRI project beneficiaries in the districts visited. Secondary data was not available to support the changes in productivity reported in progress reports and summaries.

5. Findings (main findings and results)

5.1. General characteristics of Districts visited.

The 11 districts visited in the course of the study are listed in table below. Most were introduced to the CA in 2009 as is shown in the Table 1 below... The household population is larger than national average (8 vs 6)

Table 1 Districts sampled for the interviews (a)

| District | | Total House hold Popula tion | When first Introdu ced to CA | Total Area Put to Crops this Year | | The Area under CA this season - Ha | | | Lea d Far mer | Cam p Offic er | Follo wer Far mer | Fem ale |
|----------------|-----|------------------------------|------------------------------|-----------------------------------|----------------------|------------------------------------|----------------------|----------|---------------|----------------|-------------------|---------|
| | N | Mode | Mode | Me an | Stand ard Deviat ion | Me an | Stand ard Deviat ion | Perc ent | % of N | % of N | % of N | % of N |
| Chibombo | 72 | 8 | 2009 | 4.9 | 3.1 | 1.7 | 1.7 | 35% | 77.8 % | 1.4% | 20.8 % | 47.2 % |
| K/Mposhi | 34 | 7 | 2009 | 2.5 | 1.3 | 0.8 | 0.7 | 33% | 0.0 % | 0.0% | 100. 0% | 50.0 % |
| Mumbwa | 75 | 6 | 2011 | 2.7 | 2.3 | 1.0 | 1.0 | 38% | 74.7 % | 0.0% | 25.3 % | 42.7 % |
| Mpongwe | 95 | 7 | 2010 | 3.9 | 4.0 | 1.8 | 2.3 | 45% | 75.8 % | 12.6 % | 11.6 % | 45.3 % |
| Chipata | 25 | 6 | 2009 | 3 | 2.4 | 1.0 | 1.7 | 33% | 4.0 % | 40.0 % | 56.0 % | 48.0 % |
| Petauke | 22 | 4 | 2009 | 3.4 | 1.7 | 1.7 | 1.6 | 50% | 0.0 % | 40.9 % | 59.1 % | 40.9 % |
| Chongwe | 22 | 8 | 2009 | 3.2 | 1.8 | 1.5 | 0.9 | 48% | 81.8 % | 13.6 % | 4.5 % | 36.4 % |
| Kalomo | 45 | 6 | 2009 | 11.5 | 14.7 | 1.3 | 1.0 | 11% | 55.6 % | 33.3 % | 11.1 % | 31.1 % |
| Monze | 42 | 8 | 2009 | 3.6 | 2.4 | 2.2 | 1.6 | 61% | 81.0 % | 14.3 % | 4.8 % | 19.0 % |
| Sinazongwe | 38 | 6 | 2011 | 3.2 | 3.5 | 1.0 | 1.5 | 31% | 42.1 % | 10.5 % | 47.4 % | 52.6 % |
| Kaoma | 36 | 6 | 2009 | 1.9 | 1.4 | 1.0 | 1.1 | 54% | 13.9 % | 8.3% | 77.8 % | 58.3 % |
| Total | 506 | 8 | 2009 | 4.1 | 5.6 | 1.4 | 1.6 | 34% | 55.9 % | 12.5 % | 31.6 % | 43.1 % |
| Without Kalomo | 461 | | | 2.62 | 3.0 | 0.44 | 1.7 | 42% | | | | |

The mean area for the project area is 4.1 hectares while that under CA is 1.4 hectares. Kalomo hecterage is outside the norm for other districts. When we exclude Kalomo, the area under CA jumps from 34% to

42% of the total under crops. Females were 43 per cent of the beneficiaries interviewed. Kaoma had the highest proportion of female beneficiaries (58%) while Monze had the lowest at 19%. Within type of beneficiaries, the lead farmers dominate the sample at 56% compared to 32% for participating farmers.

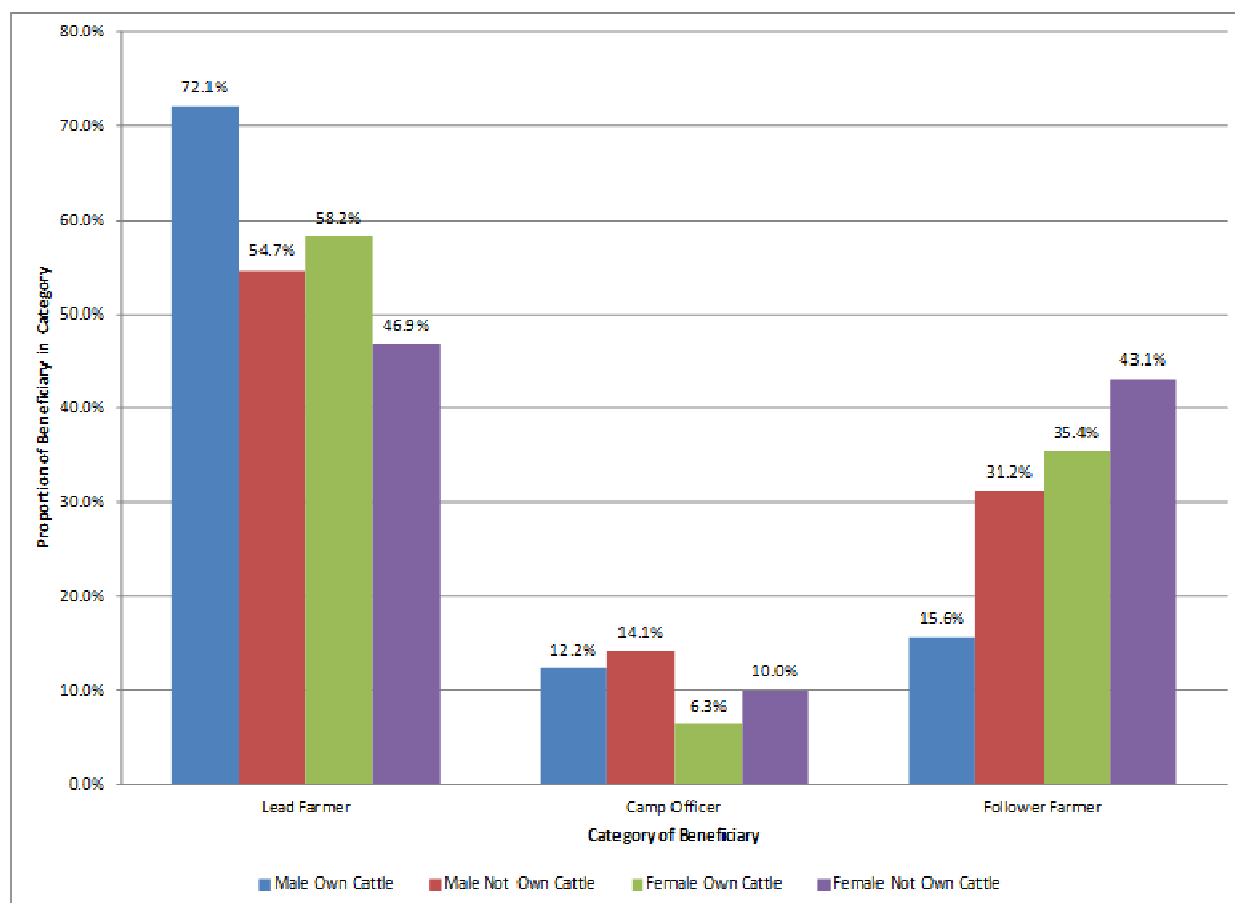


Figure 3 Characteristics of the sample of beneficiaries

Figure 3 is a description of the sample of beneficiaries in the study. If farmers were cattle owners and male, they stood a higher chance of being selected as lead farmers. There were more cattle owning females in lead farmer category than were non cattle owning males. The signal that being a participating or follower farmer is not equal to being a lead farmer is the reversal in proportion of cattle owning males who rank last in this category while non-cattle owning females, who were least among the lead farmers are here the majority at 43%. We may be confident that the project succeeded in recruiting community or opinion leaders in the communities.

The next 4 chapters address the four main project outputs. First we tackle the *Building of capacity of MAL, lead farmers and beneficiaries to manage and implement Conservation Agriculture*. The key undertakings in this area were training, facilitation and support provision. Secondly we address the mechanism of *supplying inputs to the small scale farmers through the electronic voucher scheme*. The scheme has led to growth in the private sector supplying inputs to farmers. Thirdly we analyse the *establishment and supporting of Conservation Agriculture mechanization and system of equipment hire*, a scheme run jointly with MAL, FAO and ZNFU. Lastly the project supported the *Establishment of Conservation Agriculture*

scale up platforms such as represented by the ZCAA which has a secretariat at GART. The full matrix of the stakeholders involved in the promotion of CA in Zambia is yet to be elaborated.

6. Building capacity of MAL, lead farmers and beneficiaries to manage and implement Conservation Agriculture.

The key undertakings in this area were training, facilitation and support provision. The central message in the training was CA and the key target beneficiaries were identified as:

- Agricultural Extension Officers at district and camp level
- Farmers (LFs and PFs and indeed all other farmers)
- The private sector involving agro-dealers and service contractors

Training also covered aspects of storage and marketing.

Facilitation was extended to the private sector in enabling them access loans to acquire equipment that would serve the farmers and linking them with other service providers through contracts in the redeeming of vouchers. Awareness meetings were held to orient the players to the project concept and expectations thereof.

The project supported the MAL staff carry out their duties effectively through provision of transport, operational funding and, equipment.

6.1. Capacity Building

The project addressed this important component through planned training interventions in Conservation Agriculture (CA) and provision of equipment and facilities for effective and efficient implementation of the project activities. The capacity building was both at institutional and individual levels. The project strategically targeted both public and private institutions/organizations through its facilitation.

Training was targeted at provincial, district and field staff as well as at the farmers, specifically the Lead Farmers (LFs). Provision of support for smooth execution of the project was to key players in the extension services delivery at both district [the District Agricultural Coordinator (DACO), the Senior Agricultural Officer (SAO) and other relevant staff] and camp (Camp Extension Officers and the Leader Farmers) levels. The participation of the private sector included service contractors and agro-dealers, which were facilitated through a loan scheme and group mobilization, respectively.

Training of the provincial and district agricultural staff, which addressed institutional needs at large, covered topics on the project concept, extension approaches and CA/best agricultural practices (BAP) concepts with the objective to increase the capacity of Ministry of Agriculture and Livestock (MAL) to effectively provide future extension support in CA to the beneficiaries in the country and to increase the capacity of lead farmers to provide future extension support in CA to the beneficiaries in their localities.

Farmers training, which was at individual level, focused on technical issues related to CA, such as land preparation, planting, weeding, pest and disease management and, harvesting and storage. The overall objective was to impart skills to the farmers so that they can practice CA technologies thereby improve their productivity and mitigate food insecurity. The concept (i.e. knowledge) behind CA was not fully imparted.

Capacity building at institutional level also included provision of operational funding at district level in order to strengthen the monitoring activities². In addition, computers and relevant accessories were provided by the project for information management and reporting³. At district level the CEOs were provided with motor bikes and operational funding (fuel and allowances) to enhance their supervision of project activities. Furthermore input vouchers (of a value of ZMK 250,000 each) were provided to the CEOs to establish demos at their own field; no implement voucher was given to the CEOs.

The model adopted by the project saw the LFs provided with bicycles as an extension of the extension delivery system. The LFs were further provided with input vouchers (valued at ZMK 250,000 each) and implement vouchers (valued at ZMK 250,000 each). In districts where there were service contractors, LFs further received service vouchers (valued at ZMK 250,000 each where the services were sourced from oxen-driven contractor and ZMK 750,000 each when the services are from tractor contractor). This support enabled the beneficiaries to actualize the implementation of CA beyond the experiment station plots.

Service contractors were identified based on some transparent criteria among which were that they must be an established business person, capable of servicing a loan through proper business planning and execution. The project provided the loan for a tractor, a ripper, a planter, sprayer and a trailer for transport at a total value of ZMK 252 million.

Agro-dealers were also identified after a comprehensive search and linked to the electronic voucher (e-voucher) manager, Money Transfer Zambia (MTZ). The project further facilitated training of the agro-dealers by MTZ in the redeeming of the vouchers; a staff member from the each district was trained in the management of the voucher system so that they provide technical backstopping at district level.

Camp officers require exposure visits and training. They also need technical material to support extension work at camp level. Skills learned through FISRI relate to application of CA. Camp officers have acquired skills to operate the animal drawn no-till/mulch planter and the sprayers. The camp officers believe the CA will continue even when FISRI ends as the farmers have seen the benefits of the practice. More importantly, the structures or capacity to support CA extension are in place: the agro-dealers, mechanization service providers, the market and the extension officers.

The knowledge base on herbicides is limited at both the farmer and extension officer level. Specialized training is required in chemical handling, criteria for choosing particular chemicals, and handling of the boom sprayers and knapsack sprayers. Overall, the adoption of CA has not covered all farmers nor have the adopters used all the principles of CA. In particular, ripping has been the easiest to adopt and we have witnessed lead farmers who have ripped their entire crop fields and used the cultivator to weed. The use of the cultivator almost eliminated purchase of seasonal inputs linked to CA especially herbicides. Residue management and rotations have not been very evident and still need a lot of training for farmers. Farmers did not volunteer information of residue management or mulch, neither did the extension workers. The fields visited did not show any sign of mulching or residue management⁴.

² Equivalent to USD 200; the district was treated as a camp

³ This capacity is underutilized

⁴ CIMMYT suggests the results are not yet supportive of crop residues

One of the most tangible changes brought by the project regarding camp officers is the alleviation of the transport problem. Camp officers have motor bikes and access to funds for running costs. FISRI is not felt to be a burden outside their normal work; it has fitted well within the regular ministry work. The support received from the supervisors is also largely satisfactory although in some districts (e.g. Sinazongwe) contacts between the district and camp officer some distant from the headquarters appeared to have been very limited. Camp officers in Maamba complained of not being trained on FISRI but were simply told to recruit farmers under the FISRI.

6.2. The District Core Team

The FISRI project was coordinated at the district level through the District Agricultural Coordinator (DACO), with the Senior Agricultural Officer (SAO) being the key player. The office of the SAO was not always filled by the substantive person in the visited districts due to transfers, a number of the officers met were in acting status, but in all cases a competent officer discharged the duties. The district core team varied greatly in terms of qualified subject matter specialists (SMSs). In no district were Team members all at first degree level except at the DACO level. This state is reflected in the manner data to support the progress of the project is collected and used.

Key district core team members were the DACO and the SAO, though officers in the information section were actively involved; this could be related to the requirement by the Project to ensure visibility. The SAO office supervised the implementation of the Project in the district.

The Project facilitated the implementation at district level through training in Conservation Agriculture (CA), monitoring and evaluation and general administration of the e-vouchers system and provision of equipment such as computers and operational funding. Technical training was focused at SAO level mainly.

The district core team was responsible for overseeing progress, monitoring and internal evaluation through field visits and report writing.

6.3. Camp officers

Camp Extension Officers (CEOs) were the key field people for the implementation of the Project and were part of the direct beneficiaries of the Project and constituted a critical component of the extension delivery system, interfacing with the farmers (lead farmers, participating farmers and non-participating farmers).

The extension delivery functions of the CEOs were facilitated by the Project via provision of the inputs (in form of e-voucher) for the establishment of the Farmers Field School (FFS) and operational support (transports in form of motor bikes and fuel for running the bikes).

The CEOs were responsible for selection of the lead farmers. It was observed at times that CEOs selected the LFs directly and at times they involved community and/or traditional leaders. In most of the camps visited the selection was by Camp Advisory Committees (CACs). The criteria used such as ownership of land and influence or opinion leader in the community favoured men.

In the training and demonstration of the CA technologies to the LFs the CEOs used the FFS. LFs contributed to the running of the FFS especially that no support was extended to the CEO for the FFS resulting in different camps having different designs.

The extension model adopted by the project that of using the LFs and FFs was in line with the MAL system thus enhanced the performance of the CEOs.

Benefits accruing to the CEOs were in terms of training [in CA techniques including pest management and weed control; post-harvest and storage technology; monitoring and evaluation] and the intangible enhanced performance due to the operational support.

The implementation of the project had some challenges which included among others the following:

- Mobility limited because of irregular monthly provisions of fuel for motor bikes; Allocation varies from 0-20 litres per month.
- Project does not provide inputs for the farmer field schools presenting a challenge in the quality of the FFS.
- Limited opportunities for camp officers to meet and share their experiences.

6.4. Extension Approaches

The main extension approaches used to disseminate CA information in the project was the lead farmer approach. Although farmer field schools were not in the design of the project, many camps visited used farmer field schools to provide the training and interaction platform for the lead farmers who then go on to establish demonstrations, for the purpose of training and influencing the follower farmer. Group discussions which were conducted on and away from demonstration sites and at farmer field schools complimented the two extension approaches. Farmer field schools provide a more continuous learning platform for the lead farmers where they can closely investigate and compare the technologies under demonstration and the crop condition throughout the growing season. The set up in farmer field schools allows the lead farmers to also learn not only from the positive results but also understand the reasons for negative occurrences observed during the course of the growing season. . Unlike demonstration plots that can be established and run by individual farmers with support from extension officers, farmer field schools require strong local farmer organization for them to run effectively. Group dynamics may come into play relating to sourcing of inputs for the school, timeliness of group activities and the sharing of the produce from the farmer field school. It may be relevant to initially set aside some funding until the school can start to sustain itself.

The demonstrations set up by lead farmers were meant to reach a larger number of farmers, referred to as follower or participating farmers as each lead farmer in the project was expected to recruit up to 15 follower farmers. The advantage of demonstrations is that the farmers can see the results for themselves and the learning does not depend on the farmers' literacy levels. The demonstration plots served both as methods demonstrations and results demonstrations in that, the results obtained from the CA demonstration fields were expected to convince the farmers of the advantages of implementing CA in comparison to conventional farming methods and also provide a learning platform in the implementation of CA

technologies including herbicide use and the use of CA implements. For a demonstration to be effective, it should be well- managed in order to send the correct messages. Inadequate attention to a demonstration which is promoting a new technology in an area can be disastrous as it may prematurely imply that the technology does not work. The location or siting of a demonstration is also key in terms of accessibility by the target group. Additionally, the host of the demonstration should be of acceptable and influential social standing in the community. As such the criteria for the selection of the farmers to host the demonstration should be arrived at using participatory means.

6.5. The Performance of the Lead Farmer Approach to Extension

In the FISRI project, the lead farmer was the main vehicle through which CA information was disseminated. The selection criteria for the lead farmers varied in the project districts that were visited. Although selection through community meetings that involved local leadership was the most common approach, the strong influence of camp extension officers on the ultimate choice for a lead farmer was also evident in some camps. The extension worker went through the village headmen to call for a meeting where the programme and the extension method of the lead farmer were explained. The main work of the LF is to attend to follower farmers, establish demonstration plots from the vouchers received, and organize meetings for their area or at the request of the camp officer. The lead farmers were capacitated by the project through training on CA and other related technologies, access to inputs and implements through the e-voucher scheme and bicycles to enhance their mobility. In return for this support, each lead farmer was expected to recruit 15 follower farmers whom he or she would then mentor and support in terms of implementation of CA technologies at their own homesteads or farms. The presence of the lead farmer network, the improved mobility of the camp officers through the provision of motor cycles and increased use of cell phones across all the groups have greatly facilitated communication allowing camp officers to coordinate some activities through the lead farmer. The existence of management structures among the farmer groups in the project was limited to those groups that had already existing group structures at the start of the project. In cases where there was no structure existing prior to the project, the responsibility of the groups seemed to lie solely on the lead farmer.

6.5.1.Role and impact of Farmer field Schools

Farmer field schools were established by the majority of the districts and camps in the project areas. The number of farmer field schools, which were the centre for learning for the lead farmer was not consistent in the different camps but depended on the initiatives of the camp and district officers. In camps where farmer field schools are active, the lead farmer held meetings more regularly, once a week like in the farmer field school observed in Kalomo, which however suffered from lack of attention and inputs. As such, its role as a school was somewhat diminished. In Mwachisompola camp in Chibombo for example, the camp officer was able to establish two farmer field schools using the inputs acquired through the e-voucher supplied to the extension worker. In Mono Camp in Mumbwa, the camp officer established four FFS with farmers contributing inputs from their own vouchers and other sources. Having fewer farmer field schools meant that lead farmers had to travel long distances on a regular basis for learning, while more FFS schools reduced the distance travelled by the lead farmers. The lead farmers were further constrained as the bicycles that were supplied by the project were of very poor quality and had broken down within the first few

months of use. Where the bicycles were still operational, farmers had to replace several parts including the tyre rims, brakes, saddle, etc. The ideal situation would be to have a FFS for each zone within the camps, which was not possible due to the absence of funding for the farmer field schools. The farmer field schools will also act a source for long term data for CA development and adaptation and provide evidence for CA best practices.



Figure 4. A farmer field school in Katete camp, Kalomo

6.5.2. Input support for lead farmers

Observations from focus group discussions in the field indicate that the purpose and role of the lead farmer was not clearly understood, especially at field level by the lead farmers themselves and their follower farmers. The farmers seemed to view the project as just another input support programme; hence the demand for increased voucher value by the lead farmers themselves and requests for inclusion in the voucher scheme by the follower farmers. The presence of previous and/or existing projects in some areas, like CELIM in Kalomo which supplied free inputs to both lead farmers and follower farmers and FISP which was an input programme may have contributed to this perception. The farmers did not seem to link the support that the lead farmer received to the duties and responsibilities that he or she was involved in such as those relating to the training, supervising and following up on the follower farmers. In addition, since the Lead farmers were selected at community level, some of those who were not selected have been reluctant to become follower farmers as that appears to demote them or elevate certain people to a status “that does not suit” them. Consequently the interaction between the lead farmer and the follower farmer is problematic and presents a lot of challenges to the extension approach as implemented in the project.

Many follower farmers, who had joined the programme in anticipation of input support in subsequent years, eventually lost interest as no inputs were forthcoming. In Mumbwa, for example, the SAO indicated that the initial understanding was that the follower farmers will receive vouchers whose value will amount to half of that received by the lead farmer. Although replacements are made to cover attrition the number who are

active remain lower than 15. The low participation of follower farmers was also reflected in the lower numbers of follower farmers attending the focus group discussions and being interviewed throughout the assessment mission.

The expansion or replication pathway for the lead farmer model of extension has stalled. The discord between the lead farmer and follower farmer is palpable. New camps on to which the programme has expanded do not have active follower farmers due to the conflict over e-vouchers and bicycles which lead farmers have and follower farmers do not. Overall, the number of follower farmers is lower than planned as often only about half of the 15 or in many cases even less are actively or purposively involved in the project activities. In this regards, the “free” e-voucher does not sit well with the lead farmer concept and may be an obstacle to the linkages between the Lead Farmer and the follower farmer, quite the opposite of what it was meant to be.

Another source of possible stagnation is the leeway given to the lead farmer to select follower farmers. This team came across a case where the lead farmer was the senior wife and the junior wife and a son to the senior were follower farmers. All these were under one household where the decision to use a parcel of land was not in their hands but the owner of the farm, in whom lay the power to dispose.

In the face of alienation of the follower farmers and the loss of the demonstrations at out scaling in farm, the justification for keeping the lead farmer is diminished. A clearer emphasis of the link between the inputs given to the lead farmer and his roles and responsibilities as expected by the project is essential, or alternatively the best performing follower farmer should be picked every few years so that members of a group know they have a chance to access the e-voucher. A payback mechanism for the inputs by the lead farmer into a revolving fund was one suggestion offered by one district officer in Sinazeze.

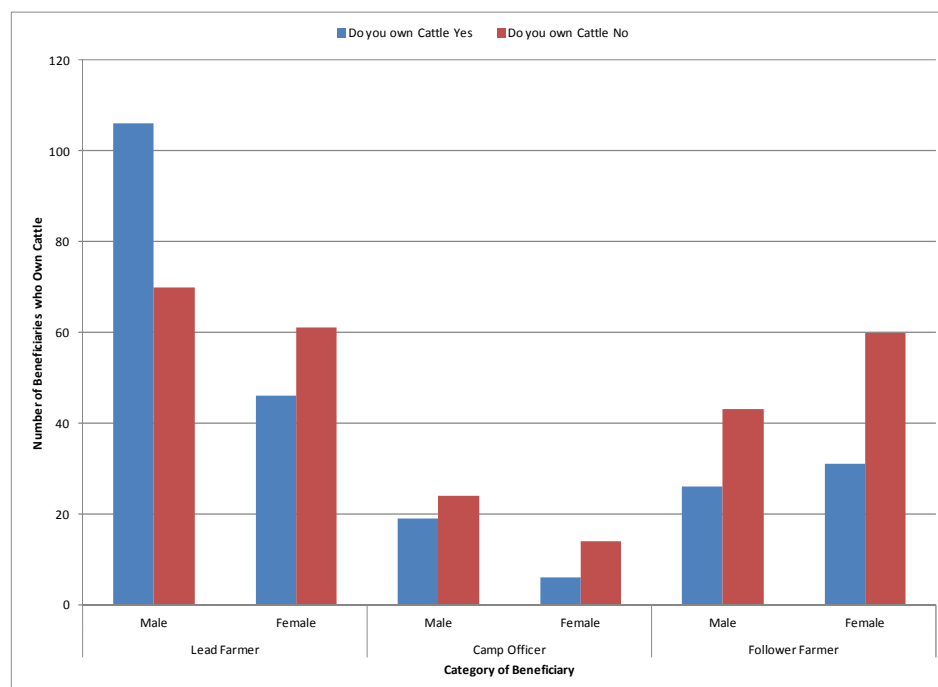


Figure 5. Number of Beneficiaries Interviewed by Category and Sex

6.5.3. The Role and impact of demonstrations

Lead farmers in the project areas visited were able to establish CA demonstrations using the inputs received through the e-voucher. However, it appears that the lead farmers did not feel obliged to effectively manage the demonstrations and adequately facilitate the learning activities of their follower farmers. While there was evidence of interaction between camp officers and lead farmers, the frequency of lead farmers meeting follower farmers was not immediately clear. The meetings are generally guided by the key management steps of planting, ripping, and herbicide application. This lack of understanding of the roles and obligations of the lead farmer has negatively affected the standard and therefore the impact of some of the demonstration plots hosted by lead farmers, many of which look like ordinary conventional fields due to poor management and lack of attention to detail. In Chibombo, the SAO highlighted that camp officers had no capacity to correctly set up demonstrations and therefore needed training in that area. Failure to realize this training need may have affected the status of the demonstration in some other districts. The limited understanding of the CA concept also appears to have affected the status of the demonstrations. The absence of soil cover or mulch, for example, which was mostly attributed to communal livestock grazing regimes and wild fires, was in many cases also observed even at homestead field that were protected. This implies that farmers did not apply this principle mostly as a result of the lack of appreciation of the benefits associated with maintaining soil cover in CA systems. To enhance the understanding of the CA concept by lead and follower farmers, the lead farmers should have considered it as an obligation to have demonstrations that portray the correct message. Limited availability of appropriate CA material at field level may also have affected the both the lead and follower farmer's understanding of CA.

