



Conservation Agriculture Climate Change Training of Trainers
Lilongwe-Malawi

Technical Report



Group photo of Participants to the CA Climate Change Training of Trainers in Lilongwe-Malawi

By

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ACRONYMS

ACT	African Conservation Tillage Network
ADD	Agricultural Development Division
ADP	Animal Draught Power
CA	Conservation Agriculture
CFU	Conservation Farming Unit
DS	Direct Seeder
EPA	Extension Planning Area
FAO	Food and Organization of the United Nations
GMO	Genetically Modified Organism
ICRAF	World Agroforestry Centre
LRCD	Land Resources Conservation Department
MG	Malawi Government
MIM	Malawi Institute of Management
MoAFS	Ministry of Agriculture and Food Security
NCATF	National Conservation Agriculture Task Force
NGO	Non-Governmental Organisation
REOSA	Regional Emergency office for Southern Africa
TLC	Total Land Care
ToRs	Terms of Reference
WVM	World Vision International - Malawi

1.0 INTRODUCTION

1.1 Background

In accordance with the FAO-ACT agreement, a Regional Training of Trainers (TOT) course on Conservation Agriculture in a Climate Change environment was held in Lilongwe, Malawi comprising participants drawn from Conservation Agriculture Taskforces in Malawi, Botswana and Zimbabwe. The course took place in Lilongwe, Malawi at the Malawi Institute of Management and practical's at Chitedze Agricultural Research Station. The learning course was conducted from 21st to 25th May 2012 with financial support Food and Agriculture Organization of the United Nations (FAO), Regional Emergency Office for Southern Africa (REOSA) and implemented by African Conservation Tillage Network.



Photo1: Official opening of Training, 21st May 2012 at MIM, Lilongwe.

The Learning course for ToTs was opened by the Principal Secretary, Dr.Maganja, on behalf of the Permanent Secretary.

Conservation agriculture has great potential in Africa because it can control erosion, produce stable yields, combat effects brought by climate change and reduce labour needs, basically conservation fall into three major principles first permanentsoil cover which control soil erosion, moisture stress, suppress weed and conserve soil microorganisms which is important for organic decomposition. Secondly crop rotation which helps to recycle nutrients into the soil and break disease and pest life cycle. Thirdly minimum soil disturbance- to overcome the problem of soil erosion (splash), maintaining soil structure and texture

and conserve micro organisms which is responsible for organic decomposition in the soil.

The training enhanced the capacity of Extension Agents in the southern Africa region on CA, its application and possible role in mitigating some aspects of climate change by smallholder farmers in the region. The delivered course modules contributed to improved preparedness for the extension staff towards effective response to, food and agricultural threats and emergencies caused by the ever changing farming environment and climate. Training modules were geared towards enhancing capacities of the participants in managing sustainable intensification of crop production in their working areas.

1.2 Course Objectives

1.2.1 Overall Objective

To enhance the capacity of Extension Agents in the Region on Conservation Agriculture, its application and possible role in mitigating some aspects of climate change by smallholder farmers.

1.2.2 Specific Objectives

1. To enhance understanding of the principles of conservation agriculture as the new way to farm in a changing climatic regime.
2. Practical knowledge and skills in the application of CA practices for different socio-economic and changing agro-ecological environments to enable them respond competently to farmers' needs.
3. To provide the participants with approaches and methodologies for enhanced documentation and wide-scale adoption of profitable CA as a means to combat effects of climate change.
4. To strengthen the competency of the participants to facilitate learning of Conservation Agriculture to CA support staff (e.g. researchers, extension staff).

1.3 Expected Outputs and Outcomes

The 26 participants were equipped with knowledge and skills to understand the role of CA in mitigating some impacts of Climate Change in the Region.

At the end of the course, the participants should be able to:

1. Explain and demonstrate to others the concept and principles of CA and farm level applications of the same.
2. Guide farmers and other stakeholders in analysing and determining solutions to problems in sustainable use of soil and water in farming.

3. Plan and facilitate farmer based trials and demonstrations for development and/or adaptation of CA technologies.
4. Participants guided in development of learning facilitation materials and work plans for implementation of identified field activities.

Participants provided with relevant reference information materials and Monitoring & Evaluation tools.

1.4 Training working Committees

The training established 4 committees as part of the workshop processes comprising:

- **Welfare Committee** - (Kupi, George, Diau); (ToRs: look into food aspects; first aid/medical demands; time management; code of conduct; practicals/field trip arrangements);
- **Rapporteurs Committee** – (Bernard, Willie, Thomson, Patrick); (ToRs: summary presentation of previous day’s activities; written report - ongoing); and
- **Issues Committee** - (Peter, Obed, Isaac); (ToRs: summary of issues, challenges, and lessons; propose strategies; written report).
- **Field trip/Tools Committee** – (Ivy,); (ToRs: Capture basic processes of different field interventions; record tools used and key aspects of field visit).Some feedback from the Committees is illustrated in Annex 5.

2.0 COURSE CONTENT

2.1 Setting the Scene

Learning began by introductions of participants who had grouped themselves, not as Malawians but delegates of their favourite African countries that were grouped into four regional blocks: Federation of Rhodesia, Nyasaland and Mozambique (Zambia, Zimbabwe, Malawi, Mozambique), SADC (South Africa, Botswana, Namibia), EAC (Kenya, Uganda, Tanzania), ECOWAS (Ghana, Nigeria, South Sudan) and the MAGHREB (Tunisia).

Through use of cards, each participant was introduced by a representative of their regional block giving the name, roots/interests, what they were proud of in their personal or professional life, what they wanted to see happen and what they did want to see happen, which topics they wanted to see covered/included, and their expectation.

2.2 Course Participants Expectations

Listed participant expectations were mostly those to develop the cognitive domain and not so much of building the psycho-motor domain. Very little was mentioned of lessons pertaining towards improvement of the attitudinal domain. It is the following that came up:

a) of the Cognitive Domain:

- To know what conservation agriculture is.
- To acquire knowledge on best bet (association) technologies under CA to achieve maximum profits.
- To know how to manage weed where herbicides are expensive and organic cover has other alternatives
- Learn how to make trees grow and not die with heat.
- To acquire the knowledge gap in CA and skills necessary for CA adoption for farmers.
- Means of accelerating CA adoption amongst farmers.
- To be refreshed knowledge wise on African Conservation Agriculture.
- To learn best how to approach farmers in a pluralistic manner as to achieve our goal.
- Come up with ways of producing crops in areas where rain is in short supply.
- Rain water harvesting and permaculture.

b) Of the Psycho-motor Domain:

- To have a practical understanding of CA principles, challenges etc
- Practical challenges of solutions to CA implementation.
- To learn how animals can be involved in conservation tillage systems.
- To acquire skills knowledge in land conservation to promote environmental management among the farmers.

c) Of the Attitudinal Domain:

- Understand better the concept of CA and its key principles.

-Clear understanding of weed control in Conservation Agriculture.

2.3 Resource Persons

Resource persons were drawn from Malawi's Bunda College of Agriculture, Chitedze Research Station, World Agroforestry Centre (Chitedze), Zimbabwe, Kenya and CFU (Zambia).

Table 1: List of Resource Persons

	Resource Person	Organisation
1	Edward Chuma	Picoteam, Zimbabwe
2	Saidi Mkomwa	ACT, Kenya
3	Patson Nalivata	Bunda College of Agriculture, Lilongwe
4	Smart Jere	CFU, Chipata, Zambia
5	Bruce Sosola	ICRAF, Lilongwe
6	Jill Clapperton	Rhizoterra, USA
7	Chikondi Makwiza	Bunda College of Agriculture, Lilongwe
8	Paul Fatch	Ministry of Agriculture and Food Security
9	Hendrix Kazembe-Phiri	Chitedze Agricultural Research Station, Lilongwe

Herbert M. Mwanza and Bridget Mupeti of ACT, Harare; and Gertrude Kambauwa and James Mlamba from the LRCD on behalf of the NCATF co-hosted this learning course

2.3.1 Training Activities Undertaken



Photo 2: Use of LCD projector for presentation, Dr. Patson Nalivata

Course **presentations** were given in plenary sessions using LCD power presentations that also had pictorial or graph presentations besides key points illustrated. Sometimes these were also accompanied by **question and answer sessions** to draw participation and sharing of lessons and experiences.



Photo Set 3: Practical Sessions on Erosion modelling and Conducting a Sol vita test

Practical sessions were also held to impart 'hands-on' interactions as part of psycho-motor skills development. **Demonstrations** on important aspects enhanced learning, some of them 'in-class' and others 'out-of-class.' A sample **erosion-modelling tray** from Harare was left for participants to multiply to help them in their subsequent training.



Photo Set 4: Demonstrating Use of a Manual DS that plants and applies fertilizer.





Photo Set 5: CA ADP Tillage Implements – Narrow tined Magoye Ripper (top row) and Werner DS (bottom row)

While the narrow-tined Magoye ripper works well on clayey soils, some farmers opt to use the broad-tined ripper on ‘sandish’ soils. At the same time, the Werner DS is more efficient where seed, fertiliser and lime are placed at once (cutting down on number of operations) while the Fitalleri DS applies only seed and fertiliser. The Fitalleri DS was also displayed at the Field practical.



Photo 6: A Demonstration of Herbicide Application.

A half-day's **field practical session** was held at Chitedze Research Station to **show-case** ADP equipment not seen in Malawi at the time that others in nearby Zambia were using as an exposure to what could be assessed.



Photo Set 7: Field Interactions with a No-Till, 'Not ridging/not ploughing' Lady CA practitioner, Mpingu EPA, Lilongwe ADD.

At Mpingu EPA, participants were given an opportunity to **physically interact** with a novice CA practitioner, confident that her choice to go CA was yielding beneficial results in terms of the land resource and increased yields



Photo Set 8: Group Discussions in progress, also copies of the CA Manual and Posters Distributed

Group discussions brought out salient CA aspects of enhancing understanding and knowledge and skills of participants.

The drawing up of appropriate **action plans** at the end of the learning course created not only challenges but also acted as a forward planning mechanism to further develop the knowledge and skills acquired and to positively benefit and engage new participants and actions.



Photo 9: Walled Posters Depicting CA Concepts and Situations

Visualisation was an important learning aspect emphasised to cement grasping of concepts and knowledge given. A number of different **posters** were mounted on the walls of the classrooms.

During evenings, participants had opportunities to interact with resident resource persons for **further clarifications and mutual exchange** of experiences.

It was not surprising that the course content comprised new knowledge to many of the participants.

2.3.2 Process Used



Photo Set 10: Group Presentations Using Flip Charts and Facilitation Boards

Most of the learning was aided by visual exposures through LCD projector, use of flip-charts, facilitation board and assorted cards and pinning. We were privileged to see use of other information gathering gadgets, erosion-modelling trays and ancillaries depicting different situations.

In group sessions, participants used flip charts to conclude their discussions that were later shared in plenary with the rest of the participants. These were usually 'pinned' on the walls of the classrooms. A digital camera was used to capture many of the activities taking place.

Some posters and a sample erosion model were given to participants for their use.



Photo 11: A Point of Commendation...Jill and Kupi!

The group was also privileged to have among its resource persons an internationally-reknown specialist on the rhizosphere, such a key ingredient to understanding the CA farming system, who spent considerable time to relate pertinent CA systems to tillage, soil cover and rotations.

