



**CONSERVATION AGRICULTURE
STUDY TOUR REPORT FOR EASTERN AFRICA
POLICY MAKERS AND PRACTITIONERS
TO ZAMBIA AND ZIMBABWE**



by

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EXECUTIVE SUMMARY

Senior policy makers and practitioners of conservation agriculture from five Eastern African Countries of Ethiopia, South Sudan, Kenya, Uganda and Tanzania participated in the Regional Conservation Agriculture Tour to Zambia and Zimbabwe. The tour was organized by the African Conservation Tillage Network (ACT) in partnership with the Zambian and Zimbabwean Ministries of Agriculture, Conservation Farming Unit (CFU) of the Zambia National Farmers Union; Golden Valley Agricultural Research Trust (GART); and the Food and Agriculture Organisation of the United Nations (FAO). The tour, held in Zambia and Zimbabwe from 21st to 27th 2013 exposed participants to a variety of conservation agriculture practices; provided the platform to share personal experiences and the regional/global trends on CA; and joint strategizing on promoting increased/wider uptake CA in the region. The tour was financially supported by the Common Market for Eastern and Southern Africa (COMESA); the Norwegian Agency for Development Cooperation (NORAD) and FAO Ethiopia.

CA comprises of three principles namely minimum tillage, crop rotations and permanent soil cover together. Full benefits and sustainability from CA are derived when all three principles are applied simultaneously.

The methodology of the tour involved (i) provision of awareness/evidence materials on CA; (ii) plenary presentations followed by discussions of CA at specific zone, country and regional level experiences; (iii) field visits and interactions – including doing CA - with CA practitioners; and (iv) individual/institutional planning on the way forward actions. The tour methodology enabled participants analyse what really matters in scaling out and benefiting from CA and zooming on the strategic entry points. It was the general opinion of the mission that tillage based farming by hand hoe, oxen or tractor plough, as now widely practised cannot adequately respond to increased food needs, degrades the environment and in the overall thwarts efforts to respond to weather proofing food production and elimination of climate change risks. Alternative ways through which farmers can attain higher levels of productivity and profitability while improving soil health and the environment were witnessed in visited farmers' fields.

Impressive highlights of CA adoption from the tour included: the numerous CFU CA champion farmers who have transformed their lives with increased production and productivity translating to more assets demonstrated by new houses and cars through CA; long term visions, investments and achievements in pioneering domestication of *Faidherbia albida* by GART; the systemic extension and inputs support for CA by the MoAL services (case of Monze district); the model CA Centres of Excellence in generating and disseminating scientific evidence for farmers and researchers - Gwebi Agricultural College in Zimbabwe and CIMMYT Trial Research site at Monze FTC in Zambia.

Change in mindset, weed control, availability of functional and affordable CA equipment, all year round retention of soil cover, innovative cropping systems and farm power were some the key identified constraints. The main drivers that make CA visible and interesting to farmers and development partners are continued yield decline, as a result of soil degradation, high costs of external inputs and vagaries of climate change, namely unpredictable amounts/timing of rainfall.

The following were identified as next steps and actions for policy and decision makers to take: Reactivating and/or establishing CA platforms; Selection of pilot areas, projects and partners to upscale CA; Mainstreaming CA in Agricultural Extension Systems and secondary school curricula; Preparation of Guidelines on CA field implementation; Training and experience sharing; Generate more empirical evidence for specific sites; Linkages to funding for CA programmes implementation; and Need to influence policy makers.

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Thanks are especially due to the Zambian and Zimbabwean institutions which hosted the tour participants for their generosity in sharing their experiences. These include: The Ministry of Agriculture of Zambia, Ministry of Agriculture, Mechanisation and Irrigation Development Zimbabwe; Golden Valley Agricultural Research Trust; Conservation Farming Unit of Zambia; Gwebi Agricultural College; Grownet Investments and the various progressive CA farmers. At the regional level, the hosting by CIMMYT to their long term CA research trials and the participation of the University of Zimbabwe/SOFECSA is sincerely acknowledged.

The good outcomes of the tour are attributed to the unique mix of vested interest participants. We acknowledge the genuine contributions of the Professors, Government Department Directors; Senior CA practitioners; and the Media to the course of ensuring hunger is eradicated in Africa forever.

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ACRONYMS

ACT	African Conservation Tillage Network
ADP	Animal Draught Power
AGRITEX	Department of Agricultural, Technical & Extension Services
ASP	Agriculture Support Programme
BEO	Block Extension Officer
CA(P)	Conservation Agriculture (Programme)
CARP	Conservation Agriculture Regional Programme
CASPP	Conservation Agriculture Scaling Up for Increased Productivity and Production among Small Scale Farmers in Zambia
CeLIM	Centre for Lay Italian Missionaries
CEO	Camp Extension Officer
CF(U)	Conservation Farming (Unit)
CIMMYT	International Centre for Maize and Wheat Research Improvement
CLUSA	Cooperative League of the USA
COMESA	Common Market for Eastern and Southern Africa
DAPP	Danish Aid from People to People
ESA	East & Southern Africa
FAO	Food and Agriculture Organisation of the United Nations
FISRI	Farmer Input Support Response Initiative
FRA	Food Reserve Agency
FTC	Farmer Training Centre
FY	Female Youth
GART	Golden Valley Agricultural Research Trust
KR	Rebased Zambian Kwacha
LF	Lead Farmer
LM	Land Management
MAMID	Zimbabwean Ministry of Agriculture, Mechanisation and Irrigation Development
MF	Married Female
MHH	Male-Headed Household
MY	Male Youth
MoAL	Zambian Ministry of Agriculture and Livestock
NEPAD	New Partnerships for Africa's Development
NORAD	Norwegian Agency for Development Cooperation
NGO	Non-Governmental Organisation
NOCAD	Norwegian Organisation and Community Agricultural Development
R & D	Research and Development
SCAFE	Soil Conservation & Agroforestry Extension
SE	Support Entity
UZ	University of Zimbabwe
WVZ	World Vision International - Zambia
ZIMCAN	Zimbabwe Conservation Agriculture Network

1.0 INTRODUCTION

1.1 Background

In April 2013, the African Conservation Tillage Network (ACT) and partners¹ organised a study tour on “Conservation Agriculture (CA) in addressing food insecurity and adaptation and mitigation to climate change”. The 5-day Regional Conservation Agriculture Tour was attended by Policy makers and CA Practitioners from five Eastern Africa countries of Ethiopia, South Sudan, Kenya, Uganda and Tanzania. These were joined by counterparts from Zambia and Zimbabwe. The multi-disciplinary team comprised of senior CA practitioners from NGOs, Universities, Research and Development institutions, a District Executive Director and the Media. The tour was held in Zambia and Zimbabwe from 22nd to 26th April 2013. Participants had the opportunity to visit and interact with small and medium sized CA farmers, researchers, policy makers, extension workers, academia, and CA equipment manufacturers.

The Zambia Ministry of Agriculture and Livestock; Zambia Conservation Farming Unit (CFU) (<http://conservationagriculture.org/>); Golden Valley Agricultural Research Trust (GART) (<http://www.gartzambia.org>); International Centre for Maize and Wheat Research Improvement (CIMMYT); Gwebi Agricultural College (<http://www.ies.ac.zw/gwebitinto.html>); Zimbabwe Ministry of Agriculture, Mechanisation and Irrigation Development (<http://www.moa.gov.zw/>); and Grownet Investments hosted the mission in the different sites.

The Regional CA Tour was supported financially by the Common Market for Eastern and Southern Africa (COMESA); the Norwegian Agency for Development Cooperation (NORAD) and FAO Ethiopia.

1.2 The Challenge

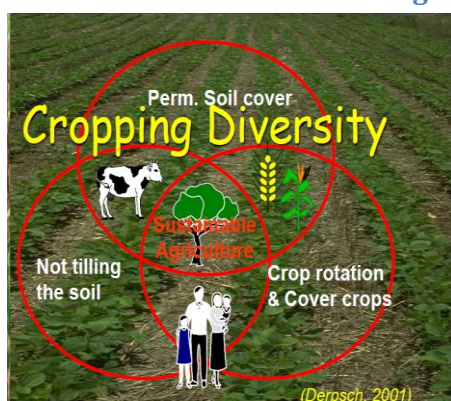
Up to 80% of the people of Sub Saharan Africa depend largely on agriculture for their livelihoods and survival, making them profoundly vulnerable to natural and socioeconomic shocks that affect agricultural production. These shocks arise in part from low crop and soil productivity, the effects of extreme weather events and changing climate on food production, and high prices of agricultural inputs and food commodities. Poor households, who form the majority of populations in Sub Saharan Africa, are increasingly unable to cope with these shocks, leading to worsening food insecurity, in a region where livelihoods are already compromised by low incomes, very low productivity compounded by high HIV and AIDS infection and related illness and death.

¹ Food and Agriculture Organisation of the United Nations (FAO) in conjunction with the Zambia and Zimbabwe Ministries of Agriculture (MoA), Zambia Conservation Farming Unit (CFU) and Golden Valley Agricultural Research Trust (GART).

1.3 Meeting the Challenge – through Conservation Agriculture

Attaining food security and development goals at the household, national, regional and global levels requires a shift from conventional to more efficient and sustainable food production practices. The common farming practices by the majority of farmers in sub-Saharan Africa are characterised by extensive soil disturbance through ploughing, low use of inputs and exploitation of fragile lands. These land management practices lead to soil mining, severe soil degradation and declining levels of soil organic matter (World Bank, 2007; Benites, 2008 and ACT, 2008). As land continues to degrade, livelihood options for at least 485 million Africans also dwindle with it (Terrafrica, 2009). While soil and vegetation on the earth's land surface store three times the carbon present in the earth's atmosphere, land clearing and degradation in the quest for virgin land or conventional tillage turns this valuable carbon sink into a major source of greenhouse gas emissions. Agriculture turns, then, to be a major contributor to global warming (Hobbs, 2006).

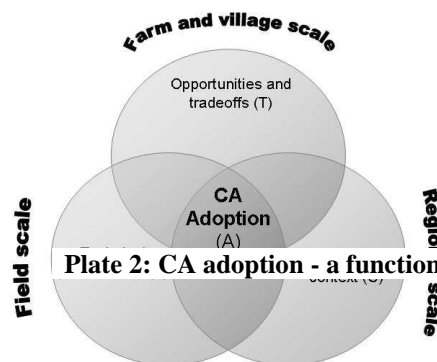
1.3.1. What is Conservation agriculture?



