



# Conservation Farming Unit

CFU established in 1996

## Zambia Conservation Agriculture Programme (CAP) – a brief update

Financed by Norwegian Government

Goal: Adoption of CA by 350,000 Small and medium-scale farmers by 2015

This presentation does not include perennial food security standby crops of elite Cassava and Sweet Potatoes promoted by CAP

# CAP SET UP AND SCOPE

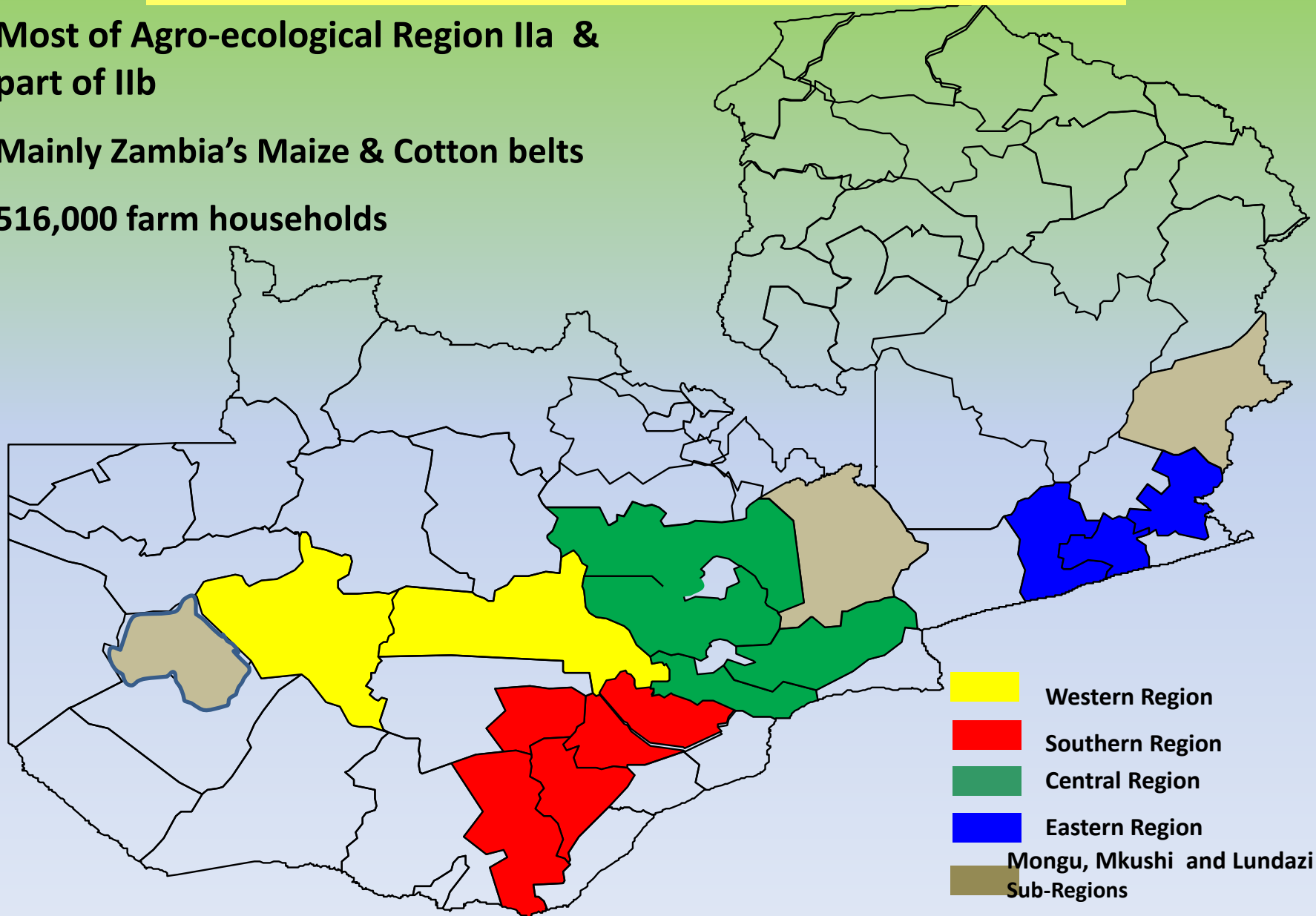


# CAP Areas – 4 Administrative Regions

Most of Agro-ecological Region IIa & part of IIb

Mainly Zambia's Maize & Cotton belts

516,000 farm households



# Key Features of CAP

Long term view by the sponsor ,consistent funding, minimal bureaucracy.