In subsequent years as the lead farmers out-scale, the status of the initial CA demonstration plot becomes unclear. The larger expanded fields replacing the initial demonstration plot may not have the same management levels as the smaller demonstration plots that have an advantage in terms of easier management and therefore better ability to correctly portray the potential for CA. It is also not possible to show the long term benefits of CA unless the demonstration plot is maintained in the same position (see Figure 6) for some time⁵. There may be need, therefore to adequately support farmer field schools , which could be maintained over long periods and provide data in terms of long-term benefits of CA , like soil quality changes, progressive yield increase, etc.

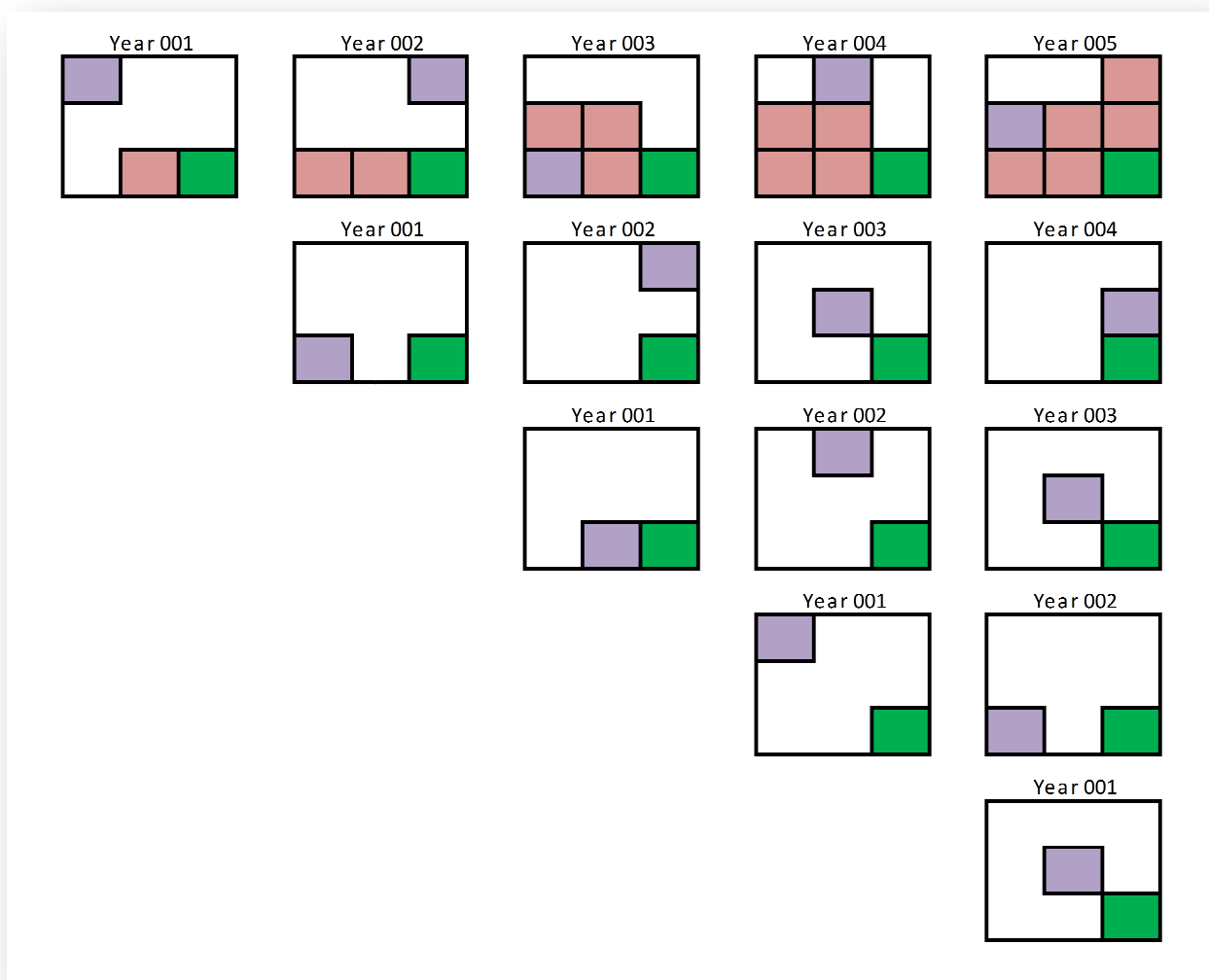


Figure 6. The value of the demonstration at current (purple) and preferred (green) out scaling on a model farm (white).

The expansion or replication pathway for the lead farmer model of extension has stalled. The discord between the lead farmer and follower farmer is palpable. New camps on to which the programme has

⁵ This is the weakness of out scaling within the farm, we lose the long term effect in the demo.

expanded do not have follower farmers due to the conflict over e-vouchers and bicycles which lead farmers have and follower farmers do not. Overall, the number of follower farmers is lower than planned as often only 8 out of the 15 are actively or purposively involved in the project activities. In this regards, the e-voucher does not sit well with the lead farmer concept and may be an obstacle to the linkages between the Lead Farmer and the follower farmer, quite the opposite of what it was meant to be.

Another source of possible stagnation is the leeway given to the lead farmer to select follower farmers. This team came across a case where the lead farmer was the senior wife and the junior wife and a son to the senior were follower farmers. All these were under one household where the decision to use a parcel of land was not in their hands but the owner of the farm (the husband), in whom lay the power to dispose.

In the face of alienation of the follower farmers and the loss of the demo at out scaling in farm, the justification for keeping the lead farmer is diminished. Instead the best performing follower farmer should be picked every two years so that members of a group know they have a chance to access the e-voucher. Or better still each member of a study group may have an equal chance of hosting the voucher by randomly selecting a voucher recipient every two years. Other forms of non-voucher incentives should be considered. For instance the farmer could receive certification to prove they have attained a yield level above 5 tons per hectare while using CA. Such certification would indicate the farmer is less vulnerable to weather changes and, therefore attractive to finance institutions who may find it safe to extend seasonal loans to such farmers. The fact that CA practice should confer preference for loans should be a stronger but neutral incentive limited only by the level a farmer dedicates to CA practice.

6.5.4.Challenges of the Lead farmer Model

The lead farmer identified the follower farmers, and interested them to join the project. Because of the input and equipment vouchers given to the lead farmers, the participation of follower farmers has gone down. As the Lead farmers were selected at community level, those who were not selected have been reluctant to become follower farmers as that appears to demote them or elevate certain people to a status “that does not suit” them. Consequently the interaction between the lead farmer and the follower farmer is problematic and presents a lot of challenges to the extension approach as implemented in the project. The lead farmer reported specific times that they met with the follower farmers:

- a. At harvest, the lead farmers are called to explain the start of the land preparation
- b. Start of planting
- c. Occasional home visits to encourage the follower farmers on their journey to adoption of CA to improve productivity.

The lead farmer has fewer than the 15 farmers he/she is supposed to have. In contrast, the lead farmer in CFU has 90 follower farmers. The lead farmer model in FISRI is stalling and needs injection of new dynamism to prevent it from falling into dead routine for a clique.

6.5.5.Fate of the Follower or Participating Farmer

Follower Farmers are essentially “club members” without benefits. The project is seen as a source of support for members. There is a growing division between lead and follower farmers because of this apparent exclusion from the perceived benefits of the project. Despite this clamor for the FISRI inputs,

most receive inputs from the FISP programme which is also on course to adopt vouchers. The district extension has explained that the Lead Farmer demo is for all follower farmers to learn from. Follower farmers are free to visit the LF whenever they need to. The overall mood, however, is that the follower farmers would rather visit the camp officer than the lead farmer. The ownership of the inputs obtained by some camp extension officers from the E-vouchers is apparently strictly personal. A camp officer in Chipata asked if the project could give camp officers an extra voucher to support the farmer field school. Currently, the farmers provide inputs for the farmer field school from their own proceeds. This author pointed to him that he already had a voucher which he could use to buy the inputs for the farmer field school. He promptly replied, without hesitation, that “The voucher is mine” and he could not therefore cede it to the farmers. If the camp officer is that clear about the vouchers, we see a link with the strong and persistent request for the follower farmers to have vouchers of their own.

Given the uneasy relationship between the lead farmer and the follower farmer, a rotating of the demo plot across the members may create a sense of belonging to the exclusive club of members who access inputs and implements through e-vouchers. Since the lead farmer is supported, it may not be clear at this stage whether he or she is implementing CA as a result of the inputs supplied. The follower farmer in this case represents the ultimate impact of the project, there is therefore need to make a deliberate effort to document their activities. This potential role of the follower farmer was not clearly understood at the implementation level by both the camp officers and the lead farmers resulting in their neglect. Field days were mostly hosted by lead farmers, while the participating farmers with something to show were mere bystanders. Efforts to document a sample of follower farmers should be facilitated by the project in order to gather evidence on adoption processes as this data will provide evidence on the sustainable adoption of CA technologies. Random samples of these farmers could be taken and then followed through during, and beyond the project where possible.

It is important to note that the adoption process normally takes over several years – four to five years as shown in Table 2 below. This implies that there may be no actual adoption by follower farmers in the initial years as many of them may still be going through the initial stages of adoption. A monitoring framework could, however still be put in place to document their activities in order to capture any aspects that the follower farmers may be adopting.

Table 2 Stages of the adoption process

| | |
|----|--|
| 1. | Awareness: farmers hear about the innovation |
| 2. | Interest: farmers seek further information about it |
| 3. | Evaluation: Weighing up the advantages or disadvantages of using the technology |
| 4. | Testing: farmers will test the innovation on a small scale for themselves |
| 5. | Adoption: Farmers will apply CA technologies on a large scale in preference to conventional farming methods |

Source: Adapted from Van Den Ban and Hawkins, 1985

6.6. Best Agricultural Practices and evidence of their uptake by farmers

The FISRI project set out to improve food security at household level of farmers in the rural Zambia. To enhance this, the project selected agricultural production practices that had proven track record of increasing productivity and thus contribute to increased production. Against a background of long research on production practices in Zambia Conservation Agriculture technologies were identified and promoted.

6.6.1. Conservation Agriculture Principles: Theory and Practice

CA is defined as “a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment” (FAO 2007). It comprises three core principles: (i) minimum mechanical soil disturbance, (ii) use of crop rotations and interactions, and (iii) the maintenance of soil organic cover in the form of dead organic materials or live crop cover. Correct implementation of the three core principles enhances and improves crop management including early planting, improved weed management, and more efficient utilization of fertility amendments (manure and fertilizer) due the precise application of the same. The understanding of CA as a natural resource management strategy is not clearly articulated and understood. Improved soil quality and reduction in cropped areas as a result of increased yields can benefits pasture quality. This can be highlighted as a benefit to livestock farmers and consequently enhance their adoption of CA.

6.6.1.1. Minimum soil disturbance: To ensure minimum soil disturbance, land preparation technologies promoted included the following:

Basin-making: this practice constituted the first step by which farmers excavated a basin of some dimension and used it as a planting station for a number of seasons. Planting and input application was administered into this basin, thereby concentrating the resource directly to where the crop was. An appropriate tool, the Chaka hoe (Figure 7), was used for the making of the basins, though at the initial stages farmers used ordinary hand hoes. The Chaka hoe is a product of intensive research in Zambia characterized by being strong and of specified weight to ensure ease in the basin making. The FISRI project supported LFs in purchasing Chaka hoes via vouchers. The tool has limitation in that it can be used only for small areas (<5 ha), as it requires a lot of energy. The energy demand in the use of the tool presents some factor that disadvantages female farmers from using it extensively.



Figure 7. A Chaka hoe and a Magoye ripper with accessories in an Agro-dealer shop in Mpongwe District.

Ripping: this was the opening a furrow in the ground using a ripper (Figure 7), which is a specially-design implement. The furrow constituted the place of planting and input application. Having the same advantages as that of the basin in terms of efficient use of inputs, ripping required some form of draft power. Oxen and/or tractor can be used in the ripping, thus adoption of this tool required access to some form of draft power. With the ripper a large area can be cultivated. In the FISRI project there was provision of vouchers to LFs, only, to enable them access services that complemented use of these tools (from service providers). While farmers interviewed appreciated the ripper in that it enables them to prepare their land in a shorter period, thereby enhancing early planting, some farmers in Mono camp in Mumbwa complained that it is not ripping deep enough and this may be affecting some crops like maize. In this case including a sub-soiler in the input package would ensure that plough pans are broken and crop growth is enhanced.

Direct seeding: The project also introduced the use of animal-drawn direct seeders which can rip, plant and cover seed in one operation. These were supplied to contractors, who would then offer services to farmers through the voucher system.

6.6.1.2. Maintenance of soil organic cover: The maintenance of soil organic cover is in the short term meant to improve water infiltration, reduce evaporation, suppress weed growth and at the same time safeguard the soil from erosive forces. In the long term the residue is also meant to revitalize the soil in terms of organic matter and contribute to carbon sequestration. This entailed that at harvest the crop residue would not be removed from the fields. The same effect could be achieved through the use of other dead organic matter (grass) or live crop cover (Figure 8). The practice was in most cases challenged by the demand of cattle grazing; as in most rural areas cattle graze on range and will, therefore, consume the crop residue. In practicing this intervention farmers were also advised not to burn the residue: again this was difficult to

control as bush fires were a common feature after harvest for a number of reasons including the facilitation of rodent hunting.

Despite the fact that CA/F is about observing all the basic principles, the post harvest study also established that the other CA practices are not receiving much attention by farmers. For instance, there were few households that were using organic matter resources as soil fertility additives for soil improvement. Only about 3 percent were practicing composting and 17 percent applied manure in the 2010/11 agricultural season. These findings suggest that more extension effort is required to enhance the practice of other CA technologies.



Figure 8. Mulching in a Sunflower field in Muswishi Camp, and in soya bean crop in Ploughman's Camp in Chibombo District.

6.6.1.3. Crop Rotations and/or interaction: The final key guideline of CA dealt with crop rotations and interactions. The practice was centred on the use of legumes in the rotation (Figure 9) thus ensuring that the advantages associated with this practice accrue to the farming system. In the project legumes included all pulses. In practicing rotations, farmers faced challenges in sourcing legume seed and also finding market for their legume crop after harvest. As such portions under legume were much smaller than those under cereals in the farmers' fields that were observed. To enhance rotations, the evaluation team is of the view that the input packages supplied via e-vouchers should only contain legume seed as farmers would buy the maize seed any way, even if not supplied



Figure 9 Planting of beans and maize in rotation: A field of a Lead Farmer in Kanakantapa camp in Chongwe District

6.6.2.Promotion of best practices

The promotion of the Best Agricultural Practices was done through training and demonstrations. Indeed the use of the voucher to access the inputs, implements and/or services facilitated the uptake of the practices. Most of all, the use of vouchers created networks which are involved in the supply of agricultural services and products thereby ensuring sustainability in the supply of these components even beyond the project period.

Training was planned for the different categories of beneficiaries viz; camp officers, lead farmers and follower farmers. The model used to deliver the messages on CA entailed training at all levels. The training was conducted by experts wherever the project could get them, but mostly by the Conservation Farming Unit (CFU) and the Golden valley Agricultural Research Trust (GART). The training was normally planned in terms of the relevant activity at the time of the training: digging basins, ripping and planting just before the start of the season, application of fertilizer and herbicide use, etc, thereafter. While it is important to focus on the relevant activities at each training session, it may be necessary to ensure that the recipients of training understand the conservation agriculture concept and its benefits. Understanding the concept allows innovations as farmers can adapt some of the technologies but still adhere to the basic principles.

Implementation of CA in the project districts visited involved the application of mainly two major CA principles of minimum mechanical soil disturbance and the use of crop rotations and interaction. The beneficiaries generally defined CA as a list of activities that they implement in the programme, (digging basins, applying fertilizers, herbicide application etc) without necessarily stating the three core principles. There may be need therefore to also include the teaching of CA as a concept at each training session. The use of a comprehensive CA training guideline could be one way of achieving this. To promote best

practices, there is need to document success stories, which can then be used as focal points for learning. The evidence of documentation of these in the project was perceived to be very limited.

Application of the CA principles enhances the following “best agricultural practices”:

- Efficient use of external inputs.

The precise application of fertilizers and manure ensure more efficient use of these resources as they are placed in the planting station, close to the plant roots where they are required. This can greatly reduce the quantities and therefore the cost of fertilizer requirements. The placing of lime in rip lines was observed to reduce the lime requirements, although no data was available on the actual rates per hectare.

- Use of herbicides to reduce labour for weeding

The use of herbicides in CA systems has been greatly welcomed by the beneficiaries, who are highly constrained with labour, especially for weeding. However it is important that the project uses a more integrated weed management approach to ensure sustainability of CA systems and inclusivity in terms of CA adoption across social groupings. The excessive use of the same herbicide may bring about resistance in some weed species which may result in frustration for the farmer and the possibility of reverting to conventional ploughing as a weed control measure.

- Use of crop rotations and interactions to enhance soil fertility

The inclusion of legumes in rotations in CA systems has been used by farmers to reduce their fertilizer requirements in subsequent years. There was evidence of farmers successfully growing crops on fields previously occupied by legumes with reduced fertilizer rates or sometimes with no fertilizer at all. Shortage of legume seeds and insecure markets for the legume crops have affected farmers commitment to growing legumes in CA systems

- Timely planting

Use of CA manual systems have reduced the farmers’ reliance on draft power and enabled even those farmers without livestock to plant early in the season as they are able to prepare their planting basins slowly over time using a hoe.

6.6.3. Use of CA implements among the beneficiaries.

The most commonly used implement among the beneficiaries was the Chaka hoe (table 3), mostly because it does not require any draft power. The use of the animal-drawn ripper was also quite common because even the beneficiaries without the rippers and livestock could hire services from those with the implement and the livestock owners. Fewer farmers accessed the animal-drawn direct seeders and the tractor drawn equipment as these were introduced in the final season of the project and focused on six districts only. The cost of hiring tractor services may also be prohibitive in some instances.

Table 3 CA implement use among the different groups

| For the Area under CA, implement used. | Category of Beneficiary | | |
|--|-------------------------|--------------|-----------------|
| | Lead Farmer | Camp Officer | Follower Farmer |
| | N | N | N |
| Chaka hoe basins | 163 | 19 | 107 |
| Ox-drawn ripper and Hand sow | 73 | 32 | 33 |
| Ox-drawn (ripper) Planter | 31 | 8 | 6 |
| Tractor drawn planter in ripped lines | 16 | 2 | 1 |
| Total | 283 | 61 | 147 |

$$\chi^2 = 40.4 \text{ (p=0001)}$$

Table 3 above indicates the tendency to use certain type of tools depends on the farmer category. The low significance value suggests that the number of beneficiaries does differ by the type of implement used. Whereas 16 lead farmers used the tractor, only one participating farmer did so.

6.6.4. Evidence of CA Uptake as indicated by number of vouchers redeemed

A number of CA supporting technologies were availed through the project and these were in form of inputs, implements and services. Based on the vouchers redeemed it was observed that the number of farmers that demanded the technologies varied from 2010/11 to 2011/12 season (Table 4).

The highest proportion of seed purchased was that of maize, in both seasons, 17.9% and 8.6% respectively. The number of units demanded for sunflower, sorghum and cowpea seed increased significantly, 147.5 %, 172.8% and 92%, respectively. On the other hand a reduction was observed for maize (44.8%) and soya (29.3%). This could be explained by the fact that the importance of these crops in rotation under the CA programme was being realized. The reduction in the number of farmers that demanded maize and soya bean does not mean that farmers reduced their need for maize rather, using the vouchers farmers decided to purchase seed of other crops.

Chaka hoes were the most sought after implement unit constituting 11.2% of the demanded units in 2010 and 12.6% in 2011. followed by rippers at 2.4% and 3.8%, respectively. The trend in the uptake of most CA implements was very steep ranging from 220 to 423 %. The relatively low change in demanded units of Chaka hoes represented a saturation situation for the implement; the high number of units in 2010 could change only a little. The change in the Trek chains was the highest (423%) given the wide range of use the item can be put for ox-driven equipment and for on-ward sale to other ox-owners.

Another input of importance in CA was fertilizer, both the basal and top dressing, which constituted 19.8% and 17.6%, respectively, of the demanded units in 2010/11 season and 17.8% and 19.3%, respectively, in 2011/12 season.

The use of herbicides by small scale farmers has been noted to be a new practice, however the observed uptake of 11.2% of the total demanded in 2010 and 8.8% in 2011 point to the realized role the technology plays in weed control.



Figure 10. Two lead farmers with different degree of weed control. On the left (Mpongwe) a herbicide was used while on the right (Kaoma) no herbicide was used.

A sharp swing was noted in the purchased knapsack sprayers (252%) complementing the demand for herbicides. Weed control through use herbicide is a critical component of CA. During the field visit weed free fields were observed where farmers used herbicides and weeds were a problem when herbicides were not used (Figure 10).

The significant reduction in the demand for most legumes and inoculums could be a result of the poor quality legume seed which was observed in some area and the unavailability of market for the harvested crop.

Table 4 Percentage Changes in the uptake of CA Components from 2009 to 2011(based on purchased items from the e-vouchers)

| | Product Name | Number of Units demanded in 2010 | Proportion | Number of units demanded in 2011 | Proportion | % change |
|--|-----------------------|----------------------------------|------------|----------------------------------|------------|----------|
| | Legume - Beans | 532 | 1.2% | 519 | 1.0% | -2.4 |
| | Legume - Cowpea | 214 | 0.5% | 412 | 0.8% | 92.5 |
| | Legume - Groundnut | 788 | 1.7% | 657 | 1.2% | -16.6 |
| | Seed - Maize | 8289 | 17.9% | 4572 | 8.6% | -44.8 |
| | Seed - Sorghum | 80 | 0.2% | 219 | 0.4% | 173.8 |
| | Legume - Soya | 429 | 0.9% | 271 | 0.5% | -36.8 |
| | Seed - Sunflower | 244 | 0.5% | 604 | 1.1% | 147.5 |
| | Legume - Velvet Bean | 163 | 0.4% | 158 | 0.3% | -3.1 |
| | Chaka Hoes | 5170 | 11.2% | 6687 | 12.6% | 29.3 |
| | Hitch Assemblies | 489 | 1.1% | 1566 | 3.0% | 220.2 |
| | Magoye Rippers | 1116 | 2.4% | 2002 | 3.8% | 79.4 |
| | Ripper Bolts and Nuts | 636 | 1.4% | 1065 | 2.0% | 67.5 |
| | Ripper Spanners | 233 | 0.5% | 1152 | 2.2% | 394.4 |
| | Ripper Tines | 182 | 0.4% | 662 | 1.2% | 263.7 |
| | Trek Chains | 351 | 0.8% | 1837 | 3.5% | 423.4 |
| | Fert - AN | 332 | 0.7% | 1152 | 2.2% | 247.0 |
| | Fert - D Compound | 9166 | 19.8% | 9433 | 17.8% | 2.9 |
| | Fert - Urea | 8143 | 17.6% | 5455 | 10.3% | -33.0 |
| | Lime | 2195 | 4.7% | 1551 | 2.9% | -29.3 |
| | Inoculum (L) | 83 | 0.2% | | 0.0% | -100.0 |
| | Herbicides | 5179 | 11.2% | 4697 | 8.8% | -9.3 |
| | Knapsack Sprayers | 2211 | 4.8% | 7801 | 14.7% | 252.8 |
| | Zamwipe | | | 603 | 1.1% | |
| | Total | 45693 | | 53075 | | |

1. Adoption is still hampered by the lack of vouchers among the follower farmers who strongly feel they were unfairly denied membership to the e-voucher; weeds have been the major barrier to adoption of CA. The introduction of herbicides has opened up CA to many farmers. In these initial stages there are areas of knowledge and skills that need attending to. We expect these problems to continue to be important in the next 5 five years.
2. Options to smoothen entry into herbicide use include developing spraying service providers who would streamline the mixing, calibration and other fine details involved in herbicide application. However, as conditions of weeds vary per farm, the long term goal should be the capacity of the farmers to carry out their own spraying.

3. The impetus for use of ripping was the apparent problem with rains. Together with herbicide spraying ripping was opted for in order to speed up planting. Herbicide is advantageous because it reduces the time taken by women to weed from as high as a month to only two days.
4. There are district differences not only at the large agro-ecological level but also down to the micro-environment resulting from the soil – culture interactions. The core team in Sinazongwe felt that the emphasis here should have been on “change of attitude”. The teaching of skills is not yielding results because of attitude barriers. A careful understanding of the rationale of the farmers is still needed to gauge exactly where and how to intervene
 - a. The stony nature of the soil prevent smooth operation of the rippers and chaka hoes
 - b. The tightly growing grass in the lake flood zone is so difficult oxen fail to pull the ripper through.
 - c. Consequently we do not find many farmers buying the ripper or chaka hoes for cash.

In order to ensure that the practices are replicated there is need to documents the processes involved. There is no evidence of a learning and documentation strategy in the project due to the rather very weak monitoring and evaluation system. The project is process focused; there is need that there be included in the design a “learn, practice and reflect” component to ensure experiential learning is accomplished.

Since the project is facilitating the adoption of the practices via provision of inputs, services and implements, and this is not a sustainable approach there is need to link with other programmes that specifically provide the non-process aspects such the FISP.

Evidence in the field has shown that female farmers are very active in CA thus for the practices to be replicated in other programmes the engendering of the programme must be explicit.

It is evident that the project has stimulated uptake of CA technologies. To sustain this, draft power source must be addressed for increased cultivated areas and full participation of both males and female farmers. Oxen provision and/or tractor services should be considered in promoting CA.