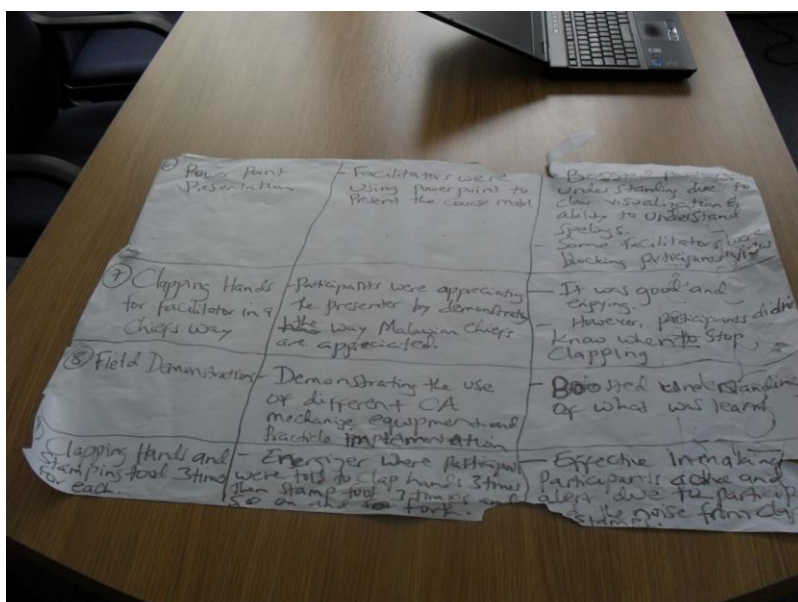
The rest of the facilitation had a local perspective from the current CA development in the country. Presence of a few non-Malawian participants flavoured those local experiences.

A variety of tools and energisers were used in the learning process as illustrated below.

Photo Set 12: A Depiction of Tools Used

TOOLS USED		
Tool	How It was Used	Comment
① Writing of names on head.	An energizer. Participants took papers and put on their head. Took a pen and wrote their names on the paper on the head.	<ul style="list-style-type: none"> Most Participants failed to get their names right. Effective in energizing Participants due to stretching of hands when writing, Mind when thinking & Chest & Jaws when laughing.
② Maths Solving Using body Parts.	Participants were taken into an energizer where they were calculating maths problems using their body parts.	<ul style="list-style-type: none"> It was enjoyable as it was quite new to most Participants. There was maximum twisting of body parts hence effective.

Tool	How It was Used	Comment
③ Clapping Hands for Presenter	Participants were clapping hands to reflect the degree of performance of a presenter.	<ul style="list-style-type: none"> Not very effective as it was confusing to most participants at beginning. It was subjective because everyone was just clapping anyhow.
④ Group Work for Assignments	Tables where Participants sat were turned into groups for discussions.	<ul style="list-style-type: none"> Effective because it promoted participants interaction. Participants were active & more involved.
⑤ Use of Flipcharts	Groups were writing answers to the questions on flipcharts and present.	<ul style="list-style-type: none"> Boosted participants understand as they could visualise what was discussed. Some people could use the flipcharts.



3.0 SITUATIONAL ANALYSIS



Photo 13: A Presentation of the Situational Analysis by a Participant

3.1 Typical Characteristics

Three scenarios are presented here, two about Malawi itself and a third about Zimbabwe.

Table 2: Summary of Situational Analysis

a) Physical	MoAFS	TLC Group	Zim Group
	<ul style="list-style-type: none"> - Poor road network - Rough terrain - Mostly annual rivers - Deforestation - General land degradation 	<ul style="list-style-type: none"> - Geographical Location; Bordered by Zambia, Tanzania and Mozambique; - Varied Landscape - Roads: Good network, most districts and all cities connected by tarmac roads; - Most earth roads seasonal - Rivers: Good network of rivers both permanent and seasonal; Rivers and streams are affected by soil erosion with high level of siltation causing frequent incidences of flooding. - Lake: Malawi has a lake that covers 20% of the country with great diversity of fish species. 	<ul style="list-style-type: none"> -Some areas are rocky, sandy (poor soils), poor road network and communication network -Topography is mountainous and mobility is hindered for extension agents
b) Climate/ Climate Change	MoAFS	TLC Group	Zim Group
	<ul style="list-style-type: none"> - Erratic rainfall - Uneven rainfall distribution - Low/high intensity rainfall - Generally increased temperatures - Increased incidences of pest and diseases 	<ul style="list-style-type: none"> -Rainfall pattern: Oct-May, 600-1100mm, Heavy at on-set, but showery at the end. -Longer rainy season in hilly areas than in low lands -Temperatures min: 0-18° C max:20-41°C 	<ul style="list-style-type: none"> -Erratic and poor rainfall distribution -Heat waves (High temperatures) causes permanent wilting of crops
c) People	MoAFS	TLC Group	Zim Group

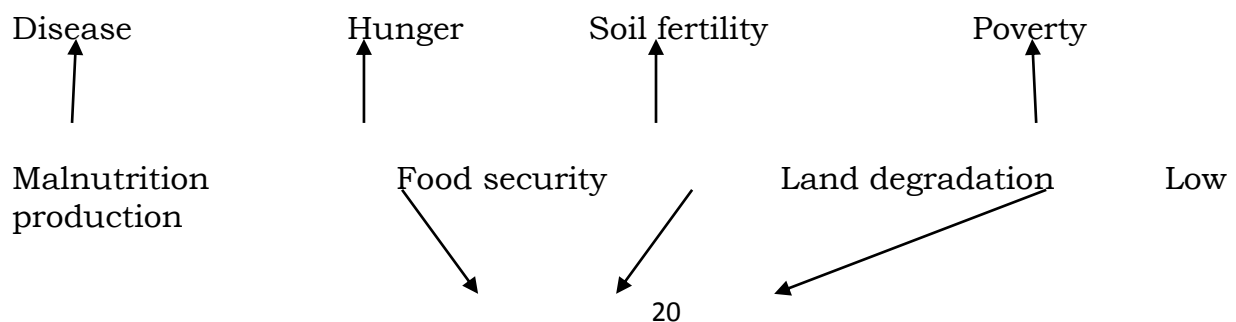
	<ul style="list-style-type: none"> -High density settlements -Increased population -Burning of residue -Livestock feed on crop residue -Subsistence farming/casual labour - traditional dances -encroachment into marginal areas. 	<ul style="list-style-type: none"> -Settlements -Villages at random -Density depends on availability of land and culture -Matrilineal and patrilineal systems 	<ul style="list-style-type: none"> -Urbanisation relocation to unproductive sites -Traditional beliefs i.e. anti use of chemicals in crops/livestock production, not to grow certain crops i.e. finger millet
d) Agriculture	MoAFS	TLC Group	Zim Group
	<ul style="list-style-type: none"> -maize is staple food -tobacco is main cash crop - (production dependent on external inputs- inorganic fertilizer) -legumes (peas, beans) are sources of proteins - goats, chickens most common, availability of cattle - inadequate grazing land -average land holding size (0.4ha) Hand hoes, panga, axes for cultivation Continuous grazing (limited fallowing) 	<ol style="list-style-type: none"> 1) Crops <ul style="list-style-type: none"> -Small holder subsistence farming with maize taking about 80% 2) Cash crops <ul style="list-style-type: none"> -Tobacco, cotton, coffee, legumes 3) Livestock <ul style="list-style-type: none"> -Mostly free range system, considering store feeding for dairy cattle Common stock: cattle, goats, chicken, pigs, sheep 4) Field <ul style="list-style-type: none"> -Small land holding size 0.4 ha on average 5) Farming <ul style="list-style-type: none"> -Rain fed with minimal irrigation 6) Implements <ul style="list-style-type: none"> -Mainly hand hoe with minimal ADP 	<ul style="list-style-type: none"> -Knowledge -Germplasm – suitable varieties -Capital
e) External inputs	MoAFS	TLC Group	Zim Group
	<ul style="list-style-type: none"> -FISP (Use of organic fertilisers, herbicides) -Manure making/application -Poor markets, little value addition -Inadequate research programmes -Manual work and animal draught power -Minimal interaction with urban markets 	<ol style="list-style-type: none"> 1)Development programmes <ul style="list-style-type: none"> -Greenbelt, ASWAP, irrigation schemes, land procurement programme, livestock pass on, USL 2)Extension and Research <ul style="list-style-type: none"> -Extension available through MG and NGOs -Research programmes through research institutions, universities and NGOs 3)Inputs <ul style="list-style-type: none"> -Subsidy, soft loans 4)Labour 	<ul style="list-style-type: none"> -No funding to carry out extension research -No specific policy which supports CA

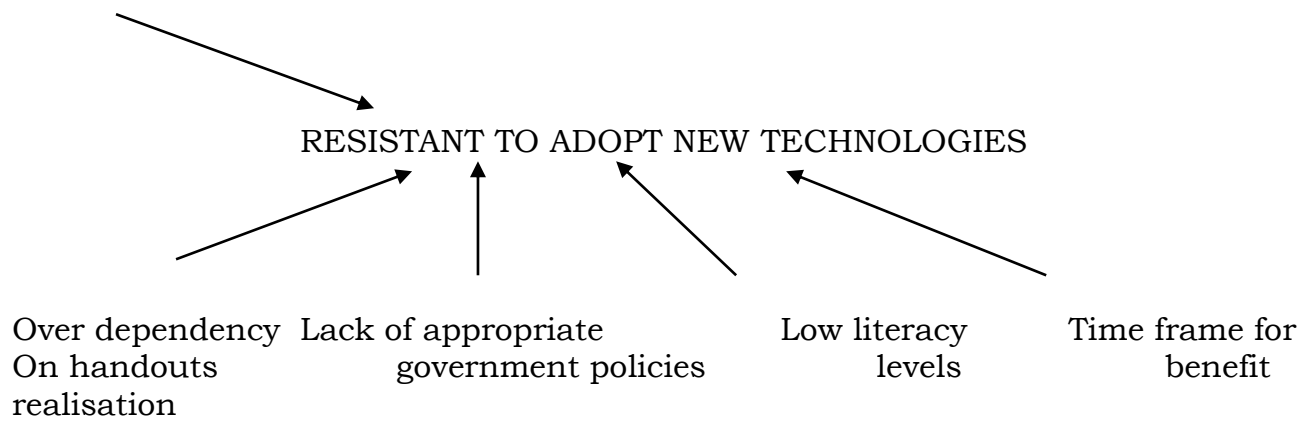
		-Human affected by HIV/AIDS ADP minimal 5) Interaction with urban centres -Done through middle men/traders	
f) Survival strategies	MoAFS	TLC Group	Zim Group
	-Casual labour -Selling livestock -Food for work programme -Planting of strategic crops e.g. cassava and potatoes -Renting out of land -Selling of maize meant for home consumption -Migration to other urban centres	-Subsistence farming -Casual labour Small and medium business enterprise	-Adoption of GMOs -Food handouts by Donors/Government
	MoAFS	TLC Group	Zim Group
	1. Farmers resistance to adopt modern farming; 2. High costs of farm inputs; 3. Climate change variability; 4. High dependence on handouts; 5. Poor road works between farmers and markets; and 6. Poor market price of agricultural produce.	-Poor soil fertility -Small land holding size -Poor farming practices -Land tenure systems -High cost of inputs -HIV/AIDS	
a) What has not changed	MoAFS	TLC Group	Zim Group
	-Land size is static	-use of hand hoe -Ridging -Burning crop residues -Uncontrolled grazing -Subsistence farming system -Selling of raw produce(no valued added)	-Area planted to major crops -Farming systems i.e. conventional farming subsistence
b) What has	MoAFS	TLC Group	Zim Group

declined			
	-Forest area -Soil fertility. -Water sources -Total yields –land productivity -Perennial to annual stream/river flows due to siltation -Reduced total rainfall received.	-landholding size -soil fertility -Human labour due to HIV/AIDS -Organised markets -Public extension services	-Yield -Climate
c) What has increasing	MoAFS	TLC Group	Zim Group
	-Use of organic fertilisers -Introduction of CA -Use of improved cultivars/seed -Use of herbicides -Introduction of agroforestry	-Use of inorganic fertilizer -Use of improved varieties -Adoption of CA -Improved uptake of new technologies -Availability of private produce markets	-More Agric professionals -More research -Economic Recession leading to Poverty <ul style="list-style-type: none"> • Lack of know how • Soil erosion • Lack of capital • Poor markets • Lack of germplasm