Lead Farmer training system enables scale-up.

Primary focus is Training Groups. Delivery of practical training services in the field.

Proactive training with both technical and basic business content. New topics introduced annually.

Much emphasis on technical detail backed up by user friendly reference material.

Minimisation of technical ambiguity at farmer level.

Substantial Field Day programme with Ministry, local leadership, private sector and NGO's in attendance.

Non adopters removed from Groups.

No handouts or subsidised seasonal farming inputs for beneficiaries provided by CAP

Direct engagement of private sector and promotion of Agro-dealer networks.

Hoe, ADP and mechanised MT and ZT technologies promoted.

Field activities for the forthcoming rainy season commence in June each year.

Mobile Training Unit delivers training on demand to many other organisations , farmer groups in and outside Zambia.

Close collaboration with GART for research, ZNFU for advocacy and PROFIT for private sector aspects.

CF declared national extension policy in 1999. Increasing collaboration with MACO.

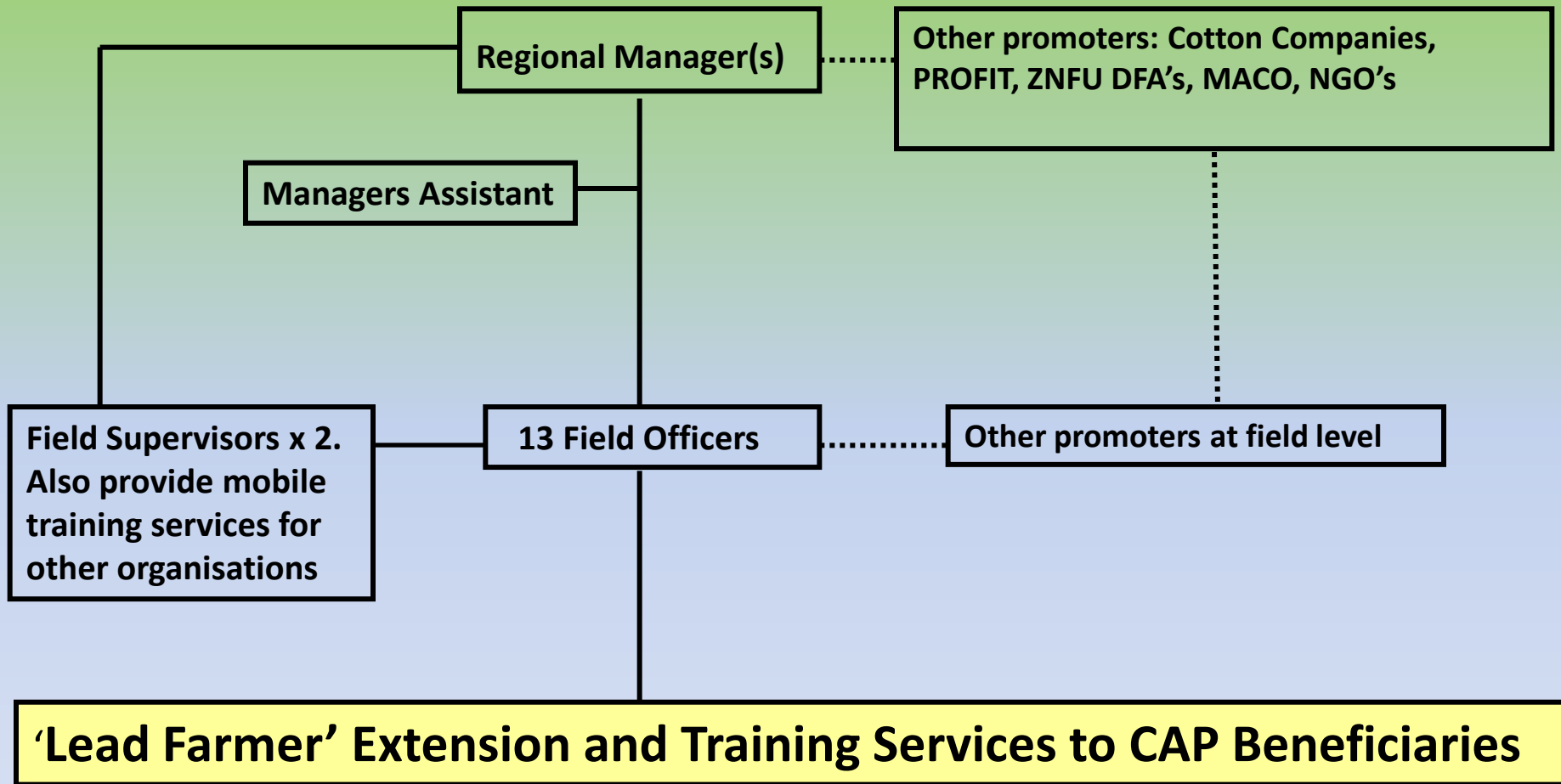
External M&E of programme impact by NORAGRIC and IMCS.