The advice to farmers is to make basins soon after harvest while the ground is soft. How wide is this window, what other activities are present in the window, how much land can be prepared in the window? Basins are said to be hard to prepare during the dry season, consequently more basins are made during the rainy season. It ought to be a monitoring variable to see in which month the basins are made and why:

1. The land may be too dry for making basin during the dry season
2. Basins made soon after harvest are destroyed by cattle as they feed on the stovers.
3. Sandy soils cannot hold basins longer than a month in a field exposed to normal traffic

7. Capacitating small-scale farmers through improved input subsidy electronic voucher system.

The project in providing this facility engaged a private financial organization, Money Transfer Limited (Z) to manage the voucher system. There were a variety of vouchers that were provided namely:

- Input vouchers for the purchase fertilizer, seed, and herbicide valued at ZMK 250,000
- Implement voucher for the acquisition of CA implements such as Chaka hoes, rippers and sprayers also valued at ZMK 250,000

Service vouchers for accessing relevant services in the application of CA valued at ZMK 750,000 (for tractor services) and ZMK 250,000 (for oxen related services)

7.1. How the E-Vouchers Scheme was Implemented

The e-voucher is intrinsically tied to the agro-dealer and is meant to be a cost effective means of targeting agricultural inputs in the form of incentives to smallholder farmers practicing conservation Agriculture. The model involves the issuance of an e-voucher by FAO, the programme implementer, to a farmer as a bond worth a certain monetary value that can be spent or redeemed for specified agricultural inputs at a local agro-dealer's outlet. Each beneficiary is issued with vouchers to enable him/her access inputs or services for the season. The agricultural inputs against which vouchers are redeemed include basic inputs and CA tools. The scheme is a departure from direct procurement model that requires the programme implementer to inputs in bulk and distribute them to targeted beneficiaries.

The beneficiaries are linked to the e-vouchers using any mobile phone over a specified interface. The e-voucher serial number is linked to the farmer's NRC number for security, so that only the farmer can redeem the voucher.

The scheme works in the following manner:

1. The client or programme implementer (FAO) deposits funds with MTZ to back up the value of vouchers issued to beneficiaries into their client account accessible only to the transactions allowed. Beneficiaries are targeted, and preloaded into the platform for added security
2. Beneficiaries are registered in the system and then receives an electronic voucher scratch card
3. Beneficiaries redeem their e-vouchers at one or more registered retailers. The system keeps track of what products are received by the beneficiaries.
4. The retailer is automatically paid the value of the products redeemed from the funds in the client account.
5. The implementer monitors the information about beneficiaries and redemption in real time.

Overall, the system included the selection of agro dealers qualified by set criteria to offer the service to farmers. The beneficiaries are also selected and registered in the system. Vouchers are prepared and linked to the beneficiaries by students. The Extension service distributes them to the farmers.

7.1.1. Agro-Dealers

7.1.1.1. Location and Criteria of selection:

The participation of Agro-dealers in the FISRI project required that they be identified for the purpose that supports the projects' objectives. In this regards the selection of Agro-dealers was to be purposive, but

open/fair and transparent to avoid any monopoly. There was observed a variation of selection criteria from district to district, yet guidelines for the selection of Agro-dealers were available.

Criteria for selection of a participating Agro-dealer were:

1. Registered Zambian Company. An established agro-dealer (registered) with fixed premises
2. Have physical presence in the beneficiaries district
3. At least one year of proven record in either seed or fertilizer and agricultural equipment sales. Though not expected upfront an Agro-dealer that can cushion shocks in business (due to delays in transactions and/or sudden change in transactional costs) was preferred.
4. Stocks more than one type of agricultural input (chemicals, seed and farming equipment)
5. Holders of seed traders' license (in case of seed supplier)
6. A physical survey is recommended annually to review the performance and ascertain if there are new agro-dealers actively selling agro-inputs in rural areas

Through the Project, Agro-dealers were able to increase their sales and the scope of products, with special inclusion of CA technology tools such as chaka hoes, rippers, accessories of ripper attachments etc. Procurement of products is guided by past season performance and the projected sales for the coming season.

7.1.1.2. Experience of Agro-Dealer with e-vouchers

The value of the voucher presented to the agro shop does not cover all the inputs required let alone the whole farm, consequently, vouchers come second to “cash purchases” as a source of inputs at the farm.

The purchase of implements and other inputs is supplemented by the farmer topping to cover the full cost. The Top up is very small ranging from 1.1 percent to 2.8 percent. Many agro dealers were not willing to share their records, especially cash sales. From the ones that shared and from verbal statements, the vouchers were a significant proportion of total sales; some reporting up to 75% of sales being from vouchers during the season.

The impact of the voucher scheme on agro-dealers has been remarkable for many. From selling seed, vet drugs and fertilizers, the agro-dealer has expanded to CA implements and inputs such as herbicides, ripper assemblies, chains, and sprayers. The vouchers have allowed agro-dealer to expand to other districts. In addition to expanding his transport fleet, an agro-dealer in Chongwe has clinched a deal to import agro-chemicals in his trade name. Resulting from the higher sales during the voucher season the voucher shops tended to embark on expansion programme.⁶

⁶ The case of the Kaoma agro-dealer who was opening another outlet in Senanga and TBZ in Kaoma; there is currently no agro-dealer in TBZ nor Senanga. The case of Kumawa in Chipata that has outlets in Petauke and Chongwe).

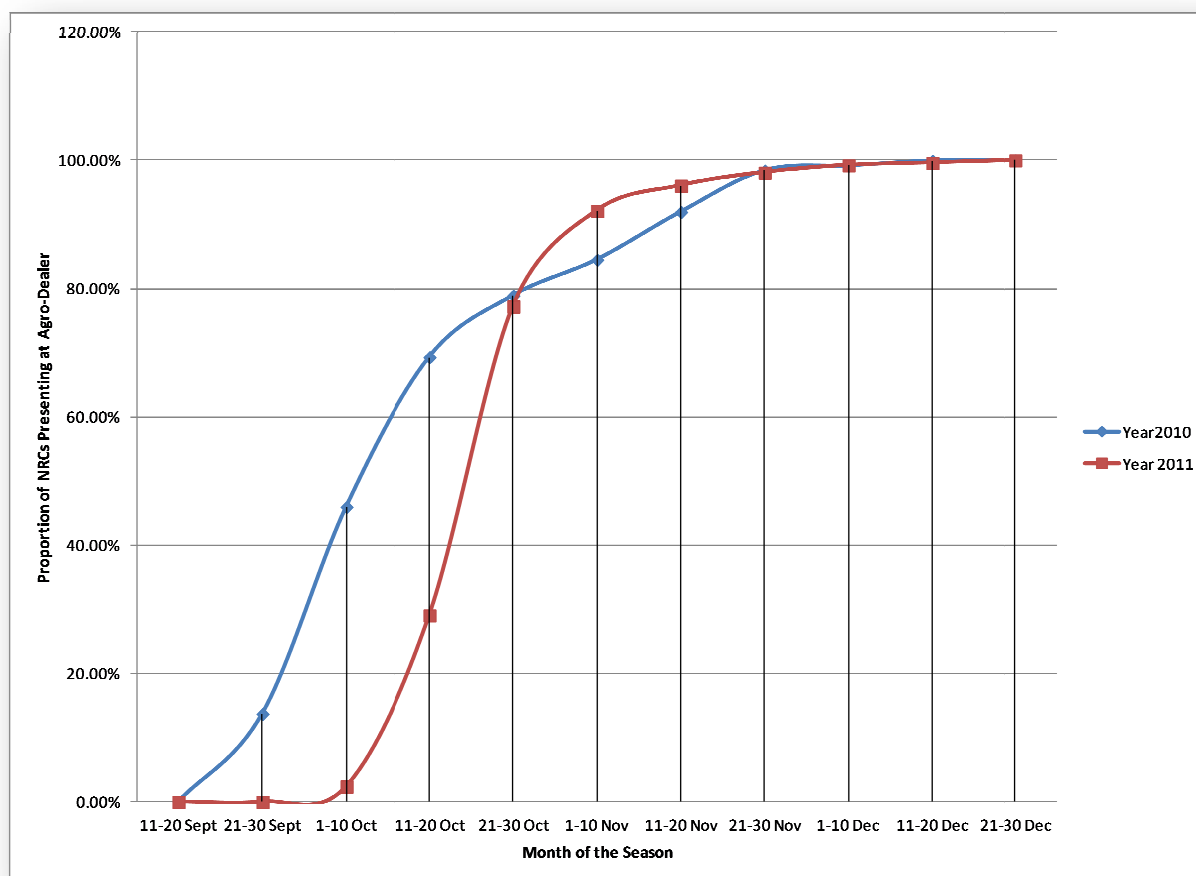


Figure 11 Timing and Rate of Voucher Redeeming at Agro-dealers for 2010 and 2011 seasons.

In year 2010, the e-voucher season was early. In comparison the 2011 season started almost 30 days later than the previous season⁷. In 2011, the season started in the first week of October whereas at this time last year, 46% of the transactions of 2010 were already presented. However, in 2011, the presentation of transactions was much faster the first 40 days such that by 30 October, the number of transactions in 2011 was practically the same as was the rate at this time in 2010, 80% of transactions presented. The 80% mark was reached in 40 days last season but in half the time in 2011.

The period of validity of the voucher was a fixed for one month only but in all cases the vouchers were delivered late thus the redeeming period was reduced (Figure 11 above). This resulted in 'panic buying' by farmers: a situation that predisposes the farmers to exploitation by Agro-dealers as there is no time for 'shopping' to compare prices and indeed negotiate. Because vouchers were redeemable only in certain shops a situation presents itself for formation of a price cartel by agro-dealers to exploit farmers by increasing prices of items on the vouchers.

⁷ The impact of an Election year

7.1.2. Farmer Experiences with the voucher

The e-voucher has been very helpful for the farmer to gain access to inputs and implements that gave them the capacity to implement CA. Although the selection of lead farmers appears to lean towards “Wealth” farmers who might not need the supplemental subsidy, the importance to the farmers may also be gauged by the feeling of exclusion expressed by follower farmers for not receiving the voucher. The farmers looked at price and availability of items to arrive at a decision to buy from a given shop.

7.1.2.1. Challenges for the Farmer

7.1.2.1.1. Pricing of inputs, the difference between voucher and non-voucher shops.

Prices of inputs between voucher and non-voucher shops was not investigated but it is envisaged that non-voucher shops paid no attention to the voucher system in their pricing rather presented their business as attractive as possible for the general farming community. Agro-dealers cater for the farming community at large and thus ascertain that they do not differentiate between voucher and non-voucher holding farmers.

Further agro-dealers state that pricing of the inputs is determined by that obtaining price structure from the suppliers.

7.1.2.1.2. Difference between before and after the voucher season for both types of shops.

Farmers using vouchers noted a change in prices of inputs before and after the voucher season among the voucher shops, being higher during the voucher season, though the agro-dealers state the contrary.

The farmers strongly believe that Agro-dealers increased input prices for the items on the vouchers during the voucher redeeming period. The M&E system ought to catch this change in prices.

7.1.2.2. Challenges faced by agro dealers

Vouchers are released by MTZ and delivered to the districts. There has been varied ways through which the vouchers were delivered ranging from MTZ using students only to MTZ working with the MAL staff.

MAL staff linked the vouchers to the farmers and distributed the vouchers. Prior to redeeming the vouchers farmers ‘shop’ for better prices for the specified goods among Agro-dealers.

Agro-dealers who have lost clients due to problems with redemption process of vouchers and from other reasons not discovered by this study are suspicious of a third force influencing the buying behaviour of farmers. We prefer to ask for the type of services agro-dealers offer to attract customers to their shop:

1. The emerging competition among the agro-dealers has instilled a sense of entrepreneurship evidenced by some agro-dealers offering **transport** for farmers’ inputs.
2. At the **risk** of vouchers not being redeemed, due to some error/problem in the redeeming process, some agro-dealers gave inputs before the vouchers are redeemed. This has led to some serious problems of unredeemed vouchers with agro-dealers; a financial challenge that should be addressed quickly to ensure success of the voucher system.
3. Evidence of expired and slow moving items sold on vouchers to farmers would indicate herding

4. Farmers are able to obtain goods **NOT authorized** by the contract. Left to themselves, the farmers buy seed and fertilizers only⁸. The agro-dealer has to try and get the balance right in terms of the type of agriculture the farmer is supposed to practice
5. The Agro-dealer may use the extension worker as his agents and give them commission for **herding** the lead farmers his way.
6. In the 2011/12 season, many vouchers in were rejected by the system. The suspicion fell on the registration process carried out by university students. Some dealers could not redeem any vouchers this season due to the difficulties with the system and have let the season pass. The start of the redeeming season was late and so did not leave much room to sort out the problems with the system. An agro dealer in Kalomo ordered rippers, sprayers, herbicides in advance but this stock has not been bought due to the difficulty in voucher redemption.
7. There were a lot of problems with redeeming vouchers this 2011/12 season. To resolve them, MTZ had to train the extension staff to have access to the system and assist the farmers in need. Lead farmers in Simujika confirmed that the redeeming exercise was perfect and got assistance from an appointed extension when they needed it. This was in contrast to Kalomo district where the registration process appears to have been the main source of errors encountered at redeeming.
8. The agro-dealers are generally content with the FISRI programme. Some dealers report that the vouchers account for over 70% of sales. Challenges experienced by dealers are varied but the common challenge is the frustrations encountered when vouchers fail to redeem for a variety of reasons. Other problems are:
 - i. Input availability—items such as chaka hoes are sourced from Zimbabwe by one company only. Agro-dealers do not have the leeway to source on their own. Other implements are the rippers and tines. In the absence of these items, some agro-dealers have substituted them with spares, sprayers etc.
 - ii. When they arrive at the agro-dealer, some farmers appear not to know what they want while some come very prepared after having earlier sent a reconnaissance survey over prices and availability of items.
 - iii. In some districts up to 90% of farmers top up the vouchers to get their inputs or equipment. However the amount of top up is often small averaging 2.85 at most.
 - iv. Agro-dealers face pressure to sell items not listed on the voucher. Farmers may argue that they do not need to buy a chaka hoe because they bought one the previous year. This encounter has led agro-dealers to suggest that the farmers be **rotated** to permit other access to CA implements⁹. Alternatively, the voucher should include other inputs aimed at augmenting the CA practice such as attention to soil health.

⁸ The Follower farmers in Sinazongwe were asking for seed only---if they could not get the package that the lead farmers were getting.

⁹ CA takes long; effects may not show in one year. The voucher does not permit a farmer to buy all the equipment at once—it is expected that the farmer would start with the priority instrument and build the full complement over time.

- v. The redeeming started 30 days later than last year thereby restricting the window of execution. The procurement process requires ample notice time. A larger window of redemption would give the dealer and the farmers to plan their purchases.
- vi. In Chipata and Chibombo, some agro-dealers felt they were being disadvantaged by some forces that are diverting all the vouchers to a preferred shop (Figure RR) below.

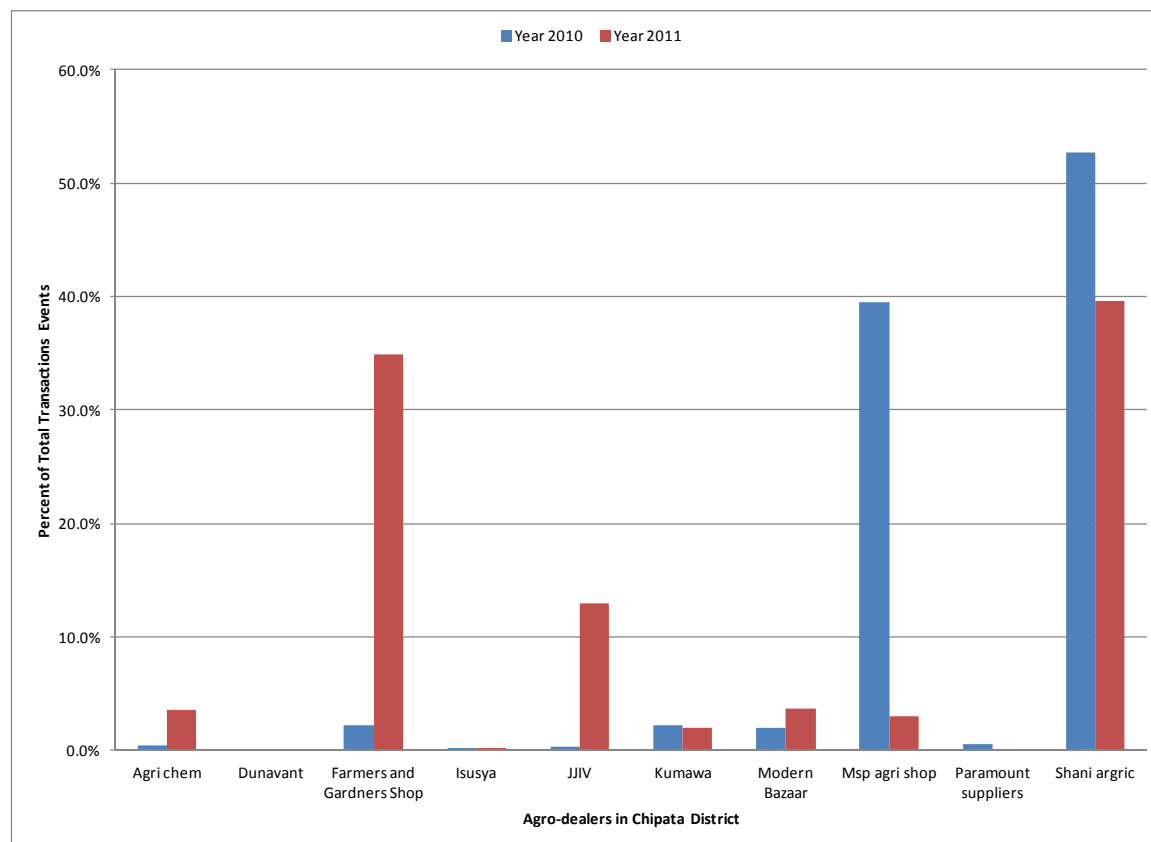


Figure 12 Change in Transactions between two years for Agro—Dealers in Chipata

7.1.3. The way forward

For a long time, development workers lacked the means to show in real life the way the models, equipment, systems of production etc were working. The market did not stock the items because there was no demand, and the farmers could not demand it because they were yet to be convinced. The e-voucher has been able to address the two needs simultaneously. We are certain herbicides have been known to small farmers or extension for a long time but not to the extent of actually using the herbicides. What the voucher scheme has done is to put the herbicides to work on a large scale and on many farms. The spike in demand for herbicides attests to the effective contribution of the voucher and the demonstration effect of the lead farmer as many purchases were by cash and by farmers outside FISRI. This analysis will be better done at the end of 2012-13 season when the MTZ implement a more detailed database.

The voucher is thus recommended for out scaling where we need to demonstrate the solution to a felt need. In FISRI the voucher was tied to the teaching role of the lead farmer and camp officers. In this role, the voucher enabled a demonstration of the CA technology components to all. Whether it has had the

desired impact on the target group; the follower or participating farmer is open to question until the project collects appropriate data on this group. This is strongly so because the follower farmers are despondent for not receiving the voucher. They are also the least reported beneficiaries.

8. Establishment and supporting of Conservation Agriculture mechanization and system of equipment hire.

In conjunction with MAL, FAO and ZNFU the project identified service contractors based on elaborate selection criteria guided by the rationale that the most limiting factor to agricultural production in smallholder farming sector is labour for land preparation, planting and weeding; Also that with increase in land area per farm household which stands at 3.27 ha hand cultivation is not practical.

In selecting the contractors the following were among the important criteria:

1. Interest in setting up and managing agricultural contracting business on a commercial basis
2. Capable of comprehending contractual obligations
3. Experience with agricultural machinery especially tractors
4. Having a customer care policy
5. Knowledge of agricultural chemical inputs (herbicides, pesticides, fertilizers etc.
6. Good marketing policy and strategy for agricultural machinery

Conservation Agriculture is characterized by operations that are done earlier than in the conventional cultivation practices as such timeliness is of essence and the project facilitated the scheme for hire of tractor or oxen services. The Zambia National Farmers' Union was contracted to manage the scheme using a revolving fund concept.

The scheme was supported by the project, indirectly, through provision of e-vouchers to LFs valued at 50% of the cost of CA land preparation, which included ripping, planting and spraying: an amount of ZMK 750,000 was attached to the voucher.

8.1. Conservation Agriculture Mechanization Pilot

8.1.1. Operation

The business model of a mechanization service provider centres on providing tractor and ox-drawn planter to operators who would provide a service to farmers in their locality. A total of 10 tractors and 234 animal drawn no-till/mulch planters have been distributed in Chongwe, Mazabuka, Choma, Kalomo, Monze and Kazungula. The tractor includes a ripper, trailer, sprayer, planter, and a sheller which is yet to be delivered. The tractor loan is K252million payable in three years. The operator is supposed to make three payments per year: (i) in January, (ii) after harvest, and (iii) after ripping in October. The business is performing well as by October 2012, K740 million was the target expected from the 10 tractors. Instead, the operators paid a total of K1.4 billion to date, effectively doubling the repayment. At this rate, the loan of 3.4 billion would be paid in less than the three years agreed.

Table 5. The number of clients served by one mechanization service provider, 2011/12

| Gender | Service | Cash | | Voucher | | Total for Cash and Vouchers | |
|--------------|----------------------|-------------------|------------|-------------------|------------|-----------------------------|------------|
| | | Number of Clients | Total Paid | Number of Clients | Total Paid | Number of Clients | Total Paid |
| F | HAULING | 2 | 1,250,000 | | | 2 | 1,250,000 |
| | PLANTING | 1 | 600,000 | 5 | 1,000,000 | 6 | 1,600,000 |
| | RIPPING | | | 13 | 3,900,000 | 13 | 3,900,000 |
| Female Total | | 3 | 1,850,000 | 18 | 4,900,000 | 21 | 6,750,000 |
| M | HAULING | 7 | 6,020,000 | | | 7 | 6,020,000 |
| | PLANTING | 5 | 5,900,000 | 14 | 5,800,000 | 19 | 11,700,000 |
| | RIPPING | 13 | 17,850,000 | 37 | 11,000,000 | 50 | 28,850,000 |
| | RIPPING AND PLANTING | | | 1 | 300,000 | 1 | 300,000 |
| | SPRAYING | 7 | 5,100,000 | | | 7 | 5,100,000 |
| | TRANSPORT | 6 | 3,390,000 | | | 6 | 3,390,000 |
| Male Total | | 38 | 38,260,000 | 52 | 17,100,000 | 90 | 55,360,000 |
| Grand Total | | 41 | 40,110,000 | 70 | 22,000,000 | 111 | 62,110,000 |

The tractor covered a wide area of almost 20 km radius to service the clients. For the operator in Table 5, a total of 111 clients were served of these 19% were female. Of the 111 clients, 37% paid for the services by cash while the rest used vouchers. This indicates the high demand for ripping and the viability of the service. Though only 37% of the clients, this number accounted for 65% of the total cash earned from the mechanization service.

The mechanization service providers were over stretched during this first season of operation. Firstly they have had to figure out how to source funds for operations while attending to a long queue of voucher carrying customers. In the end some voucher clients will only be attended to this 2012/13 season while some cash paying clients had their cash returned. The cash paying clients were a significant proportion of the clients and they enabled the operator to access cash for operation of the tractor service. The timing of the operations for the tractor service was generally late due to several factors:

- a. The modalities of the tractor service was spelt out clearly towards the end of the year
- b. Ox-drawn animal drawn no-till/mulch planters were only distributed in November

Due to the limited number of tractors, there was a lot of confusion in the season. Some farmers resorted to conventional farming when the CA tractor could not be accessed on time. Yet other farmers could not wait for the tractor to come and plant, instead used a hoe to plant along the rip lines. This need to carry out the

services in sequence has led to the operator in Chongwe to put a second tractor on the budget so that he could satisfy his customers better. One would rip while the other would plant and spray.

From Table 6 below, it is evident that the vouchers were used only for ripping and planting. Other services were paid for by cash. Taking only the activities using hectare as a unit of charge, we note that the cash paying clients had the biggest land worked at 126.5 ha, accounting for 60% compared to 85ha for vouchers. This difference in size of land serviced plus the other services bought for cash like haulage resulted in cash payment being 57% of the total income despite the cash clients accounting for 27% of hectare based services

Table 6. The number of units delivered by a Mechanization service Provider

| Gender | Service | Cash Payment | | | Voucher Payment | Grand Total |
|--------------------|----------------------|--------------|--------------|-----------|-----------------|--------------|
| | | Bags | Ha | Trip | Ha | |
| Female | HAULING | 150 | | 2 | | 152 |
| | PLANTING | | 3 | | 5 | 8 |
| | RIPPING | | | | 13 | 13 |
| Female Total | | 150 | 3 | 2 | 18 | 173 |
| Male | HAULING | 470 | | 18 | | 488 |
| | PLANTING | | 29.5 | | 29 | 58.5 |
| | RIPPING | | 60 | | 37 | 97 |
| | RIPPING AND PLANTING | | | | 1 | 1 |
| | SPRAYING | | 34 | | | 34 |
| | TRANSPORT | | | 19 | | 19 |
| Male Total | | 470 | 123.5 | 37 | 67 | 697.5 |
| Grand Total | | 620 | 126.5 | 39 | 85 | 870.5 |

8.1.2. Historical Trace

The first step in mechanization was the introduction of the plough to Zambia in the early 1900. That process is continuing today due to the observed advantages of mechanization. For example in 1988 the introduction of oxen in Northern Province gave the following (a) - The average area under cultivation increased dramatically, (b) - Average total production of maize among oxen owners was doubled¹⁰. There have not been enough oxen for every farmer even in cattle owning regions of the country. This shortage of draft power has led to late crop establishment a matter which was one of the justifications for use of planting basins prepared by hoe well before the start of the rains. A farmer so prepared will plant early at the start of the rains whereas before, he had to wait for the ground to be wet then plough. However, the use of the chaka hoe for basin making has come up against the constraint of the hoe in general which oxenization programmes have been trying to solve since the 20th Century. FISRI is one in line of projects that are promoting faster, larger and earlier land preparation. Planting basins may be earlier but they are not faster or lighter on the practitioner. The ox-drawn ripper solves the scale and speed limitation of the chaka hoe and conventional ploughing. Going further up the ladder, the tractor drawn ripper and planter

¹⁰ Kerven, C., Bolt, R. (1988) Oxenization and draught power implements in Northern province. A review of supply, impacts and constraints, 20 PP

improves upon the ox-drawn implements. This stage, however, is accessible largely by hire (see Figure 13 below), removing the control of time in the hands of the operator. As long as the barrier to entry is the cost of the tractors, operators will enter the business until profits become zero. To avoid over-concentration of the service in the hands of a few, the financing institutions should vary the repayment period from 3 years when the demand is high to 6 years when the demand is in equilibrium with supply. Keeping the number of operators high in this manner will open access to more farmers.

As the farmers associations grow financially, the ZNFU may find it profitably to lend to the group. Past experience on group ownership of machinery suggests private ownership or by organizations closely associated than farmer groups is to be preferred.