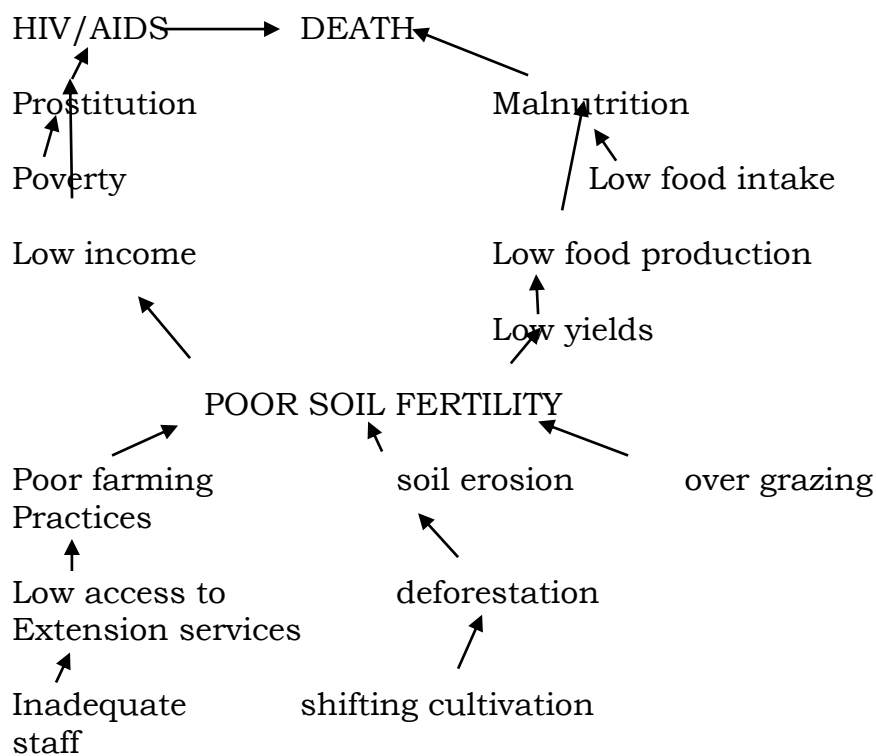
3.1.1 Problem Analysis

1) MoAFS

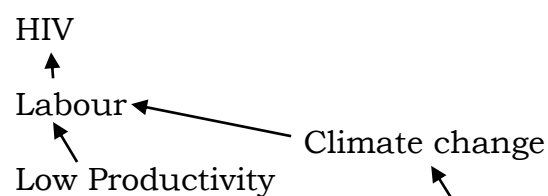


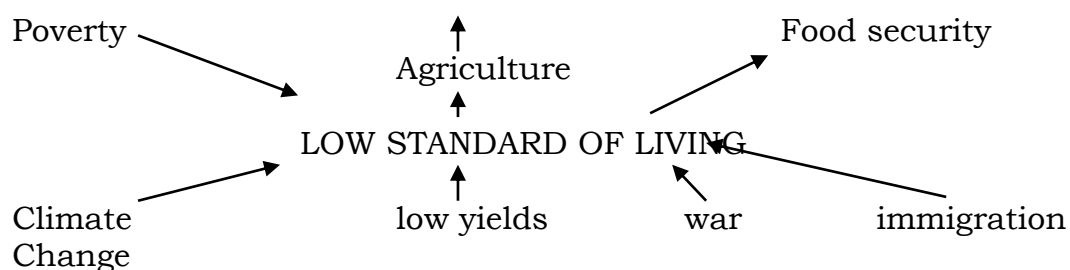


2) TLC Group



3) ZIM Group





3.2 NCATFs CA Approach

In a bid to harmonise understanding, Malawi's basic approach to CA means:

- 1) Soil Cover : 30% ground cover of crop residues;
- 2) Crop Rotations: intercropping with legumes; and
- 3) Tillage: temporal –advantage 'pit planting' of 30cm x 30cm or 40cm x 40cm pits (into which 4 maize plants establish).

However, only about 0.04% of the smallholder farming community participates in CA so far.

4.0 STATUS OF CA EQUIPMENT IN MALAWI

Table 3: Use of Various CA Equipment in Malawi

a) Hand Powered Tools and their use

Tool	Use	Market Availability	Source	Remark
Jab-planter	-planting -fertilizer application	Not available	N/A	Need to be adapted to local soils
Zamwipe	-Weed control	Not available	Zambia	Need to be imported
Hand hoe	-Land preparation -Planting -Weeding -Harvesting	Locally available	Local Market	Found everywhere
Dibble stick	-Planting -Fertilize application	Locally made	Locally made	Not marketed
Sprayer	-chemical application	Available (sometimes)	-Agora -ACT	Need to import other

	for pest and disease control -Herbicides application		-Chemicals and Marketing	types e.g. pulled sprayer
Slasher	-Weed control	Available	Local markets e.g. Hardware shops	

b) ADP Motorised

Equipment	Use	Market Available	Source	Remark
A Dripper	Ground dripping	Available	Snolink	Not commonly used in Malawi
Drill Planter (mechanised) & (ADP)	Used for planting, fertilizer application	Available	Ministry of Agriculture	Not commonly used as of now in Malawi
Subsoiler	Break hard pan	Not available	None	Not available in Malawi
Knife Roller (mechanised and ADP)	Weed control	Not available	None	Not available in Malawi

Exposure of the team to possible ADP CA equipment from Chipata in Zambia opened traits of new opportunities for advancing CA activities in the country.

We were not able to provide ACT visibility materials due to cost such as T-shirts and caps.

5.0 MAJOR ISSUES:

5.1 The perception (by some people) that CA is about traditional hand tools

1. Challenge

How can the perception be mitigated?

2. Strategy

Engaging the private sector to actively participate in making mechanised CA equipment available in the markets

3. Lesson Learnt

Mechanised equipment is possible with CA.

5.2 Most CA implements are not available locally or are not fully utilised.

1. Challenge

No local production of the tools and equipment , implements not available at the market.

2. Strategy

a) Engage the private sector to participate in the production and marketing of tools and implements.

b) Government should formulate policies that create conducive environment for private sector participation.

3. Lesson Learnt

CA promotion requires a holistic and inclusive approach.

5.3 How to mechanise small land holding sizes

1. Challenge

Identification and promotion of appropriate mechanised CA implements.

2. Strategies

a) Mobilise farmers into groups so as to maximise use of mechanised equipment

b) Arrange hiring out of equipment e.g. 2-wheeled tractors or ADP.

3. Lesson Learnt:

With proper planning, political will and appropriate packaging of extension messages and approaches, small land holdings can still be under CA mechanisation.

5.4 Process for technology release takes too long e.g. Jab planter

1. Challenge

Delays in technology release

2. Strategy

Lobby technology release committee to be proactive and act quickly on new technologies.

5.5 Inability to allow farmers test technology by themselves

1. Challenge

Restrictive / rigid policy on release of new technologies

2. Strategy

- a) Review policy on technology testing and eventual release
- b) Lobby for importation of technology and testing by farmers

3. Lesson Learnt

- It takes unnecessarily too long to release technologies hence negatively impacting on CA technology adoption

5.6 Inability to utilize available cover crops in Malawi

1. Challenge

- **Limited linkage between cover crops and CA**

2. Strategy

- a) Promote cover crops in CA extension messages
- b) Engage research to establish appropriate combinations of crops and cover crops to maximize soil management and crop production

3. Lesson Learnt

Cover crops produce good results just as crop residues do, for example, other cover crops have allelopathic effects on weeds

5.7 Explaining Soil Science Principles to farmers

1. Challenge

Difficult to simplify scientific principles in Soil Science for farmers' understanding and appreciation

2. Strategy

Research and extension to innovatively package soil science principles into simple messages for farmers to understand

3. Lesson Learnt

For farmers to appreciate the value of soil management they need to understand its biological properties

5.8 Inadequate linkage between research priorities and extension messages and farmer needs

1. Challenge

Low adoption of technologies

2. Strategy

Promote stronger linkages amongst stakeholders in technology development, dissemination and utilization

3. Lesson Learnt

Lack of harmonized extension messages results in low adoption of technologies

5.9 Inadequate extension service provision on CA leading to adoption

1. Challenges

- a) Inadequate and/or inaccurate knowledge of CA among change agents (Extension Staff)
- b) Slow adoption hence CA takes long time to reach critical mass.
- c) CA still being piloted by farmers
- d) CA still not integrated or linked to crop rotation and cover crop arrangements in Malawi.

2. Strategy

Engage the private sector and NGOs to provide harmonised CA extension services.

3. Lesson Learnt

Effective and efficient extension service is key in the promotion and adoption of CA.

5.10 Lack of National Statistics on CA

1. Challenge

No M&E CA system to feed into the National Data Base

2. Strategy

- a) Lobby government for inclusion of CA indicators into the Food Security and Nutrition Policy Indicator Manual
- b) Institute mainstreaming of CA in all food security projects and programmes
- c) Promote subscription of CA indicators into the national data base

3. Lesson Learnt

If we cannot monitor what we are doing in CA we cannot establish what progress we are making.

5.11 Low commodity price

1. Challenge

Lack of limited value addition

2. Strategies

- a) Engaging the private sector to participate in value addition of crop produce.
- b) Promotion of market oriented production among farmers.

3. Lesson Learnt

Farming remains very unattractive to engage in as a result of low market price of produce, thus remain unprofitable.

6.0 LIST OF PARTICIPANTS TRAINED



Photo 14a: A List of Participants – Capturing the ‘Others!’

The ACT Learning course in Malawi was set to enhance CA promotion in a changing climatic environment targeting key institutions of the NCATF. Six institutions sent participants:

- i) 11 from World Vision Malawi;
- ii) 8 from MoAFS’ Land Resources Conservation Department;
- iii) 5 Total Land Care;
- iv) 1 Concern Universal; and
- v) 1 from Forest Research Institute, Zomba.

Three participants came from out of Malawi, i.e. 2 from Zimbabwe and 1 from Botswana.

A list of the participants and their details is attached in Annex 3.

7.0 LIST OF TRAINING MATERIALS PROVIDED



Photo Set 14b: Presentation Ceremony of Certificates of Attendance by ACT's Executive Secretary.

Photo Set 14b: Presentation Ceremony of Certificates of Attendance by ACT's Executive Secretary.

In addition to the CA Manual for extension workers, each participant also received a flash disk of all presentations, additional notes (over 27 files) and a set of the action plans. CA posters and 1 sample erosion-modelling tray were also distributed. All participants received a certificate of attendance.