Internal Data Management Systems (DMS) tracks key basic adoption data accumulated by CF's and cross checked on a sample basis by field staff.

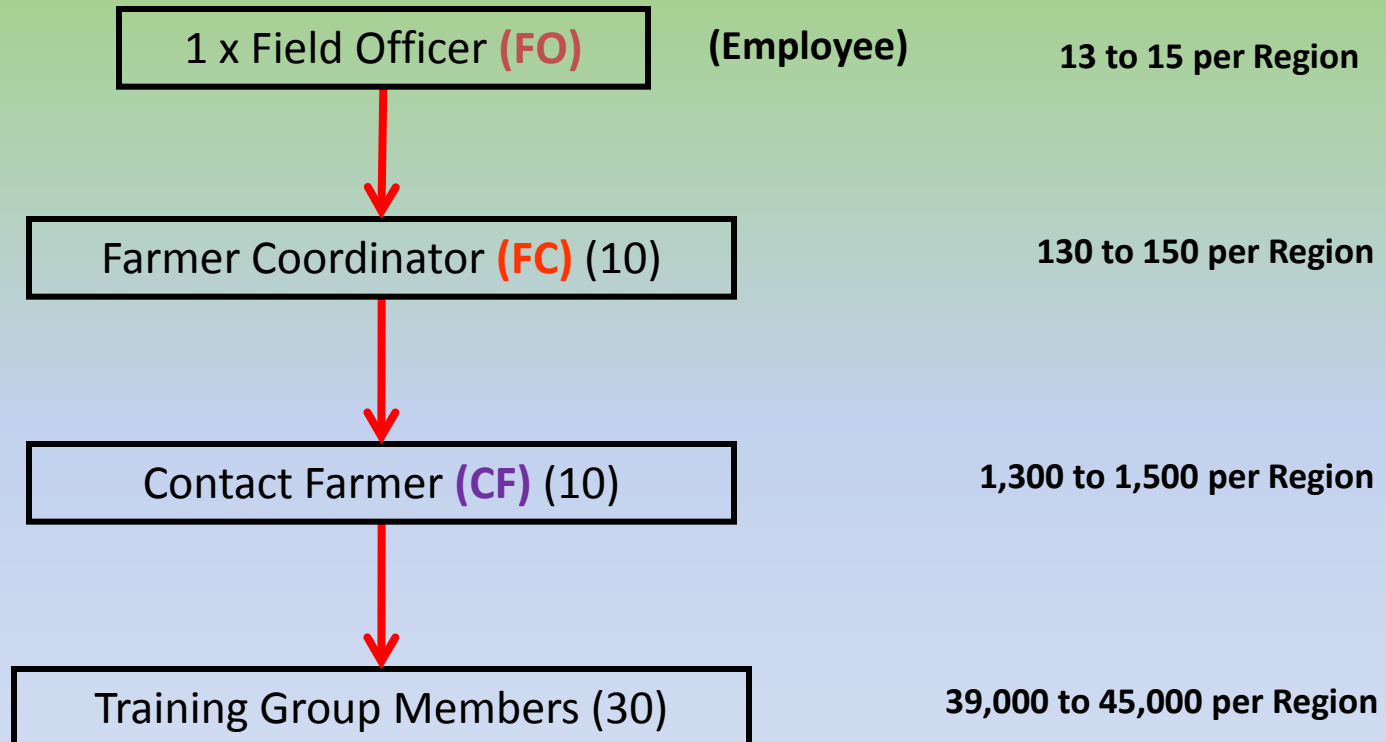
Staff remuneration based on annual performance and knowledge assessment.