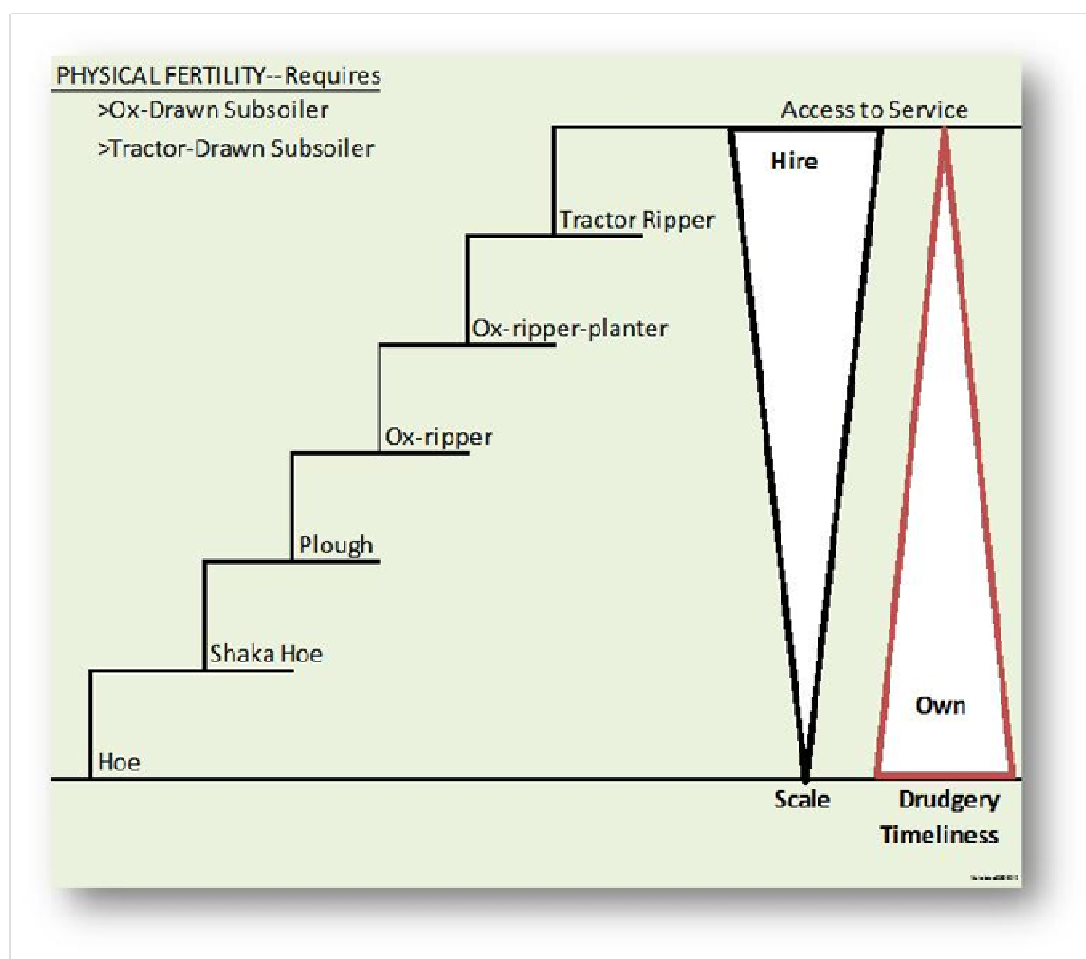


Figure 13. The trends in drudgery, timeliness and scale of operation for different land preparation methods

The access to tractor services was facilitated by vouchers given to lead farmers. The fact that the farmer bought the herbicides, it meant that the mixing was done at the farmer's farm. This exposes the herbicides to water of differing pH and other mineral composition that may affect the efficiency of the herbicides. In the interim, the tractor service providers should be responsible for buying the herbicides and other inputs and let the farmer pay for full service at a price that includes the cost of inputs. The same is true for the ox-

drawn mechanization providers. Here also the sprayer teams should bear the risks of poor mixing of chemical and should provide the farmer with advice on choice of chemical given the timing of spraying. By the end of a few years, the farmers would have gained insight from the operator and be more comfortable to own his own sprayer and chemicals.

8.1.3. Challenges

The contractors have had problems with machinery operations due to limited knowledge of the machinery regarding operation, maintenance and storage. Tractors were found in the sun and un-oiled. Some operators are building sheds to house the tractor and equipment. The lack of designated maintenance provider means that the operators seek their own solutions such as tying pieces with ordinary wire in the absence of an approved clip, Figure 14 below. The limited training spreads to the use of inputs such as the herbicides, fertilizers and seed. The operation of attachments that apply these inputs is yet to gain proficiency in a lot of operators.



Figure 14 Spare parts improvisation on a planter in Monze

The time to observe the tractors is short, it is only in October 2012 that the operators will have one year of data. The record keeping is yet to be standardized by the Ministry of Agriculture and Livestock. The performance of the business model can only be estimated from the excellent repayment rates achieved by the 10 operators who are surpassing expectations.

The reason for using the ripper is to break the plough pan. Yet many farmers have never seen the plough pan or have made effort to trace it or to ensure that the ripping they have carried out has actually broken the layer. However, farmers have observed the performance of a maize crop planted in basins versus that planted in rip lines. The basins often come on top because the basins hold water well and concentrate the

applied inputs better than rip lines. In addition the depth of ripping achieved by the rip tines currently sold is suspected to be too shallow and is even implicated in poor seed germination. The implementers, the ministry of agriculture and livestock have not started to collect data on plant population meaning that the performance of the technologies being promoted are poorly understood regarding their contribution to one of the most important yield component; plant population.

The basins give a better crop performance than rip lines but they are tedious to prepare. Farmers may stop using rippers in fields that have not been sub-soiled. To make the ripper useful, they should work in light soils or soils that have been sub-soiled. Sub-soiling should be identified as a service to be sought especially from tractor operators during the dry season. The use of the ripper for non cattle owners is further constrained by the ox owners' reluctance to hire oxen for use during the dry season. This leaves ripping to the rainy season and the rush for the service leading to delays for some non-cattle owners. This clearly emphasizes the need for dedicated mechanization service providers for ox and tractor drawn service providers. Sub-soiling should be offered as a service every 3-5 years.

8.1.4. Advantages of Mechanization

The tractor service has unearthed the middle income farmer who was not catered for by the chaka hoe. Among the impacts of mechanization is that women will not feel compelled to stay in polygamous marriages. In polygamy, the man provides the equipment to prepare parcels of land for each wife and for him in exchange for their labour in all other field activities from ploughing to harvest. If the women can access draft power for seedbed preparation from a mechanization service provider, polygamy may not be very attractive. For the man, the reduced labour demand for weeding, by using herbicides, means he too may not need more wives. In the short term, wives look more health and attractive due to reduced drudgery. The extra time at the hands of the women may also go into better care of the children and diversifying into poultry and other income generating activities¹¹.

With ripping, a hectare takes only two days, the kilometers travelled have reduced from 11km to 4 km. The Tractor Mechanization Service Provider sees several advantages of using the ripper:

1. Timely planting
2. Short time taken to rip a hectare
3. Spraying herbicide has encouraged the farmers a great deal and many more will seek the service again next season. The demonstration effect of herbicides was quick and effective because it was addressing an acutely felt need in the farming community.

Farmers in general continue to use the plough for several reasons tied mainly to the need to control weeds. If a farmer is late in implementing CA activities, ploughing is the default they fall back to.

The per capita availability of Farm Implements such as a ripper or plough is still at the same or lower rate as in the 1980s or from the time the plough became part of smallholder agriculture in Zambia. In the interim, before all farmers own their own draft power or can afford to hire, we shall experience delays in crop establishment. The solution in the interim is the chaka hoe until such time that the per capita income rises to permit independence in draft power. Ownership of assets (Ox, Tractor, ripper, plough etc)

¹¹ Interview with ZNFU

determines whether a farmer would rip at the right time. Other determinants are the overall planning of annual activities by the farmer.

In scaling up to meet the demand, more tractors per operator instead of many one-tractor operators is suggested. MSP in Chongwe is already budgeting to buy the second tractor to enable him serve all clients effectively.

Conservation agriculture mechanization pilot

The operator in Monze, Ntambi camp was selected by the community among lead farmers.

The service provider judges the prospects for the business to be very good and is confident the 252million kwacha loan will be paid off easily. The business this year could have been even better if the equipment had arrived earlier. So far he was able to carry out ripping, planting and spraying up to December 2011. From January to the time of the interview in March, he has provided transport to the community.

The clients he served were varied in terms of payment methods. He had a list of 200 voucher carrying farmers but had to attend to those paying cash in order to raise operational funds. Because of the delay in the start of the voucher season, the proportion of the farmers paying cash was higher as he ripped fields for cash while the vouchers were awaited.

Given the limited experience, the Mechanization service Provider has learnt a few lessons and plans to improve the service delivery in the 12/13 season by starting ripping as early as possible.

The first year operational parameters are:

1. Planting 2.5hr per hectare. He is able to cater for 10ha in 24 hours
2. The sprayer does 3 ha per tank full

The operator faced a few problems during the season:

1. The ripper tines broke
2. Roller bolts broke several times after welding
3. Had one week down time when the pump was not functioning properly

The attention received from the MAL district staff in responding to problems was acknowledged as being very encouraging to the operator. At the time of the interview, the MSP had paid 110 out of the 252 million, equivalent to 44% in a season when the window of operation was limited.

The maintenance of the machinery in the districts is not organized around any designated workshop or service station. The tractor operators have began using improvised parts instead of factory specified parts (Figure 14 Spare parts improvisation on a planter in Monze)

9. Establishment and supporting Conservation Agriculture scale up platforms

The platform exists in the name of the Zambia CA Association with GART as the Secretariat. Across the SADC region, countries are struggling with various configurations. It is advisable to distinguish between the three sub-networks of the National CA Network:

- a. The overall National CA Network such as the CAPNET in Zimbabwe or the Lesotho Conservation Agriculture Networking Group (LCANG), and Zambia Conservation Agriculture Association (ZCAA).
- b. National CA (NCA) Task Force (TF): This is the National CA Programme led by a national Coordinator supported by coordinators at the sub-national levels.
- c. Technical Team: facilitators providing specialized services from their institutional bases

Except for Lesotho, all other countries have not clearly defined all the three bodies. In Zimbabwe, for example, the membership of the Task force is too large and operational reality appear to split the Zimbabwe Conservation Agriculture Task Force (ZCATF) into two—the TF and the NCA Network. In his back-to-the-office report on the subject of merging the MACO led NCATF and the GART inspired ZCAA, Martin Ager stumbled on the three mounds above as follows: “The name of the stakeholder group and the frequency and format of meetings would have to be decided among the membership. It may be appropriate to have yearly or six monthly **meetings of all stakeholders** with more frequent meetings of a **few key players** in the field or perhaps several **sub-committees**, depending on the needs that are identified”¹². It may not necessarily be desirable to merge the two. ZCAA is the National CA Network, while the NCATF should coordinate activities of the CA Programme in the country. Merging them because they service the same stakeholders is like merging a hat and stockings¹³.

¹² Martin Ager, FAO 26th February 2009. Harmonisation of CA/CF Stakeholder Groups in Zambia

¹³ Mukelabai Ndiyoi (2010). Conservation Agriculture Task Forces: Assessing their Effectiveness in Southern Africa

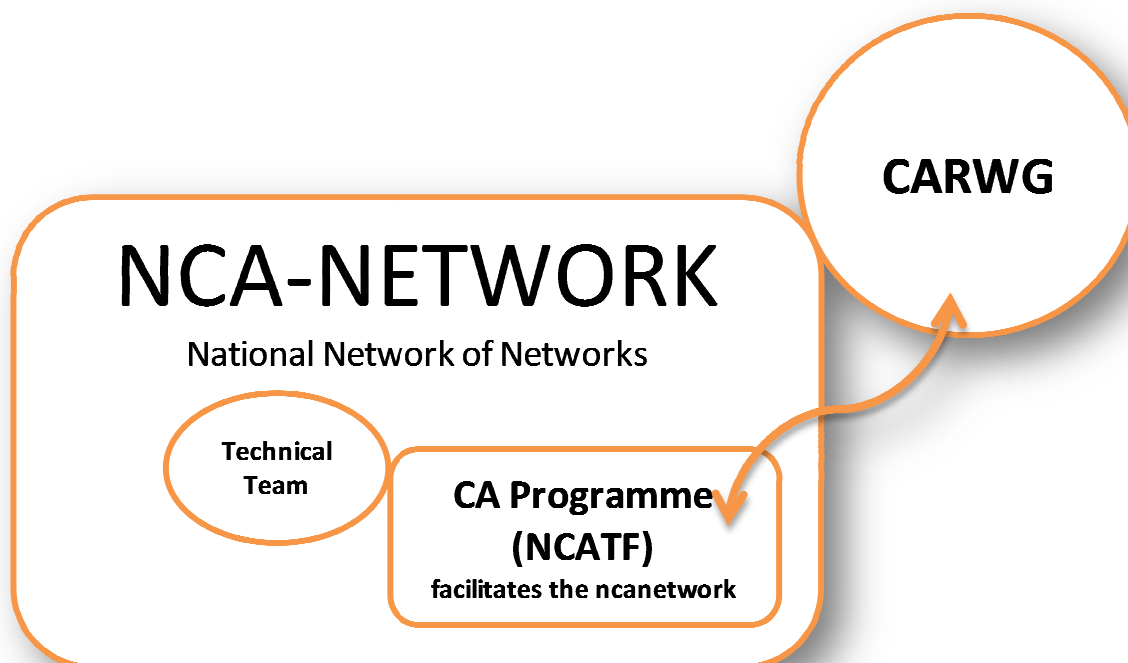


Figure 15 The CA Programme Serviced by A technical Team all belong to the NCANET that in turn is serviced by CARWG

The ZCAA hosted a platform meeting last 16 to 21 April 2012.

10. Gender Dimensions in FISRI

Since the Beijing conference (1995) United Nations (UN) organizations, bilateral cooperation agencies, development organizations and governments, including the Zambian Government have adopted gender mainstreaming strategy to reach the goal of gender equality and equity. Research by the FAO world wide revealed that if women had the same access to productive resources as men, they could increase yields on their farms by 20-30%. This would raise the total agricultural output in developing countries by 2.5-4%.¹⁴ Women play a vital role in the agricultural sector both as producers, processors and consumers of agricultural products. Integration of gender in all conservation agricultural (CA) processes is crucial for adoption, up-scaling, increased productivity and attainment of food security.

10.1. Findings

The gender dimensions in CA processes in the eleven districts which were visited were assessed and a number of gender issues were revealed. It was revealed that the situation and participation of women and men with regards to the different CA processes are different. Analysis of the project documents and the district reports revealed that there is generalization of terms which portray women and men as a homogenous group yet they have different experiences and situations. The terms 'household', 'community' and 'farmers' referred to in the documents not only fail to recognize gender dimensions regarding the female and male "beneficiaries" but masks them together. The participation of women and men, their roles, access and control of resources and benefits, service delivery dimensions in CA are influenced by gender dimensions that prevail in the areas of operation of the project.

10.2. Participation and performance of women and male farmers

The project has selected female and male lead farmers and these have been trained in CA and were provided with vouchers to purchase inputs and equipment in appreciation of their leading role. There are few women lead farmers 28% compared to 72% male lead farmers in the project. The agriculture extension system is a male domain. The data collected during the BA field discussions revealed that there are more male camp officers and lead farmers compared to female camp officers and lead farmers. The landscape regarding female and male participation in the project changes when it comes to participating farmers. There are more female compared to male participating farmers at this level where there are no CA incentivized vouchers and where it's a matter of voluntary involvement in CA. Figure 16 below shows a reflection of the distribution of male and female camp officers, lead farmers and participating farmers based on the beneficiary assessment sample respondents.

The reasons which caused the gender gap¹⁵ between the number of female and male lead farmers which were given by the respondents included the following:

¹⁴ FAO, The State of Food and Agriculture 2010-2011

¹⁵ Gender gap refers to an identifiable, statistical difference between females and males arising from society's attitudes, perceptions and opinions.

- One of the selection criteria used was the ability to influence. Men were considered by respondents as generally influential given societal gender stereotypes. Through the socialisation process, women and men readily accept men as leaders.
- Preference for lead farmer selection was for literate people who would be able to read and write and train others, however perceptions from FGDs were that comparatively men are more literate than women and hence stand a better chance of being selected as leaders. .
- There was perception by respondents that lead farmers were selected from the “affluent” members of society. Male headed households (MHH) were said to be wealthier than most female headed households (FHH). Figure 16 confirms the perceptions of the respondents that lead farmers were selected from wealthier ranks in the community. Cattle ownership in rural areas is considered as an indicator of wealth.

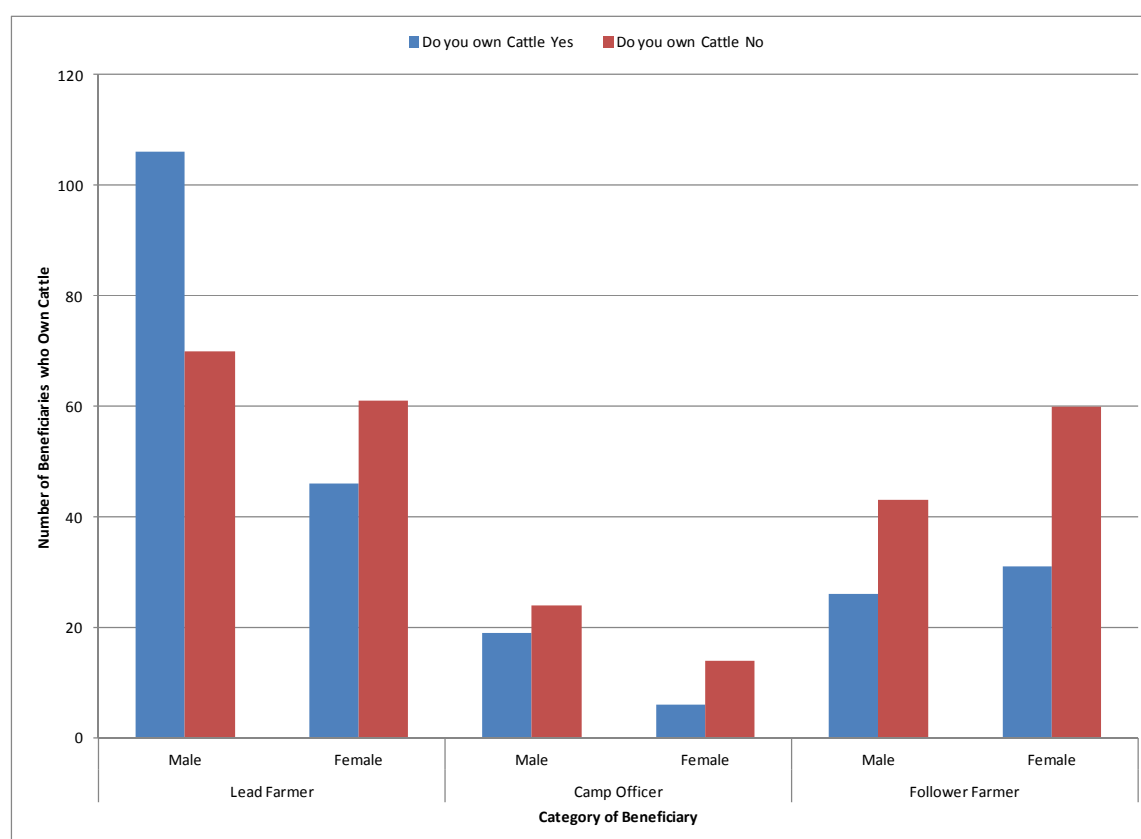


Figure 16. **Cattle ownership by Camp officers, Lead Farmers and PFs and sex.**

The graph shows that the number of male respondent lead farmers who own cattle is more than double the number of females who indicated that they own cattle. There are more male lead farmers who own cattle compared to those who don't own cattle. On the contrary there are more female lead farmers who don't own cattle compared to those who own cattle.

- Where there are free agricultural inputs, services or benefits, men, because they have influence, power and authority, tend to access these benefits more compared to women.

- Discussions also revealed that some women do not get permission to be involved in lead farmer activities from their husbands.
- Some focus group discussions with Lead farmers however revealed that there was equal opportunity for women and men to be selected as lead farmers.

Female headed households were not considered as a special category of beneficiaries either as lead farmers or as participating farmers. The data sources do not reflect on representation of men by *defacto*-female household members. Power dynamics and decision making processes in *defacto* and *dejure* female headed households are different. The lack of identification of *defacto* female headed household results in an under representation of men, albeit as ‘shadows’ who have a lot of influence in society and decision making on CA processes within these household. An engendered analysis can provide information on whether household headships have any effect on CA adoption.

Discussions with camp officers revealed that women lead farmers are their best farmers in practising CA compared to male lead farmers. Lead farmers on the other hand also indicated that women participating farmers are their best compared to males. The reasons given by the camp officers and the lead farmers regarding the performance of women in CA included the following:

- Push factor for women as food providers at household level. Women are responsible for food supply chain processes up to the stage where food is on the plate for the entire household. They have an interest to make sure that the household has its daily food.
- Women are hard workers in their CA fields.
- Men have other errands and activities they concentrate on such as charcoal burning which gives them “quick money”
- Women are more available for CA and are more at home than men.

One male lead farmer indicated that in his area, the best fields are for male headed households because once the men has grasped the concept he uses his household headship position and power to command the whole family to support CA.

10.3. Gendered Roles in CA

Intra-household division of labour and responsibilities affect productivity of women and men differently. Women have multiple gender roles within the household and in the community which affect their involvement in CA. The FGDs categorised the involvement of women and men in various CA components. Table 7 below is a summary of respondents' perceived women and male involvement in CA.

Table 7. Women and Men Gendered Roles in CA

| | Activity | Women | Men |
|------|---|-------|-------|
| i | Basin Making | ✓ | X (✓) |
| ii | Ripping | X(✓) | ✓ |
| iii | Weeding | ✓ | X (✓) |
| iv | Spraying | X(✓) | ✓ |
| v | Harvesting | ✓ | ✓ |
| vi | Marketing | X (✓) | ✓ |
| vii | Power and decision making on the money from agricultural proceeds | X (✓) | ✓ |
| viii | Food processing | ✓ | |

✓ Means activity is predominantly done by sex category indicated.

X (✓) Means that sex category indicated does not (X) carry out the activity

however, there are exceptional cases (✓) of the sex category that carry out the activity.

10.4. Basin making

FGDs and in-depth discussions with the farmers revealed that basin making is usually done by females. Basin making is a key activity in CA particularly amongst households which are resource poor. Basin making using the chaka hoe was said to be heavy especially for the elderly women and the sick. The team came across an elderly female participating farmer who heads a household who is in possession of a chaka hoe but has not used it because it is too heavy for her. Most Female headed households indicated that they use the chaka hoe for making basins because they do not have cattle and ripper equipment for ripping. Those who have resources hire ripping services or labour for basin making. Referring to the chaka hoe, one female lead farmer indicated that *"It's like a person doing exercises the first time you exercise it hurts but as you continue exercising the body gets used to it and it no longer hurts, that's how it is with the"*

chaka hoe. It is painful and heavy when you initially use it but with time one gets used to it" FGDs however also revealed that there were some few cases where, men in male headed households jointly work with their spouses and children in basin making.

10.5. Mechanisation/Ripping

Mechanisation is a more efficient and time saving CA tillage option for both female and male farmers. It reduces the burden of hand basin making which is usually a woman's responsibility. Besides the project facilitated ripper ownership, it was revealed that proportionately most female headed households do not have rippers and cattle and as such use the labour intensive chaka hoe for basin making.

10.6. Weeding and Herbicides Use

Hand weeding was considered as predominantly women's role. Involvement of men in weeding depended on the crop under weeding. Men do not weed in groundnuts plots because groundnuts are considered as women's crop. Weeding is a very involving task in CA especially for the first and second CA planting seasons. People can do hand weeding as many as four to six times per season in order to manage weeds. Those who are well resourced hire people to weed for them. Most FHHs mentioned serious challenges of labour for weeding and the lack of resources to buy herbicides or to hire labour for weeding.

Herbicides application reduces the burden of weeding which is predominantly a woman's activity. Spraying was considered to be men's role and men were reported to be faster in spraying compared to women. In Male headed households, decision making on use of herbicides was said to be usually done by men. The low literacy levels of women affect them in accurate herbicides use. The type of available knapsack sprayers that are carried at the back was reported to be unfriendly for women. It is unsafe for women to do herbicide spraying because of their gender role for food preparation and biological role for breastfeeding (in case of breastfeeding women). A model for providing support for herbicide spraying, such as through contractors, can encourage women's adoption and reduce women's workload burden in CA

Most of the CA activities which are time consuming and physically demanding such as basin making and weeding are predominantly done by women and this adds additional burden on women who are already overburdened by multiple gender roles. In addition labour reducing activities such as herbicides and ripping require substantial resources which resource poor female and male farmers cannot afford.

10.7. Harvesting

FGDs revealed that both women and men are involved in harvesting especially of maize. Some men indicated that time for harvesting is usually time for community meetings so they lead and organise the harvesting processes and leave the family doing the harvesting.

10.8. Marketing:

Men predominantly market products except in cases of FHH who market products for themselves. Men are usually responsible for marketing cash crops such as maize, cotton and soya beans. Groundnuts are marketed predominantly by women.

Reasons given by the respondents for this marketing trend were:

- Groundnuts are considered as a woman's crop. Surplus after food consumption reserves are sold.
- Cotton and soya beans are cash crops and a man's responsibility.
- Maize surplus is a man's responsibility.
- Marketing processes are too demanding and heavy and cannot be done by women.
- Marketing processes take time about a week or two and women as home makers stay at home taking care of household chores.
- Fear that women can be promiscuous if they get exposed to so many men who come to market their produce.

10.8.1. Women's Concerns on Marketing

Women expressed the following concerns regarding the CA produce marketing role by men:

- Some men do not bring back the money home after marketing the products.
- There have been reported cases of gender based violence when women insisted on accountability regarding the money from the marketed products.
- Women become discouraged to participate and reduce area under CA *"Why suffer when I don't enjoy the benefit, I will just do what is adequate for food for the family"* said one woman and the rest of the female FGD group members echoed in agreement.

Marketing, control and use of income from proceeds are key and have an implication on up-scaling and expansion of household area under CA if this is not addressed. An option would be to have awareness raising sessions on gender during CA training.

10.8.2. Decision making

FGDs reflected a diversity of opinions on decision making on the money from the sales of the produce. FGDs with both women and men's groups generally concurred that in Male headed households the usual practice is that men are the main decision makers on the money obtained from the proceeds. Although this is the general trend some few women and men from male headed households indicated that they mutually budget how the money should be spend. Some have to endure protracted gender negotiations in order to enjoy CA benefits from their labour. Women from female headed households indicated that they decide for themselves how they want to spend the money form proceeds. It was mentioned that some female farmer participation is limited due to limited decision making powers they have in their households. FGDs revealed that some women do not join CA because their husbands did not give them permission to do so.

10.9. Access and Control of CA Related Resources

The assessment revealed that women and men have differential access and control of critical resources. Female and male lead and participating farmers were asked regarding their access and control of some of the CA resources, Table 8 shows a summary of the findings.