Conservation agriculture (CA) was developed in response to continuously declining land productivity under “conventional” systems based on soil tillage. CA farming practices revolve around three principles: (i) minimising soil disturbance, (ii) maintaining a permanent soil cover and (iii) practising crop rotations. Simultaneous application of these principles allow farmers to better manage available soil, water and

Plate 1 The three principles of CA biological resources as well as farm inputs and labour

and make more effective use of natural ecological processes. CA contributes both to environmental conservation and to enhanced and sustained agricultural production. CA offers solutions for smallholder and larger-scale farmers alike. CA significantly increases and stabilises crop yields while reducing production costs.



$$\text{Adoption} = \text{Performance} + \text{Tradeoffs} + \text{Context} + (P \times T \times C)_{\text{interactions}}$$

Plate 2 CA adoption - a function of many factors

1.3.2. Status of CA in Southern Africa

Experience from pilot CA projects in Zambia and Zimbabwe have shown that CA practices, together with good agronomic practices, such as timely planting and effective weed control, enables households to increase access to food from their own production. Introduction of shrubs and trees such as *Faidherbia albida* into the CA farming system played a significant role in supplying wood and non-wood forest products, restoring soil fertility and improvement of the microclimate. Adoption of CA, in turn, enables farmers to reduce their dependence on food markets and increases their resilience to weather and socio-economic related shocks.

Conservation agriculture is currently being practised in 125 million hectares world wide 85% of which is in North and South America. Worldwide, the adoption of CA is increasing at the rate of 6 million hectares annually. In Africa, the total area under CA is still small (1 million ha) relative

to areas farmed using conventional tillage methods and constitutes less than 4% of the total area. The highest adopters of CA in southern Africa are South Africa (380,000 ha – mostly commercial large scale); Zambia (250,000 ha – mostly small scale); and Zimbabwe (140,000 – also mostly small scale ha). A few countries have adopted CA as part of their agricultural programming policy and strategy despite the potential benefits. Among others, some of the contributing factors to the low uptake of CA in the region include: limited awareness of the technology and its potential benefits; limited sharing of documented evidence on CA; limited or lack of supportive policies, research, extension and resources capacity.

1.4 Objectives of the Visit

The objectives of the visit to Zambia and Zimbabwe by participants from Eastern Africa were to increase awareness on conservation agriculture (CA) as a first step towards increasing the uptake of CA in their region by:

- exposing the participants to a variety of conservation agriculture practices;
- providing a platform to share existing efforts and current developments on CA; and
- promoting increased/wider uptake CA in the sub-region.

1.5 Participants

The tour brought together twenty three participants comprising Directors of Departments from Ministries of Agriculture of Ethiopia (8), South Sudan (1), Kenya (3), Uganda (1) and Tanzania (5) including other Senior CA practitioners from NGOs, Universities, Research and Development institutions, and a District Executive Director. Others were media staff from Zambia (2); ACT staff based in the Harare Southern Africa sub-regional office, and the Executive Secretary from the Nairobi ACT headquarters. The list of participants is in [Annex 2](#).

The visit, organized and coordinated by the African Conservation Tillage Network (ACT) was hosted by the Ministries of Agriculture of Zambia and Zimbabwe. Other host institutions were: Golden Valley Agricultural Research Trust; Conservation Farming Unit of the Zambia National Farmers Union; smallholder farmers and upcoming large scale CA farmers; equipment manufacturers; and an agricultural training college. At the regional level, CIMMYT, COMESA, and FAO co-hosted the visitors.

2.0 METHODOLOGIES

The methodology of this knowledge sharing tour consisted of many sets of events involving (i) provision of awareness/evidence materials on CA; (ii) courtesy calls; (iii) plenary presentations followed by discussions of CA at specific zone, country and regional level experiences; (iv) field visits and interactions – including doing CA - with CA practitioners; and (v) institutional / national planning on the way forward actions.

2.1 CA Awareness Materials

Learning is a key aspect of **sharing knowledge and skill** in ACT. During this study tour, the African Conservation Tillage Network (ACT) provided CA awareness materials summarising the principles, practices, and extent of adoption and potential impact of CA. Each participant received a set comprising the CA manual, and CA case studies of Ghana, Kenya, Tanzania, Uganda and Zambia. A T-shirt and bag branded with CA messages was part of the package for each participant.

Participants were also each given a copy of the 2011 GART Yearbook by GART, a CFU manual on CA by CFU, a CIMMYT article on CA by CIMMYT, some brochures on CA Equipment by Grownnet, and a ZIMCAN CA manual.

2.2 Courtesy Calls

(i) Call on the District Agricultural Coordinator, MoAL, Monze, Zambia.

The team met with Mr. Justin Ngosa (DACO, Monze), and Mr. Paul Nyambe (SAO, Monze) who gave a briefing of agricultural activities under the Department of Agriculture in the district:-

- 33 agricultural camps (6,687 km²), each under a CEO (average of 202 km²/camp, about 1,000 HHs/camp);
- 5 agricultural blocks, each under a BEO (each covering 7 agricultural camps on average);
- 80-90% of population in the district is agricultural, comprising mostly small-scale farmers;
- 8% or 47,000 farmer HHs are engaged in some form of CA farming;
- CA-related activities have been championed through SCAFE, LM&CF, ASP, CASPP, and recently FISRI 1 & 2 under government but also CFU, CLUSA, DAPP, NOCAD, WVZ and others under non-government support;
- A tractor-based CA hire service for ripping, spraying and also shelling has enhanced uptake of CA farming, as similarly observed in the Chikankata area; and
- LF approach under FISRI 2 likely to expand land under CA.

More information regarding **biophysical and socio-economics** characteristics of the Monze can be extracted from Zambia's CA case study of Southern province (provided to each of the participants).

(ii) Call on the Permanent Secretary, MAMID, Harare, Zimbabwe.

In Zimbabwe, besides a call at FAO the team paid a courtesy call at the Ministry headquarters. At Ngungunyana Building, the delegation met Eng. Khoza (Deputy Director – Department of Agriculture Mechanisation) and Mr. Mudhefi (Chief Horticultural Specialist- AGRITEX) who stood in for the Permanent Secretary. Mr Mudhefi gave the welcome remarks and Eng. Khoza briefed the delegation on the:-

- development of CA in Zimbabwe;
- functions and responsibilities of the various departments with emphasis on those actively involved in CA promotion;

- CA training for both farmers and extension officers;
- field extension services structure; and
- Cooperation between government departments and FAO plus other NGOs through the Zimbabwe Conservation Agriculture Network (ZIMCAN) formerly Zimbabwe CA Taskforce.

2.3 Plenary Presentations

A **plenary presentation** was held on the first half of the first day to familiarize participants and the tour objectives. Other plenary presentations and discussions were held during the course of the tour to share reports on experiences with CA and identify constraints and opportunities for scaling up the techniques.

Six plenary session presentations were made as indicated below.

(i) *Why Conservation Agriculture?* By Herbert M. Mwanza, Sub-Regional Coordinator, ACT – Harare. (Powerpoint Presentation at: [http://www.act-africa.org/file/20130729_why_conservation_agriculture .pdf](http://www.act-africa.org/file/20130729_why_conservation_agriculture.pdf)).

- **CA as a farming system embracing 3 core principles** for attaining profitable sustainable agriculture based on ecosystem and socio-economic management;
- CA as answer to **Africa's challenges** of reducing productivity, a waning environment, food insecurity, and climate change threat; and
- CA principles augmenting **socio-economic and biophysical challenges** at field-level (farm field drudgery, increasing productivity, labour/input savings, water harvesting, erosion control, improving biodiversity).

(ii) *Conservation Agriculture: The Foundation for Africa's Green Revolution.* By Saidi Mkomwa, Executive Secretary, ACT – Nairobi. (Powerpoint Presentation 2 at: [http://act-africa.org/file/20130722_ca_the_foundation_of_green_revolution .pdf](http://act-africa.org/file/20130722_ca_the_foundation_of_green_revolution.pdf)).

- The **uniquely African Green Revolution** will come, but anchored on CA;
- **Low external input CA** is the affordable and feasible option for the millions of resource poor farmers in rainfed farming systems; and
- While the 3 CA principles work in unison and complement each other, they do not have the same weight or effect to farming. **Permanent soil cover plays a more critical role** than the others.

(iii) *Research, Development and Promotion of Climate Smart Agriculture*, by Dr. Stephen Muliokela, Director, GART – Chisamba. (Powerpoint Presentation 3 at: http://act-africa.org/file/20130722_ca_research_activities_gart.pdf).

- **Challenges facing agriculture in Zambia**, and to some extent the sub-region, were highlighted (low fertilizer uptake, soil mining, forest invasion, insufficient infrastructure investment, biophysical [erratic rainfall, frequent droughts, declining soil nutrients and biodiversity] and socio-economic [widespread poverty, illiteracy, opaque policies, diseases, markets] aspects).
- A number of **CA-related research activities** are being carried out at GART responding to critical CA demands, not just for Zambia but for the sub-region:-

Table 1: GART Research Areas

	Research Area	Countries Participating with GART				
		Botswana	Lesotho	Mozambique	Namibia	Zambia
1	Conservation Agriculture				√	√
2	Seed Multiplication		√		√	√
3	Smallholder Dairy/Livestock		√	√		√
4	Village Poultry	√	√			√
5	Se and Zn Bio-fortification	√			√	√

- Posting **challenges of C-Smart agriculture** activities in terms of adaptation (reduced tillage, soil cover, crop rotation, timely planting, crop diversification/crop variety selection/plant populations, fertilizer placements, weeding, agro-forestry, livestock farming) and mitigation (reduced tillage, soil cover, crop rotation, fertilizer coating, livestock farming, crop/livestock integration, biogas harvesting, pasture/range management).
- Presentation of some **R&D results** in terms of timely planting, spreading of labour, Nitrogen flash, efficacy of CA technologies, CA equipment development, soil improvement results with legumes (soya beans, cowpeas, sun hemp, velvet beans, green gram), enhanced productivity of cereal/ food legume intercrops, *Faidherbia albida*, and the smallholder livestock systems with dairy cows, goats, village chicken and domesticated guinea fowls.
- A lot of these results are presented in **GART's Yearbooks** produced since 2002.