Independent field audits conducted regularly to track downstream expenditures.

# CAP I -Regional Management Structure x 4



# 'Lead Farmer' Extension and Training Structure by CAP Region (Total 4 Regions – 164,000 beneficiaries)



Each **CF** is responsible for mobilising his/her group of 30 farmers for the training sessions which are conducted IN THE FIELD by the **FC** (with assistance of the **CF's**).

**2 CFs mobilise 60 farmers in total for each session - The Training Group**

# 'The Lead Farmer' Extension and Training System

## Key Features:

- The training hierarchy is kept as 'flat' as possible to minimise technology distortion
- There are **4 Training Periods** a year between June and October
- Each **FC** holds **5 Training Sessions** per Training Period – total 20 sessions per annum
- Each **CF** assists with 1 training session per period – total 4 sessions per annum
- Two **CF's** mobilise their 30 farmers to form a **Training Group comprising 60 farmers**
- In each Region **2,600** training sessions are held each year for 39,000 to 42,000 farmers
- **164,000** farmers are trained 4 times each year by CAP
- **1,200** field days held each season on adopters fields attended by **110,000 to 115,000** farmers

**FCs** and **CFs** 'work' for the CFU and  
are paid for their services using **ELECTRONIC VOUCHERS**

# 2009 Electronic Voucher System

## PAYMENT SYSTEM FOR LEAD FARMERS :

Web based system designed by Mobile Transactions Zambia Limited (MTZ Ltd)

## OBJECTIVE:

To pay lead farmers for training services provided and to drive business for the purchase of specific CF relates equipment and inputs to 63 rural cooperating Agro-dealerships

## FEATURES:

- *Discrete 'Voucher Account ' capitalised by CFU , 2009/10*
- *6,000 lead farmers registered on data base . Name + Gender + NRC + Region*
- *Value of each voucher is K400,000 or US\$80*
- *Fertiliser and Maize seed excluded.*
- ***FC** receives 4 vouchers, **CF** receives 1 voucher*
- *63 Cooperating Agro-dealerships where farmers redeem their vouchers*
- *Cost/voucher to CFU \$1.00. Printing cost/voucher US\$0.10. Training \$7,500.*
- *Total operational cost to CFU about \$15,000 or 2.8% of value*

# Electronic Voucher System – How It Works



Potential for social transfers and targeted 'smart' subsidies is enormous

## Key Features:

- Web based system – log onto on PC or via web portal cell phone
- All information goes into a web database – basis for reports
- Reports are key for information regarding redemption and re-stocking by dealers
- Secure
- Real time transactions
- Cash based

## Advantages compared with a Manual Voucher System:

- More secure
- Improved cash flow retailers
- Instant redemption
- Lower management costs
- Instant reports

**Total cost of CAP I programme including cost of Sub-contracts with ZNFU, GART, Cotton Association & other partners is \$33 per engaged beneficiary per annum**