Table 8 Access and Control of CA resources

| | Item | Access | | Control | |
|-----|----------------------------------|--------|-----|---------|-----|
| | | Women | Men | Women | Men |
| i | Land | ✓ | ✓ | X(✓) | ✓ |
| li | Chaka Hoe | ✓ | ✓ | ✓ | ✓ |
| iii | Ripper | X(✓) | ✓ | X(✓) | ✓ |
| iv | Cattle | X(✓) | ✓ | X(✓) | ✓ |
| v | Money from agricultural proceeds | X(✓) | ✓ | X (✓) | ✓ |

✓ Means sex category indicated has access or control of item indicated.

X (✓) Means sex category indicated does not (X) often have access or control of item indicated however there are exceptional cases who have access or control (✓) of the item indicated

10.9.1. Land

It was revealed that women's access to land is through a man, such as a brother, father or male child. The assessment came across cases of women who bought land and now own it or who got land through their matrilineal or patrilineal lineage from the traditional system. Women from MHHs indicated that they have access to CA land although they do not control the land. They also indicated that men usually control the money from CA produce and they linked this to land ownership. The lack of ownership of land dis-empowers women and discourages them to be involved in CA.

10.9.2. Chaka hoe

Both women and men have access and control of the chaka hoe which however is of little value. Hoes are considered as women's assets because of their weeding and basin digging responsibility. Participating farmers revealed that some of them do not have chaka hoes some are using ordinary hoes for basin making and these do not give them the required depth and measurement of the hole.

10.9.3. Mechanisation/Ripping

There are few households with rippers, this is more so for female headed households. However for those male headed households with rippers, women have limited access and control of the ripper.

The total number of beneficiaries for FISRI ox-drawn CA implements was 2400 whilst for tractor drawn implements it was 1600; however this data has not been disaggregated by sex to give a gendered indication of beneficiary access to this crucial service. Data from Chongwe district revealed that out of the 400 vouchers for ripping using the two tractors, 88 vouchers were given to female farmers. Records from one tractor service provider in Mazabuka revealed that 25% of the recipients of tractor ripping services were women. Discussions with ZNFU revealed that all the ten tractors were provided to male service providers and that there were fewer women compared to men who got ox-drawn rippers. It was also revealed that due to increased demand for mechanised tillage services some women did not manage to get services because they couldn't push or influence hard enough.

From this project experience, it can be concluded that when CA activities are manual and time consuming women take up the key roles such as hand basins and hand weeding however when it becomes mechanised and commercialised, the landscape of services changes in favour of men. In the FISRI project more men compared to women had access and control of mechanised services. There is need for the project to consider inclusion of potential female lead farmers for ownership of mechanised services and to encourage the current operators to prioritise women's access to mechanised ripping services because in practice they are the ones who are involved in the hard task of hand basin.

Limited access and control of project resources and benefits from CA by women due to gender perspectives affects CA up-scaling, hence gender considerations should be an integral in all CA implementation processes.

10.10. Some gender issues in lead farmer service delivery

Most focus group discussions revealed that there were no challenges to lead or be led by the opposite sex. However, some focus group discussions revealed that there are some gender sensitivities regarding male and female lead farmers providing extension services to participating farmers of the opposite sex. Some male and female lead farmers indicated that providing services to the opposite sex sometimes causes suspicions of mischief. Some male and female lead farmers have developed ways of working with female and male participating farmers through the spouse or family to avoid suspicions of mischief from community and spouses. This was especially mentioned as a risk for young female participating farmers and young female lead farmers. Some women preferred having female CA lead farmers because they understand their situations, needs, gender roles as women and they are free to discuss with them on sensitive issues relating to situation of women in CA.

It was observed that male and female lead farmers got some bicycles from FISRI. These assisted the lead farmers in service delivery. The bicycles given to male and female lead farmers had the frame meant for men and yet women preferred female friendly frames. The weekly camp meetings at some farmer field schools for five to eight hours after walking

(Most of bicycles have broken down) for at times seventeen kilometers one way, is rather heavy for women who have to walk back sometimes late hours to go and prepare family meals and do numerous household chores. This is not a gender friendly working calendar for women.

The training that was provided to the lead farmers is technical on CA and has not included social issues such as gender, record keeping, leadership, basic service delivery issues and how to be good ambassadors of CA in their areas.

10.11. Gender Related Changes Realized from CA.

The capacity building process in CA has contributed to women's empowerment as their strategic gender needs of leadership are partly being met. This has brought about a change in their position in society where women and men are taking leadership positions in CA. Women have used their acquired knowledge to train female and male participating farmers in CA. Women's leadership in CA has been accepted by both female and male participating farmers.

CA training is a positive development for the empowerment of women and men since collectivity has potential for strengthening their ability to lead and organize farmers for CA adoption. The CA outcome of increased yields has facilitated the attainment of practical gender needs for participating women farmers where they now have food to feed the family.



Figure 17. Participating farmer sitting close to her Grinding mill on left are clients and on her rights are her grandchildren-

Some women and men and FHH and FHH have started other income earning activities from the proceeds of CA. An example is a widowed participating farmer who managed to buy a grinding mill form her CA proceeds and is now providing this important food processing service from her home to the community. Some female and male farmers from FHH and MHH have bought building material, built houses and bought assets such as livestock from their CA produce.

CA has enabled some women such as female headed households who may not have draught power and mechanized equipment to be involved in agricultural production which has yielded higher yield per acre. The introduction of mechanised ripping and herbicides has reduced the labour burden for women who usually do the hand basins and hand weeding. This reduces the time the woman spends in CA and frees her for other activities.

11. Monitoring and Evaluation Elements of Management and Coordination

Definition of Monitoring, backstopping

Monitoring and backstopping visits were made to some camps that FISRI is operating, during recruitments of lead farmers, voucher distribution, redeeming and land preparation.

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On a scale of 1 to 10, Sinazongwe score themselves 4 because most of the things that were planned have not been achieved. Communication has been bad, the computers have no internet. Monitoring of farmer activities has been poor due to inadequate transport. In discussions with the district core team it became apparent that many problems or modes of operation could have been developed through discussions such as we were having. The planning of FISRI

should involve the district staff in a platform to review and plan. The district staff rarely, if ever, receive feedback on their reports.

Due to lack of funds, project activities were not properly implemented. The allowances meant for the camp staff were reduced, leaving them with diminished capacity to monitor the farmers. New camp officers were not trained due to lack of funds. Consequently the camp officers could not adequately train the new lead farmers. Granted that operational funds are key to project activities, it is a drastic decision taken by the national coordination team NOT to release funds to the districts. Out of three installments budgeted in FISRI 2, two have been received by the district.

For the camp officers, the issue of the irregular allowances and the lack of attention to their motor bikes occupy them a great deal. To ensure they get their allowance, the camp staff suggested that FAO should deposit the 200 dollar allowance directly into their accounts because they suspect that the district have too many programmes planned for this allowance. In contrast, the district supervisors feel they should control the use of the allowance in order to compel the camp officers to visit the district.

The monitoring and evaluation has not been able to avail data to the project team in Lusaka. Out of 30 districts only 4 districts had data available at FAO. Similarly only two district reports were available at FAO in Lusaka.

The most critical omission is the lack of appreciation by the district of the type of data that need to be collected in order to answer the objectives of the project. For example, given that the project is introducing new methods for seedbed preparation and planting, it is important to collect data on plant population as this variable has implication on productivity—an outcome the project aims to achieve. Given the capacity in terms of computing power capacity available at the district level, it was disheartening to find no data sets for participating or lead farmers on district computers. Where it existed, it was only in hard copy and at plot level without specifying the size of the plot. More often, the team was given data aggregated at district level where the distribution or dispersion of the mean reported is unknown.

11.1. The Follower or Participating Farmer

The participating farmer in this project represents the ultimate impact of the project. As such, it is important to monitor the uptake processes of the various components of CA and other project elements among the participating farmers. Long term monitoring guidelines for these farmers are important as they provide indicators for the sustainable adoption of the CA technologies and other project elements that were promoted. There is need to identify the successful participating farmers and use them as platforms for lesson learning and understanding of adoption issues.

This potential role of the participating farmer was not clearly understood at the implementation level by both the camp officers and the lead farmers resulting in their neglect. Field days were mostly hosted by lead farmers, while the participating farmers were mere bystanders.

Follower farmers are free to visit the LF whenever they need to. The overall mood, however, is that the follower farmers would rather visit the camp officer than the lead farmer. Given the uneasy relationship between the lead farmer and the follower farmer, a rotating of the demo plot across the members may create a sense of belonging to the exclusive club of members who access inputs and implements through e-vouchers.

Since the lead farmer is supported, it may not be clear at this stage whether he or she is implementing CA as a result of the inputs supplied. It is important to note that the adoption process normally takes over several years –

- The role of M&E in a project implementation is understood but the evidence of a functional M&E system was lacking.
- An M&E data capturing frame for the salient aspects of the project (derived from the Log Frame) was absent.
- Standard guide lines and templates for continuous monitoring were not evident as well as feedback from project management after submission of reports. In most cases the core team were not sure whether reports submitted have reached management or not.
- Evaluation yard sticks for the different levels, i.e. district, camp, farmer are required

11.1.1. Overall, the Follower farmer is the ultimate point of action for the project as all functionaries above this point only serve the FF. Data collection is silent on FF and often assumed to exist when summaries are channelled up from the Lead farmer. In fact the farmer should be the smallest data point.

11.1.2. The M&E need to put time aside to design forms for data collection on which so much depends.

11.1.3. The plant population density in rip lines is uncertain in these early days of the technology. Conventional ploughing continues in the light of this concern and the need to control weeds when the season has advanced or when the access to CA equipment is delayed.

Table 9 Example of a data collection sheet

| Province | District | Camp | Category | Name of Farmer | Crop | Variables1 | Variable 2 etc |
|----------|----------|------|-------------|----------------|---------|--------------|----------------|
| | | | Lead Farmer | Ito Itwi | Sorghum | Area of Plot | |
| | | | | | etc | | |
| | | | | | etc | | |

11.1.4. The M&E need to put time aside to design forms for data collection on which so much depends.

11.1.5. The plant population density in rip lines is uncertain in these early days of the technology. Conventional ploughing continues in the light of this concern and the need to control weeds when the season has advanced or when the access to CA equipment is delayed.

11.1.6. Weak gender based data base, no sex disaggregated data on Female headed households (defacto) female headed households (defacto) and male headed households lead farmers to enable an analysis of whether the nature of the household impacts on the production levels and systems. Data on sex especially (FHH) & yield levels not available could have shown whether there is gender based trend on production levels.

11.1.7. Weak monitoring and evaluation system: Data collection systems from the participating farmer, lead farmer to camp officer weak. There is no system to capture CA farming practices at participating farmer level. Picture of yield level at participating farmer level is not available because system does not go that far.

11.1.8. Holistic picture and trends on (household type) and items redeemed through voucher system are not reflected in the M&E system. This would have provided trends on gendered farmer priorities and how this has impacted on productivity.

12. Measuring Change

12.1.Observed Changes resulting from CA Implementation

Generally, the beneficiaries of the project have observed some CA benefits during the course of the project. Farmers highlighted the potential of harvesting more from small land units in CA systems, as opposed to conventional farming where less is obtained from large areas. The increased productivity by CA farmers has impacted positively on the food security status of the farmers, with many of the farmers indicating that they now can harvest enough cereal to last for longer periods and in many cases, lasting until the next harvest. These positive impacts are reflected in the proportion of the farm land under CA, which is about 42% from the districts that were visited.

The use of herbicides has been an important component of the project, with the labour savings experienced by CA farmers making a tremendous impact on the beneficiaries. There is an increase in knowledge on herbicide use among both camp officers and farmers, with increasing appreciation of the advantages of herbicide use as opposed to manual weeding among the beneficiaries, with one farmer, a polygamist, proudly announcing *“my three wives who were very thin now have some flesh since we started using herbicides*. Evidence from the field visits indicates that the promotion of herbicide use in CA systems presents a tremendous opportunity for the adoption of CA among many small scale farmers who face severe limitations in labour for farming activities, especially for weeding. The increased procurement and sale of herbicides was also evident among agro-dealers even the ones who were not involved in the FISRI project. However, there are still challenges in herbicide application; there is a lot of myths that herbicides damage the soil, a myth that disturbing particularly when the training on herbicides has not been adequate for the farmers and a few of the operators regarding the technical aspects of timing, sprayer calibration and choice of water to use which may all compromise the efficacy of the herbicide.

Precise application of fertility amendments has resulted in more efficient use of small quantities of fertilizers and organic manure. A significant impact has been observed in the ability of the beneficiary farmers to effectively use small quantities of lime which they normally apply along rip lines. The large application rates of lime inhibits many farmer from using it due to the huge costs associated with its transportation and this reduction in the application rates in CA systems has impacted positively on crop yields.

Increased interaction among stakeholders in the agricultural sector was reported in some areas as a result of the different components of CA and the project in general which brought together stakeholders in farm implements, seed, chemical industry, and of course the agro-dealers who supplied the commodities to the farmers. There was also evidence of increased interaction between the agro-dealers and the farmers, as a result of the need for the agro-dealers to entice the farmers as they compete with each other.

Other general benefits reported from implementing CA include early planting, improved moisture conservation and weed management, and increased crop diversity as CA demos always included cereal, legume and cash crops.

However those farmers not implementing any CA components have cited the high labour demands characteristic of manual CA systems for digging basins and weeding as deterrent. Some farmers in the

programmes also cited the mismatch between some of the ripper tines that were supplied and the conventional plough beams that they have available. This would entail that a farmer buy a complete ripper with beam which is quite expensive.

Seed availability and affordability for sunflower and other cash crops was also cited as hindrance to CA adoption as it affects crop rotations in the CA systems. Poor performance of certain legumes crops in CA systems has impacted on the demand for legume seeds by the farmers.

12.2. Camp Officers Changes

Camp officers 'adoption' of CA technologies was noticed through the change in their practice of the key CA aspects which is presented in Table 10 below.

Camp officers relied almost exclusively on oxen as source of draft power in attending to land under CA before 2009 (83%) and in the 2011/2012 season (80%), though few (40%) owned cattle. The CA implement that was mostly used was the oxen-driven ripper as confirmed by 52% of the respondent CEOs.

Whereas oxen are an important source of draft power and for CA to be scaled up and adopted draft power is critical, the high proportions of farmers who do not own cattle (64% of follower farmers, 60% of CEOs and 46% of lead farmers) is a threat to the success of CA, especially that most follower farmers are female and these do not own cattle.

Land preparation for maize planting changed significantly towards CA technologies from the season before 2009 to the 2011/12 season. There was a reduction in the use of the plough from 51% to 2% among the CEOs asked, while an increase in the use of basins (13 to 31%) and ripping (30 to 67%) was observed. Planting was predominantly by hand hoe in the two periods being compared, 67% and 70%, respectively.

Another noticeable change was in weed management, which again shifted towards use of CA technology component of herbicide from 17% before 2009 to 56% in the 2011/12 season. An accompanying reduction in use of hand hoe in weed control was observed from 74 to 37%.

The changes observed with the CEOs with regards to the 'adoption' of the CA practices are important in the context of providing farmers (LFs, FFs and non participating farmers) with evidence of the CA potential and also consolidating the knowledge base through CA practice for the CEOs. That the CEOs also adopted the CA technologies made their training easier as farmers had faith in what the officers teach and practice.

The camp officer is supported with input voucher to enable them host demonstration in their own fields. The vouchers have supported ripping by tractor and purchase of herbicides. Others have paid cash for use of the ox-drawn animal drawn no-till/mulch planter and supplemental herbicide. The project supported the CEOs with inputs only; as such the implementation of the full package of the CA technologies could not be done based on the project support. A serious design lapse! If CEOs have to demonstrate the technologies the full package for the purpose must be given. Leveraging support from farmers for implements and labour for the demonstration [(Field Farmer Schools (FFSs)] establishment and management, while acceptable for the purpose of engaging the farmers in the management of the demonstrations, it also introduces potential points of variation in the method and quality of delivery of the CA technologies. The

participation of the farmers in the establishment and management of the FFS must be budgeted judiciously. *It must be mainly in the context of learning and not otherwise. Fortunately, during the field visits no major variations in the design and quality of the FFSs were observed.*

Table 10 Changes in the Practices of Conservation Agriculture among Farmers under FISRI Project

| | | Area under CA for Farmer Type | | | | | | |
|--|---------------------------------------|-------------------------------|------|--|--------------|------|-----------------|------|
| | | | | | | | | |
| | | Lead Farmer | | | Camp Officer | | Follower Farmer | |
| | CA Practice/Component | 2009.00 | 2011 | | 2009 | 2011 | 2009 | 2011 |
| For the Area under CA, implement used. | Chaka hoe basins | 0.58 | | | 0.31 | | 0.73 | |
| | Ox-drawn ripper and Hand sow | 0.26 | | | 0.52 | | 0.22 | |
| | Ox-drawn (ripper) Planter | 0.11 | | | 0.13 | | 0.04 | |
| | Tractor drawn planter in ripped lines | 0.06 | | | 0.03 | | 0.01 | |
| | Total | | | | | | | |
| | Chaka hoe basins | 0.00 | | | 0.06 | | 0.00 | |
| | Ox-drawn ripper and Hand sow | 0.55 | | | 0.61 | | 0.77 | |
| | Ox-drawn (ripper) Planter | 0.37 | | | 0.17 | | 0.19 | |
| | Tractor drawn planter in ripped lines | 0.08 | | | 0.17 | | 0.04 | |
| | Total | | | | | | | |
| What was most important | Own Cash | 0.82 | | | 0.90 | | 0.94 | |

| | | | | | | | | |
|---|------------------|------|------|--|------|------|------|------|
| source of inputs for your farm this season | Credit | 0.03 | | | 0.00 | | 0.05 | |
| | E-Voucher | 0.15 | | | 0.10 | | 0.01 | |
| | Total | | | | | | | |
| | Own Cash | 0.01 | | | 0.00 | | 0.25 | |
| | Credit | 0.02 | | | 0.06 | | 0.25 | |
| | E-Voucher | 0.96 | | | 0.94 | | 0.50 | |
| | Total | | | | | | | |
| Do you own Cattle | Yes | 0.54 | | | 0.40 | | 0.36 | |
| | No | 0.46 | | | 0.60 | | 0.64 | |
| | Total | | | | | | 1.00 | |
| Source of Draft Power for Land Preparation 08/09 Season | Hoe | 0.43 | 0.43 | | 0.09 | 0.13 | 0.50 | 0.46 |
| | Oxen | 0.43 | 0.38 | | 0.83 | 0.80 | 0.41 | 0.39 |
| | Tractor | 0.01 | 0.00 | | 0.00 | 0.02 | 0.01 | 0.01 |
| | Oxen and Hoe | 0.12 | 0.19 | | 0.09 | 0.06 | 0.07 | 0.13 |
| | Tractor and Oxen | 0.00 | 0.00 | | 0.00 | 0.00 | 0.01 | 0.02 |

| | | | | | | | | |
|---|--------------|------|------|--|------|------|------|------|
| | Total | | | | | | | |
| Source of other Draft Power for Land Preparation 08/09 Season | Hoe | 0.04 | 0.00 | | 0.00 | 0.00 | 0.50 | 0.13 |
| | Oxen | 0.78 | 0.91 | | 1.00 | 0.80 | 0.38 | 0.75 |
| | Tractor | 0.13 | 0.09 | | 0.00 | 0.00 | 0.13 | 0.13 |
| | Oxen and Hoe | 0.04 | 0.00 | | 0.00 | 0.20 | 0.00 | 0.00 |
| | Total | | | | | | | |
| What did you use for land preparation before 2009 | Basins | 0.21 | 0.61 | | 0.13 | 0.31 | 0.25 | 0.50 |
| | Ripping | 0.12 | 0.38 | | 0.30 | 0.67 | 0.03 | 0.29 |
| | Ploughing | 0.64 | 0.01 | | 0.51 | 0.02 | 0.62 | 0.19 |
| | Other | 0.03 | 0.00 | | 0.06 | 0.00 | 0.10 | 0.03 |
| | Total | | | | | | | |
| What did you use for land preparation in addition before 2009 | Basins | | | | | | | 0.02 |
| | Ripping | 0.28 | 0.00 | | 0.43 | 0.00 | 0.34 | 0.41 |
| | Ploughing | 0.44 | 0.56 | | 0.57 | 0.69 | 0.55 | 0.56 |
| | Other | 0.28 | 0.43 | | 0.00 | 0.31 | 0.10 | 0.02 |

| | | | | | | | | |
|---|------------------|------|------|--|------|------|------|------|
| | Total | | | | | | | |
| What2 did you use for land preparation in addition before 2009 | Ripping | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.08 |
| | Ploughing | 0.00 | 0.00 | | 0.00 | 1.00 | 0.00 | 0.92 |
| | Total | | | | | | | |
| What equipment did you use to plant maize that season, 08/09 | Hoe | 0.61 | 0.55 | | 0.62 | 0.70 | 0.73 | 0.76 |
| | Oxen | 0.27 | 0.24 | | 0.30 | 0.19 | 0.19 | 0.13 |
| | Tractor | 0.00 | 0.00 | | 0.00 | 0.02 | 0.01 | 0.00 |
| | Oxen and Hoe | 0.11 | 0.20 | | 0.09 | 0.09 | 0.06 | 0.09 |
| | Tractor and Oxen | 0.00 | 0.01 | | 0.00 | 0.00 | 0.01 | 0.01 |
| | Total | | | | | | | |
| What additional equipment did you use to plant maize that season, 08/09 | Hoe | 0.08 | 0.01 | | 0.00 | 0.00 | | |
| | Oxen | 0.67 | 0.95 | | 0.00 | 0.00 | 0.00 | 1.00 |
| | Tractor | 0.25 | 0.05 | | 0.00 | 0.00 | 0.00 | 0.00 |
| | Total | | | | | | | |
| How did you control | Hand Hoe | 0.87 | 0.00 | | 0.74 | 0.37 | 0.93 | 0.78 |

| | | | | | | | | | | |
|--|--------------------|------|------|--|------|------|--|------|------|--|
| Weeds in Maize in 2008/09 season? | Ox-Cultivator | 0.03 | 0.51 | | 0.06 | 0.07 | | 0.05 | 0.04 | |
| | Herbicide Knapsack | 0.09 | 0.03 | | 0.17 | 0.56 | | 0.03 | 0.17 | |
| | Herbicide Tractor | 0.00 | 0.46 | | 0.02 | 0.00 | | 0.00 | 0.00 | |
| | Total | | | | | | | | | |
| How Else did you control Weeds in Maize in 2008/09 season? | Ox-Cultivator | 0.31 | 0.10 | | 0.22 | 0.10 | | 0.50 | 0.00 | |
| | Herbicide Knapsack | 0.69 | 0.90 | | 0.78 | 0.90 | | 0.50 | 1.00 | |
| | Total | | | | | | | | | |

12.3. Observed Changes by Lead Farmers

The cultivation practices of the lead farmers showed a shift towards adoption of CA technologies. The Chaka hoe and the ripper were the most prominent CA implements used on land under CA with 58% and 55% of the farmers reporting using these implements (Table 10). That the Project supported the acquisition of these implements the adoption was expected. It is not clear how many hoes or rippers farmers got through the support from the project as these were annually on the voucher.

Own cash remained the major source of inputs for 82% of the LFs, with the voucher 'backstopping' acquisition of inputs for 96% of the farmers. The value of the voucher (ZMK 250,000) for inputs was not sufficient to cater for the land area that farmers put to under cultivation and specifically under CA, thus the use of own cash is justified; indeed the voucher assisted in obtaining the inputs.

The hand hoe and oxen were the predominant sources of draft power being recognized by 43% of the farmers as the means of cultivation. This is true for the periods under comparison. The limitation presented by reliance on these power sources is that of increasing the land area for increased production; only a small area can be tended to using a hand hoe and a little more with oxen. The niche for increased mechanization is evident in this regard.

Land preparation by LFs clearly showed adoption of CA with basin making increasing from 21 to 61% and ripping moving from 12 to 38% from 2009 to 2011/12 season. Inversely related was the change in number of farmers who were ploughing; from a proportion of 64% prior to 2009 to a nominal value of 1%. In all cases farmers resorted to ploughing when CA technologies could not be fully used.

Planting of maize was mainly by hand hoe (55 to 61%) during the period under comparison. Use of oxen was significantly low (24 to 27%) but important for farmers with 67 to 95% expressing the important role of oxen in planting: The option of introducing oxen along CA is further suggested.

There was observed a drastic reduction in the use of the hand hoe in weed control from 87%, prior to 2009, to almost none reported use by the lead farmers in 2011/12 season. This situation is explained by what was observed in the field that due the increase in the size of the fields under cultivation hand hoe weeding was impossible and when use of herbicides was unaffordable they used oxen cultivation. Some fields however were seen that were not weeded due to other factors such as too much rains. Use of herbicides shifted from no reported use prior to 2009 to 46% of LFs applying herbicides in the 2011/12 season. Asked if the farmers had an alternative to weeding only very few (N=16 out of 232 prior to 2009 and N=29 out of 232 in 2012/12 season) gave any alternative but most (69 % and 90%, respectively) reported the herbicide use as the important alternative. There was a significant recognition of herbicides as an important option for weed control, evidenced by the shift from 69 to 90%.

The role of the LFs was to further demonstrate the CA technologies to the farmers, especially the FFs. In the same vein they were part of the targeted beneficiaries, but facilitated to extend the

extension delivery system. In this regard the changes observed among these farmers constituted the first level of 'influence' of the project on farmers.

12.4. Observed Changes by Follower farmers

Follower farmers represented the ultimate target of the project and observed CA practices here were an important indication of the impact of the project. It was observed that the Chaka hoe and the ripper again were the most important CA implements used in CA, reported by 58% and 73% of the Lead and FFs, respectively (Table 11).

Table 11 Implements used to prepare land for planting under CA

| For the Area under CA, implement used. | Lead Farmer | | Camp Officer | | Follower Farmer | |
|--|-------------|------------|--------------|------------|-----------------|------------|
| | N | Proportion | N | Proportion | N | Proportion |
| Chaka hoe basins | 163 | 58% | 19 | 31% | 107 | 73% |
| Ox-drawn ripper and Hand sow | 73 | 26% | 32 | 53% | 33 | 22% |
| Ox-drawn (ripper) Planter | 31 | 11% | 8 | 13% | 6 | 4% |
| Tractor drawn planter in ripped lines | 16 | 6% | 2 | 3% | 1 | 1% |
| Total | 283 | 100% | 61 | 100% | 147 | 100% |

The major source of inputs was own cash as these did not receive any support in terms of inputs from the project. Most reported relying on hand hoe (50%) and oxen (41%) for draft power.