(iv) *The Promotion and Adoption of CF/CA in Zambia and the ESA Region*, by Peter Aagard, CFU – Zambia. (Powerpoint Presentation 4 at: http://act-africa.org/file/20130722_ca_activities_by_cfu_zambia.pdf).

- Presentation outlined targeted beneficiaries of 240,000 families under CAPII (Zambia) and 112,000 families under CARP (Uganda, Kenya, Tanzania & Malawi) by 2015.
- It outlined **stagnant production performance in Africa** when compared with the rest of the world due to low productivity, food crisis threat, and climate change.
- Africa faced with **challenge of transformation of farming practice**, increasing yields sustainable intensification of productivity.
- Presentation then gives reasons through **case studies for low productivity** arising from conventional tillage practices, and thus reason towards a CA approach.

Yields around *Faidherbia albida* (a long term intervention for sustainable low input cereal production and re-forestation of farm land) without other inputs.

Table 2: Observed Crop Yields Under and Outside *Faidherbia albida* Canopy

	Crop	Yield under <i>F.albida</i> canopy,	Yield outside <i>F.albida</i> canopy,
		kg/ha	kg/ha
1	Maize	5 640	2 360
2	Soya	1 665	1 570
3	Cotton	1 113	1 314
4	Groundnuts	1 293	1 493

Source: CFU

- It emphasized on the need to **build a farmer-to-farmer extension**.
- The presentation concluding that **African farmers aspirations** are no different from farmers the world over. They want to:-
 - Drive down costs, labour inputs, increase yields, make more money;
 - Survive adverse climatic conditions;
 - Ride out the crests and troughs of market turbulence;
 - Have ready access to sound technical advice;
 - Be linked to input supplies, markets and other farming services; and
 - Benefit from stable agricultural policies.

(v) *Conservation Agriculture Developments in Zambia – Monze District Experiences*, by Paul Nyambe, Senior Agricultural Officer, Department of Agriculture, Monze Zambia.

(Powerpoint Presentation 5 at: http://act-africa.org/file/20130722_ca_developments_in_monze.pdf).

- CA under **FISRI and CASPP** was introduced in 26 of 33 agricultural camps to 1,064 Lead Farmers and 15,950 follower farmers;
- A **mechanisation programme** that facilitated 55 ADP DS', over 3,200 ADP rippers, and a tractor scheme, comprising CA no-till equipment, boom sprayers, shellers and trailers. Other equipment was brought in by other programmes such as CeLIM;
- Maize yields increased from an average of 1.2 tonnes/ha to 4 tonnes/ha while at research level, these range 5-7 tonnes/ha;
- There exists strong ties between farmers and agro-dealers; and
- Development of markets was cited as a key aspect.

During discussion aspects on Lead Farmer selection, the Werner planter, on adoption, and the Electronic voucher scheme were raised:

- LFs are chosen by communities through their camp zones, based on a number of criteria, not necessarily of being the best farmer around!
- The issue of synchronous application of seed/fertiliser and lime was also raised but that new science justifies such a combination;
- Over 40% rip their land using ADP and that 20% do crop rotations;
- The e-Voucher was of a limited value, a total of KR500 (approx. US\$100), of which 50% was to cover procurement of implements, and 50% for inputs.

(vi) *Overview of Conservation Agriculture (CA) in Zimbabwe*, by Karsto Kwazira, FAO, Harare, Zimbabwe. (Powerpoint Presentation 6 at: http://act-africa.org/file/20130722_fao_project_summary_ca.pdf).

Performance of CA out-yields that of conventional farming systems in different agro-ecological types (see Fig.1 below).

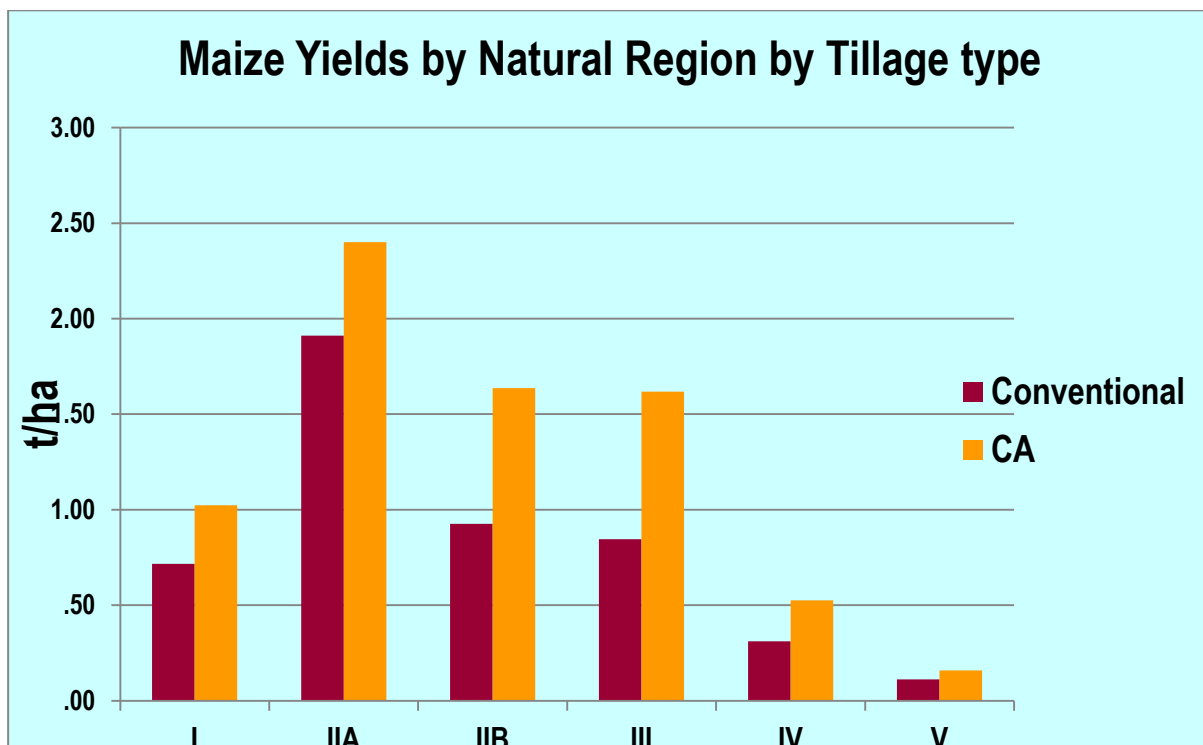


Figure 1 Yield Differentials by Agro-Ecological Region in Zimbabwe
Source: FAO Post Harvest Survey, 2010

However, the CA farming system in Zimbabwe and like in semi-arid Southern Africa still poses challenges to adoption: (i) of meeting permanent soil cover; (ii) Research & Development – mechanization; and (iii) need for initial change of attitude among farmers and extension agents. The number of farmers using CA Techniques (1 to 3 CA principles) has been increasing over the years, and very significantly in the 2010/11 and 2011/12 farming seasons mostly due to increased donor support (see fig.2 below).

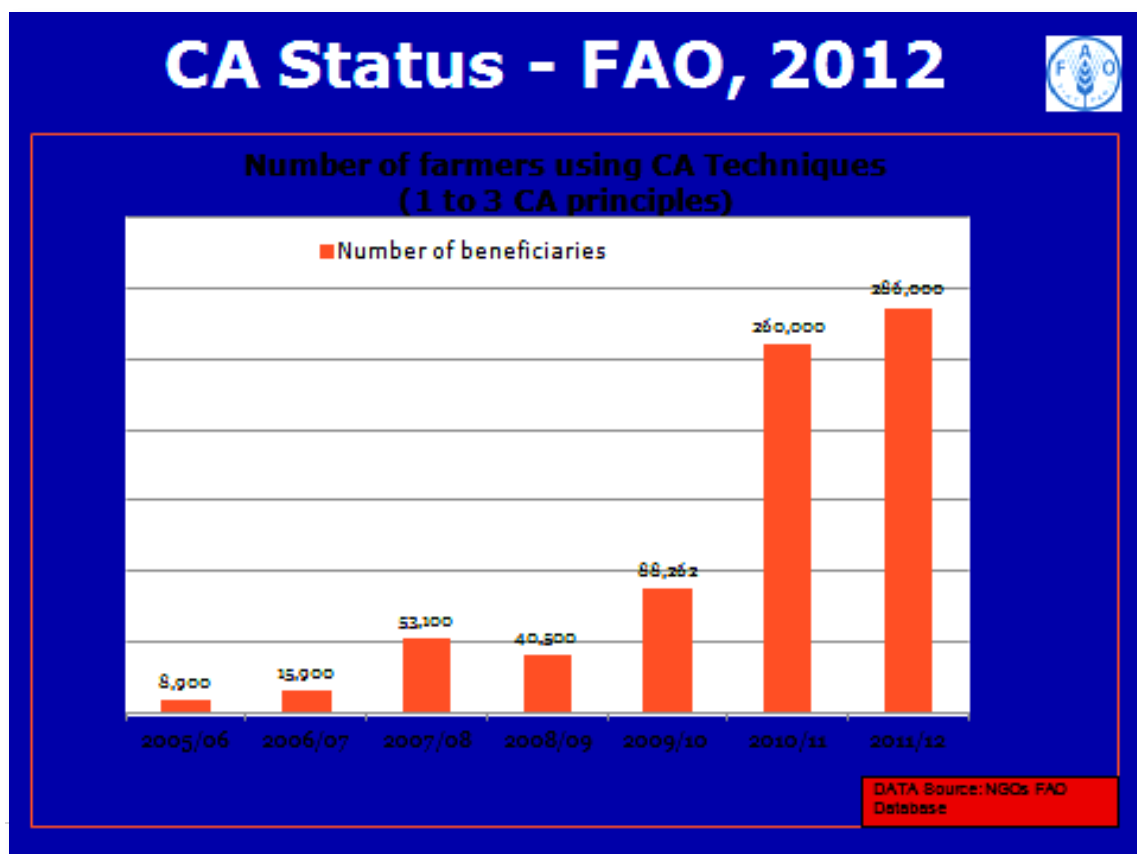


Figure 2 CA Status in Zimbabwe

The **Zimbabwe National CA Task Force** (now ZIMCAN) was formed in 2004 on request of donors to set up of technical guidelines on CA package. It is comprised of MAMID (Agritex - Chair), NGOs, CGs, UZ, FAO).