8.0 TRAINING TOPICS COVERED

Box 1: Sol Vita Test

- Used to measure Soil pH
- Concentration of CO₂ changes and colour of Sol Vita.
- The more the CO₂ the more the presence of soil organisms (through respiration)
- This determines the life of the soil
- The Sol Vita colour is referred to pH chart hence the soil pH)

Training was adapted to the CA modules by ACT. Following were discussed during the training:

Module 1: Introduction and current status

- 1.1 Agriculture in Africa's development strategies
- 1.2 Soil fertility and agricultural productivity
- 1.3 Soil degradation
- 1.4 Water degradation

1.5 Climate change and Agriculture; implications for smallholder farming systems

Module 2: Conventional agriculture: what has gone wrong?

2.1 Conventional farming systems, short, long term impact on agriculture and climate change.

Module 3: Conservation agriculture: The concept and principles

3.1 Conservation agriculture – the benchmark principles

Module 4: Conservation Agriculture: principles and farm level adaptation

4.1 Tillage in agriculture

4.2 Tillage options in conservation agriculture

4.3 Soil compaction: causes and treatment

4.4 Soil cover: principles and application

4.5 Crop management in conservation farming – options for sustainable supply of plant nutrients

4.6 Water harvesting and management in conservation agriculture

4.7 Weeds and pests in conservation agriculture: possible interaction with climate change

4.8 Farm power and machinery in conservation agriculture

Module 5: Natural challenges to the application of conservation agriculture

5.1 Conservation agriculture in humid/tropical farming systems: possible impact of climate change

5.2 Conservation agriculture in arid and semi- arid farming systems: possible impact of climate change

5.3 Sustainable cropping on steep lands

5.4 Adapting Conservation Agriculture to climate change

5.5 Application of Conservation Agriculture to adapt and mitigate some aspects of climate change in smallholder agriculture

Module 7: Facilitating development and dissemination of CA technologies

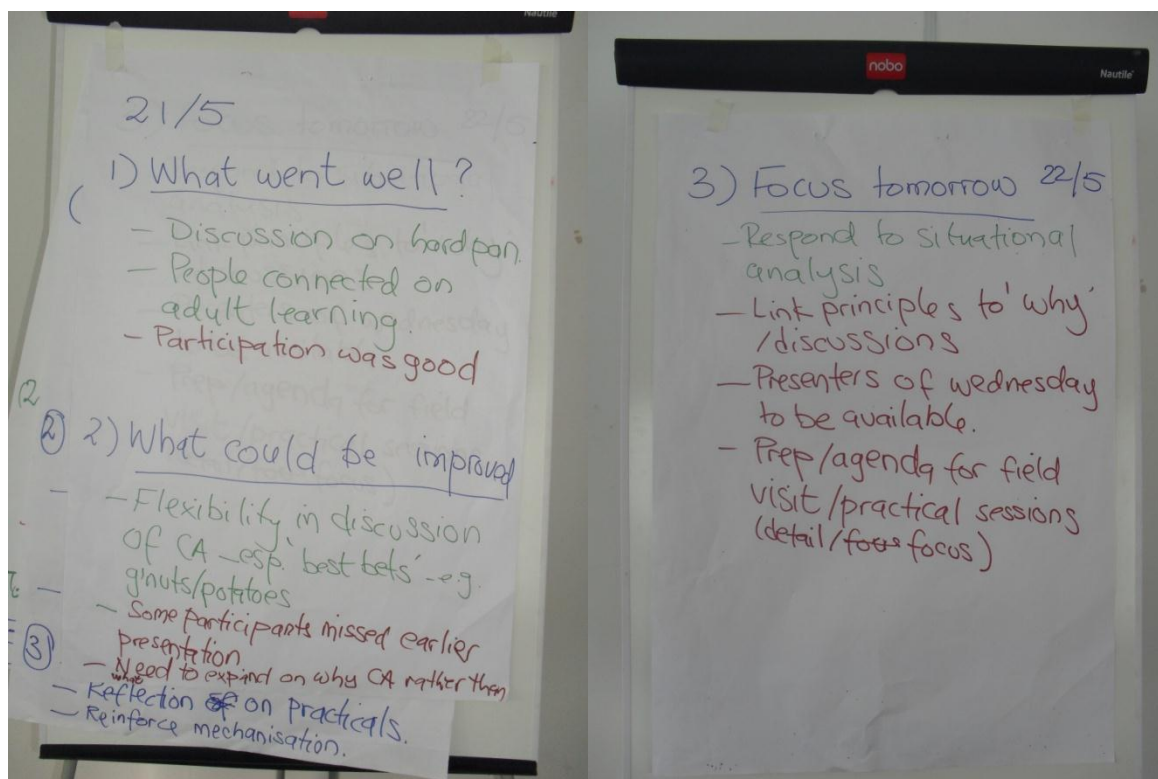
7.1 Group Dynamics and farmer participation in the development and dissemination of CA technologies

7.2 Dissemination approaches in enhancing farmers' accessibility of CA technologies

Module 8: Special sessions

Module 9: Discussion on Lessons Learned around the CA Regional ToT

Each day's activities were reviewed with necessary adjustments made in the next day's activities. A sample of the notes discussed is attached in fig. below.



5. Fig. 1: Charts Showing Reviews of Day Activities

Details of the training programme are given in Annex 4.

9.0 CONSOLIDATED LESSONS LEARNT

The Malawian approach to CA is being effectively coordinated by its NCATF and establishing a common understanding though challenged by certain circumstances such as small land parcels, 'a ridging culture', technical approval requirements, etc.

Issues of changing the mindset or a 'paradigm shift' from the conventional way of doing things on the agricultural field will still require frequent follow ups and more training to shift from a seasonal alternating ridge/furrow land preparation system to one that 'tills the soil in-situ' but using other mechanisms. Some complementary

evident agroforestry practices that can be integrated promise good progress towards a CA farming system.

Harnessing ADP onto the field is another challenge once use of appropriate tools has passed the rigours of acceptance by authorised government systems. Such development will efficiently increase productivity and labour use.

Different countries in the region have local/national adaptations to elements of CA practice. Planting basins, referred to as ‘pit planting’ in Malawi has different dimensions to those in Zambia or Zimbabwe.

Continued training and exposure is inevitable to foster relevant CA development among stakeholders. Thanks to FAO-REOSA who has continued to support CA trainings and general capacity building for farmers, CA national task forces and technocrats within Southern African region.

10.0 COURSE EVALUATION

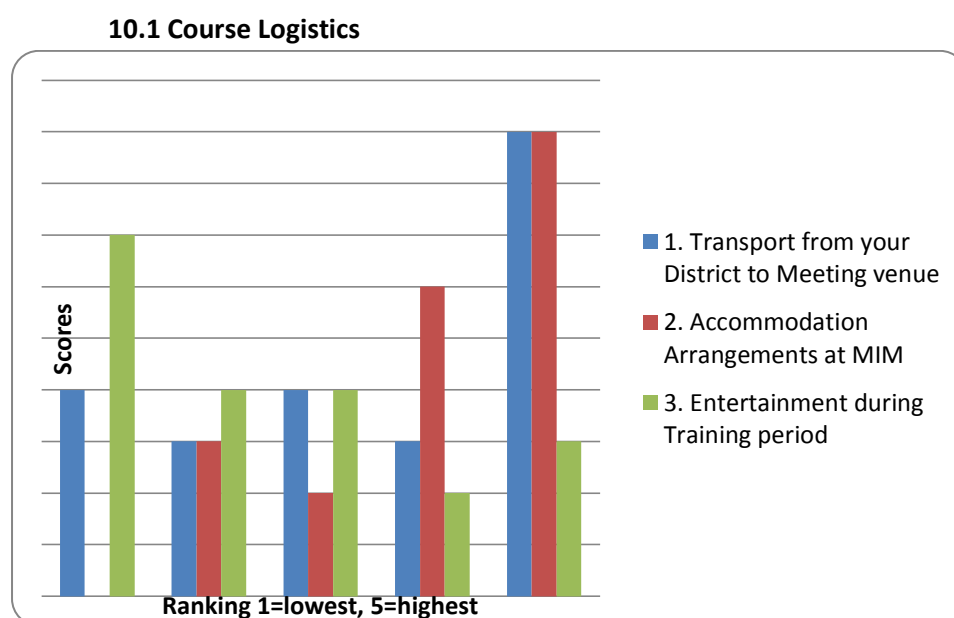


Fig. 2: evaluation of Course logistics

Transport arrangements generally moderate to excellent (70%) except the Zimbabwean team which had to spend a night at Johannesburg airport en-route to Malawi, and some local participants that did not have adequate time to prepare for the training.

Accommodation at MIM was reasonably fine (74%), except it was in a secluded place without other facilities around, and located approximately 10 away from the Old Town business centre.

Entertainment was generally lacking (65%) due to tightness of programme. Only limited room-based facilities were available, notably TV.

10.2 Course Facilities

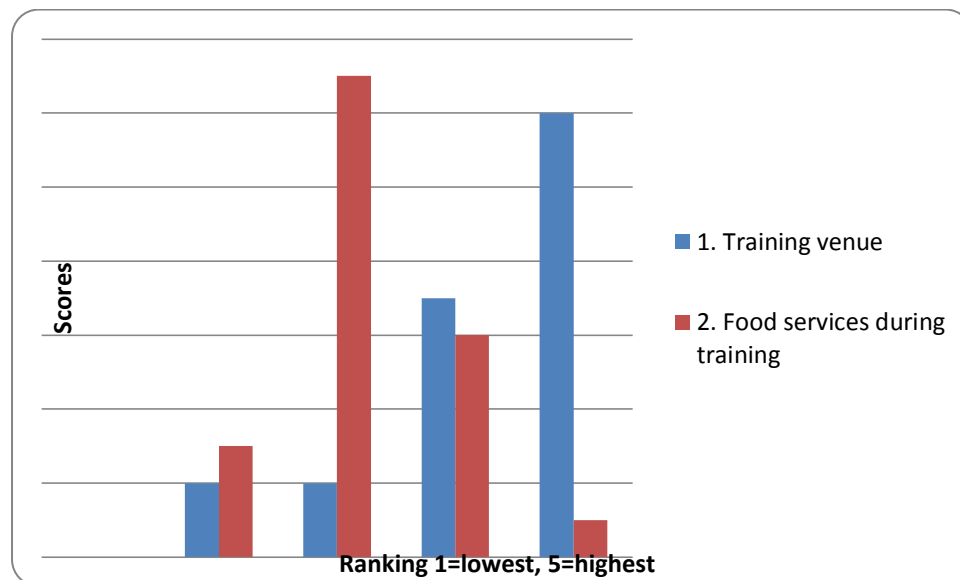


Fig. 3: Evaluation of Course facilities

The Training venue was generally rated good to excellent (83%), while food services were moderate to poor due to monotony of diet and inadequate/shortage of food (70%). Our Welfare committee did not seem to be very active.