Land preparation was mainly by CA techniques viz basin-making whose use was reported by more farmers in the 2011/12 season than prior to 2009: shift from 25 to 50%. For ripping the shift was from 3 to 29% of the FFs between the periods under comparison. Fewer farmers (19%) ploughed their land compared to 62% prior to 2009. The fact that FFs were not supported by the project introduced great variations in the degree of 'adoption' of the CA technologies, depicting the level of endowment of the farmer: Poor farmers had very poor fields and very low degree of adoption of the CA technologies even when they knew what they were supposed to do, they just could not afford the inputs and implements. Linkage of the project to the Farmer Input Supply Programme (FISP) could be strategic in that the inputs thereby obtained would be applied in the CA.

The predominant implement used by FFs for planting was the hand hoe, reported by 73% and 76% of the farmers for the two periods under comparison, respectively. The same implement was key in weed control (reported by 78 and 93% of the farmers for the periods). Use of herbicide in weed control showed an upswing from 3% prior to 2009 to 17% in the 2011/12 season.

The relative poor 'adoption' of CA technologies by this category of beneficiaries should be first and foremost be related to the diffusion period for the technology. It takes longer for farmers to change the way they do things: it was reported on a number of occasions that use of herbicides 'destroy' soil: if grass cannot grow on the soil then the soil is destroyed. This is a myth, but can be very strong in the society given past cultivation systems and practices. It was noted that the use of herbicides was a relative new intervention for the small scale farmers (a point that was admitted by both the agro-dealers and the extension staff, advocating for extended training in the use of

herbicides from a safety and cost effectiveness point of view) as such it required sometime for the diffusion of the technology.

As the project did not support the FFS farmers in the inputs acquisition, the intervention may have favoured farmers who are well endowed. This category of farmers was mostly females and relatively poorly endowed (Figure 18). Project support to FFs should be considered linking to phasing out of some LFs. Another important consideration in this regard is making the FISP part of the project component.

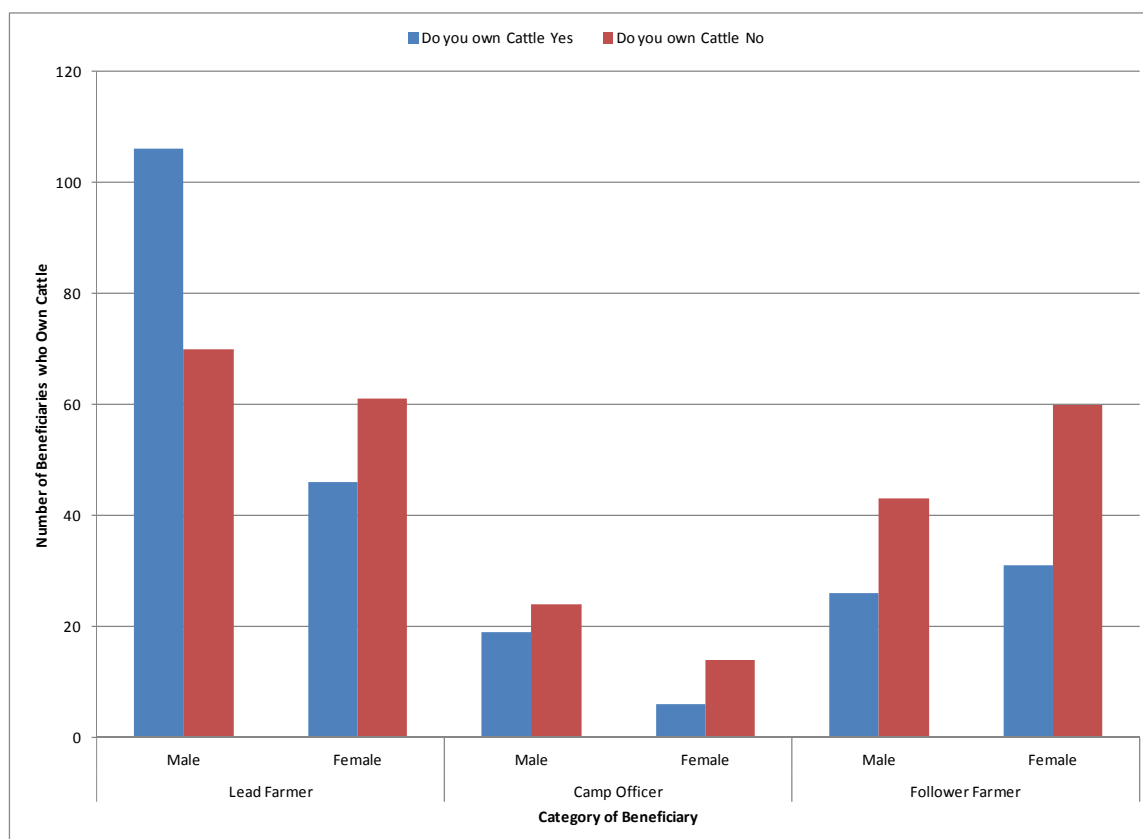


Figure 18 Number of Beneficiaries Interviewed by Category and sex

The perception created by the support to LFs to the exclusion of the FFs is unhealthy as it breeds envy and societal discontent. During the field visits attrition reported at this level was centred on the issue of support. In all districts visited the issue of attrition was reported

The harvest is higher under CA than under conventional farming. For example in Simujika of Monze, the farmers reported that 0.25ha used to produce 10 bags by 50 kg but the same area produces 30 to 35 bags¹⁶. The use of the basins means that the farmer does not have to wait for oxen. The use of the ripper has increased the land under crops beyond what the basins could do. The ownership of the ripper has increased among lead farmers as all of them now own rippers.

¹⁶ No data is available to the evaluators on actual farm yields.

The time created by herbicide use is still undergoing re-allocation. In some instances it may go into increasing the land area under crops. ZNFU report that women now have extra time on their hands which they are putting into diversification into poultry and better care for their children

As there is great variation in opinion over herbicides such as stellar among farmers there is need for knowledge and skills in application. Some users said at 1 litre per hectare, Stellar was the best herbicide they have used. On the other extreme, some farmers labeled Stellar as “very disappointing” as it encouraged the growth of the weeds.

12.5. Food Security

The overall objective of the project is to contribute to greater food security due to increased food production. The project is focussed on food production and availability at beneficiary household level. It targets to attain self sufficiency through home produced food. Although there is limited data regarding extent to which first beneficiary level (Lead farmers) have attained food self sufficiency, LF discussed with indicated that through increased productivity from CA, they now have food (staple food) for home consumption and some have managed to get surplus from their produce to market. The manner CA was extended in FISRI offered production diversification through crop rotation and provided an opportunity for dietary diversification.

FISRI focuses on improved food availability and access (rather than food consumption and reduced hunger) Food security goes beyond staple food self sufficiency, because this largely ignores access (market/household income) issues as well as issues of nutritional quality and acceptability of food available and consumed. The project design has not integrated other important food security components. The issues of food consumption and nutrition are not identified in the log-frame. As an important means of improving incomes and stabilizing food consumption throughout the year, the mission also found that FISRI has not paid enough attention to food conservation/processing or value addition which can make food nutritious and available throughout the year. Food storage and food safety issues have not been adequately addressed in the project. M&E systems have not provided trends of food sufficiency within the lead farmers and participating farmers over the past three phases.

13. Conclusions

1. Minimum Tillage and Crop Rotations were the two key CA principles that were practiced while mulching was almost absent. There was evidence of the knowledge of the reasons behind the practice of CA, although a clear understanding of the whole CA concept was limited.
2. The management practices like weeding and plant population have direct impact on maize yields. A low plant population encourages weed growth and leads to decline in yield and increased expenditure on weed control. Herbicides have the advantage of killing the weeds before the crop emerges. The crop has potential to grow in a weed free environment thereby improving productivity. A lot more farmers have bought herbicides for cash. The vouchers have induced an interest in herbicides far beyond expectations.
3. The *extension model used was the Lead Farmer*. This model adds a layer of community extension workers called the lead farmer below the Camp officer. The camp officer interfaces with the ultimate target, the participating farmer, through the Lead Farmer. The appreciation of the role and responsibilities of the CEO was mixed. For example, the application of the voucher received by the camp officers varied between camps. This ambiguity about the role of the voucher is reflected in the quality of the demonstrations at their camps which, were not configured to cater for large number of visitors.
4. The performance of the lead farmer approach calls for closer scrutiny. There is a growing discontent between the lead and follower farmers, a consequence of vouchers received by lead and not follower farmers. The FISP and FISRI could be better synchronized so that follower farmers receive FISP inputs as is the case in some district. Given the discord between the lead farmer and the follower farmers, a careful examination is required to establish where the benefits of the e-voucher for lead farmer falls. If the benefits are the heightened appreciation of CA leading to adoption onto the full field, and the corresponding despondence of the follower farmer, then a system of rotation or graduation of the lead farmers is strongly recommended.
5. *Follower Farmers* are essentially “club members” without benefits. The project is seen as a source of support for members. There is a growing division between lead and follower farmers because of this apparent exclusion from the perceived benefits of the project. The district extension has explained that the Lead Farmer demo is for all follower farmers to learn from.
6. The expansion or replication pathway for the lead farmer model of extension has stalled. The discord between the lead farmer and follower farmer is palpable. New camps on to which the programme has expanded do not have follower farmers due to the conflict over e-vouchers and bicycles which lead farmers have and follower farmers do not. Overall, the number of follower farmers is lower than planned as often only 8 out of the 15 are actively or purposively involved in the project activities. In this regards, the e-voucher does not sit well

with the lead farmer concept and may be an obstacle to the linkages between the Lead Farmer and the follower farmer, quite the opposite of what it was meant to be.

7. Agro-dealers and the e-voucher scheme have given rise to an emerging competition amongst agro-dealers which is contributing to an environment of fair prices for farm the inputs. Despite this positive development, there are concerns about reported differences in prices between voucher and non-voucher shops during the voucher season.
8. E-vouchers have greatly facilitated access to inputs and CA implements thereby making it possible for farmers to experience the application of CA at scale. The vouchers have also stimulated the agro-dealers to increase their network and grow their business thereby bringing inputs closer to the farmers. The e-voucher was cost effective compared to the project distributing the inputs directly.
9. *Conservation agriculture mechanization pilot* was key to up scaling of CA. Mechanization in conjunction with herbicides has changed the way constraints are viewed on smallholder farms. If we are going to promote mechanization, we ought to do so at scale. The first season with 10 tractors has demonstrated that the demand far outstrips supply and that queuing up for the service resulted in some reverting to conventional farming. We recommend that the number of tractors in the district be increased while the operators remain profitable.
10. The introduction of mechanization has usually resulted in advantages such as (a) - The average area under cultivation increasing dramatically, (b) - Average total production of maize among oxen owners doubling. As in the beginning of mechanization in 1900, there have not been enough oxen for every farmer even in cattle owning regions of the country. Late planting was experienced this year due to waiting for the tractor or other mechanization options. The use of the chaka hoe for basin making has come up against the constraint of the hoe in general which oxenization programmes have been trying to solve since the 20th Century. FISRI is one in line of projects that are promoting faster, larger and earlier land preparation. Planting basins may be earlier but they are not faster or lighter on the practitioner. The tractor drawn ripper and planter improve upon the ox-drawn implements. This stage, however, is accessible largely by hire, removing the control of time in the hands of the operator exposing the farmer to late planting, constraint first addressed by making basins.
11. The per capita availability of Farm Implements such as a ripper or plough is still at the same or lower rate as in the 1980s or from the time the plough became part of smallholder agriculture in Zambia. In the interim, before all farmers own their own draft power or can afford to hire, we shall experience delays in crop establishment. The solution in the interim is the chaka hoe until such time that the per capita income rises to permit independence in draft power.
12. Project M&E system in place was not able to avail sufficient data and information from the farmer to the national level. The new methods of land preparation have not been well studied on farm yet the data reaching the headquarters does not attend to variables that may

permit understanding the contribution of these new methods to productivity. Given that FISRI is promoting new methods of planting, it is an omission that no data is available on plant population density. As farmers still plant large tracts under conventional ploughing practices, the above should also be collected on plots not under CA.

13. A major opportunity was missed to establish meaningful CA best-practice demonstration effect and a foundation for on-going research (through GART) as a result of delayed and/or ineffective M&E and data collection/analysis. In most of the FISRI documentation, it is implicitly assumed that the Senior Agricultural Officer (SAOs) office is able to employ complete enumeration. However, this is not possible and we may be getting far less information than we would if a statistically valid sample were taken. Much effort should be expended to achieve acceptable sample surveys so that conclusions from such surveys may be accepted with a known degree of reliability. Because it is costly and practically impossible to attain 100% enumeration of all households in the district, sampling should be an important component of the FISRI monitoring system. The sampling process should recognize and take into account inherent variations in farming systems and agro-ecological conditions. The exact stratification scheme is likely to differ from district to district, depending on each district's specific characteristics. Data should be available at the smallest unit, which in FISRI is the sub-plot of the participating farmer, the lead-farmer, and the camp officer. This is a rare opportunity to collect rich data at the farm level which can contribute to CA research and progression.
14. Capacity building was meant to enable the extension system from the headquarters in Lusaka to the lead farmer to function to support the promotion of CA now and in the future. Depending on the level in the chain, CAPACITY Building; training conducted at all levels was taking place outside a documented plan. Expression of the knowledge acquired was difficult to discern at follower farmer level due to limited access to inputs. Clear understanding of the CA principles among the farmers was limited and there was little evidence of CA material appropriate for the farmer level.
15. Food Security issues are not comprehensively addressed in the project design. The project design is focused on food production and availability. The project has enabled households to have adequate food and dietary diversification. However the project design has not integrated other important food security components such as food storage, nutrition, food safety, food conservation, food consumption and value addition.
16. FISRI has contributed towards attaining of some strategic and practical gender needs of women. However, gender mainstreaming was not adequately incorporated in the project design, implementation, monitoring and evaluation processes. There were no gender outcomes and indicators that were defined, no gender analysis have been carried out prior to formulating the different phases of the project. There are no clear staff gender mainstreaming responsibilities and accountability systems. There are no clear terms of reference for the gender focal person. Mainstreaming of gender has not been inbuilt as part of the key performance areas of the extension staff. CA capacity building for extension staff has been focused at technical issues at the exclusion of social and gender sensitive issues.

There has been limited collection of sex disaggregated data, analysis and utilization. Limited attention has been paid to differential gender roles, access and control issues, practical and strategic gender needs for women and men relating to the CA processes. Other social issues such as HIV and AIDS have not been included in the programming.

14. Recommendations

1. To improve monitoring and evaluation, the people who collect data must have the use for it. It is unlikely that data will be collected if the capacity or the need to use it does not exist. Until recently, there was no single person designated to lead Monitoring and Evaluation function in the project. Although staff at various levels report of monitoring and backstopping visits, these visits do not fall in any defined framework and it is difficult to document the results of such “monitoring visits”. The FISRI management should designate a member of the core team at each level, from the national to the district, who should coordinate the M&E. The data availed to the team was often aggregated at district level or camp level with rare disaggregation into gender, for example. The capacity to integrate gender concerns at implementing level is required.
2. In the face of alienation of the follower farmers and the loss of the demo at out scaling in farm, the justification for keeping the lead farmer is diminished. Instead the best performing follower farmer should be picked every two years so that members of a group know they have a chance to access the e-voucher. Or better still the each member of a study group may have an equal chance of hosting the voucher by randomly selecting a voucher recipient every two years.
3. There is need to improve the status of CA demonstrations. This could be achieved through closer linking of the incentives (vouchers) and expected responsibilities for the lead farmers. Efforts to highlight all the three CA principles at the demonstration sites should be increased. Understanding of the CA concepts could be ensured through the use of a standard and comprehensive CA training guideline. A clear understanding of the concept and principles of CA will encourage innovations among the farmers as they can then adapt CA to suit different situations, while staying within the basic principles.
4. The use of herbicides as a weed management strategy should not be promoted exclusively, but an integrated approaches which may include use of correct plant populations, use of mulch or crop rotations as weed control measures could also be promoted. Such an integrated approach will reduce over-dependence on herbicides and provide options for those farmers who cannot afford the herbicides. Currently, there is a danger of CA being synonymous with herbicide use.
5. Effective promotion of CA “best practices” could be enhanced through adequate and systematic documentation of successful CA farmers who can then be used as focal points for learning. Farmer field schools if well-established could also provide this evidence and act as a source of long term data for CA development and adaptation. Production of appropriate CA material at the different levels of implementation will assist in closing the “information gap” that was observed in the areas of operation.
6. The participating farmer in this project represents the ultimate impact of the project. As such, it is important to monitor the uptake processes of the various components of CA and other

project elements among the participating farmers. Long term monitoring guidelines for these farmers are important as they provide indicators for the sustainable adoption of the CA technologies and other project elements that were promoted. There is need to identify the successful follower farmers and use them as platforms for lesson learning and understanding of adoption issues.

7. Other forms of non-voucher incentives should be considered. For instance the farmer could receive certification to prove they have attained a yield level above 5 tons per hectare while using CA. Such certification would indicate the farmer is less vulnerable to weather changes and, therefore attractive to finance institutions who may find it safe to extend seasonal loans to such farmers. The fact that CA practice should confer preference for loans should be a stronger but neutral incentive limited only by the level a farmer dedicates to CA practice.
8. As long as the barrier to entry is the cost of the tractors, operators will enter the business until profits become zero. To avoid over-concentration in the hands of a few the financing institutions should vary the repayment period from 3 years when the demand is high to 6 years when the demand is in equilibrium with supply. Keeping the number of operators high in this manner will open access to more farmers. In scaling up to meet the demand, more tractors per operator is to be preferred to many one-tractor operators. Such tractors working in series will serve all clients effectively.
9. The FISRI should attend to market access for crops other than maize. Crops grown in rotation are perceived not to have a market, leading to putting them on a low priority in farmer's activities. To encourage crop rotations, crop buyers should flag their intentions early in the season so that farmers can plan their cropping. Market access is integral to on-farm practice. FISRI should link up with other programmes attending to crop marketing such as Dunavant.
10. The graduation from the ox to 4-wheal tractor is too steep; the FISRI may consider other power sources in between. The project teams should ensure there is equitable access to mechanization services to women given the factors that may limit that access such as social assets.
11. Since FISRI aims to increase productivity (i.e. yield etc), it is necessary to pay attention to yield components. Monitoring data should be collected on a sample of farmers covering the following:
 - a. Plant population at emergence
 - b. Plant population at harvest
 - c. Weed score at 2 months after planting.
12. During the 12/13 season, FISRI M&E should establish the factors that determine plant population under the various seedbed preparation methods. To achieve that, the camp officers need a tape measure to be part of their field kit.

13. Once the advantages of the animal drawn no-till/mulch planters are clearly documented (i.e. plant population, accurate fertilizer application, speed etc) farmers should be encouraged to buy their own animal drawn no-till/mulch planter or team up in groups of 5 or more to share the cost of one unit.
14. Gender mainstreaming and social issues must be addressed in CA adoption programmes:
 - a. Future, programming should take in account differential access and control of resources, gender roles, strategic and practical gender needs. Consider inclusion of potential female lead farmers for ownership of mechanised services, develop a model of providing support for herbicide spraying, such as through contractors and encourage Camp Officers to follow working calendars that are gender friendly to reduce women's workload burden in CA
 - b. Develop clear gender equity outcomes and indicators and establish clear gender mainstreaming responsibilities and accountability within project staff and the extension delivery systems. Appoint project Gender Focal Person (GFP) with clear terms of reference from within current staff;
 - c. Gender equality and women empowerment, HIV and AIDS should be in-built in CA extension service delivery and capacity-building;
 - d. M&E systems should collect sex disaggregated data, gender and social issues information, which should be analysed and utilised for gender sensitive programming. Develop gender mainstreaming strategy. Information, educational and communication (IEC) material, on CA should positively reflect gender dimensions

Consider integration of diverse food products with value addition and market linkages to provide increased incomes for women.

15. References or Bibliography

1. Aagaard P. (2003). **Conservation farming handbook for Hand hoe farmers in agro-ecological I & II fl at culture**. Lusaka: Zambia National Farmers Union.
2. Aagaard P. (2011). **The Practice of Conventional and Conservation Agriculture in East and Southern Africa**. Lusaka. Conservation Farming Unit.
3. Baker et al. (2002). **No-tillage seeding: Science and practice 2nd Edition**. Oxford, UK: CAB International.
4. CASU, Action Fiche for Conservation Agriculture Scaling Up Project (CASU)
5. CASU, Description of Action, Conservation Agriculture Scaling Up Project (CASU)
6. FAO -DSRRU (December 2011). **Post-harvest Survey of Conservation Agriculture Projects in Zambia: An Assessment of Farmer Practices and Production in the 2010/11 Agricultural Season**.
7. FAO Rome, Monitoring Reports food facility, EC FAO11 dated 04/04/2011 and 20/04/2010
8. FAO, 2010. **Conservation Agriculture** Website. {<http://www.fao.org/ag/ca/index.html> }
9. FAO. 2007. **Agriculture and Conservation Tillage**. Protection Department. Rome, Italy.
10. FASAZ/FAO. 2010. **Conservation Agriculture and Agricultural Production Systems in Zambia (Status Documentation, Analysis and Guidelines Development in Zambia)**. Lusaka – Zambia.
11. FISRI Logical Framework 1,11,&11
12. FISRI, 111, Project –GCP/ZAMO71/EC, assistance to consolidate best agricultural practices in small scale farming in Zambia.
13. FISRI, 2010 and 2011. **Project Logframes**. Lusaka.
14. FISRI, 2011. **FISRI Progress Report 2011– Kalomo District**. Lusaka.
15. FISRI, 2011. **FISRI Progress Report: April-November 2011 – Mpongwe District**. Lusaka
16. FISRI, 2011. **FISRI Progress Report: August-October 2010 – Mpongwe District**. Lusaka
17. FISRI, Implementing the electronic voucher input scheme in Zambia; step by step guide to implementation.
18. FISRI. (undated). **Mechanizing Conservation Agriculture in Zambia through An Equipment Support Fund for Privately Operated Commercial Agricultural Contracting Services**. Lusaka.
19. FISRI. 2011. **First and third quarter Progress reports**. Lusaka.
20. FISRI. 2011. **FISRI Project Document: Description of the Action. Assistance to consolidate the best agricultural practices in small-scale farming in Zambia**. Lusaka.
21. FISRI. 2012. **FISRI Progress Report December 2011 – January 2012**. Lusaka
22. G Sims, Farmer Input Support Response Initiative (FISRI), CA contractor services and training. 3-16 February 2012
23. G.Sims Farmer Input Support Response Initiative (FISRI) expansion, 12-21 November 2010
24. Gupta, R., Hobbs, P.R. Sayre, Ken. 2007. **The Role of Conservation Agriculture in Sustainable Agriculture**. The Royal Society.

25. Kerven, C., Bolt, R. (1988) Oxenization and draught power implements in Northern province. A review of supply, impacts and constraints
26. Landell Mills Development Consultants, Conservation Agriculture Scaling Up (CASU) Project formulation Report, December 2011
27. MACO, 2011. **FISRI Progress Report. June 2010 –June 2011.** Lusaka.
28. Mitti Joyce Mulila, Back to Office Report for combined mission for follow up technical support for Zambia and participation in the Tropical legume 11 (TL11) project meeting in Lilongwe May 2011.
29. Mitti Joyce Mulila, Back to Office Report for technical backstopping mission to the DRMMU, in Zambia, 20 April 2011.
30. Mumbwa District, Progress report, December 2011-Jan 2011.
31. Thomson Kalinda and Crispin Kapunda, A post harvest assessment of conservation agriculture scaling up for increased productivity and production (CASSP) and Farmer Input Support Response Initiative (FISRI) 15 November, 2010.
32. Thomson Kalinda and Crispin Kapunda, Baseline survey to establish indicators for impact assessment in Zambia's Farmer Input Response Initiative (FISRI) project 13 December 2009.
33. Victor Shitumbanuma and Fabian Maimbo, Baseline survey of agricultural production systems in fifteen new districts of Zambia targeted for up- scaling of conservation agriculture project, June 2011.
34. Zambia Impact Assessment Team. (2003). ***Conservation Farming & the FAO Food Security Pack – 2003 Briefing Note on the Post-harvest Assessment of Maize Yields.*** Lusaka Zambia.