Current activities and outputs of ZIMCAN include:

Table 3: Current Activities and Outputs of ZIMCAN

Current Activities	Outputs
<ul style="list-style-type: none"> Monitoring and dissemination of information on CA activities. Analysing and publicising the results of CA activities. Coordinating CA training. Advocating and monitoring CA-related research and studies, including farmer and stakeholder surveys. Advice to all stakeholders on CA, through guidelines, strategy and standards. Providing a link for stakeholders with and between national, regional and international CA networks. Lobbying. 	<ul style="list-style-type: none"> Sharing information/coordinating with MAMID. Updating all partners on all CA activities updating all partners on all CA activities. Assisting in developing a CA policy. Providing, where possible, technical support to partners/government institutions involved in CA. Linking and cooperating with MAMID on CA promotion activities.

ZIMCAN's **next steps** are:

- formalize CA extension training;
- synchronize NGO and government training;
- complement field activities through relevant research;
- expand to mechanized CA; and
- gradually expand CA coverage.

The **perceived CA Outlook** is:

- mechanized CA, to increase CA area nationwide;
- integration of small scale farmers into main stream agriculture;
- out grower, contract farming or nucleus set up to integrate small and large scale farmers; and
- link small scale farmers with private sector.

3.0 THE ZAMBIAN AND ZIMBABWEAN CA FIELD EXPERIENCES

Conservation agriculture in Southern Africa has been promoted diversely by the Ministries of Agriculture, humanitarian-oriented NGOs, national and international research institutions, and lobbyists coming in different forms and with different messages. In many countries these have been encouraged to come into coordination fora.

During the study tour, a substantial amount of time was set aside to visit the **drivers of CA in Zambia and Zimbabwe comprising support entities and enterprising CA farmers** who are promoting conservation agriculture and those that are successfully practising and benefitting from it.

3.1 Visit to GART, Chisamba District, Central Province, Zambia.

Pro-active CA research is critical in promotion of the CA farming system. GART has been carrying out a significant amount of research to support CA promotion. Participants were exposed to some field activities at GART, particularly the *Faidherbia albida* research work at the station.



Plate 3: (i) Domesticated *Faidherbia albida* supporting CA activities. (ii) Intercropping research trials
Source: GART

3.2 Visit to Farmer Elemani Mumba, Shimabala Area, Chilanga District, Lusaka Province



Plate 4 Beans/Maize on Farmer Mumba's fields, Shimabala Area, Chilanga

Emerging Farmer Mumba together with his wife (who initially introduced her husband to CA after being trained herself by CFU) have been practising CA since 1996. Through this **household-based approach**, the Mumbas have adopted CA and now manage an **established**

Musangu (*Faidherbia albida*) field on which they grow their cereal (maize) and legume crops (soyabeans) in basins and rip-lines respectively. Early planting and water harvesting as well as soil fertility improvement are cardinal in their operations. Productivity on their land has improved enabling them to increase income and ability to acquire new assets including cattle from their farming activities.

3.3 Visit to Selected CFU Programme Farmers, Chikankata District, Southern Province, Zambia.

- *Farmer Third Hamazila*

An **self-confident** farmer of Chikankata district practising CA with use of herbicide for weed control amongst many others in the area. The farmer had been receiving regular training from CFU to improve his CA farming skills in terms of timely land preparation, crop rotation and weed control operations.

- *Farmer Stembridge Simoloka*

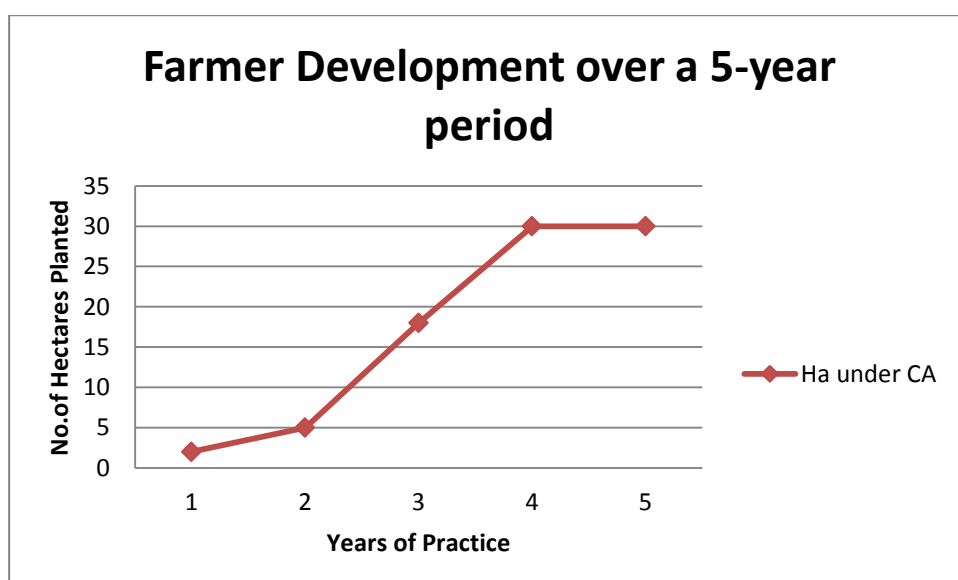


Fig. 3: Farmer CA Hectarage Development with Time

An **emergent** farmer who has increased his CA coverage with time (Fig.3), beginning with 2 ha in year 1, rising to 5 ha in year 2, 18 ha in year 3, and to 30 ha in years 4 and 5. Now a proud owner of new house and a car from the income of his CA activities.

- *Farmer Norah Hachiwa*

A **successful** female farmer that planted 41 ha under CA and harvested 3369 x 50 kg bags maize during 2011/12 season (A 50kg bag sold to FRA was fetching KR65). She has since increased that hectarage to 50 for the 2012/13 season, and was able to host 3 field days during the season at her farm. From her CA enterprises she has a number of new assets including a land cruiser, five bank accounts and others on the farm.



Plate 5 Proud Farmer Norah Hachiwa

3.4 Visit to CIMMYT Long-Term Trials, Monze District, Southern Province, Zambia.

i) Background

Since 2005, a total of 10 replicated treatments in the **Long-term Trial** have been implemented and observed under this CIMMYT research. Soil Characteristics (Monze FTC, Monze, Zambia) – a loamy sand!

Location: 16° 24' S, 27° 44' E; Altitude: 1108 m above mean sea level.

Agro-ecological region IIa (annual rainfall of 800-1000 mm).

Table 4: Soil Profile Data, Monze FTC

Soil Horizon	Depth, cm	Bulk density, g cm ³	Mottling, vol %	pH, CaCl	CEC, cmol kg ⁻¹	C, %	Particle Size, %			Soil Type
							Sand	Silt	Clay	
Ap	0-21	1.56	-	4.8	2.8	0.6	82	6	12	Loamy sand
AB	22-52	1.55	2	4.8	5.2	0.52	55	8	37	Sandy clay
Btg	53-100	1.33	15	5.2	5.1	0.4	53	8	39	Sandy clay
BCcg	>105	1.45	>40	5.8	5.5	0.17	71	6	23	Sandy clay loam

Source: modified from Thierfelder et al (2013)

Crops are planted with first rains in mid-November at a density of 44,000 plants/ha, fertilized with 109N:33P₂O₅:17K₂O as basal at planting, urea at 4 and 7 weeks after crop emergence. Maize planted at a spacing of 90cm apart and 50cm in-row, and 25cm under DS. Weeds were controlled with 2.5 litres/ha glyphosate at planting. Protocol details are given in Annex 4.

(ii) Results: Monze Maize Yields

Table 5: Monze Farmer Training Centre's CIMMYT Long-Term Trial Maize Yields

FARMING SEASON		DESCRIPTION (Maize Yields in tonnes/hectare)					
		Conven- tional	Direct Seeded Maize	Permanent Planting Basins	Direct Seeded Maize/Cotton	Direct Seeded Maize/Cotton /Sun hemp	Conventional Maize/Cotton
1	2005/6	3.8	3.7	3.9	3.5	3.7	-
2	2006/7	3.6	3.8	3.85	3.9	4.2	-
3	2007/8	3.7	4.0	3.8	4.0	5.0	-
4	2008/9	3.7	3.9	4.2	5.3	6.0	-
5	2009/10	3.0	4.2	4.4	4.2	7.2	-
6	2010/11	2.9	4.5	4.5	4.3	6.3	4.0
7	2011/12	3.0	4.4	5.0	4.4	6.8	3.3
8	2012/13	2.2	3.1	3.0	3.7	5.5	2.8
	Estimated						

(Source: Monze FTC)

Over the years, results show improvements in crop yields under CA when residue retention and rotations form part of system. DS and herbicide technologies save labour. There is however challenge of retention of sufficient crop residues (Thierfelder et al, 2013).

3.5 Visit to Farmer Roy Malambo, a CIMMYT On-Farm Demo Farmer, Monze District, Southern Province, Zambia.

Characterisation at farmer-level is key to improving performance and accentuating adoption among small-scale farmers, a tenet many promoters avoid to invest in choosing to end interventions at group-level. The two farmers visited in Monze were both ASP-supported farmers whose performances were characterised and are traceable. Below is that **household characterisation**.

Table 6: Farmer Development Categorisation

Level	Household Characterisation
1. Traditional (1-20% score)	Unaware of benefits of improved business or agricultural practices, does not participate/act upon new knowledge or skills.
2. Aware (21-40% score)	Aware of benefits of improved business or agricultural practices but does not and has no plans to practice/adopt any.
3. Self – confident (41-60% score)	Has planned to or is in the process of adopting improved business or agricultural practices.
4. Emerging (61-80% score)	Is or has adopted improved business or agricultural practices of a significant measurable magnitude.
5. Successful (81-100% score)	Employs integrated measurable and recorded improved business or agricultural practices in farm undertakings.

Farmer Malambo was an ASP supported household with ID as stated below.