10.3 Course Content

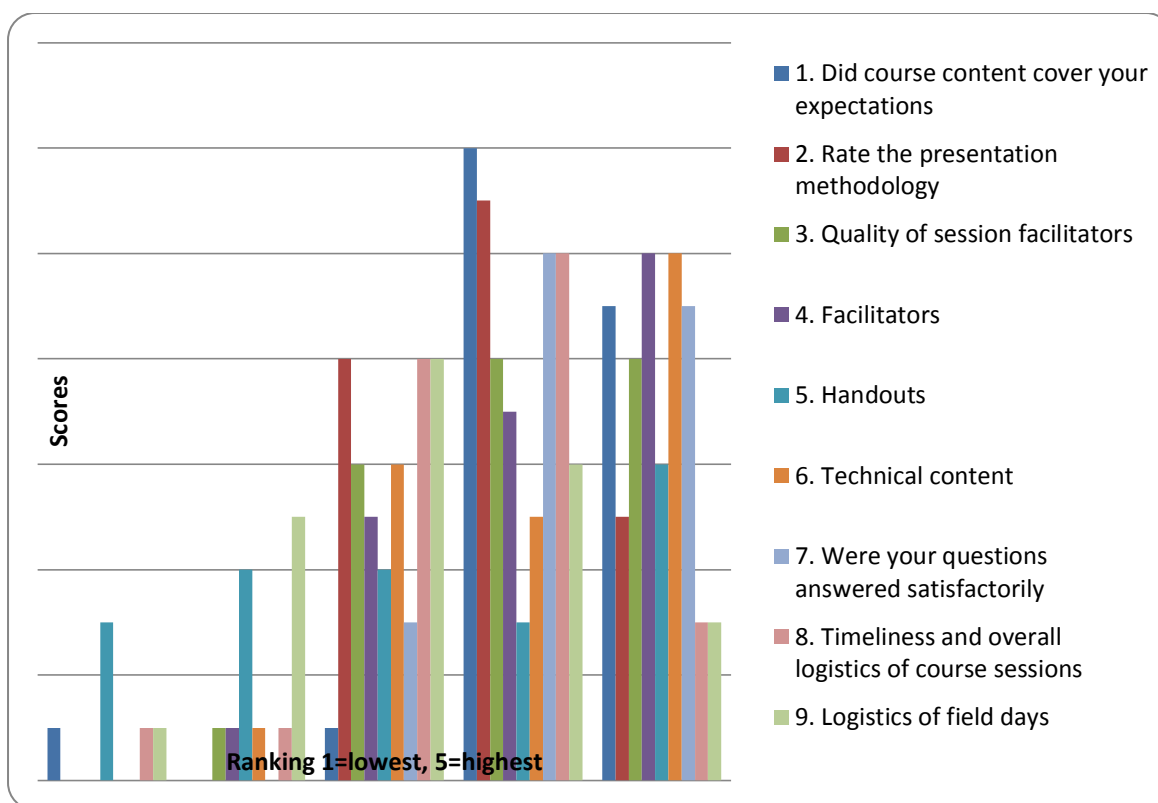


Fig. 4: Evaluation of Course Content

The course content despite extremities in some cases was rated generally above-average. Many participants considered it worthwhile and coming at the right time when effort is geared towards up-scaling.

The issue of lack of handouts comes out despite having given each participant a complete CA manual, a rare handout given elsewhere, and an e-copy of all presentations. We will need to review this part of the evaluation form so that it captures sharper.

Time for field visit and practicals was inadequate. In future, we shall need to devote one whole day for this set of exercises. However, exposure to ADP CA equipment of the participants was very worthwhile. Even the people at Chitedze Research Station looked encouraged to explore those possibilities. The Chinese manual DS was also appreciated, with one of the participants remarking, ‘if only the Technology Release Committee would have approved, I would have gone to China to order a container of them.’

Participants felt satisfied that it was indeed possible to mechanise CA in Malawi after lessons and exposure to potential equipment. They were also satisfied that the training covered all areas of CA principles. However, they felt that time was not adequate to fully grasp the knowledge and skills being imparted. A need to ‘localise’ the training and relevance was also raised – an issue to be considered hopefully as teams develop their action plans. The training was considered relevant for CA up-scaling.

11.0 CONCLUSION

Southern African countries needs to be encouraged to mechanise its CA to increase hectarage under CA but also contribute towards the reduction of its soil resources as farmers realise increased health and socio-economic benefits from a CA farming system framework.

The various Action plans developed at the training need to be supported and followed up through appropriate visible instruments that will attract farmers and others enticing them for adoption.

We would like to acknowledge the financial support ACT received from FAO, and ACT for making this course a reality for the benefit of the people of southern African countries. Special Thanks to all the resource persons for giving their best.

REFERRED REFERENCES

- 1) Farming in Nature's Image, Soule & Piper (Authors)
- 2) www.Dakotalakes.com Dakota Lakes Research farm
- 3) Single straw Revolution

Annex 1: OPENING SPEECH



OFFICIAL OPENING SPEECH FOR THE NATIONAL CONSERVATION AGRICULTURE TRAINING

By

SECRETARY FOR AGRICULTURE AND FOOD SECURITY

ERICA MAGANGA, MRS

AT

MIM, LILONGWE

21ST MAY, 2012

- Director of Ceremonies,
- The Director of Land Resources Conservation Department, Mr. J.J. Mussa,
- The Controller of Agriculture Extension & Technical Services, Mr. W. Lipita,
- The Programme Manager, Lilongwe ADD,
- The Acting Resident Representative of FAO, Mr. A. Nkhoma,
- The Executive Director of African Conservation Tillage Network, Eng Saidi Mkomwa, and your counterparts from your Head Office in Nairobi,
- The Sub – Regional Coordinator for African Conservation Tillage Network for Southern Africa, Mr. Herbert Mwanza, and your counterparts from the Regional Office in Harare,
- Distinguished Facilitators both Local and International,
- Distinguished Course Participants from Botswana, Malawi and Zimbabwe,
- Ladies and Gentlemen,

1. I feel greatly honoured to be here with you this morning and preside over the official opening ceremony of this very important national training course on conservation agriculture being conducted by the African Conservation Tillage Network (ACT) in conjunction with FAO. I am informed that although we are calling this a national course, we still have international participants from the region. Before I go further, allow me to extend my warm welcome to all participants to Malawi Institute of Management here in Lilongwe, Malawi, the Warm Heart of Africa, and wish you all a successful training over the coming week. Through you, I would also like to thank your various organizations and institutions for nominating and allowing you to come and participate in this training. Without your participation, this training was not going to be possible. I am told that there will be a practical session and field trip to interact with farmers on conservation agriculture practices at Chitedze Research Station and Mpingu EPA under Lilongwe ADD. I therefore would also would like to thank the Director of Department of Research Services and the Officer In-Charge at Chitedze Research Station as well as the Programme Manager for Lilongwe ADD for making the necessary preparations for the course hand-on session.

2. Director of Ceremonies, distinguished delegates, ladies and gentlemen, as you all know, agriculture is the major contributor to the Gross Domestic Product (GDP) in most of Sub Saharan African (SSA) countries. In Malawi, it is the single most important sector for the economy. The sector contributes nearly 40% of the GDP,

employs almost 90% of the population and brings in over 80% of foreign earnings through exports. The performance of agriculture therefore has a strong influence on the rate of economic growth for the country.

3. Land degradation, nutrient depletion and human-induced desertification due to mining of farmland and overgrazing of common land are dominant in smallholder land use in sub-Saharan Africa. The low productivity within the smallholder sector in SSA is also being worsened by climate change and variability whose effects have mainly been less rainfall amount and reliability. The IPCC (2007) states with high confidence that Africa is highly vulnerable to climate change and variability and this is worsened by the interaction of multiple stresses (such as endemic poverty, complex governance and institutional dimensions, limited access to capital, including markets, infrastructure and technology; ecosystem degradation; and complex disasters and conflicts) occurring at various levels and low adaptive capacity. This implies that rainfall will become less and more variable across agro-ecological zones (even in high rainfall areas) thereby negatively affecting the farming systems that had stabilized at different levels. Therefore to address food security and family nutrition of SSA's 625 million people who largely depend on rain-fed agriculture has to be addressed within the context of climate change and variability.
4. Besides unreliable rainfall, poor soil fertility is widely acknowledged to be the primary constraint to food security in the smallholder sector throughout humid and sub-humid Africa, but the socio-economic environment constrains opportunities to maintain or improve soil fertility. Soil erosion particularly poses the most serious threat to sustainable cropping as it washes away the relatively more fertile top soil which forms the basis for recapitalising the soil through use of organic and inorganic fertiliser resources and other agronomic practices.
5. Conservation Agriculture (CA), is a term encompassing farming practices which have three key characteristics: 1. minimal mechanical soil disturbance (i.e. no tillage and direct seeding); 2. Maintenance of a mulch of carbon-rich organic matter covering and feeding the soil (e.g. straw and/or other crop residues including cover crops); and 3. Rotations or sequences and associations of crops including trees which could include nitrogen-fixing legumes, has been successfully used to control soil erosion, revitalise degraded soils and increase crop productivity. CA benefits include water conservation and reduced erosion due to reduced soil disturbance and surface cover,

soil organic matter (SOC) accumulation, reduced labour and with time increased and sustained yields. There are currently some 117 million hectares (about 8 percent of global arable cropland) in such systems worldwide, increasing by about 6 million hectares per year (www.fao.org/ag/ca). They cover all agro-ecologies and range from small to large farms. CA offers climate change adaptation and mitigation solutions while improving food security through sustainable production intensification and enhanced productivity of resource use.

6. Adoption of CA in smallholder sector is steadily increasing though it is still low although several initiatives have been implemented. This scenario is further compounded by the fact that two of the pillars of CA have been reported to conflict with livestock needs (keeping soil surface covered with residues) and also the proportion of legumes in the farming systems is too small for an effective crop rotation system. There is need to develop strategies to increase the proportion of appropriate legumes in the farming systems across the agro-ecological zones.
7. Dear participants, our major challenge amongst our various agricultural land users is converting their mind set from conventional agriculture practices to conservation agriculture, as they require new knowledge and skills to effectively implement and manage CA systems. Most importantly, this huge mind shift is required not only by farmers, but all of us. It is almost impossible for one to convince farmers to convert to CA when we ourselves are not convinced.
8. Research, training and extension support as well as private sector participation are therefore pivotal to successful CA implementation and adoption by farmers. Inadequately or poorly trained extension agents pose a risk to CA uptake by farmers as these people will fail to clearly articulate the case for CA and to impart the necessary knowledge and skills to the farmers. Similarly, availability of appropriate and affordable CA equipment and machinery are required to increase the hectareage, production and participation under CA.
9. Because CA is a knowledge intensive technology, training courses/events that combine both theoretical and practical sessions are required over a number of seasons to foster confidence among extension agents and farmers. These events also require presence of business houses to ensure availability of machinery and equipment, input and agro-chemicals.

10. While short term course like the one you will receive in this week are important, the long term solution lies in having CA being taught in all relevant institutions that produce extension agents, and of course combine this with follow up courses while on the job. The challenge will be to see integration of CA into the curricula of agricultural training colleges with assistance from cooperating partners, a move that is expected to strengthen CA expertise and adoption.
11. Agriculture in developing countries needs to undergo a significant transformation in order to meet the related challenges of achieving food security and responding to climate change. Projections based on population growth and food consumption patterns indicate that agricultural production will need to increase by at least 70 percent to meet demands by 2050 (FAO,2010). Most estimates also indicate that climate change is likely to reduce agricultural productivity, production stability and incomes in some areas that already have high levels of food insecurity. Developing climate-smart agriculture is thus crucial to achieving future food security and climate change goals. CA is one such element in climate smart agriculture.
12. Ladies and gentlemen, I am informed that this training course is the first of three to be held in the region. I would therefore like to commend the organizers of the training for choosing to conduct one such training here in Malawi. This is clear evidence that our efforts in promoting conservation agriculture are being recognized and that there is room for cross fertilization of knowledge and skills to assist the region overcome the challenges which are still affecting its adoption amongst the small holder farmers.
13. I realize that despite the human and other resource challenges in most countries, FAO recognizes the current efforts by Governments, Intergovernmental Institutions, NGOs, Donors, International Research Organizations, Academic Institutions and other players to up – scale CA in the region.
14. Allow me once again to thank all of you for coming to attend this national training. Let me also thank the African Conservation Tillage Network and FAO for organizing and funding the training. I would also like to thank the Director of the Department of Land Resources Conservation, which is also the Secretariat for the National Conservation

Agriculture Task Force (NCATF) for coordinating the training program in collaboration with the organizing team and for work well done.