16. Annex

Annex 16.1. People Met

| Name | Of respondent | Gender | District | Position | Contact |
|--------------------|----------------------|---------------|------------------|----------------------------|----------------|
| Benny Tembo | | M | Kapiri Mposhi | DACO | |
| Kanyata Muchulu | | M | Kapiri Mposhi | SAO | |
| Patrick Musonda | | M | Kapiri Mposhi | CEO | |
| Cheelo. H. Mudenda | | F | Kapiri Mposhi | TSP | |
| Maurine Chibo | | F | Kapiri Mposhi | Agro Dealer | |
| Alice Mangolwa | | F | Kapiri Mposhi | Leadf Farmer | |
| William Banda | | M | Kapiri Mposhi | Agro Dealer | |
| Maxwell Monga | | M | Kapiri Mposhi | Lead Farmer | |
| Regina Hachikaka | | F | Kapiri Mposhi | Lead Farmer | |
| Hitler Mayanda | | M | Kapiri Mposhi | Lead farmer | |
| Noah Chonga | | M | Kaoma | Lead farmer | |
| Christine Moyele | | F | Kaoma | Lead farmer | |
| Judith Nanyangwe | | F | Kaoma | JTO | |
| McChabby Lupiya | | M | Kaoma | TO | |
| John Matombo | | M | Kaoma | JTO | |
| Milimo Mnakenda | | M | Kaoma | NSAO | |
| Lawrence Witola | | M | Kaoma | JTO | |
| Naiwa Sipyambango | | M | Kaoma | PTO | |
| Aubrey Chanda | | M | Kaoma | DACO | |
| Chuma Mwiya | | F | Kaoma | Block Extension Officer | |
| Mukungu | | M | Kaoma | PAO | |
| Kennedy Kakwava | | M | Kaoma | Lead Farmer | |
| Christetar Makunya | | F | Kaoma | Participating Farmer | |
| Inonge Munalulu | | F | Kaoma | Lead Farmer | |

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|-----------------------------|---|---------|---|--------------|
| Ngwira | M | Kaoma | Agro Dealer | |
| Boston Ngasimbs | M | Kaoma | Agro Dealer | |
| Tom Chisanga Mwansabomba | M | Mumbwa | Acting CEO | |
| Siame Masida | M | Mumbwa | Junior TSP | |
| Phillis Mwansa | F | Mumbwa | CEO | |
| Chanda | F | Mumbwa | Agro dealer | |
| Timothy Tehuho | M | Mumbwa | CEO | |
| Kaputo Surrion | M | Mumbwa | CEO | |
| Bwalya Katongo | M | Mumbwa | Participating farmer | |
| Exild Tepu | F | Mumbwa | Satisfactory Participating farmer | |
| Eunice Shikonde | F | Mumbwa | Participating Farmer | |
| Geofrey Nyirenda | M | Chipata | Camp Officer | 0979-625487 |
| Shikasako M. Mosa | M | Chipata | Camp Officer | 0977-978669 |
| Etson Phiri | M | Chipata | Camp Officer | 0967-7318371 |
| Simuzile King | M | Chipata | Camp Officer | 0977-131340 |
| Muyeko Phiri | M | Chipata | Camp Officer | 0977-195595 |
| Mutinta C. Hangombe | M | Chipata | Camp Officer | 0965-349266 |
| John Phiri | M | Chipata | Camp Officer | 0978-173973 |
| Benjamin Nyoni | M | Chipata | Camp Officer | 0979-124246 |
| Floridah M. Hamvumba | F | Chipata | Camp Officer | 0979-122634 |
| Martin Mhanza | M | Chipata | Camp Officer | 0978-049955 |
| Nakombe Joyce M. | F | Chipata | Camp Officer | 0977-967568 |
| Mulenga Catherine | F | Chipata | Camp Officer | 0979-625652 |
| Evans Chileshe | M | Petauke | Camp Officer | 0977-382160 |
| Godfrey Njobvu | M | Petauke | Camp Officer | 0977-890818 |
| Ephraim John Phiri | M | Petauke | Camp Officer | 0974-855902 |

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|---------------------|---|------------|----------------------|-------------|
| Tembo Sophia | F | Petauke | Camp Officer | 0977-987354 |
| Elijah Mkandawire | M | Petauke | Camp Officer | 0975-171350 |
| Nchimunya Beyani | F | Monze | Camp officer | 0977-661092 |
| Katema Motive | M | Monze | Camp officer | 0979-754745 |
| Sara Goma Sikota | F | Monze | Agricultural Officer | 0976-901150 |
| Pamela C. L. Daka | F | Monze | Hamapande | 0977-253962 |
| Paul M. Nyambe | M | Monze | SAO - District | 0976-654445 |
| Mr Masungo Hansenka | M | Monze | Camp Officer | 0977-680694 |
| Mr Louis Chinene | M | Monze | Camp Officer | 0975-625986 |
| Mukamba Monde | F | Kalomo | Camp Officer | 0977-727464 |
| Clement Kayungwa | M | Kalomo | Camp Officer | 0977-789877 |
| Gift Miyanda | M | Kalomo | Camp Officer | 0962-191362 |
| Alfred Hamaundu | M | Kalomo | Camp Officer | 0974-365004 |
| Grace Hansende | F | Kalomo | Camp Officer | 0976-232628 |
| Kwesela Christopher | M | Kalomo | Camp Officer | 0978-306525 |
| Kayombo Kashweka | M | Kalomo | Camp Officer | 0964-155552 |
| Dickson Siamungulu | M | Kalomo | Camp Officer | 0978-385834 |
| Rich Chizyuka | M | Kalomo | Camp Officer | 0979-961256 |
| Christine Muloba | F | Kalomo | Camp Officer | 0979-303219 |
| Peter Munkombwe | M | Kalomo | Camp Officer | 0975-967100 |
| Roy Chiinda | M | Kalomo | Camp Officer | 0966-211222 |
| Ben Chisenga | M | Kalomo | Camp Officer | 0977-228507 |
| David Malumo | M | Kalomo | Camp Officer | 0977-196123 |
| Rosemary Kanunka | F | Kalomo | Camp Officer | 0974-745913 |
| Lillian Hamusiya | F | Sinazongwe | Camp Officer | 0977-882608 |
| Solomon Ngoma | M | Sinazongwe | Camp Officer | 0979-442375 |
| Mwiindwe Alice | F | Sinazongwe | Camp Officer | 0979-490184 |

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|---------------------|---|------------|----------------------|--------------|
| Mandala Kelly | M | Sinazongwe | Camp Officer | 0977-533306 |
| Bachenge Nyirenda | M | Chongwe | Agro Dealer | 097-746-0456 |
| Victor Njovu | M | Chongwe | District | 097-723-3488 |
| Francis Kubi | M | Chongwe | District | |
| Simwami Nickson | M | Chongwe | Ag Sup | |
| Simulunda Charles | M | Chongwe | DACO | |
| mulonda Richard | M | Chongwe | BEO | 097-962-3003 |
| Kenthern Banda | M | Chongwe | BEO | 977-377-9312 |
| Samba S, Inamwae | F | Chongwe | Agr Sup | 097-711-9770 |
| Olivia Makina | F | Chongwe | Camp Officer | 097-639-1505 |
| Soneni Sayi | F | Chongwe | Agro Dealer | 097-882-5512 |
| Webby M. Kwalombota | M | Chongwe | Contractor Fitereli | 097-938-9543 |
| Titus Kabanso | M | Chongwe | Agro Dealer | |
| Warren Nansukuma | M | Monze | Contractor Tractor | |
| Rosta Nchimunya | F | Monze | Farmer | |
| Gilbert Vlahakis | M | Monze | Agro Dealer | 955-850-0232 |
| Jean Vlahakis | F | Monze | Agro Dealer | 955-850-0232 |
| Phillip Kaocha | M | Monze | Agro Dealer | 097-780-0632 |
| Bristol Twaambo | M | Monze | Agro Dealer | 096-515-5651 |
| Nakwala Mutaneko | F | Monze | Camp Officer | |
| | | Kalomo | SAO - District | |
| Request Mulwani | M | Kalomo | Contractor - tractor | 097-793-4266 |
| Albert Muyimbwa | M | Kalomo | Farmer | 097-774-3894 |
| Benjamin Mwanza | M | Kalomo | Agro Dealer | 097-782-2198 |
| Prudence Sefa | F | Kalomo | Agro Dealer | 097-655-3233 |
| Andrew Mwambazi | M | Kalomo | Agro Dealer | 097-779-3643 |
| Perrot Mboози | M | Kalomo | Agro Dealer | 097-762-4217 |

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|--------------------------|---|------------|------------------|--------------|
| Samuel Siyunyi | M | Sinazongwe | Methodologis | 097-575-1070 |
| Jackson Phiri | M | Sinazongwe | Farm Power | 097-304-7491 |
| Joseph Mbozi | M | Sinazongwe | Marketing | 097-753-4146 |
| Judith Chipaila | F | Sinazongwe | Agro Dealer | 097-721-8270 |
| Potious Lungu | M | Chipata | Agro Dealer | 097-735-8244 |
| Mary S. Phiri | F | Chipata | Agro Dealer | 097-807-3292 |
| Evans Chileshe | M | Chipata | Camp Officer | 097-738-2160 |
| Godfrey Njovu | M | Chipata | Camp Officer | 097-789-0818 |
| John Phiri | M | Chipata | Camp Officer | 097-485-5902 |
| Tembo Sophia | F | Chipata | Camp Officer | 097-798-7354 |
| Elija Mkandawire | M | Chipata | Camp Officer | 097-517-1350 |
| Stella Phiri | F | Petauke | Agro Dealer | 097-930-1807 |
| Collins Nkantiko | M | Lusaka | CFU | 097-779-3999 |
| Peter Agaard | M | Lusaka | CFU | 096-686-1481 |
| Sinya | M | Lusaka | CFU | 096-523-8008 |
| Madalitso | M | Lusaka | CFU | 096-523-8084 |
| Alick Daka | M | Lusaka | Deputy Director | |
| Eddy Delaunay-Belleville | M | Lusaka | EU Delegation | |
| Hans Hesse | M | Lusaka | MTZL | 096-757-3001 |
| Cynthia M. Belemu | F | Lusaka | ZNFU | |
| Stephen Muliokela | M | Lusaka | GART | |
| Jim Belemu | M | Lusaka | FAO Project Team | |
| Bazak Z. Lungu | M | Lusaka | EU Delegation | 021-125-5583 |
| Kirsi Pekuri | F | Lusaka | EU Delegation | 021-125-5583 |
| James Breen | M | Lusaka | FAO Consultant | 097-538-9697 |
| Christian Thierfelder | M | Monze | CIMMYT | |

Annex 16.2. CAPACITY BUILDING FOR SUSTAINABLE FARMING: THE CASE OF CONSERVATION AGRICULTURE TRAINING UNDER FISRI PROJECT

Capacity building, as it encompasses the transfer of knowledge and skills for the purpose of empowering the recipients to practice what has been exposed to them, is a deliberate process that entails a change in the mindset. In adults this must be undertaken following the experiential learning cycle which is learner-centred and involves a period of experiencing/ exposure followed by a process of reviewing, reflecting and applying thereby allowing the learner to internalize the message. Such an approach would enhance effective skill transfer to facilitate conceptual and attitudinal development and eventual change in behaviour of the learner. Capacity building in this context demands a well planned process encompassing theory (conceptual issues) and practise: Definite activities must be planned for each stage of the learning cycle with an action plan for application.

Training of farmers requires that the felt needs (training needs) are identified and specific training materials that respond to the needs are prepared or procured and delivered within the experiential learning cycle context. In the FISRI project training was conducted but without making it respond to 'felt' needs. Undoubtedly, the frame within which the project was conducted, under emergency conditions, may have compromised the planning of the trainings. It was evident from the field visits that a number of training interventions were made via out-sourced facility (the Conservation Farming Unit). While the content could have been of good quality the programming of the interventions did not guarantee maximum effect of the training. Referencing the CFU training programme, the FISRI project training was not in synch with the season (for example there was training on herbicide use in May 2012!). The CFU trains farmers on herbicides in October, closer to the time of application. The FISRI state in training is likely due to absence of a training needs assessment and training programming.

The duration of exposure is critical in training as shorter periods reduce probability of appreciation of the messages, while longer periods are simply inefficient. From the field visits it was noted that most training events reported to have been conducted (based on what the farmers said) were of very short durations; the field visits cannot ascertain whether there was more and longer training sessions in the field in the absence of records on training in the project.

The art of training needed to be consolidated at the CEOs and LFs levels through a training-of-trainers (ToT) programme allowing for technical reference for the farmers to be closer to them and also ensuring that there are updated training materials responding to emerging issues (innovations and shifts in the agricultural sector at large). The assumption under the FISRI project that the CEOs constitute a cadre of ToTs is not warranted as the support extended to them under the project does not guarantee provision of such a responsibility. There was no such a strategy under FISRI, but would be useful for the future.

As training is aimed at changing the behaviour of farmers, ultimately, the issue of quality assurance is important. How can we know that there has been a change in the behaviour of the farmers? Capture of salient information about the farmers before, during and after the training events could allow gauging the effectiveness of the training. No consistent records of any training event or follow up reports (checking on the action plans from training) under FISRI were provided. It would have been useful to know the date of training, participants (disaggregated by gender, age and otherwise) and, the focus of the training event (guided by a concept note that spells out the objectives of the training event). Good training should not stop at exposure, rather should follow the learner through

the application stage, therefore under FISRI a deliberate follow-up process would have positively contributed to quality assurance. It is through deliberate quality assurance setting that improvement in the content of the training and the delivery can be realized, responding to the farmers' needs. Again referencing CFU where the aspect of quality assurance is explicitly addressed, involving internal systems and external input, the impact of training intervention can be followed with clear indicators.

Capacity building can also be extended to the institutional levels in which case the frame within the FISRI project was implemented is an important candidate of some capacity building. It was noted that the extension service delivery system involving the Ministry district staff and the CEOS was key for the success of the project, to the extent, therefore, that these offices needed to be supported. The evaluation revealed that implementation was challenged by poor support of these offices through the project. At all visited locations the challenge of delayed funding for fuel and poor maintenance programme were cited.

A brief comparison between FISRI and CFU training programmes revealed that the FISRI approach was closed due to the LF-FF focus, while the CFU was open; that is to say training was open to any farmers who was interested. This allowed for early adopters to advance and become 'models'. The LF equivalent in CFU was the Farmer Coordinator, was supported (via the e-voucher) by the organization on a performance basis for the training that was conducted and this was evaluated before payment is done: Poor performers were dropped off! As mentioned above the CFU training programme represented a well programmed intervention which FISRI could have emulated for impact. It was noted that the delivery system adopted by the FISRI project omitted the Block Extension Officer, further compromising the integrity of the system. It was easily discerned as to why this done.

Conclusions

1. There was no comprehensive training programme while capacity-building was taking place at all levels (with MAL staff, agri-dealers, agri-contractors, lead-farmers and to some very limited extent with participating farmers). The training was not well aligned with the training needs of the farmers as they were not based on training needs assessments that would have guided the topics for specific target beneficiary category. Evident also was that the interventions, while targeted, were of varying quality in terms of 'fitness for purpose'; some training being out-of-sync with season, while some was too brief to be of any effect as was the case with tractor operators on agri-business principles, maintenance and record-keeping, which was conducted in one day only; indeed the need for expediting the roll-out of tractors was clearly expressed but necessary minimum training was required but not conducted.
2. The MAL DACOs and CEOs are critical to CA adoption as they are key components of the delivery system of the extension messages; unfortunately they are currently not as effective in ensuring adoption of the technologies due to poor logistical support in terms of fuel provision, allowances and transport repairs. The functionality of the system is further compromised, in the project, by the omission of the Block Extension Officer, who is the direct supervisor of the field staff who ensures closer follow-up of implementation of activities.
3. The frame used by the FISRI project in implementing CA was inefficient compared to those used by other players in terms of scope, application of the lead-farmer model, targeted farmers, capacity-building approach and the use of the e-voucher concept as an incentive, among others. As a process project, FISRI should have opted for an opened participation to

all farmers so as to identify and empower 'early starters/adopters'. The support to lead farmers should have been based on performance allowing for weaning off of those not making the grade and indeed avoid farmers developing a dependency on inputs.

Lesson learnt

In the absence of a comprehensive training programme whose effects will take time when in place concentration of key interventions/activities into 'specialised nodes' should be considered. This would serve to minimise risk and maximise capacity-building/training effect at the early stages of target-farmer development. The 'specialised nodes' would provide services such as ripping, herbicide application (e.g. agri-contractors being trained on use of herbicides, creating synergies in bringing together spraying equipment, procurement of herbicides and application of herbicides more effectively), tractor maintenance and others of this nature which would have been concentrated into few hands of 'specialist practitioners'. This would make training more effective as a few but detailed points of interventions would be created, reducing risk and improving learning. Undoubtedly the strategy would encourage more private sector participation. Diffusion of such service provision would increase with farmers becoming more advanced in their knowledge of these technologies.

Recommendation

Capacity-building needs to become more sustainable and replicable through a Train-the-Trainer (ToT) approach linked to performance-based incentives. Embarking on a ToT programme to sustain capacity-building of CA in the farming community is thus a key success factor for future initiatives.

Annex 16.3.: Conservation Agriculture Implementation in the FISRI Project.

1. CA Concept, Theory and Practice

CA comprises three key principles namely: minimum soil disturbance, maintenance of at least 30% soil organic cover and the inclusion of suitable crop rotations and/or interaction. Applying all three principles simultaneously will optimize benefits from the CA system. In the project areas visited, the two principles of minimum soil disturbance and crop rotations and interaction were largely being applied by the farmers. Communal grazing regimes in most of the areas and wild fires were in most cases cited by the farmers as the major constraints to maintaining soil cover in their CA fields. However, when questioned on their understanding of CA, the farmers would mostly list the activities that they go through when implementing CA such as digging basins, ripping, rotations, manure application, planting early, etc. The principle of mulching or maintenance of soil cover was mentioned in very few cases. It is evident from the interactions with the farmers and the training material available that the training is largely activity- based. The danger of the activity – based training is that as long as farmers do not understand and appreciate the underlying principles in CA, they are likely to go back to conventional farming methods when the project ends and the inputs are withdrawn. The activity-based training needs to be continuously complimented with the key CA principles and messages. A comprehensive CA field training manual could enhance the effectiveness of the training.

Lead farmer Approach

The majority of the lead farmers that we interacted with during the evaluation mission had managed to establish their demonstration plots. The lead farmer approach is very ideal in such situations where the extension networks are sparse and have mobility problems. With adequately trained lead farmers, the extension officer is able to indirectly reach a larger number of “follower farmers”. Farmer field schools were used by the CEOs as a platform for training lead farmers. In most areas visited the farmer field schools were not running very effectively as they had no budget allocation. The CEOs in most camps used the vouchers which they received from the programme to source inputs for the farmer field schools, while others complimented these with contributions from the farmers themselves. The inputs from the CEOs voucher could only cover one or two schools but there was a need to set up more schools (preferably, one farmer field school per zone) to reduce the distance that the lead farmers will have to travel. This was worsened by the quality of bicycles received by the lead farmers, many of which were no longer functional. Farmer field schools if used may require initial funding before they can sustainable function independently.

The failure to understand the link between the inputs or vouchers received and the duties and obligations of the lead farmer at the implementation level affected the state of some demonstration plots, whose state were not adequately portraying the potential for CA. If lead farmers understand and appreciate that the inputs are an “incentive” for managing the demonstration and linking with the follower farmer, there should be an effort to portray CA with all the three principles where ever possible, more so on demonstration plots managed by lead farmers. This will ensure that the correct CA message gets across to the follower farmers. As the lead farmer realize the benefits initially in terms of yield (sometimes after the first year), they quickly expand and the large field will not receive the same level of management. It is therefore important to maintain these “initial” demonstrations in order to observe the long term benefits of CA. Alternatively, if farmer field schools are adequately funded, these would serve as permanent demonstration or research sites where data could be collected over the long term and documentation of the “best agriculture practices” could be a reality.

Benefits from implementing CA as highlighted by farmers

Farmer testimonies and observations in the field indicate that there are tremendous benefits that farmers are getting from implementing CA, with farmers getting higher yields in their CA systems. Many of the benefits cannot necessarily be defined as CA principles but they are coming as added benefits which are enhanced through application of the CA principles. The following are some of the benefits highlighted by the farmers:

- Ability to plant early
- More efficient use of manure, fertilizers and lime
- Reduced labour in ripping systems
- Reduced labour for weeding when herbicide are used
- Increased resilience to dry spells for crops under CA

The use of herbicides in CA systems has been embraced by farmers as it greatly reduces the labour demand that is required for manual weeding. While herbicides present an excellent entry point for promoting CA, caution should be taken not to exclusively promote herbicides as the only weed management option. A more integrated approach that includes mulching as a weed control strategy, use of cover crops, and other strategies should be promoted. Excessive use of the same herbicide may lead to resistance to the herbicides by some weed species, which if happens may frustrate farmers and may lead to them reverting to conventional farming practices. Continuous identification of these emerging successes and their documentation is key to successful up scaling of CA.

Apart the labour for manual weeding, labour requirements for land preparation in manual CA systems were identified by those farmers that are not implementing CA as major deterrents. The project should therefore be commended for the introduction of the CA mechanization component which has generated a lot of interest among the farmers. Continuous interaction with the farmers will assist in designing suitable mechanization models for different socio-economic and bio-physical settings.

Annex 16.4.: Service providers

Table 12 Ox-drawn Planter Service Providers

| | | | |
|----|-------------------------|-----------|------------|
| | | | |
| 1 | Oscar Hamachila | Monze | 0978303890 |
| 2 | James Hanseluka | Monze | 0976512354 |
| 3 | Philemon Moonze | Chongwe | 0979623004 |
| 4 | Webby Machaka | Chongwe | 0979389543 |
| 5 | Jacob Nyambe | Kazungula | 0979044072 |
| 6 | Boyd Madubula Munkombwe | Kazungula | |
| 7 | Collington Juma | Mazabuka | |
| 8 | Frank Hanjalika | Mazabuka | |
| 9 | Glady Muchindu | Kalomo | |
| 10 | Killion Siamalmba | Kalomo | 0978160153 |
| 11 | Mwabakapunga Mapani | Choma | |
| 12 | Ackim Maumbwe | Choma | |

Annex 16.5. Changes Noted Due To Exposure To Conservation Agriculture Via The FISRI Project

Table 13 Changes Noted Due To Exposure To Conservation Agriculture Via The Fisri Project

| Target beneficiary | Stated changes/benefits |
|---------------------------|---|
| DACO and District Staff | <ul style="list-style-type: none"> • Improved knowledge on CA technologies through training • Enhanced staff performance due to facilitation (transport, computer, camera, operational support) by Project |
| Camp Extension Officers | <ul style="list-style-type: none"> • Improved knowledge on CA technologies through training • Enhanced staff performance due to facilitation (transport, inputs for FFS, operational support) by Project |
| Lead Farmers | <ul style="list-style-type: none"> • Improved knowledge on CA technologies through training • Increased application of CA technologies • Increased land under CA proportionate to the total land: 50 to over 100% increases were reported. • Improved food security (high productivity) • Initiation of asset acquisition (including re-investment in agriculture) |
| Follower Farmers | <ul style="list-style-type: none"> • Improved knowledge on CA technologies through training • Improved food security (high productivity) |
| Agro-dealers | <ul style="list-style-type: none"> • Increased sales (contributions ranged from 30 to 70% of 2011/2012 season sales). • Enhanced business profile (able to get credit line) • Improved service delivery • Enhanced entrepreneurship (the competition for vouchers called for 'thinking out of the box') • Expansion of business (spatially, volumes and range of products) |

Annex 16.6. Volume of business (items sold) in agrodealers for 2011/12 season**Table 14 Volume of business (items sold) in Agro-dealers for 2011/12 season**

| District | Company | Total | Proportion in Dist |
|-----------------------|---------------------------|--------------|---------------------------|
| Chadiza | Farmers and Gardners Shop | 66 | 10% |
| | Modern Bazaar | 1 | 0% |
| | Msp agri shop | 109 | 16% |
| | Phatwell Chinyama | 427 | 63% |
| | Shani argric | 78 | 11% |
| Chadiza Total | | 681 | 100% |
| Chibombo | C and S Agro Services | 464 | 13% |
| | CROPPACK LUSAKA | 2 | 0% |
| | CROPSERVE KABWE | 528 | 15% |
| | CROPSERVE KABWE (CFU) | 32 | 1% |
| | CROPSERVE LUSAKA | 3 | 0% |
| | CROPSERVE LUSAKA (CFU) | 4 | 0% |
| | CROPSERVE MUMBWA | 26 | 1% |
| | Cropserve Mumbwa (CFU) | 15 | 0% |
| | Growers World - Mumbwa | 6 | 0% |
| | KUMAWA CHONGWE | 12 | 0% |
| | Lima Agro Suppliers | 9 | 0% |
| | Lima agro supplies | 59 | 2% |
| | LIMA KABWE | 742 | 21% |
| | LIMA MUMBWA | 585 | 17% |
| | Minelands Chibombo-FAO | 189 | 5% |
| | Minelands Chongwe-FAO | 100 | 3% |
| | Minelands Lusaka-FAO | 547 | 16% |
| | Namipeza | 14 | 0% |
| | Plant Agrichem - Kabwe | 30 | 1% |
| | Plant Agrichem - Keembe | 68 | 2% |
| | Rubie Agro Suppliers | 35 | 1% |
| Chibombo Total | | 3470 | 100% |
| Chienge | ADSEK MANSA | 188 | |
| Chienge Total | | 188 | |
| Chipata | Agri chem | 144 | 4% |
| | Dunavant | 4 | 0% |
| | Farmers and Gardners Shop | 1417 | 35% |
| | Isusya Collector 2 | 8 | 0% |
| | JJIV | 526 | 13% |
| | KUMAWA CHIPATA | 79 | 2% |
| | Modern Bazaar | 149 | 4% |

| | | | |
|----------------------|--------------------------|-------------|-------------|
| | Msp agri shop | 119 | 3% |
| | Plant Agrichem - Kabwe | 4 | 0% |
| | Shani argric | 1606 | 40% |
| Chipata Total | | 4056 | 100% |
| Choma | Agri chem | 1 | 0% |
| | Arupee | 2119 | 56% |
| | ATS Choma | 3 | 0% |
| | Chems Agro | 56 | 1% |
| | CROPSERVE CHOMA | 94 | 2% |
| | CROPSERVE MAZABUKA (CFU) | 4 | 0% |
| | Deliram Enterprise | 3 | 0% |
| | Farm centre ltd | 11 | 0% |
| | Greenbelt agro ltd | 82 | 2% |
| | Greenland Agro | 205 | 5% |
| | H.w enterprises | 9 | 0% |
| | Harshad bazaar | 1141 | 30% |
| | Kayeema Hort-Agricare | 3 | 0% |
| | MOOMBA MONZE | 7 | 0% |
| | Munzuma | 33 | 1% |
| Choma Total | | 3771 | 100% |
| Chongwe | ATS LUSAKA | 48 | 1% |
| | Kaoma garden | 2 | 0% |
| | KUMAWA CHONGWE | 1178 | 36% |
| | M11 Chongwe | 1 | 0% |
| | Minelands Chibombo-FAO | 2 | 0% |
| | Minelands Chongwe-CFU | 21 | 1% |
| | Minelands Chongwe-FAO | 395 | 12% |
| | <i>Namipeza</i> | <i>1611</i> | <i>49%</i> |
| | Plant Agrichem - Chongwe | 47 | 1% |
| | Plant Agrichem - Kabwe | 1 | 0% |
| Chongwe Total | | 3306 | 100% |
| Isoka | Chandi | 903 | 45% |
| | Zemech agro inputs | 1124 | 55% |
| Isoka Total | | 2027 | 100% |
| Kalomo | Chichi Hardware Ltd | 15 | 5% |
| | CROPSMINE KALOMO | 282 | 89% |
| | Greenbelt agro ltd | 19 | 6% |
| | Harshad bazaar | 2 | 1% |
| Kalomo Total | | 318 | 100% |
| Kaoma | Kanagei Gen Suppliers | 1569 | 38% |
| | Kaoma garden | 1540 | 38% |
| | Mutalanda agencies | 984 | 24% |