Table 7: Recorded ID Farmer Identification - Malambo's Household

ASP ID Code	Name	HH Type	Sex	Village
30606105574	Roy Malambo	MHH	M	Muyobe
	M. Malambo		MF	Muyobe
	H. Malambo		MY	Muyobe

Between 2004 and 2006, records show that his overall **business etiquette** placed him in HH development stage 4 upon assessment of a number of criteria.

Table 8: Farmer Entrepreneurship and Business Development Performance (2006)

Farmer	1.1 New Business	1.2 Improved Business	1.3 Increased turnover	2.1 Linkages with SEs	3.1 Savings schemes	3.2 Investment	4.1 Access to financial services	5.1 Insuring business	Total HH Score	HH % Score	HH Stage of Development
R. Malambo	3	4	4	3	3	4	3	4	28	70	4
B. Sichimwi	4	3	3	3	3	4	5	3	27	67.5	4

In terms of agricultural development, Farmer Malambo excelled from being a farmer of stage 4 (emerging) to being in stage 5 (successful).

Table 9: Farmer Agricultural Development Performance (2006)

Farmer	2.1.1 Diversifying crop production	2.1.2 Increasing livestock production and productivity	2.1.3 Utilisation of animal draught power	2.1.4 Growing of pasture	2.1.5 Supplementary feeding of livestock	2.1.6 Growing of high value crops	2.1.7 Exploitation of non-traditional farm enterprises	2.1.8 Utilisation of improved irrigation technologies	2.2.1 Use of improved legume seed	2.2.2 Use of improved cereal seed	2.2.3 Use of improved cassava cultivars	2.2.4 Use of improved Sweet potato cultivars
R. Malambo	5	4	5	4	4	4	4	4	4	4	4	4
B. Sichimwi	4	4	4	4	4	3	4	4	4	3	3	4

Farmer	2.3.1 Access to foundation seed timely	2.3.2 Ability to market seed	2.4.1 Maintenance and conserving of landraces	2.5.1 Use and practice of land management practices	2.5.2 Growing of organic produce	2.5.3 Growing of fruit trees	2.5.4 Raising non Fruit trees nursery	2.6.1 Increased security of land use under traditional tenure system	2.7.1 Adoption of labour saving technologies	2.7.2 improved recipes for cooking	Total HH Score	HH % Score	HH Stage of Development
R. Malambo	4	4	4	4	4	4	4	4	4	4	91	83	5
B. Sichimwi	0	0	4	3	3	4	3	4	3	3	70	70	4

- Farmer demonstrating a 50m x 10m plot each on (i) conventional (ADP plough-based), (ii) ADP ripping (planting/fertilizer application by hand +herbicide application), (iii) ADP direct seeding with a Fitalleri DS and herbicide use + 2 manual weedings.
- Mr Malambo, in his discussions referred to his records book that he carried with him.

3.6 Visit to Farmer Bevels Sichimwi, Monze District, Southern Province, Zambia.

In the Monze area, like in the rest of the plateau of Southern province, **an increasing number of farmers practising CA-related technologies** aim to reduce cost and increase benefit but at the same time invest also in the sustainability of use of their land.

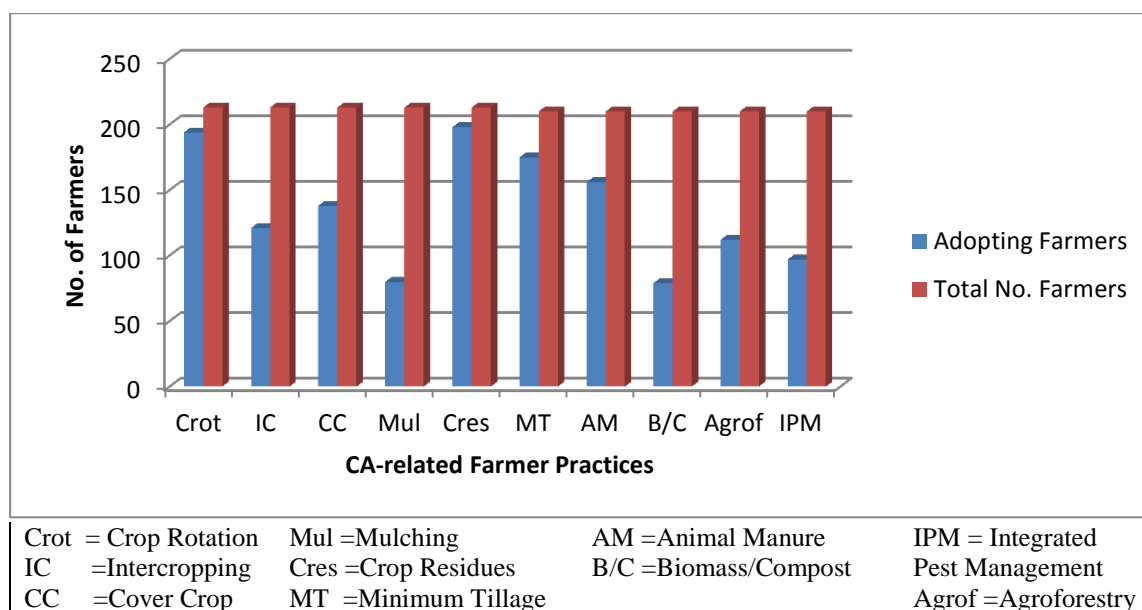
**Fig. 4 Sample of CA-Related Practices in Monze Area**



Plate 6: (i) Relay cropping (ii) Crop rotation (iii) Intercropping in Monze Area

Farmer Sichimwi was also a farmer under ASP, though we regrettably learnt of the demise of his wife Temson. He belonged to 3 IGs that he has continued up to now. In terms of business etiquette and agricultural development, Farmer Sichimwi was categorized as of development stage 4 (emerging) at the time ASP weaned him off support.

Table 10: Recorded ID Farmer Identification – Sichimwi’s Household

ASP ID Code	Name	HH Type	Sex	Village	Cereals/ Tubers IG	Legumes	Livestock
30606105547	Bevels Sichimwi	MHH	M	Malende B.	*	*	*
	Temson Sichimwi	MF					
	Maggie Sichimwi	FY					

A FISRI Farmer, accessing CA tractor hire service for ripping and ADP for planting of improved seed. He plants his groundnuts in basins.

3.7 Visit to Akajoe, CA Equipment Manufacturer, Magoye, Mazabuka District, Southern Province, Zambia.

- The farmer is sited next to the Magoye Trials site under ZARI where GART has one of its sites in Region IIa.
- Akajoe is a **successful** farmer-entrepreneur, who is not just doing crops and livestock farming but also manufactures CA equipment. At his workshop he produces on order:-
 - Magoye rippers,
 - Palabana Ripper Planters,
 - CF Kits,
 - Motorised rippers.
- The farmer-entrepreneur has also a range of other motorised farming equipment such as for livestock handling (self-built spray race, grass threshing).

3.8 Visit to Gwebi Agricultural College, Zvimba District, Zimbabwe.



Plate 7: CA Trials at Gwebi College (i) Various themes

(ii) Involving Interactions with Farmers

At Gwebi College, the team met Dr Matizha, the College Principal, and his teaching staff. The Principal briefly narrated the history of the institution since establishment in 1950. He went on to explain:

- the CA mainstreaming process into Zimbabwe's agricultural colleges' curriculum development of the CA module in 2009 and subsequent adoption in 2010 in all agricultural colleges; and
- establishment of the CA Centre of Excellence for Southern Africa at the institution as an ACT-Gwebi Agricultural College partnership.

The participants were given a presentation of the CA module contents by one of the lecturers (Mr Zingwari) which is examined and emphasizes practicals and demonstrations. There was CA equipment exhibited for the delegation to appreciate and share experiences, challenges and limitations of the various implements. Finally the team toured Gwebi College's CA demonstration and research plots.

3.9 A Quick Tourist View of the Kariba Dam on the Zambezi River, Siavonga and Kariba Districts of Zambia and Zimbabwe Respectively.



Plate 8:(i) Built in 1950s Kariba dam houses 2 HEPs (ii) HEP outlets where >1,200 MWs is generated.



(iii) Dam holds a 300km long throw back, that carries with it among others (iv) recreation on the lake.

4.0 DELIBERATIONS ON NEXT STEPS

On the final day of the tour plenary sessions were held. Two sets of meetings were held because the Ethiopian group could not travel into Zimbabwe. One team (East African participants) met in Harare, Zimbabwe and another one (Ethiopian participants) met in Lusaka, Zambia to discuss barriers and possible solutions to scaling up CA in the region.

Participants were expected at the end of the visit to:

1. Policy and Decision Makers from Eastern Africa would be more aware of CA activities and its potential benefits to sustainable food production for that region.
2. Be able identify barriers to CA Up-Scaling/Uptake in Eastern Africa and propose ways to address them. Some of the focal issues to include:
 - i) capacity building on CA;
 - ii) support to CA research, extension and development, policies and resources; and
 - iii) institutionalisation of CA at national and regional levels.
3. Identify next steps to further enhance CA awareness and sharing of information at national, regional, and continental levels. These were to include:
 - i) recommendations for Ministries of Agriculture and Higher education/Colleges to mainstream and scale up CA;
 - ii) organized round tables to exchange lessons learnt and present findings to respective government agencies;
 - iii) establish/ strengthen conservation agriculture society and ministry-led steering committee and task forces;
 - iv) develop and revise the curriculum for teaching and training of Conservation agriculture;
 - v) and enhance CA awareness and sharing of information at different levels.

5.0 OUTCOMES OF THE VISIT

According to the participants, the following lessons learnt and challenges regarding upscaling of CA were outlined.

The participants drew a number of lessons from the tour summarised in Table 11.