15. Let me also extend my sincere gratitude to Management of MIM hosting this training allowing us to use their premises.

16. It is now my singular honour and pleasure to declare this national conservation agriculture training officially opened.

17. I thank you for your attention and may God bless us all.

ANNEX 2: ACTION PLANS

(1) Ministry of Agriculture and Food Security

1. CA Technology Options

AREA	FEASIBLE CA OPTIONS	JUSTIFICATION
Balaka, Chikwawa Lilongwe Rumphi	<u>Soil & Water Conservation</u> <ul style="list-style-type: none"> ➤ Making marker ridges ➤ Vetiver hedgerows ➤ Gully reclamation 	<ul style="list-style-type: none"> ➤ Slow down runoff and improve infiltration ➤ Improve soil binding ➤ Sustainable Land Management
	<u>Tillage systems</u> <ul style="list-style-type: none"> ➤ Planting pits ➤ Dibbling 	<ul style="list-style-type: none"> ➤ Rainwater harvesting due to erratic rains ➤ Availability of hand hoes and dibbling sticks ➤ Labour saving technologies
	<u>Cover Crops</u> <ul style="list-style-type: none"> ➤ Pigeon Peas ➤ Cow Peas ➤ Mucuna ➤ Velvet beans ➤ Pumpkins ➤ Water melons 	<ul style="list-style-type: none"> ➤ Source of food and nutrition enrichment ➤ Source of income ➤ Favourable conditions in most parts ➤ Locally available ➤ Farmers knowledgeable about the crops ➤ Protects soil from raindrop impact and sun ➤ Recycle N (most)

AREA	FEASIBLE CA OPTIONS	JUSTIFICATION
Balaka, Chikwawa Lilongwe Rumphi	<u>Residue Management</u> <ul style="list-style-type: none"> ➤ Crop residue incorporation ➤ Retention of mulch on the surface 	<ul style="list-style-type: none"> ➤ Mulch provide cushion to rain drop impact ➤ Suppression of weeds ➤ Retention of moisture ➤ On field manure making ➤ Improves soil organic matter
"	<u>Fertilizer Application & Planting</u> <ul style="list-style-type: none"> ➤ Hand application ➤ Hand planting ➤ Direct seeder_Jab Planter 	<ul style="list-style-type: none"> ➤ Precision of fertilizer placement ➤ Availability of labour
"	<u>Weed Management</u> <ul style="list-style-type: none"> ➤ Hand weeding ➤ Use of herbicides ➤ Cover crops ➤ Mulching 	<ul style="list-style-type: none"> ➤ Availability of labour ➤ Farmers knowledge and experience on using Sprayer ➤ Availability of sprayers

	<u>Agroforestry</u> <ul style="list-style-type: none"> ➤ Faidherbia albida ➤ Tephrosia vogelii & candida ➤ Gliricidia sepium ➤ Pigeon Peas 	<ul style="list-style-type: none"> ➤ Fodder ➤ Farmers experience and knowledge of cover crops. ➤ Some species occur naturally ➤ Soil fertility improvement ➤ Source of firewood
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2. Action plan for CA implementation

No.	What	Where	Target	When	Who	How
1	Soil and water conservation	ADD, District, EPA and Section (Vg)	120Ha (600 LF)	July/ Dec	Farmer/MoAFS/ NGOs	Trainings (Staff and Farmers) Sensitizations meetings
	Making marker ridges					Campaigns Mount demos FFS
	Vetiver hedge rows					Inputs (Line levels)

	Gully reclamation					
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No.	What	Where	Target	When	Who	How
2	Tillage	ADD, District, EPA and Section (Vg)	(600 LF)	July/ Dec	Farmer/MoAFS/	Trainings (Staff and Farmers) Sensitizations meetings Campaigns Mount demos FFS
	Pit Planting		60			
	Dibbling		120			

No.	What	Where	Target	When	Who	How
3	Planting of Cover Crops	ADD, District, EPA and Section (Vg)	120Ha (600 LF)	Dec/ Feb	Farmer/MoAFS/	Trainings (Staff and Farmers) Sensitizations meetings Campaigns Mount demos FFS Inputs (Germ)
	Pigeon Peas		10			
	Cow Peas		10			

No.	What	Where	Target	When	Who	How

4	Residue Mgt	ADD, District, EPA and Section (Vg)	120Ha (600 LF)	Dec/ Feb	Farmer/MoAFS/	Trainings (Staff and Farmers) Sensitizations meetings Campaigns Mount demos FFS
	Crop residue incorporation		60			
	Retention of mulch on the surface		60			

No.	What	Where	Target	When	Who	How
4	Fertilizer application and Planting	ADD, District, EPA and Section (Vg)	120Ha (600 LF)	Dec/ Feb	Farmer/MoAFS/	Trainings (Staff and Farmers) Sensitizations meetings Campaigns Mount demos FFS Inputs (JB etc)
	Hand Application		120			
	Hand planting		100			

	Direct seeder_Jab planter		20			
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No.	What	Where	Target	When	Who	How
5	Weed Mgt	ADD, District, EPA and Section (Vg)	120Ha (600 LF)	Dec/ March	Farm er/MoAFS/	Trainings (Staff and Farmers) Sensitizations meetings Campaigns Mount demos FFS Inputs (herbicides, Seeds)
	Hand weeding					
	Use of Herbicides					
	Cover crops					
	Mulching					

No.	What	Where	Target	When	Who	How
6	Planting or out-planting of AFs	ADD, District, EPA and Section (Vg)	120Ha (600 LF)	Dec/ Feb	Farmer/MoAFS/	Trainings (Staff and Farmers) Sensitizations meetings Campaigns Mount demos FFS Inputs (Seeds, Seedlings)
	Faidherbiaalbida		20			
	Tephrosiavogelli & candida		40			
	Gliricidiasepium		20			
	Pigeon Peas		40			

No.	What	Where	Target	When	Who	How

6	Planting or out-planting of Agroforestry trees	ADD, District, EPA and Section (Vg)	120Ha (600 LF)	Dec/ Feb	Farmer/MoAFS/	Trainings (Staff and Farmers) Sensitizations meetings Campaigns Mount demos FFS Inputs (Seeds, Seedlings)
	Faidherbiaalbida		20			
	Tephrosiavogelli & candida		40			
	Gliricidiasepium		20			
	Pigeon Peas		40			

(2) WVM – Neno/Mzimba Clusters

1. List of CA Technology Options

AREA	FEASIBLE CA OPTIONS	JUSTIFICATION
NENO /MZIMBA CLUSTERS (World Vision Malawi)	<u>Tillage systems</u> <ul style="list-style-type: none"> ➤ Basins ➤ Pitting ➤ Mulching ➤ Agro-forestry ➤ Regeneration 	<ul style="list-style-type: none"> ➤ Flatness of the area ➤ Leeward side where rainfall is a challenge ➤ Enough land with potential to allow regeneration ➤ Reduced soil cover triggering erosion ➤ Soil fertility loss
"	<u>Fertilizer Application</u> <ul style="list-style-type: none"> ➤ Hand application 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired)
"	<u>Planting</u> <ul style="list-style-type: none"> ➤ Hand planting 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired)
"	<u>Weeding</u> <ul style="list-style-type: none"> ➤ Hand weeding ➤ Use of herbicides 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired) ➤ Farmers have knowledge of using Knapsack Sprayer

AREA	FEASIBLE CA OPTIONS	JUSTIFICATION
NENO /MZIMBA CLUSTERS	Cover crops <ul style="list-style-type: none"> • Cow peas • Pigeon peas • Green grams 	<ul style="list-style-type: none"> • Locally available

Table 2: Action plan for CA implementation

No.	What	Where	Target	When	Who	How
1	Demo on land prep	3 ADDPs (Matope, Midzembra&Kayezi)	12	JULY	Farmers/MoAFS/WVI	Demonstraion trials
2	Planting (Manually)	"	12	Nov-Dec	Farmer	Demonstration trials

3	Fertilizer application (Manually)	"	12	Nov-Dec	Farmer	Demonstration trials
4	Weeding <ul style="list-style-type: none"> • Hand weeding and spraying 	"	12	Dec-Mar	Farmer/stakeholders	Demonstration trials
5	Harvesting (Manually)	"	12	Apr – Jul	"	Demonstration trials

6	Agro forestry	"	12	Nov-Dec	"	Demonstration trials
7	Crop rotation	"	12	NOV- DEC	"	Demonstration trials

Neno/Mzimba Clusters Action Plan

Objectives	Activities	Partners/ players	Resources/ With What	Technical Back Up	Time Schedule	Remarks
To create awareness on available CA techs and options	Sensitizations meetings with community and partners	Farming community, Min. Of Agric. & FS,	ADP funds	CU, Land resource Team, to periodically support roll out process	Jul & Aug	Collaboration and networking among members trained here
	Joint mobilization of required inputs	Farming community, Min. Of Agric. & FS & World Vision ADPs	ADP funds		JUL-DEC	Farmers to take leading role
	Mount trail demonstrations of selected options	Farming community, Min. Of Agric. & FS & World Vision ADPs	ADP funds, Part of govt. Subsidy inputs		JUL-FEB	

	Facilitate development of M&E tools and local database	Farming community, Min. Of Agric. & FS & World Vision ADPs	ADP funds		JUL-DEC	
	Conduct Conservation Agriculture Field Day	Farming community, Min. Of Agric. & FS & World Vision ADPs	ADP and community funds		JUL-DEC	Farmers should lead the process of sharing CA processes

(3) WVM – Mulanje Cluster

Table 1. List of CA technology options

AREA	FEASIBLE CA OPTIONS	JUSTIFICATION
Mulanje, Phalombe, Mchinji	<u>Tillage systems</u> <ul style="list-style-type: none"> ➤ Minimum tillage 	<ul style="list-style-type: none"> ➤ Availability of misikiri ➤ Availability of crop residues
"	<u>Fertilizer Application</u> <ul style="list-style-type: none"> ➤ Hand application 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired)

"	<u>Planting</u> <ul style="list-style-type: none"> ➤ Hand planting 	<ul style="list-style-type: none"> ➤ Availability of misikiri hoes ➤ Availability of labour (family & hired)
"	<u>Weeding</u> <ul style="list-style-type: none"> ➤ Hand weeding 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired)
	<u>Cover crops</u> <ul style="list-style-type: none"> ➤ <u>Intercropping with soya, pigeon peas</u> ➤ And fertiliser trees 	<ul style="list-style-type: none"> ➤ Market availability ➤ Source of food for the family ➤ Nutrient fixation

2. Action plan for CA implementation

No.c	What	Where	Target	When	Who	How
1	Awareness meeting with stakeholders	EPA	24 Extension workers	5 th -june	TOTs	Focus Group Discussion

2	Awareness meeting with stakeholders	Community	200 farmers	12/06/12	TOT/AEDC	Focus Group Discussion
3	Capacity building	Residential	24 Extension staff	20- th 25 june 2012	TOT/ Land Husbandry Officer	Conducting training
4	Capacity building	community	200 farmers	25 -2 nd July 2012	TOT, AEDOs	Conducting trainings