| | | | |
|----------------------------|----------------------------|-------------|------|
| Kaoma Total | | 4093 | 100% |
| Kapiri Mposhi | CROPSERVE KABWE | 247 | 15% |
| | CROPSERVE KABWE (CFU) | 68 | 4% |
| | CROPSERVE MKUSHI | 196 | 12% |
| | LIMA KABWE | 475 | 28% |
| | LIMA KAPIRI | 201 | 12% |
| | Mukango | 501 | 30% |
| Kapiri Mposhi Total | | 1688 | 100% |
| Katete | Dunavant | 840 | 34% |
| | Isusya Collector 2 | 1023 | 41% |
| | rochis business centre | 39 | 2% |
| | San enterprise | 566 | 23% |
| Katete Total | | 2468 | 100% |
| Kawambwa | CS Holdings | 543 | 100% |
| Kawambwa Total | | 543 | 100% |
| Kazungula | Chichi Hardware Ltd | 9 | 1% |
| | CROPSMINE KALOMO | 71 | 7% |
| | Green firm | 413 | 43% |
| | Technical sprayer Services | 472 | 49% |
| Kazungula Total | | 965 | 100% |
| Lundazi | JJIV | 276 | 16% |
| Lundazi Total | | 276 | 16% |
| Lusaka | CROPPACK MUMBWA | 2 | 3% |
| | CROPSERVE KABWE | 11 | 15% |
| | CROPSERVE KABWE (CFU) | 3 | 4% |
| | CROPSERVE MKUSHI | 4 | 5% |
| | CROPSERVE MUMBWA | 3 | 4% |
| | GROWERS WORLD - CHIBOMBO | 2 | 3% |
| | Growers World - Mumbwa | 2 | 3% |
| | Harshad bazaar | 2 | 3% |
| | KUMAWA CHONGWE | 20 | 27% |
| | LIMA KABWE | 5 | 7% |
| | LIMA MUMBWA | 2 | 3% |
| | Minelands Chongwe-FAO | 4 | 5% |
| | Mukango | 2 | 3% |
| | <i>Namipeza</i> | 13 | 17% |
| Lusaka Total | | 75 | 100% |
| Mambwe | Modern Bazaar | 394 | 23% |
| Mambwe Total | | 394 | 23% |
| Mansa | 182376/31/1 | 73 | 4% |
| | 236318/31/1 | 132 | 7% |
| | ADSEK MANSA | 161 | 8% |

| | | | |
|-----------------------|--------------------------|-------------|-------------|
| | ADSEK MWENSE | 3 | 0% |
| | B and CM investments | 126 | 6% |
| | HOPEWAYS VOUCHER | 534 | 28% |
| | Mulestus Agro Services | 841 | 43% |
| | Toptech | 70 | 4% |
| Mansa Total | | 1940 | 100% |
| Mazabuka | CROPSERVE MAZABUKA | 3 | 0% |
| | CROPSERVE MAZABUKA (CFU) | 914 | 30% |
| | Deliram Enterprise | 174 | 6% |
| | H.w enterprises | 740 | 24% |
| | Kapoti agro services | 800 | 26% |
| | Kayeema Hort-Agricare | 250 | 8% |
| | Mulela Agro Shop | 179 | 6% |
| Mazabuka Total | | 3060 | 100% |
| Mkushi | CROPSERVE MKUSHI | 677 | 41% |
| | Faides | 25 | 2% |
| | LIMA KABWE | 32 | 2% |
| | LIMA MKUSHI | 918 | 56% |
| Mkushi Total | | 1652 | 100% |
| Monze | Chems Agro | 27 | 1% |
| | Farm centre ltd | 1500 | 37% |
| | Greenland Agro | 10 | 0% |
| | Moomba Investments | 95 | 2% |
| | MOOMBA MONZE | 127 | 3% |
| | Munzuma | 2325 | 57% |
| Monze Total | | 4084 | 100% |
| Mpongwe | CROPSERVE MPONGWE | 605 | 26% |
| | LUANSHYA ARGO LUANSHYA | 1729 | 74% |
| Mpongwe Total | | 2334 | 100% |
| Mumbwa | CROPPACK LUSAKA | 51 | 5% |
| | CROPPACK MUMBWA | 22 | 2% |
| | CROPSERVE MKUSHI | 1 | 0% |
| | CROPSERVE MUMBWA | 237 | 22% |
| | Cropserve Mumbwa (CFU) | 5 | 0% |
| | GROWERS WORLD - CHIBOMBO | 123 | 12% |
| | Growers World - Mumbwa | 84 | 8% |
| | LIMA MUMBWA | 536 | 51% |
| Mumbwa Total | | 1059 | 100% |
| Mwense | ADSEK MWENSE | 530 | 100% |
| | Toptech | 2 | 0% |
| Mwense Total | | 532 | 100% |
| Nyimba | KUMAWA NYIMBA | 1395 | 100% |

| | | | |
|-------------------------|--------------------------------|--------------|------|
| Nyimba Total | | 1395 | 100% |
| Petauke | KUMAWA CHIPATA | 197 | 6% |
| | KUMAWA PETAUKE | 613 | 20% |
| | rochis business centre | 2281 | 74% |
| Petauke Total | | 3091 | 100% |
| Samfya | Maryland | 164 | 18% |
| | Mbeta Agro Systems | 148 | 16% |
| | Michi Trading and construction | 601 | 66% |
| Samfya Total | | 913 | 100% |
| Serenje | CROPSERVE MKUSHI | 261 | 14% |
| | LIMA KABWE | 7 | 0% |
| | LIMA MKUSHI | 163 | 9% |
| | LIMA SERENJE | 1483 | 77% |
| Serenje Total | | 1914 | 100% |
| Sesheke | Farmers Nest | 116 | 13% |
| | Farmvet | 763 | 87% |
| Sesheke Total | | 879 | 100% |
| Sinazongwe | Chems Agro | 513 | 46% |
| | CROPSERVE CHOMA | 200 | 18% |
| | J.chomba enterprise | 412 | 37% |
| Sinazongwe Total | | 1125 | 100% |
| Solwezi | 241469241 | 778 | 100% |
| Solwezi Total | | 778 | 100% |
| Grand Total | | 53075 | 100% |

Table 15 Volume of business (items sold—Tools or Inputs) in Agro-dealers for 2011/12 season

| Project | Category | District | Company | Total |
|--------------------|----------|----------|---------------------------|------------|
| FAO 2011 Inputs | Quantity | Chadiza | Farmers and Gardners Shop | 34 |
| | | | Msp agric shop | 59 |
| | | | Phatwell Chinyama | 272 |
| | | | Shani agric | 53 |
| | | | Chadiza Total | 418 |
| | | Chibombo | C and S Agro Services | 277 |
| | | | CROPPACK LUSAKA | 1 |
| | | | CROPSERVE KABWE | 308 |
| | | | CROPSERVE KABWE (CFU) | 20 |

| | | |
|-----------------------|---------------------------|-------------|
| | CROPSERVE MUMBWA | 11 |
| | Cropserve Mumbwa (CFU) | 7 |
| | Growers World - Mumbwa | 3 |
| | KUMAWA CHONGWE | 7 |
| | Lima Agro Suppliers | 5 |
| | Lima agro supplies | 36 |
| | LIMA KABWE | 428 |
| | LIMA MUMBWA | 335 |
| | Minelands Chibombo-FAO | 118 |
| | Minelands Chongwe-FAO | 51 |
| | Minelands Lusaka-FAO | 301 |
| | Namipeza | 7 |
| | Plant Agrichem - Kabwe | 15 |
| | Plant Agrichem - Keembe | 34 |
| | Rubie Agro Suppliers | 20 |
| Chibombo Total | | 1984 |
| Chienge | ADSEK MANSA | 115 |
| Chienge Total | | 115 |
| Chipata | Agri chem | 72 |
| | Dunavant | 2 |
| | Farmers and Gardners Shop | 788 |
| | Isusya Collector 2 | 4 |
| | JJIV | 297 |
| | KUMAWA CHIPATA | 35 |
| | Modern Bazaar | 58 |
| | Msp agric shop | 68 |
| | Plant Agrichem - Kabwe | 2 |
| | Shani agric | 1105 |
| Chipata Total | | 2431 |
| Choma | Agri chem | 1 |
| | Arupee | 1149 |
| | ATS Choma | 2 |
| | Chems Agro | 34 |
| | CROPSERVE CHOMA | 48 |
| | CROPSERVE MAZABUKA (CFU) | 1 |
| | Deliram Enterprise | 2 |
| | Farm centre ltd | 5 |
| | Greenbelt agro ltd | 40 |
| | Greenland Agro | 94 |
| | H.w enterprises | 6 |
| | Harshad bazaar | 4 |
| | Kayeema Hort-Agricare | 2 |
| | MOOMBA MONZE | 2 |
| | Munzuma | 21 |

| | | |
|----------------------------|----------------------------|-------------|
| Choma Total | | 1411 |
| Chongwe | ATS LUSAKA | 35 |
| | KUMAWA CHONGWE | 622 |
| | M11 Chongwe | 1 |
| | Minelands Chongwe-CFU | 14 |
| | Minelands Chongwe-FAO | 221 |
| | Namipeza | 812 |
| | Plant Agrichem - Chongwe | 17 |
| Chongwe Total | | 1722 |
| Isoka | Chandi | 525 |
| | Zemtech agro inputs | 596 |
| Isoka Total | | 1121 |
| Kalomo | Greenbelt agro ltd | 17 |
| Kalomo Total | | 17 |
| Kaoma | Kanagei Gen Suppliers | 791 |
| | Kaoma garden | 630 |
| | Mutalanda agencies | 543 |
| Kaoma Total | | 1964 |
| Kapiri Mposhi | CROPSERVE KABWE | 136 |
| | CROPSERVE KABWE (CFU) | 35 |
| | CROPSERVE MKUSHI | 132 |
| | LIMA KABWE | 258 |
| | LIMA KAPIRI | 108 |
| Kapiri Mposhi Total | | 669 |
| Katete | Dunavant | 408 |
| | Isusya Collector 2 | 524 |
| | rochis business centre | 20 |
| | San enterprise | 355 |
| Katete Total | | 1307 |
| Kazungula | Green firm | 1 |
| | Technical sprayer Services | 281 |
| Kazungula Total | | 282 |
| Lundazi | JJIV | 141 |
| Lundazi Total | | 141 |
| Lusaka | CROPSERVE KABWE | 7 |
| | CROPSERVE KABWE (CFU) | 2 |
| | CROPSERVE MKUSHI | 3 |
| | CROPSERVE MUMBWA | 2 |
| | Growers World - Mumbwa | 1 |
| | KUMAWA CHONGWE | 10 |
| | LIMA KABWE | 1 |
| | Minelands Chongwe-FAO | 3 |
| | Namipeza | 6 |
| Lusaka Total | | 35 |

| | | |
|-----------------------|--------------------------|-------------|
| Mambwe | Modern Bazaar | 24 |
| Mambwe Total | | 24 |
| Mansa | 182376/31/1 | 45 |
| | 236318/31/1 | 86 |
| | ADSEK MANSA | 102 |
| | ADSEK MWENSE | 1 |
| | B and CM investments | 67 |
| | HOPEWAYS VOUCHER | 363 |
| | Mulestus Agro Services | 448 |
| | Toptech | 33 |
| Mansa Total | | 1145 |
| Mazabuka | CROPSERVE MAZABUKA | 2 |
| | CROPSERVE MAZABUKA (CFU) | 578 |
| | Deliram Enterprise | 82 |
| | H.w enterprises | 479 |
| | Kapoti agro services | 456 |
| | Kayeema Hort-Agricare | 126 |
| Mazabuka Total | | 1723 |
| Mkushi | CROPSERVE MKUSHI | 464 |
| | Faides | 12 |
| | LIMA KABWE | 9 |
| | LIMA MKUSHI | 635 |
| Mkushi Total | | 1120 |
| Monze | Chems Agro | 14 |
| | Farm centre ltd | 826 |
| | Greenland Agro | 4 |
| | Moomba Investments | 48 |
| | MOOMBA MONZE | 62 |
| | Munzuma | 1442 |
| Monze Total | | 2396 |
| Mpongwe | CROPSERVE MPONGWE | 401 |
| | LUANSHYA ARGO LUANSHYA | 1133 |
| Mpongwe Total | | 1534 |
| Mumbwa | CROPSERVE MKUSHI | 1 |
| | CROPSERVE MUMBWA | 75 |
| | Growers World - Mumbwa | 43 |
| | LIMA MUMBWA | 49 |
| Mumbwa Total | | 168 |
| Mwense | ADSEK MWENSE | 344 |
| | Toptech | 1 |
| Mwense Total | | 345 |
| Petauke | rochis business centre | 1003 |
| Petauke Total | | 1003 |
| Samfya | Maryland | 2 |

| | | | |
|-------|----------------------------|--------------------------------|---------------|
| | | Mbeta Agro Systems | 69 |
| | | Michi Trading and construction | 418 |
| | Samfya Total | | 489 |
| | Serenje | CROPSERVE MKUSHI | 168 |
| | | LIMA MKUSHI | 105 |
| | | LIMA SERENJE | 690 |
| | Serenje Total | | 963 |
| | Sesheke | Farmers Nest | 58 |
| | | Farmvet | 348 |
| | Sesheke Total | | 406 |
| | Sinazongwe | Chems Agro | 333 |
| | | CROPSERVE CHOMA | 98 |
| | | J.chomba enterprise | 4 |
| | Sinazongwe Total | | 435 |
| | Solwezi | 241469241 | 585 |
| | Solwezi Total | | 585 |
| | Quantity Total | | 25,953 |
| Value | Chadiza | Modern Bazaar | 1 |
| | | Phatwell Chinyama | 1 |
| | Chadiza Total | | 2 |
| | Chibombo | CROPSERVE LUSAKA | 1 |
| | | CROPSERVE LUSAKA (CFU) | 2 |
| | | LIMA MUMBWA | 1 |
| | | Minelands Chibombo-FAO | 1 |
| | | Rubie Agro Suppliers | 1 |
| | Chibombo Total | | 6 |
| | Chipata | KUMAWA CHIPATA | 1 |
| | | Modern Bazaar | 34 |
| | Chipata Total | | 35 |
| | Choma | CROPSERVE MAZABUKA (CFU) | 1 |
| | | Greenbelt agro ltd | 2 |
| | | Harshad bazaar | 570 |
| | Choma Total | | 573 |
| | Chongwe | ATS LUSAKA | 1 |
| | | Minelands Chongwe-FAO | 7 |
| | Chongwe Total | | 8 |
| | Kalomo | Chichi Hardware Ltd | 9 |
| | | CROPSMINE KALOMO | 141 |
| | | Harshad bazaar | 1 |
| | Kalomo Total | | 151 |
| | Kapiri Mposhi | Mukango | 255 |
| | Kapiri Mposhi Total | | 255 |
| | Kawambwa | CS Holdings | 218 |
| | Kawambwa Total | | 218 |

| | | | | |
|-----------------------|-------------------------|--------------------------|---------------------------|----|
| | Kazungula | Chichi Hardware Ltd | 6 | |
| | | CROPSMINE KALOMO | 35 | |
| | | Green firm | 248 | |
| | Kazungula Total | | 289 | |
| | Lusaka | CROPPACK MUMBWA | 1 | |
| | | CROPSERVE MUMBWA | 1 | |
| | | GROWERS WORLD - CHIBOMBO | 1 | |
| | | Harshad bazaar | 1 | |
| | | LIMA MUMBWA | 1 | |
| | | Mukango | 1 | |
| | Lusaka Total | | 6 | |
| | Mambwe | Modern Bazaar | 226 | |
| | Mambwe Total | | 226 | |
| | Mazabuka | CROPSERVE MAZABUKA (CFU) | 33 | |
| | | H.w enterprises | 1 | |
| | | Kapoti agro services | 34 | |
| | | Mulela Agro Shop | 85 | |
| | Mazabuka Total | | 153 | |
| | Mkushi | CROPSERVE MKUSHI | 1 | |
| | | Faides | 1 | |
| | | LIMA KABWE | 3 | |
| | Mkushi Total | | 5 | |
| | Mumbwa | CROPPACK LUSAKA | 26 | |
| | | CROPPACK MUMBWA | 9 | |
| | | CROPSERVE MUMBWA | 44 | |
| | | Cropserve Mumbwa (CFU) | 3 | |
| | | GROWERS WORLD - CHIBOMBO | 66 | |
| | | Growers World - Mumbwa | 3 | |
| | | LIMA MUMBWA | 221 | |
| | Mumbwa Total | | 372 | |
| | Nyimba | KUMAWA NYIMBA | 693 | |
| | Nyimba Total | | 693 | |
| | Petauke | KUMAWA CHIPATA | 96 | |
| | | KUMAWA PETAUKE | 309 | |
| | Petauke Total | | 405 | |
| | Samfya | Maryland | 112 | |
| | Samfya Total | | 112 | |
| | Serenje | LIMA SERENJE | 11 | |
| | Serenje Total | | 11 | |
| | Sinazongwe | J.chomba enterprise | 227 | |
| | Sinazongwe Total | | 227 | |
| | Value Total | | 3747 | |
| FAO 2011 Inputs Total | | | 29700 | |
| FAO 2011 | Quantity | Chadiza | Farmers and Gardners Shop | 32 |

Tools

| | | |
|-----------------------|---------------------------|-------------|
| | Msp agri shop | 50 |
| | Phatwell Chinyama | 139 |
| | Shani agric | 25 |
| Chadiza Total | | 246 |
| Chibombo | C and S Agro Services | 187 |
| | CROPSERVE KABWE | 220 |
| | CROPSERVE KABWE (CFU) | 12 |
| | CROPSERVE MUMBWA | 15 |
| | Cropserve Mumbwa (CFU) | 8 |
| | Growers World - Mumbwa | 3 |
| | KUMAWA CHONGWE | 5 |
| | Lima Agro Suppliers | 4 |
| | Lima agro supplies | 23 |
| | LIMA KABWE | 314 |
| | LIMA MUMBWA | 248 |
| | Minelands Chibombo-FAO | 70 |
| | Minelands Chongwe-FAO | 49 |
| | Minelands Lusaka-FAO | 246 |
| | Namipeza | 7 |
| | Plant Agrichem - Kabwe | 15 |
| | Plant Agrichem - Keembe | 34 |
| | Rubie Agro Suppliers | 13 |
| Chibombo Total | | 1473 |
| Chienge | ADSEK MANSA | 73 |
| Chienge Total | | 73 |
| Chipata | Agri chem | 72 |
| | Dunavant | 2 |
| | Farmers and Gardners Shop | 629 |
| | Isusya Collector 2 | 4 |
| | JJIV | 229 |
| | KUMAWA CHIPATA | 42 |
| | Modern Bazaar | 39 |
| | Msp agri shop | 51 |
| | Plant Agrichem - Kabwe | 2 |
| | Shani agric | 501 |
| Chipata Total | | 1571 |
| Choma | Arupee | 970 |
| | ATS Choma | 1 |
| | Chems Agro | 22 |
| | CROPSERVE CHOMA | 46 |
| | CROPSERVE MAZABUKA (CFU) | 2 |
| | Deliram Enterprise | 1 |
| | Farm centre ltd | 6 |

| | | |
|----------------------------|----------------------------|-------------|
| | Greenbelt agro ltd | 38 |
| | Greenland Agro | 111 |
| | H.w enterprises | 3 |
| | Harshad bazaar | 4 |
| | Kayeema Hort-Agricare | 1 |
| | MOOMBA MONZE | 5 |
| | Munzuma | 12 |
| Choma Total | | 1222 |
| Chongwe | ATS LUSAKA | 12 |
| | Kaoma garden | 2 |
| | KUMAWA CHONGWE | 555 |
| | Minelands Chibombo-FAO | 2 |
| | Minelands Chongwe-CFU | 7 |
| | Minelands Chongwe-FAO | 137 |
| | Namipeza | 799 |
| | Plant Agrichem - Chongwe | 30 |
| | Plant Agrichem - Kabwe | 1 |
| Chongwe Total | | 1545 |
| Isoka | Chandi | 378 |
| | Zemech agro inputs | 528 |
| Isoka Total | | 906 |
| Kalomo | Greenbelt agro ltd | 2 |
| Kalomo Total | | 2 |
| Kaoma | Kanagei Gen Suppliers | 778 |
| | Kaoma garden | 910 |
| | Mutalanda agencies | 441 |
| Kaoma Total | | 2129 |
| Kapiri Mposhi | CROPSERVE KABWE | 111 |
| | CROPSERVE KABWE (CFU) | 33 |
| | CROPSERVE MKUSHI | 64 |
| | LIMA KABWE | 216 |
| | LIMA KAPIRI | 93 |
| Kapiri Mposhi Total | | 517 |
| Katete | Dunavant | 432 |
| | Isusya Collector 2 | 499 |
| | rochis business centre | 19 |
| | San enterprise | 211 |
| Katete Total | | 1161 |
| Kazungula | Green firm | 1 |
| | Technical sprayer Services | 191 |
| Kazungula Total | | 192 |
| Lundazi | JJIV | 135 |
| Lundazi Total | | 135 |
| Lusaka | CROPSERVE KABWE | 4 |

| | | |
|-----------------------|--------------------------|-------------|
| | CROPSERVE KABWE (CFU) | 1 |
| | CROPSERVE MKUSHI | 1 |
| | Growers World - Mumbwa | 1 |
| | KUMAWA CHONGWE | 10 |
| | LIMA KABWE | 4 |
| | Minelands Chongwe-FAO | 1 |
| | Namipeza | 7 |
| Lusaka Total | | 29 |
| Mambwe | Modern Bazaar | 13 |
| Mambwe Total | | 13 |
| Mansa | 182376/31/1 | 28 |
| | 236318/31/1 | 46 |
| | ADSEK MANSA | 59 |
| | ADSEK MWENSE | 2 |
| | B and CM investments | 59 |
| | HOPEWAYS VOUCHER | 171 |
| | Mulestus Agro Services | 393 |
| | Toptech | 37 |
| Mansa Total | | 795 |
| Mazabuka | CROPSERVE MAZABUKA | 1 |
| | CROPSERVE MAZABUKA (CFU) | 261 |
| | Deliram Enterprise | 92 |
| | H.w enterprises | 259 |
| | Kapoti agro services | 282 |
| | Kayeema Hort-Agricare | 124 |
| Mazabuka Total | | 1019 |
| Mkushi | CROPSERVE MKUSHI | 212 |
| | Faides | 9 |
| | LIMA KABWE | 8 |
| | LIMA MKUSHI | 283 |
| Mkushi Total | | 512 |
| Monze | Chems Agro | 13 |
| | Farm centre ltd | 674 |
| | Greenland Agro | 6 |
| | Moomba Investments | 47 |
| | MOOMBA MONZE | 65 |
| | Munzuma | 883 |
| Monze Total | | 1688 |
| Mpongwe | CROPSERVE MPONGWE | 204 |
| | LUANSHYA ARGO LUANSHYA | 596 |
| Mpongwe Total | | 800 |
| Mumbwa | CROPSERVE MUMBWA | 77 |
| | Growers World - Mumbwa | 34 |
| | LIMA MUMBWA | 34 |

| | | | |
|-------------------------|--------------------------------|-------------------|----|
| Mumbwa Total | | 145 | |
| Mwense | ADSEK MWENSE | 186 | |
| | Toptech | 1 | |
| Mwense Total | | 187 | |
| Petauke | rochis business centre | 1278 | |
| Petauke Total | | 1278 | |
| Samfya | Maryland | 2 | |
| | Mbeta Agro Systems | 79 | |
| | Michi Trading and construction | 180 | |
| Samfya Total | | 261 | |
| Serenje | CROPSERVE MKUSHI | 93 | |
| | LIMA MKUSHI | 58 | |
| | LIMA SERENJE | 731 | |
| Serenje Total | | 882 | |
| Sesheke | Farmers Nest | 57 | |
| | Farmvet | 415 | |
| Sesheke Total | | 472 | |
| Sinazongwe | Chems Agro | 180 | |
| | CROPSERVE CHOMA | 102 | |
| | J.chomba enterprise | 2 | |
| Sinazongwe Total | | 284 | |
| Solwezi | 241469241 | 193 | |
| Solwezi Total | | 193 | |
| Quantity Total | | 19730 | |
| Value | Chadiza | Phatwell Chinyama | 15 |
| Chadiza Total | | 15 | |
| Chibombo | CROPPACK LUSAKA | 1 | |
| | CROPSERVE LUSAKA | 2 | |
| | CROPSERVE LUSAKA (CFU) | 2 | |
| | LIMA MUMBWA | 1 | |
| | Rubie Agro Suppliers | 1 | |
| Chibombo Total | | 7 | |
| Chipata | KUMAWA CHIPATA | 1 | |
| | Modern Bazaar | 18 | |
| Chipata Total | | 19 | |
| Choma | Greenbelt agro ltd | 2 | |
| | Harshad bazaar | 563 | |
| Choma Total | | 565 | |
| Chongwe | KUMAWA CHONGWE | 1 | |
| | Minelands Chongwe-FAO | 30 | |
| Chongwe Total | | 31 | |
| Kalomo | Chichi Hardware Ltd | 6 | |
| | CROPSMINE KALOMO | 141 | |
| | Harshad bazaar | 1 | |

| | | |
|----------------------------|--------------------------------|------------|
| Kalomo Total | | 148 |
| Kapiri Mposhi | LIMA KABWE | 1 |
| | Mukango | 246 |
| Kapiri Mposhi Total | | 247 |
| Kawambwa | CS Holdings | 325 |
| Kawambwa Total | | 325 |
| Kazungula | Chichi Hardware Ltd | 3 |
| | CROPSMINE KALOMO | 36 |
| | Green firm | 163 |
| Kazungula Total | | 202 |
| Lusaka | CROPPACK MUMBWA | 1 |
| | GROWERS WORLD - CHIBOMBO | 1 |
| | Harshad bazaar | 1 |
| | LIMA MUMBWA | 1 |
| | Mukango | 1 |
| Lusaka Total | | 5 |
| Mambwe | Modern Bazaar | 131 |
| Mambwe Total | | 131 |
| Mazabuka | CROPSERVE MAZABUKA (CFU) | 42 |
| | H.w enterprises | 1 |
| | Kapoti agro services | 28 |
| | Mulela Agro Shop | 94 |
| Mazabuka Total | | 165 |
| Mkushi | Faides | 3 |
| | LIMA KABWE | 12 |
| Mkushi Total | | 15 |
| Mumbwa | CROPPACK LUSAKA | 25 |
| | CROPPACK MUMBWA | 13 |
| | CROPSERVE MUMBWA | 41 |
| | Cropserve Mumbwa (CFU) | 2 |
| | GROWERS WORLD - CHIBOMBO | 57 |
| | Growers World - Mumbwa | 4 |
| | LIMA MUMBWA | 232 |
| Mumbwa Total | | 374 |
| Nyimba | KUMAWA NYIMBA | 702 |
| Nyimba Total | | 702 |
| Petauke | KUMAWA CHIPATA | 101 |
| | KUMAWA PETAUKE | 304 |
| Petauke Total | | 405 |
| Samfya | Maryland | 48 |
| | Michi Trading and construction | 3 |
| Samfya Total | | 51 |
| Serenje | LIMA KABWE | 7 |

| | | |
|----------------------|--------------------------------|--------------|
| | LIMA SERENJE | 51 |
| | Serenje Total | 58 |
| | Sesheke Farmers Nest | 1 |
| | Sesheke Total | 1 |
| | Sinazongwe J.chomba enterprise | 179 |
| | Sinazongwe Total | 179 |
| | Value Total | 3645 |
| FAO 2011 Tools Total | | 23375 |
| Grand Total | | 53075 |