Table 11: A Summary of Lessons Learnt by Participants

No	Lessons Learned	Comments
1	Drivers to CA in Zambia and Zimbabwe varied – central government support from the Zimbabwean side, ground up/farmer organization approach in Zambia.	Perhaps vice-versa, In Zambia both government and CFU; In Zimbabwe, initial thrust was by NGOs with government coming later.
2	Government acknowledges the benefit of CA to the extent of trusting NGOs (Zambia).	Both government and NGOs involved, sometimes collaborating (Zambia).
3	The drivers of CA have not promoted CA as a prescription (of the 3 principles), but as mentors.	Promotion is for the 3 principles but uptake has varied
4	The Zambian approach have identified low hanging fruits (increased yields) from which they could convince adopters.	
5	The link to produce markets has accelerated adoption in Zambia (did it retard in Zimbabwe?)	
6	Research very central in the CA agenda in Zambia. But generally lagging behind.	Perhaps needed to compare what else is taking place at ZARI?
7	Lobbying has been instrumental to drive CA. E.g. CFU in Zambia and FAO in Zimbabwe.	
8	A minimum critical number of farmers receiving the capacity building support needed – to kickstart and sustain the momentum	Farmers enthusiasm and conviction is important
9	Input support /subsidies (seeds, fertiliser, machinery) necessary.	Not always! It is initially the economic benefits that must set the thrust to be followed by other social and environmental benefits and these take time to mature.
10	Long term commitments of national governments and donors to CA instrumental.	
11	CA carries the promise to make farming profitable, resilient (to challenges of climate change). The elements of efficient water utilisation.	It refers to dealing with different sets of solutions in different agro-ecological environments, and thus cannot have 'prescriptive' recipes, and must have supportive entities to finding those solutions.
12	Manufacturers feel what we do must make business sense – if we can sell in numbers; to justify the investment. Initial investments (jigs, moulds) are high. Manufacturing and training for the local industry- including the users. Long term commitment on developing the local industry too. Making manuals available (from Chinese or Portuguese to English)	Pro-activeness on all fronts is essential.

13	Streamlining CA into the systems by the Zimbabwean government.	
14	Weed management challenges: training (on calibration, selection, etc.); water quality for herbicides use.	Chemical control perhaps to be seen as short-term solution whilst finding alternative long-term solution. A lot more work is required to continue investigating biophysical solutions.
15	Intercropping not much emphasised; factual data on type of cover crops and the benefits they bring would support adoption.	We need to get back to that agenda and continue searching for multi-purpose solutions that need to be supported with economics data. Intercropping challenges vary from country to country or from region to region.
16	Value addition and marketing of the rotation/cover crops hindering their adoption. Contract farming has enticed farmers to grow soya beans. We need to ask why are farmers producing - food, markets (for value added produce)?	There are issues of non-marketability of legume crops! This is a challenge that needs to be explored. If food, what supportive nutrition stances are being pursued? In non-edible, of what alternative or substitutive alternative benefit or economic benefit?
17	Overproduction from CA will/is bringing issues that require to be addressed e.g. storage, markets.	Impact of CA development requires indeed a whole value chain analysis and approach!
18	A lot of change seems to have been created by the media/advertisements – mostly radios in different languages (7 for Zambia); positive testimonies; field days.	Field days and demonstrations have been essential.
19	There are gaps amongst the key players: manufacturers; policy makers; researchers; extension workers; innovation platforms e.g. the NCATF/ZIMCAN	Importance of coordination and a set vision.

6.0 CHALLENGES

Arising from the visit, a number of challenges were also highlighted.

Table 12: Challenges to Upscaling CA as Observed by Participants

No	Challenges	Mitigation	Comments
1	How do we attract our youths into farming – CA farming? Let us not make farmers prisoners.	<ul style="list-style-type: none"> • Reduce the arduousness of labour – hoe under CA; tractors; • Service providers to communities; • Due support /motivation to the youths to farm. Youth to youth messages effective. 	<ul style="list-style-type: none"> • The hoe is the cheaper and more easily available entry point. • Service providers need to operate where the ‘purchasing power’ exists. • What alternatives are being solicited here?
2	Availability and affordability of CA equipment. They are not available in-country.	<ul style="list-style-type: none"> • Until we reach the critical mass, incentives, subsidies, hire service provision need to be addressed. • CA equipment needs to be part of the subsidy inputs. • Manufacturers need to respond. 	<ul style="list-style-type: none"> • How much subsidy or ‘start-up capital’ can be mobilised and to who? • Challenge is a need to get out of a ‘handouts’ syndrome as a dependable approach. • What machinery is not available? Why else is it not available?
	Low awareness on existing machinery varieties and their benefits.	<ul style="list-style-type: none"> • Invite manufacturers in shows. • Diversify - target farmers with resources in addition to smallholders. • Support promotions. 	A spirit of pro-activeness is required to seek business opportunities.
	Quality of equipment	<ul style="list-style-type: none"> • 	
3	Who should spearhead streamlining of CA training at colleges in other countries?		
4	Government involvement in CA could have been higher.	Government gradually but steadily coming in to take leadership of processes as the benefits become clear and more voters practice CA.	
5	Cover crop seeds (grain legumes; the exotic) – availability and prices.	Government has not recognised the importance of CA and cover crops. If it did, the seed agencies would produce.	
6	Loss of utilisation capacity	Modifications	

	of investment in conventional.		
7	Free range grazing livestock	<ul style="list-style-type: none"> • Clear land use planning • Fencing 	This is a more complex matter to do with customary rights (usufruct and communal).
8	Bush fires		
9	Equipping the libraries; translating the curriculum into action; research students.		
10	Low efficacy of herbicides	<ul style="list-style-type: none"> • Fake herbicides – quality assurance from Government authorities • Training (farmers, extension workers) • Innovations – waterless herbicides? 	<ul style="list-style-type: none"> • Effect on the environment and health of the people. • Rather explore alternative weed control measures.
11	CA needs to be promoted as a system – to include livestock; along the value chain.		
12	Inadequate information and coordination / networking on CA.	<p>A platform to share knowledge and information on CA;</p> <ul style="list-style-type: none"> • Inventory of suppliers, • Databases of players; stakeholders – harness synergies; bring them together 	
13	Inadequate support for R&D	<ul style="list-style-type: none"> • Funding • Identifying and mandating the institutions • Who sets the research agenda 	

7.0 WAY FORWARD

The team could not sit as one, and thus had to come up with 2 sets of processes.

Table 13: Planned Actions to be taken by Participants

No.	Activity	Responsible Person/ Institution	Time Frame	Proposed Institution To Provide External Support
I. Ethiopian Team				
1	Reporting and creation of awareness on CA.	Ministry of Agriculture and the Board of Agriculture	May –July, 2013	ACT, ATA and FAO
2	Reactivating/establishing Conservation Agriculture Platform.	Ministry of Agriculture and the Board of Agriculture	May–June, 2013	ACT, ATA, GIZ, FAO, SG2000 and COMESA
3	Selection of Pilot Areas.	The Board of Agriculture	June-July, 2013	ACT, ATA, FAO and COMESA
4	Mainstreaming CA in Agricultural Extension System.	Ministry of Agriculture and the Board of Agriculture	June, 2013 onwards	-
5	Preparation of Guidelines on CA field implementation.	Ministry of Agriculture	September, 2013 to April, 2014	ACT, ATA and FAO
6	Training and experience sharing.	Ministry of Agriculture, Board of Agriculture, etc.	May, 2013 onwards	ACT, ATA, FAO and COMESA
7	Identification of partners.	Ministry of Agriculture and the Board of Agriculture	May, 2013	-
8	Scaling-up of Conservation Agriculture.	The Board of Agriculture	January/February, 2014	-
II. East African Team				
9	More awareness on CA:	<ul style="list-style-type: none"> - Farmers' magazines. - Testimonies from farmers. - Rap music. - Celebrities. - Aggressive 		
10	Get CA into secondary schools:	<ul style="list-style-type: none"> - Demonstrations; - For food self-help; - In the curriculum 		
11	Need to influence policy makers:	<ul style="list-style-type: none"> - Demonstrations; - Print media; 		
12	Need to generate the empirical evidence – in addition to the gospel evidence??	<ul style="list-style-type: none"> - Balanced trials and promotion; - Data capture; - Testimonies/ case 		

	studies;
13	Establish and enhance performance of the national CA task forces
14	Linkages to funding/ resources for CA programmes implementation: - NCATF, ACT can link-

Overall, the delegation appreciated efforts and progress made in CA promotion in Zambia and Zimbabwe and some expressed their intentions to adopt a similar approach of establishing a taskforce or network like ZIMCAN to spearhead CA promotion in their countries. However there were concerns with the imported implements mainly the availability of spares and suitability of the material for African conditions.

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9.0 ANNEXES

ANNEX 1: PROGRAMME AND LIST OF PARTICIPANTS



PROGRAMME OF EASTERN AFRICA CONSERVATION AGRICULTURE POLICY MAKERS TOUR TO ZAMBIA AND ZIMBABWE



21-27 APRIL 2013

1. OBJECTIVES OF THE VISIT

The objective of the visit to Zambia and Zimbabwe is to increase awareness on conservation agriculture (CA) among Eastern Africa government and decision-makers, as a first step towards increasing the uptake of CA in the region. Objectives are:

- Exposing Policy and Decision-makers from the Ethiopian, South Sudan, Kenyan, Ugandan, and Tanzanian Governments and stakeholder organizations to Conservation Agriculture
- Providing a platform to share existing efforts and current developments on CA
- Promoting increased/wider uptake CA in the region

2. PARTICIPANTS

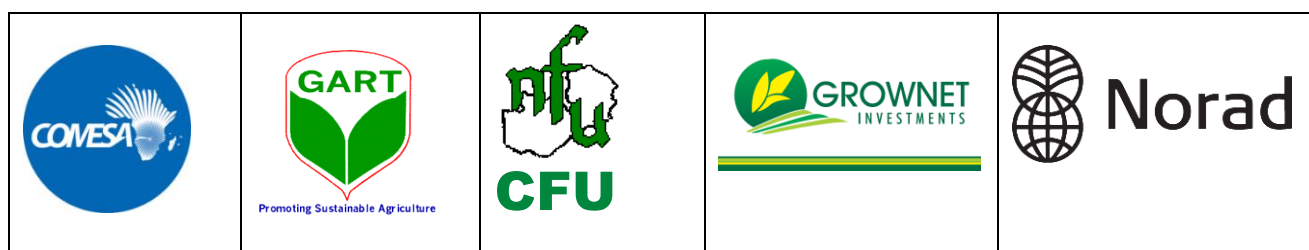
The tour will bring together close to twenty participants drawn from Directors of Departments from Ministries of Agriculture of Ethiopia, South Sudan, Kenya, Uganda and Tanzania. Others are Senior CA practitioners from NGOs, Universities, Research and Development institutions, and District Executive Directors.