# Conventional Small & Medium Scale Tillage Systems

Most of us are familiar with conventional crop establishment systems

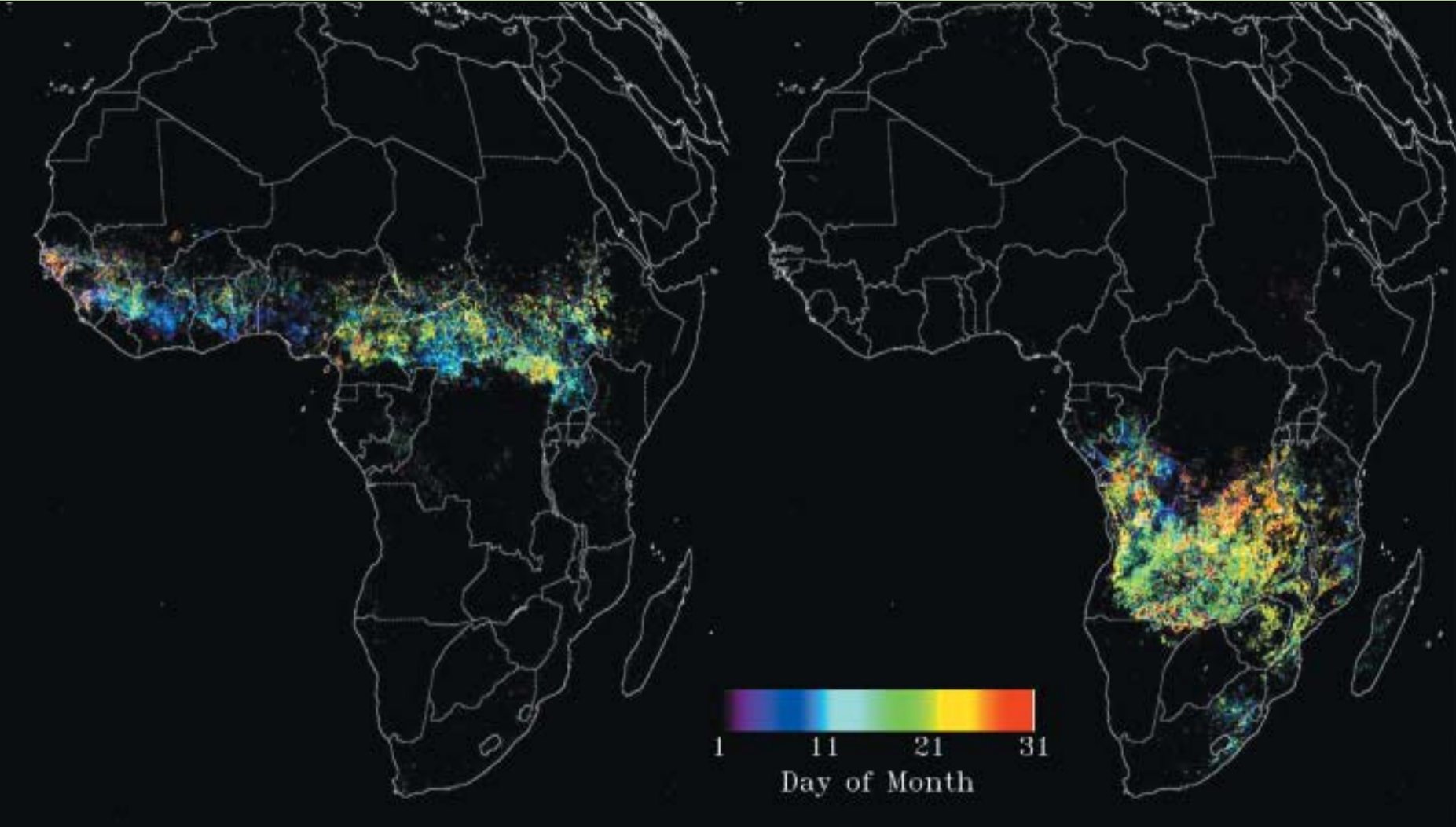
The common characteristic across our Region and beyond is the practice continuous overall soil disturbance by hoe, oxen or tractor

## BURNING RESIDUES



- (1) Residues protect crops from sheet erosion**
- (2) Residues improve infiltration of rain water into the soil**
- (3) Residues reduce capping to top soil after heavy storms**

# AFRICA – ACTIVE FIRE DETECTIONS FEBRUARY AND AUGUST 2004



# CONTINUOUS OVERALL SOIL DISTURBANCE – OX PLOUGHING

## PLOUGHING BY FARMERS WHO OWN OXEN



- (1) SOILS ARE EXPOSED TO CAPPING AND EROSION
- (2) DEPTH OF SEEDS SOWN IN EACH 3<sup>RD</sup> FURROW IS VARIABLE LEADING TO UNEVEN EMERGENCE AND POOR PLANT POPULATIONS
- (3) IF EARLY RAINS STOP PLOUGHING STOPS LEADING TO DELAYS IN PLANTING