No.c	What	Where	Target	When	Who	How
5	Resource mobilization	community	200 farmers	6/07/2012-6/08/201	Farmers	Individually
6	Implementation	Farmer's fields	200 fields	July – December 2012	Farmers	Through demonstrations on farmers fields

7	Field days	Community	400-farmers	January 2013 and March 2013	AEDOs and WV staff /TOT	Group discussion
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No	What	Where	Target	When	Who	How
8	Evaluation	community	200 plus stake holders	April 2013	Farmers , TOTs, extension staff	Group discussion
9	Monitoring	Community	Farmers, TOTs, extension staff	May 2012 To April 2013	Farmers, TOTs, extension staff	Group Discussion

(4) Total Land Care/Concern Universal

Table 1. List of CA technology options

AREA	CA TECHNOLOGY OPTIONS	JUSTIFICATION
Lilongwe Chileka EPA	<u>Tillage systems</u> <ul style="list-style-type: none"> ➤ Zero Tillage 	<ul style="list-style-type: none"> ➤ Crop residues readily available
	<u>Fertilizer Application</u> <ul style="list-style-type: none"> ➤ Hand application 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired)
	<u>Planting</u> <ul style="list-style-type: none"> ➤ Hand planting ➤ Dibbler / small hoe 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired) ➤ Dibblers and small hoes readily available
	<u>Weeding</u> <ul style="list-style-type: none"> ➤ Hand weeding ➤ Use of herbicides 	<ul style="list-style-type: none"> ➤ Availability of labour (family & hired) ➤ Farmers have knowledge of using Knapsack Sprayer
	<u>Cover crops</u> <ul style="list-style-type: none"> ➤ <u>Cowpeas</u> ➤ <u>Velvet Beans</u> 	<ul style="list-style-type: none"> ➤ Farmers have experience and knowledge of planting cowpeas and velvet beans as intercrop

2. Action plan for CA implementation

No.	What	Where	Target	When	Who	How
1	Demo on land and Agro-forestry nursery preparation Rotation Plan	Chileka EPA / Lirangwe / Mwansambo / Bolero	80	July -Sept	Farmer/FCs	Demos
2	Planting (including fertilizer trees, spraying and basal dressing	"	80	Oct -Dec	Farmer / FCs	Demos
3	1 st Hand weeding and out planting of Agro-forestry seedlings	"	80	Dec-Jan	Farmer/ FCs	Demos
4	2 nd Hand weeding	"	80	Feb - March	"	Demos
5	Harvesting	"	80	Apr - June	"	Farmer

(5) Zimbabwe/Botswana (still to be incorporated) Action Plan

	Province	Area (Ha)	% Targeted Area for CA	CA Area
1	Manicaland	247334	15	37100
2	Mash Central	185706	20	37141
3	Mash East	229926	20	45985
4	Mash West	257154	20	51431
5	Mat North	112924	15	16939
6	Mat South	131144	10	13114
7	Midlands	316116	10	31612
8	Masvingo	212124	12	25455
Total		1692428		258777

	Province	Feasible Options	Justification	Time Frame	Who
1	Manicaland	Basins, knapsacks, jab planters	Mountainous	Jul-Oct	NGO/Govt
2	Mash Central	Rippers, Werners, Fitalleri, Drill planters, Combine harvesters, Boom sprayers, Irrigation systems	Large scale farmers	Jul-Oct	NGO/Govt Private Sector
3	Mash East	Rippers, Werners, Fitalleri, Drill planters, Combine harvesters, Boom sprayers, Irrigation systems	Larger scale farmers	Jul-Oct	NGO/Govt Private Sector
4	Mash West	Rippers, Werners, Fitalleri, Drill planters, Combine harvesters, Boom sprayers, Irrigation	Larger scale farmers	Jul-Oct	NGO/Govt Private Sector

		systems			
5	Mat North	Basins, knapsacks, jab planters, Werners, Fitalleri	Livestock, Small- scale	Jul-Oct	NGO/Govt
6	Mat South	Basins, knapsacks, jab planters, Werners, Fitalleri	Livestock, Small- scale	Jul-Oct	NGO/Govt
7	Midlands	Basins, knapsacks, jab planters, Werners, Fitalleri	Livestock, Small- scale	Jul-Oct	NGO/Govt
8	Masvingo	Basins, knapsacks, jab planters, Werners, Fitalleri	Livestock, Small- scale	Jul-Oct	NGO/Govt
Total					

Remarks

- i) On the Overall plan:
- National training of staff
 - Establishment of demonstrations sites throughout the country, at least 2 per ward
 - CA inputs will be provided to those farmers willing
 - The following season another set of farmers will be given the same package which is compatible to the region
 - Demonstrations will run concurrently with research
 - Monitoring and evaluation after each season, i.e. evaluation of farmers who practise CA with support and without support
 - Overall the evaluation of the work plan will be carried on the 5th year.

ii) On Individual activities:

- Work with extension staff at my rural area provide them with agroforestry technical know how
- Yes, complicated to do study on which cover crops are compatible to tobacco because tobacco is causing a lot of environmental destruction

ANNEX 3: LIST OF PARTICIPANTS

CA TOT Training Course, Lilongwe, Malawi, 21 -25 May 2012

No	FIRST NAME	MIDDLE NAME	SURNAME	GENDER	DESIGNATION	ORGANISATION	POSTAL ADDRESS	COUNTRY	EMAIL ADDRESS	PHONE
A. Participants										
1	Isaac		Chavula	M	Rural Dev Practitioner	Concern Universal	P.O.Box 1535, Blantyre, Malawi	Malawi	isaac.chavula@concern-universal.org	265 999207400, 265 884203280
2	Patrick		Kombe	M	Land Resource Cons Officer	Ministry of Agriculture and Food Security	Box 131, Mzuzu ADD	Malawi	patrickombe2005@yahoo.com	2651312050 265 999196160
3	Thompson	Humphrey	Banda	M	SALRCO	Ministry of Agriculture and Food Security	P.O.Box 49, Deza	Malawi	n/a	265 993798080
4	Matias	Patson	Kachiuopa	M	SALRCO	Ministry of Agriculture and Food Security	P .Bag 36 Lilongwe	Malawi	n/a	265 995339297
5	Ackim		Dickson	M	District LRCO	Ministry of Agriculture and Food Security	P.O.Box 39 Chikhwawa	Malawi	ackimdixon@gmail.com	265 999604724 265888 236444
6	Chimango		Nyirenda	M	LRCO	Ministry of Agriculture and Food Security	Box 140 Balaka	Malawi	Chimangoyenda@yahoo.com	265 996343648
7	Misheck		Musoka	M	Research Officer	Ministry of Agriculture and Mechanisation	CY550 Causeway, Harare	Zimbabwe	misheck_musokwa@yahoo.com	263 773627045
8	Hilary		Mugiyoh	M	Crop Specialist	Ministry of Agriculture and Mechanisation		Zimbabwe	mugiyoh@gmail.com	263 772700379
9	Patrick		Diau	M	Senior Technician	Botswana College of Agriculture	P.Bag 0027 Gaborone	Botswana	pbdiau@gmail.com	267 3650204

10	Joseph		Ngozo	M	Development Facilitator	World Vision International	Box 80 Mulanje	Malawi	j.ngozo@yahoo.com	265 999243756 265888574234
11	Kupingani		Kumwenda	F	Programme Manager	World Vision International	P.O.Box 2050 Blantyre	Malawi	kupingani_kumwenda@wvi.org	265 888982622 265 1609885
12	Peter	Nthala	Makhunje	M	Programme Manager	World Vision International	P.O.Box 2050 Blantyre	Malawi	peter_makhunje@wvi.org	265 111609884 265888205071
13	Julius		Mpotalinga	M	Development Facilitator	World Vision International	P.Bag 29 Mzimba	Malawi	juliusmpotalinga@gmail.com	265 88452978 265 88459272
14	Bernard		Sakwata	M	Programme Manager	World Vision International	Box 101 Phalobe	Malawi	bernardsakwata@wvi.org	265 888357723
15	Felix		Tasosa	M	Development Facilitator	World Vision International	Memo Cluster, Box 2050 Blantyre	Malawi	felix_tasosa@wvi.org	265 1980871 265 888396894
16	Moses	Develias	Moyo	M	Development Facilitator	World Vision International	P.O.Box 2050 Blantyre	Malawi	moses_moyo@wvi.org	265 111943456
17	Llyod		Gwedeza	M	Development Facilitator	World Vision International	Box 101 Phalombe	Malawi	lgwedeza@yahoo.com	265 88466425
18	Levie	Chakankha	Muyale	M	Development Facilitator	World Vision International	Box 80 Mulanje	Malawi	levie.mwale@yahoo.com	265 888705540
19	Ivy		Chauya	F	Programme Manager	World Vision International	P.Bag 19 Mchinji	Malawi	ivy_chauya@wvi.org	265 888344091
20	Caroline		Kajawo	F	ADP Manager	World Vision International	P.O.Box 80 Mulanje	Malawi	caroline_kajawo@wvi.org	265 888982623
21	Franceton		Chulu	M	Field Coordinator	Total Land Care	P.O. Box 43 Lirangwe	Malawi	francetonchulu@hotmail.com	265 999439839 265884665583
22	George		Chaguza	M	Projects Coordinator	Total Land Care	P.O.Box 2440, Lilongwe	Malawi	gchaguza@yahoo.com	265 999574398
23	Abel	Benard	Mwanda	M	Field Coordinator	Total Land Care	P.O.Box 2440, Lilongwe	Malawi	n/a	265 999122842
24	Obedi	Gomezga	Mkandawire	M	Zone Manager	Total Land Care	Box 177 Rumphu	Malawi	omkandawire@hotmail.com	265 999572773
25	Jonathan		Kwanjana	M	Field Coordinator	Total Land Care	Box 3 Nkhutakota	Malawi	kwanjanajonathan@yahoo.co.uk	265 999406362
26	Willie		Sagona	M	CA Output Leader	Forest Research Institute	P.O.Box 270 Zomba	Malawi	willsagona@gmail.com	265 999868543
									-	

B. Resource Persons/Coordination

No	FIRST NAME	MIDDLE NAME	SURNAME	GENDER	DESIGNATION	ORGANISATION	POSTAL ADDRESS	COUNTRY	EMAIL ADDRESS	PHONE
27	Bridget		Mupeti	F	Admin Assistant	ACT	P. O. Box 959 Causeway, Harare,	Zimbabwe	bridget.mupeti@act-africa.org	263 772390706
28	Herbert	Mwittah	Mwanza	M	ACT Southern Africa Sub-Regional Coordinator	ACT	P.O. Box 959 Causeway, Harare	Zimbabwe	herbert.mwanza@act-africa.org	263 778 247431
29	Saidi		Mkomwa	M	Executive Secretary	ACT	P.O.Box 1037500100 Nairobi	Kenya	smkomwa@act-africa.org	254 712252549
30	Edward		Chuma	M	CA Consultant	PICO	PICO Southern Africa; Harare, Zimbabwe	Zimbabwe	Edward.chuma@pico-team.org	263 772 235047
31	Jill		Clapperton	F	CA Consultant	RhizoterraInc	P.O.Box 1778 Lolo MT 59847	USA	Jill@Rhizoterra.com	1 4062732228
32	Paul		Fatch	M	CA Consultant	Ministry of Agriculture and Food Security	Box 30145, Lilongwe 3	Malawi	paulfatch7@yahoo.co.uk	265 999638978
33	Chifundo		Makwiza	M	CA Consultant	Bunda College of Agriculture	Box 219, Lilongwe	Malawi	cmakwiza@yahoo.com	265 888570710
34	Bruce		Sosola	M	CA Consultant	World Agroforestry Centre, Lilongwe	ICRAF Box 30978, Lilongwe 3	Malawi	b.sosola@cgiarmw.org	265 991582444
35	Patson		Narivata	M	CA Consultant	Bunda College of Agriculture	Box 219, Lilongwe	Malawi	patienalivata@yahoo.com	265 999079870
36	Gertude		Kambauwa	F	Local CA Coordinator	Land Resources Conservation Department		Malawi	gkambauwa@gmail.com	265 888321562