The visit, organized and coordinated by the African Conservation Tillage Network (ACT) is being hosted by the Ministries of Agriculture of Zambia and Zimbabwe. Other host institutions are: Golden Valley Agricultural Research Trust; Conservation Farming Unit of Zambia; smallholder farmers; large scale commercial CA farmers; equipment manufacturers; and agricultural training colleges. At the regional level, CIMMYT, COMESA, FAO, and NEPAD will be some of the institutions co-hosting the event.

3. METHODOLOGIES

The methodology of this Knowledge sharing Tour consists of:

In Partnership with:



3.1 CA Awareness Materials

The African Conservation Tillage Network (ACT) will produce CA awareness materials summarizing on the principles, extent of adoption and potentials impacts of CA. These will be shared with participants during the tour.

3.2 Sharing of CA Country Experiences

Plenary presentation and video sessions will be held on the first half of the first day to enable familiarization of participants and the tour objectives. The plenary presentations and discussions, will provide a forum for countries to share reports on their experiences with CA and identify constraints and opportunities to scaling up the techniques.

3.3 Field visits

A substantial amount of time will be set aside to visit smallholders and large scale commercial farmers who are successfully practicing conservation agriculture. Farmer profiles will guide visitors identify what to expect/see from key field sites visited.

3.4 Deliberations on Next Steps

The final day of the tour will have plenary session presentations to facilitate discussions on barriers and possible solutions to scaling up CA in the region. Country specific lessons learned and ideas on the way forward will be sought and shared.

4. OUTCOMES OF THE VISIT

The expected outcomes of the visit will enable the participants to contribute to:

- a) Policy and Decision Makers from Eastern Africa are more aware of the CA activities and the potential benefits of CA in sustainable food production for the region.
- b) Barriers to CA Up-Scaling/Uptake in Eastern Africa identified and ways to address them proposed. Some of the focal issues will include:
 - Capacity building on CA.
 - Support to CA research, extension and development, policies and resources
 - Institutionalization of CA at national and regional levels.
- c) Next steps to further enhance CA awareness and sharing of information at national, regional, and continental levels identified. These will include:
 - Recommendations for Ministries of Agriculture and Higher education/Colleges to mainstream and scale up CA;

- Organized round tables to exchange lessons learnt and present findings to respective government agencies;
- Establish/ strengthen conservation agriculture society and ministry-led steering committee and task forces;
- Develop and revise the curriculum for teaching and training of Conservation agriculture;
- Enhance CA awareness and sharing of information at different levels.

5. ITINERARY

Day	Time	Focus	Responsible
Sunday 21/4		Arrival of visitors in Lusaka	HM Mwanza B Marongwe
Monday 22/4	0800	Welcome/Tour Objectives/Why CA	HM Mwanza S. Mkomwa
	1000	Travel to Mulungushi House	HM Mwanza
	1030	Courtesy Call – Permanent Secretary, Ministry of Agriculture, Mulungushi House	M Chipili
	1130	Travel to GART	HM Mwanza
	1230	Visit to GART – Presentation/Discussion	S Muliokela
	1330	Lunch, Fringilla Farm	B Marongwe
	1430	Visit to GART – On-Station Field Visit	S Muliokela
	1700	Return to Lusaka	HM Mwanza
Tuesday 23/4	0800	CA Developments in Zambia, CFU Experiences	C Nkatiko
	0900	Travel to Kafue Area	
	0945	Field Visit, Kafue, FISRI Farmer	A Daka
	1030	Travel to Chikankata	HM Mwanza
		Stop Over – Commercial Farm, Munali Hills	Sinya
	1130	Field visits Chikankata (3 varying scale farmers)	Sinya
	1300	Parked Lunch	B Marongwe
	1400	Field visits Chikankata (3 varying scale farmers)	Sinya
	1630	Travel to Mazabuka	HM Mwanza
Wednesday 24/4	0800	CA Developments in Zambia, MoAL Experiences	A Daka
	1000	Courtesy Call, DACO's Office	P Nyambe
	1100	Travel to Monze FTC	HM Mwanza
	1130	Visit Monze's CIMMYT CA Trials (R Malambo and V Chikandi)	P Nyambe; M Sitali
	1330	Lunch – Monze	B Marongwe
	1430	Selected Farmers Visits (Lead Farmer), Monze	P Nyambe
	1530	Visits (Musangu Tree Farmer), Monze	P Nyambe
	1700	Return to Mazabuka	HM Mwanza
Thursday 25/4	0630	Early breakfast	B Marongwe
	0730	Travel to Kariba	B Marongwe
	0930	Stop Over – Kariba Dam	B Marongwe
	1330	Lunch – Chinhoyi	B Marongwe
	1415	Travel to Harare	B Marongwe

Day	Time	Focus	Responsible
	1530	Visit to Grownet Investments, CA equipment manufacturer	Lewis Mataba
Friday 26/4	0800	Development of CA in Zimbabwe, NCATF	K Kwazira
	0930	Courtesy Call, Permanent Secretary, MOA, Mechanisation and Irrigation Development	J Gondo
	1030 -1230	Gwebi College CA Syllabus/Activities	Principal Jinya
	1315	Lunch Harare	B Marongwe
	1400	Wrap up presentation and discussions ²	HM Mwanza
	1930	Farewell Dinner	ACT
Saturday 27/4		Departure of Visitors from Harare	

² Session also attended by: K Kwazira (Zimbabwe CA National Task Force Co-Chairperson); I Nyagumbo (CIMMYT CA research programme); Prof P. Mapfumo (University of Zimbabwe, and SOFECSA Chairperson)

ANNEX 2. LIST OF PARTICIPANTS

Regional CA Tour

Zambia and Zimbabwe, 21-27 April 2013

No.	Name	Organization	Country	Designation	Email	Telephone
1	Abenet Mengistu Kassaie	MOA	<i>Ethiopia</i>		abenetmengistu@gmail.com	+251911701783
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11	Ms Upendo Sanga	Mbeya District Council,	<i>Tanzania</i>	District Executive Director,	attusanga@yahoo.co.uk	+255 25 2502260; +255 784 378034;
12	Erwin Kinsey	ECHO East Africa	<i>Tanzania</i>	Director		+255/754480184
13	Dr. Baanda A. Salim	Sokoine University of Agriculture	<i>Tanzania</i>	Lecturer	basalim2000@yahoo.co.uk basalim@suanet.ac.tz	+255 23 2604216 +255 755 753233
	Remmy Mwakimbwala	ARI Uyole,	<i>Tanzania</i>	Researcher	mwakimbwalar@yahoo.com	
14	Barrack Okoba, PhD	KARI-Kabete	<i>Kenya</i>	Senior Principal Research Scientists		+254 721775086;
15	Engineer J. A. M. Nkanya,	Ministry of Agriculture,	<i>Kenya</i>	Chief Engineer, Agric Engineering Services	nkanya2000@yahoo.com	+254 2711691,
16	Dr. Joseph Mbithi Mutua	Kenya Network for Dissemination of Agric Technologies KENDAT	<i>Kenya</i>	Head of Conservation Agriculture Value Chains Department	kendat@africaonline.co.ke	+254-20-6766939 +254-722-718785
17	David Bala	Crop Training Centre, Yei	<i>South Sudan</i>	Principal	ctcyei@yahoo.com ; davidbala76@yahoo.com	+211 977101436; +211 955045978
18	Levi L. Kasisira, PhD	Makerere University	<i>Uganda</i>	Associate Professor		+256-752-960-146
21	Martha Chanda	NAIS	<i>Zambia</i>	Journalist		
22	William Chiyanika	NAIS	<i>Zambia</i>	Journalist		
20	Bridget M Marongwe	ACT	<i>Zimbabwe</i>	Admin Assistant	Bridget.marongwe@act-africa.org	+263772390706
19	Herbert M Mwanza	ACT	<i>Southern Africa</i>	ACT Southern Africa Coordinator	Herbert.mwanza@act-africa.org	+263778247431
23	Saidi Mkomwa	ACT	<i>Regional</i>	Executive Secretary	saidi.mkomwa@act-africa.org	+254712252549

ANNEX 3: LIST OF PEOPLE VISITED

	Name	Organisation	Department	Country
1	Dr Stephen W. Muliokela	GART	Director	Zambia
2	Mr Douglas S. Moono	GART	Research & Development	Zambia
3	Mr Simunji Simunji	GART	Research & Development	Zambia
4	Mr Peter Aagard	CFU	Director	Zambia
5	Mr Sinya Mbale	CFU	Lusaka	Zambia
6	Mr Gibson Simusokwe	CFU	Chisamba	Zambia
7	Mr Davy Howes	CFU	Regional Manager, Choma	Zambia
8	Mr & Mrs Elemeni Mumba	Farmer	Shimabala, Kafue	Zambia
9	Mr Third Hamazila	Farmer	Chikankata District	Zambia
10	Mr Stembridge Simoloka	Farmer	Chikankata District	Zambia
11	Ms Norah Hachiwa	Farmer	Chikankata District	Zambia
12	Mr Justin Ngosa	MoAL	DACO, Monze	Zambia
13	Mr Paul Nyambe	MoAL	SAO, Monze	Zambia
14	Mr Mwangala Sitali	Research Trials Assistant	Monze FTC	Zambia
15	Mr Elijah Masika	MoAL	Monze	Zambia
16	Mr Kingsley Chanda	MoAL	Monze	Zambia
17	Mr Roy Malambo	Farmer	Monze District	Zambia
18	Mr Bevels Sichimwi	Farmer	Monze District	Zambia
19	Mr Joe Akashambatwa	Farmer	Mazabuka District	Zambia
18	Eng. Tirivangani Khoza	MAMID	Deputy Director – Dep. of Agric. Mechanisation	Zimbabwe
19	Mr. Mudhefi	MAMID	Chief Horticultural Specialist -AGRITEX	Zimbabwe
20	Mr Lewis Mataba	Grownet Investments	Director	Zimbabwe
21	Mr Tich Silika	Grownet Investments		Zimbabwe
22	Mr Karsto Kwazira	FAO	CA Officer	Zimbabwe
23	Dr William Matizha	Gwebi College	Principal	Zimbabwe
24	Mr Jeff Jinya	Gwebi College	Lecturer	Zimbabwe
25	Mr Zingwari	Gwebi College		Zimbabwe
26	Kudzai F. Ndidzano	MAMID	Inst. of Agric. Eng., Hatcliffe, Harare	Zimbabwe
28	Hatirarami Nezomba	PhD Student University of Zimbabwe		Zimbabwe

ANNEX 4: FACILITATING THE WIDESPREAD ADOPTION OF CA IN MAIZE-BASED SYSTEMS IN SOUTHERN AFRICA

(Document extracted from internet, June 2013).

Protocol for the establishment and management of:

Long-term trial at Monze, FTC, Zambia

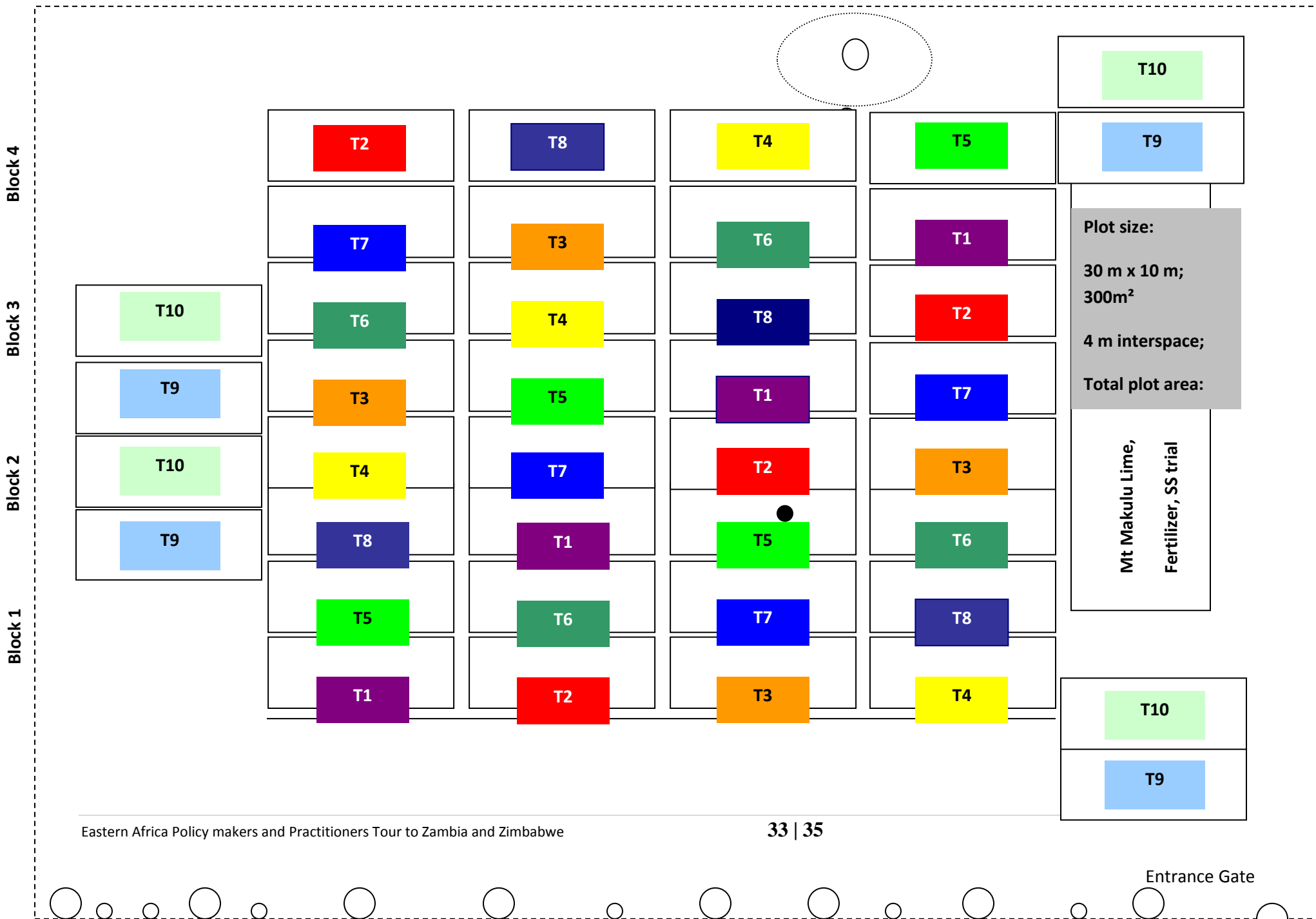
Objective: Monitor and evaluate the longer term effects of Conservation Agriculture practices on soil quality, crop yield, weeds, pests and diseases.

Locality: Monze Farmer Training Center, Southern Province, Zambia (-16.24058 S; 27.44231 E; 1108 m.a.s.l.

Design: Randomised blocks with 4 replications. 3 conventional farmers practice (sole maize and a conventional maize-cotton rotation) and 7 conservation agriculture treatments; Total 10 treatments x 4 replications = 40 plots

Treatments:

- T1.** Conventional mouldboard ploughing (**CP**): maize with residue removal, manual seeding and fertilization in the tilled seedbed after ploughing
- T2.** Direct seeding with animal drawn seeder (**MS**): maize as a sol crop, residue retention (at a rate of 2.5-3 t/ha)
- T3.** Planting Basins (**BA**): Maize as sole crop, residue retention
- T4.** Crop rotation A1 (**A1M**): direct seeding with animal drawn seeder, maize-cotton rotation (Phase 1), residue retention; *Cotton (2010)- Maize (2011)*
- T5.** Crop rotation A2 (**A2C**): direct seeding with animal drawn seeder, maize-cotton rotation (Phase 2), residue retention; *Maize (2010) - Cotton (2011)*
- T6.** Crop rotation B1 (**B1M**): direct seeding with animal drawn seeder, maize-cotton-sunn hemp rotation (Phase 1), residue retention; *Sunn hemp (2010)*
- T7.** Crop rotation B2 (**B2C**): direct seeding with animal drawn seeder, maize-cotton-sunn hemp rotation (Phase 2), residue retention; *Maize (2010)*
- T8.** Crop rotation B3 (**B3S**): direct seeding with animal drawn seeder, maize-cotton-sunn hemp rotation (Phase 1), residue retention; *Cotton (2010)*
- T9.** Conventional rotation C1 (**C1C**): traditional farmers practice using the mouldboard plough, no residues, stubbles incorporated; Cotton-maize rotation (Phase 1); *Cotton (2010)*
- T10.** Conventional rotation C1 (**C2M**): traditional farmers practice using the mouldboard plough, no residues, stubbles incorporated: Cotton-maize rotation (Phase 2); *Maize (2010)*



Plot management:

1. **Duration:** Long term trial is intended to be continued as long as possible
2. **Plot size:** 40 plots, 10m x 30 m, each = 300m².
3. **Residue:** If there are residues in the field, they should be retained in Treatments 2-8, but incorporated in Treatment 1 (Check) and Treatment 9 and 10 (conventional cotton-maize rotation). Residues from Treatment 1, 9 and 10 may be removed or grazed.
4. **Weed control:**
 - Apply glyphosate at 3 l/ha as a general spray if weeds are present at seeding. This spraying may be done before planting (1-7 days before seeding) or after planting but BEFORE the maize emerges.
 - Manual weed control after crop emergence
5. **Fertilizer.** Fertilizer rates will be the same to all plots.

Maize:

Basal: 165 kg/ha Compound D at planting (7.4 g/station, specific fertilizer cups will be delivered).

Top-dressing: 200 kg/ha of Urea applied as split application; In Treatments 1 and 2 apply 4.6 grams per planting station at 4 + 7 weeks after planting. In direct seeded treatments, use the following procedure:

Divide the plot into sub-plots of 10m long each. Dribble 90g urea along each 10m length of row at each application.

Cotton:

Basal: 165 kg/ha Compound D at planting

Top dressing: 100 kg/ha Urea at knee height (4.6g/station)

Sunhemp:

No fertilizer

6. Plant population:

Maize: 90 cm between rows.

Treatments 1,3,9: 50 cm between planting stations, 3 seeds per station. Thin to 2 plants/station when plants are about 10 cm tall (aiming at a plant density of 44,000 plants per ha).

All direct seeded treatments: Planning to achieve 44,000 plants/ha.

Cotton: 90 cm row spacing, 50 cm between planting stations, 4 seeds per station. Thin to 3 plants/station when plants are about 5 cm tall

Sunhemp: change the row spacing to 45 cm and plant spacing of 5 cm, dribbled

7. Variety.

Maize: The SeedCo maize hybrid SC513 will be used (depending on the onset of rains).

Cotton: A local variety will be used

Sunhemp: *Crotalaria juncea* seed will be used

8. Seeder calibration:

- **Maize:** The direct seeder should be calibrated before seeding. Use the maize seed plate that fits to the maize seed. If the maize grain is too big, the seed plate has to be modified with a metal file accordingly. For maize, the middle black gear will be used aiming at a seed rate of about 44,000 plant/ha at 90 cm x 25 cm spacing or 2 living plants per 50 cm. For fertilization in maize, only one big yellow cog should be used. This will give a fertilizer rate of about 165 kg/ha at 90 cm row spacing.

9. Equipment and Data collection (additional protocols are available for soil collection, rainfall, infiltration, penetration resistance and harvest and others)

- Rainfall date is constantly recorded
- Record dates of all activities, and of 50% plant emergence, 50% tasseling, 50% silking and 50% physiological maturity
- Land condition at seeding: type of residues, % ground cover. General observation over the trial area.
- Soil samples will be taken on six measuring points in each plot in 5 layers (0-10cm, 10-20cm, 20-30cm, 30-60cm, 60-90cm). Soil sampling is carried out before the season and at harvest.
- Soil physical measurements (not specified yet) will be carried out during the season
- Soil moisture probes are installed in treatments 1-5 in 3 replications and will be constantly measured (2 times per week during the season and ones per week during the dry season)
- Penetrometer resistance measurements are carried out during the season when the soil moisture content is at field capacity (use additional protocol)
- Infiltration measurements will be carried out with a rainfall simulator from Beginning of January on (use additional protocol)
- Plant populations. Plant counts on two central rows of each plot approximately 3 weeks after planting.
- Grain and biomass yields. These should be recorded at harvest on 3m of each of the four central rows of each plot, omitting the border plants on each end of the plot. Take the following data:
 - No of plants and cobs on the net plot
 - Total above ground biomass air dry
 - Total weight of grain.
 - Grain moisture content.
 - Shelling percentage.