ANNEX 4: TRAINING PROGRAMME



Government of Malawi

Ministry of Agriculture & Food Security



AFRICAN CONSERVATION TILLAGE NETWORK
NATIONAL CONSERVATION AGRICULTURE COURSE PROGRAMME
LILONGWE, MALAWI; 21st to 25th May, 2012

Date – Time	08:00-08:30	08:30-10:30	10:30-11:00	11:00-13:00	13:00-14:00	14:00-15:30	15:30-15:45	15:45-17:30
20 th May (Sunday)	<i>Arrival of Participants and Registration</i>							
21 st May (Monday)		Setting the scene [EC] Introductions; logistics; participants' expectations; course objectives and workshop processes Official opening: 10.00 am [Minister for Agric & Food Security]	B	Situation analysis - Regional Experiences with CA + coping strategies by Participants [EC] <i>Group exercises</i>		What is CA and why CA? Background, historical perspectives, rationale, benefits, challenges [SM] <i>Plenary presentations & discussions</i>	B	CA Concepts and principles I: Minimum Mechanical Soil Disturbance [SM] Manual, animal traction and tractor based systems <i>Plenary presentations, discussions</i>
22 nd May (Tuesday)	Situation analysis <i>Plenary presentations by country groups</i>	CA Concepts and principles II: Soil cover [JC] <i>Plenary presentations and discussions</i>	R	CA Concepts and principles III: Crop rotations and Associations [JC] <i>Plenary presentations, discussions</i>	L	Practical Demonstration of erosion processes and infiltration [EC] Run-off trays, links to livelihoods <i>Field based practical Exercises</i>	R	Managing Soil fertility in CA systems [PN] Soil fertility recovery options <i>Plenary, discussions, exercises</i> Field Visit Preparations [HM]: Approaches; Questions; Logistics (an evening programme)

Date – Time	08:00-08:30	08:30-10:30	10:30-11:00	11:00-13:00	13:00-14:00	14:00-15:30	15:30-15:45	15:45-17:30
23 rd May (Wednesday)	Field Visit/Practicals: Travelling (Need for early B/fast & Start of Day's Programme)	Field Visit/Practicals: CA in animal traction and Tractor systems [SM, CFU] <ul style="list-style-type: none"> harnessing work animals ripping/subsoiling /direct seeding showcase of CA equipment tractor mounted sprayers tractor subsoilers, rippers and direct seeders <i>Guided exposure to CA equipment, hands-on use and adjustments</i> CA Service Providers	E	Field Visit/Practicals: CA techniques in manual systems [CFU] <ul style="list-style-type: none"> dibbling jab planting manual DS laying, digging "basins" manual weed control <i>Field based Practical Exercises</i> Field Practical Exercises	U	Pesticide safety Awareness in CA production systems [SL] <i>Plenary presentations, discussions</i> Conservation Agriculture Equipment[SM] CA equipment for hand, oxen and tractor based systems, calibration	E	CA and Agroforestry [BS] CA and Climate Change [BS] <i>Plenary, discussions, exercises</i>
24 th May (Thursday)	Committee reports	Weed, pest & disease management and control in CA systems [JC] timeliness; manual and chemical options; strategic control <i>Plenary presentations, discussions</i>	E	Practical session on weed control [JC] Calibration of sprayers <i>Practical exercises</i>	N	Social economic aspects of CA[HB]	A	Monitoring and Evaluation of CA programmes [CM] Data/ Information management CA dissemination groups and adopters On-farmCA trial set-up Guidelines on Preparation of Country Action Plans [HM] <i>(an evening programme)</i> Group work and presentations
25 th May (Friday)	Committee reports	Extension Approaches for CA [PF] Farmer field schools; Study circles The FFS and On-farm Experimentation		Action planning[HM] <ul style="list-style-type: none"> Feasible CA options Plans for implementation <i>Exercises visualized on flip charts</i>	H	Action planning [HM] Feasible CA options and Way Forward		Course evaluation [HM] End of course [FAO Guest]
26 th May (Saturday)	D e p a r t u r e o f p a r t i c i p a n t s							

Resource persons list

			Days When Resource Persons are Required				
			Monday 21 st May	Tuesday 22 nd May	Wednesday 23 rd May	Thursday 24 th May	Friday 25 th May
1	Edward Chuma	EC	☐	☐			
2	Saidi Mkomwa	SM	☐	☐	☐	☐	☐
3	Hamisi Dulla	AC		☐			
4	Patson. Nalivata	PN		☐			
5	James Mlamba	JM			☐		
6	Herbert Mwanza	HM	☐	☐	☐	☐	☐
7	Smart Jere	CFU			☐		
8	Bruce Sosola	BS			☐		
9	Jill Clapperton	JC				☐	
10	ChikondiMakwiza	CM				☐	
11	Paul Fatch	PF					☐
12	D. Kambauwa	DK					☐
13	Bridget Mupeti	BM	☐	☐	☐	☐	☐
DAYS' FACILITATOR			EChuma	EChuma	HM Mwanza	S Mkomwa	D Kambauwa

ANNEX 5: COMMITTEE REPORTS

1) Social Welfare

SOCIAL WELFARE REPORT

The weeklong stay at MIM went with minimum adverse conditions/events, however, the following were some of the main issues that affected the welfare of the workshop participants and the suggested solutions:

- (1) Release of workshop Timetable was done on day 2.

Timetable should have been released the first day of the workshop but it was done on day 2 without an apology on day 1.

Suggestion

Timetable should be released on day 1.

(2) Field Trip

(a) Participants were not informed in advance in their invitation letters of this activity to enable them bring appropriate wear for the activity.

Suggestion

There is need to caution participants in advance of such activities in the workshop program.

(b) The arrangement to have a field trip in the morning and ~~the~~ preceded by classwork made most participants lose concentration in the afternoon presentations as they were tired.

Suggestion

Field Trips should ~~be~~ always be last activities for a day whereby participants go to rest on return.

(3) Tea Breaks

Tea was being served at the restaurant far from class, however, this was changed, on request, to serving ~~at the~~ near the classroom.

Suggestion

Arrangements should be made in advance to have tea served near the classrooms to avoid time wasting going the restaurant.

(4) Meals

There were limited choices of food being served by the restaurant thereby inconveniencing the participants.

Suggestions

The restaurant management should be asked in advance the type of food of choice by all participants.

2) Tools Committee

REVIEW¹ OF PRACTICAL SESSION (DAY 3)

Description of Tools

1. Fita^{re}ller Fitarelli

- Direct Seeder
- 2 hoper \swarrow Fertilizer
 \searrow seed
- Animal drawn
- Sharp disc meant for cutting crop residue to clear way for ripper.
- Ripper cuts the ground to open furrow
- Powered by chain connected to the wheel
- Adjustments can be made to suit varying espacement
- Different plates with holes made available to use for \neq seed sizes.
- A knocker directs the seed into holes

2. Fite^{re}ller - Cont'd

- A double knocker used for multiple seeding

2. Werner

- Has same attributes like fite^{re}ller.

EXCEPT:

- Has 3 hoppers \swarrow Fertilizer
 \searrow seed
 \searrow Lime
- Stalized to specific espacement

3. Ripper (Magoye)

- Simply used to break hardpan
- Makes openings in the ground for planting \neq fert. application
- Animal drawn tool
- No ridger used on the ripper
- Key nuts \neq from ridgers

(12) H0240/2

Ripper (Majoye) ... Cont'd

- Can use the commonly used yoke
- Has a 3-3.5 m span specifically for making furrows
- A wheel guides ripping depth just like chain.

Other Common Attributes for the animal drawn tools

- Suitably used in moist soils
- Suitable for zero/reduced tillage
- Manufactured in Zimbabwe but can be locally manufactured
- Each tool is an improvement of the earlier version/make.

4. Tchakahoe

- Made in Zimbabwe
- Fixed at a right \angle to a handle.
- Good for hard pan breaking

5. Chinese hand Seeder

- Work like a jab planter
- Could be adapted to Malawian conditions
- Chinese make.

6. Sprayer

- For herbicide application
- Specific nozzle for specific herbicides:
 - Blue nozzle for non-selective herbicides
 - Orange or flat fan for Glyphosate
- Nozzle suspended 50cm above furrow during spraying

DAY 4: PRACTICALS REVIEW

DEMO 1: ~~THE~~ Field Mimic 1

- Bare Surface
- Loose Soils
- Run off and Soil erosion

Field Mimic 2

- Bare Surface
- Ridged filled
- Obstructed water movt.
- Water loss partially to ~~erosion~~ evaporation

Field Mimic 3

- Soil Surface Cover maximum
- Less run off
- High water retention

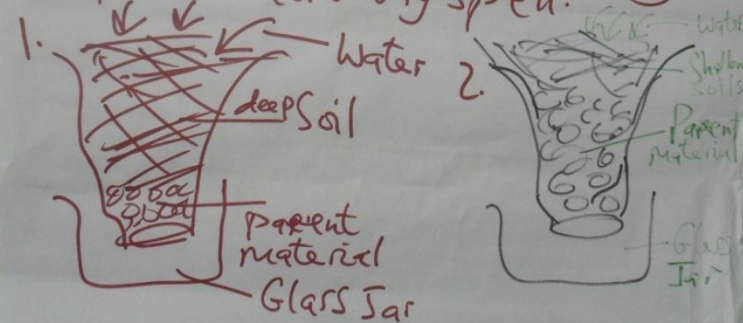
DEMO 2⁽²⁾

Field Mimic 1

- Good Soil depth
- High water retention
- No water loss/leaching
- Crops survive dry spells

Field Mimic 2

- Shallow Soils
- Poor water retention
- Likelihood of crop wilting high after a short dry spell.



Demo 3:

- Using Colloids from Cultivated filled and virgin land.

• Field Mimic 1: CA

- Colloids from virgin land resist rainfall impact
- Little or no soil disintegration
- Little or no soil loss

• Field Mimic 2: Non CA

- Colloids can't withstand rainfall impact
- High or fast soil disintegration
- High rate of soil erosion

Q: Can lost virginity be reclaimed?

REVIEW OF PRACTICAL SESSION (DAY 3)

Description of Tools

1. Fittaler Fitarelli

- Direct Seeder
- 2 hopper \swarrow Fertilizer
 \searrow seed
- Animal drawn
- Sharp disc meant for cutting crop residue to clear way for ripper.
- Ripper cuts the ground to open furrow
- Powered by chain connected to the wheel
- Adjustments can be made to suit varying espacement
- Different plates with holes made available to use for ~~the~~ seed sizes.
- A knocker directs the seed into holes.

1. Fittereller⁽²⁾ - Cont'd

- A double knocker used for multiple seeding

2. Werner

- Has same attributes like fittereller.

EXCEPT:

- Has 3 hoppers — Fertilizer
— Seed
— Lime
- Adjusted to specific spacing

3. Ripper (Magoye)

- Simply used to break hardpan
- Makes openings in the ground for planting & fert. application
- Animal drawn tool
- No ridges used on the ripper
- Key nuts \neq from ridgers