## **PLOUGHING AND CAPPING OF EXPOSED TOP SOIL**



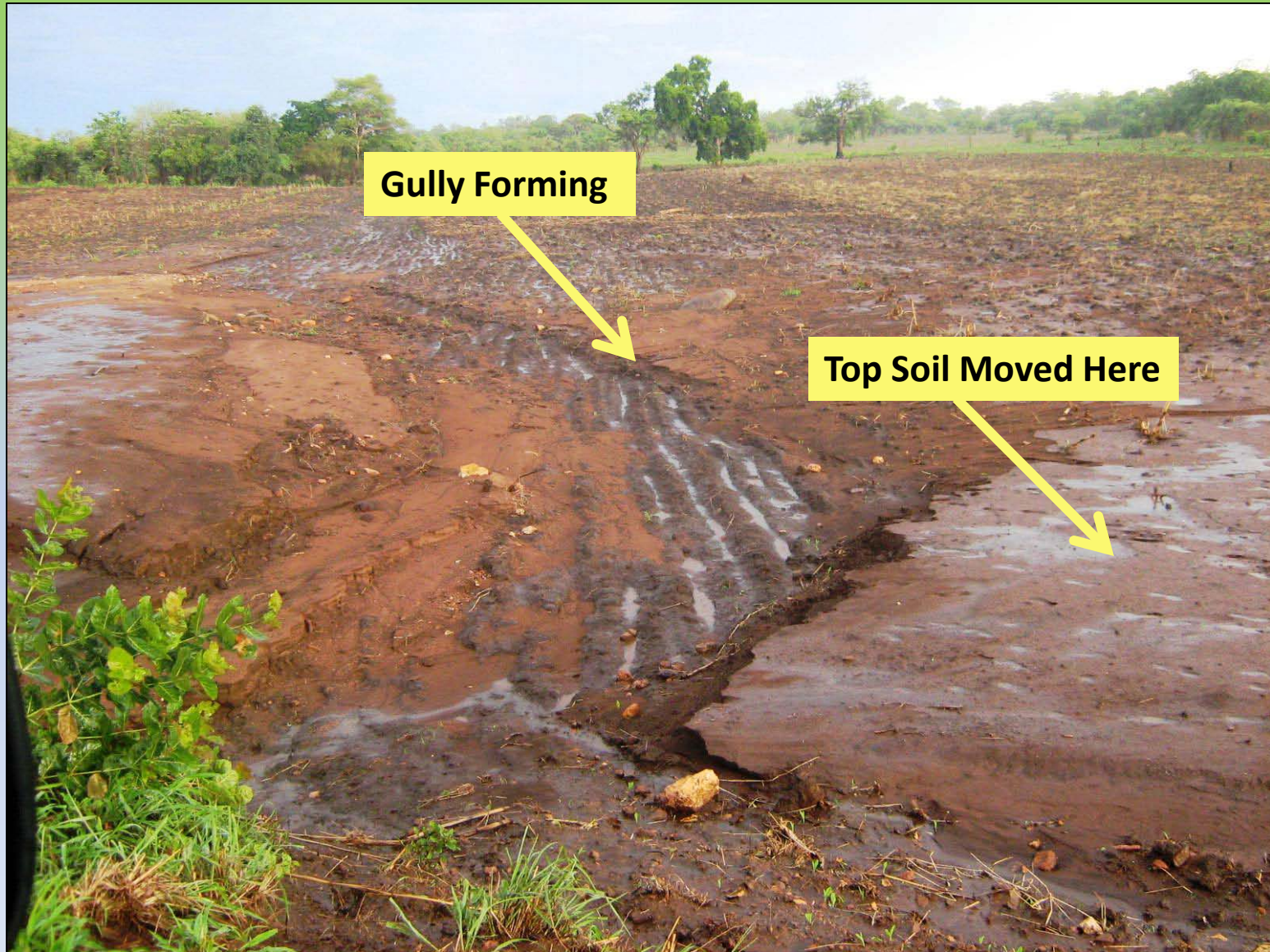
**Heavy rainfall on silty clay or loam soils that have been continuously disturbed can cause capping and poor emergence of crops**

## PLOUGHING AND SOIL COMPACTION



**Continuous soil disturbance from ploughing, harrowing and weeding with cultivators, oxidises organic matter, breaks up soil aggregates, reduces aeration and creates compact layers immediately below the plough zone**

# PLOUGHING AND SHEET EROSION



**If the soils are exposed to early storms, erosion will continue each year even where slopes are minimal.**

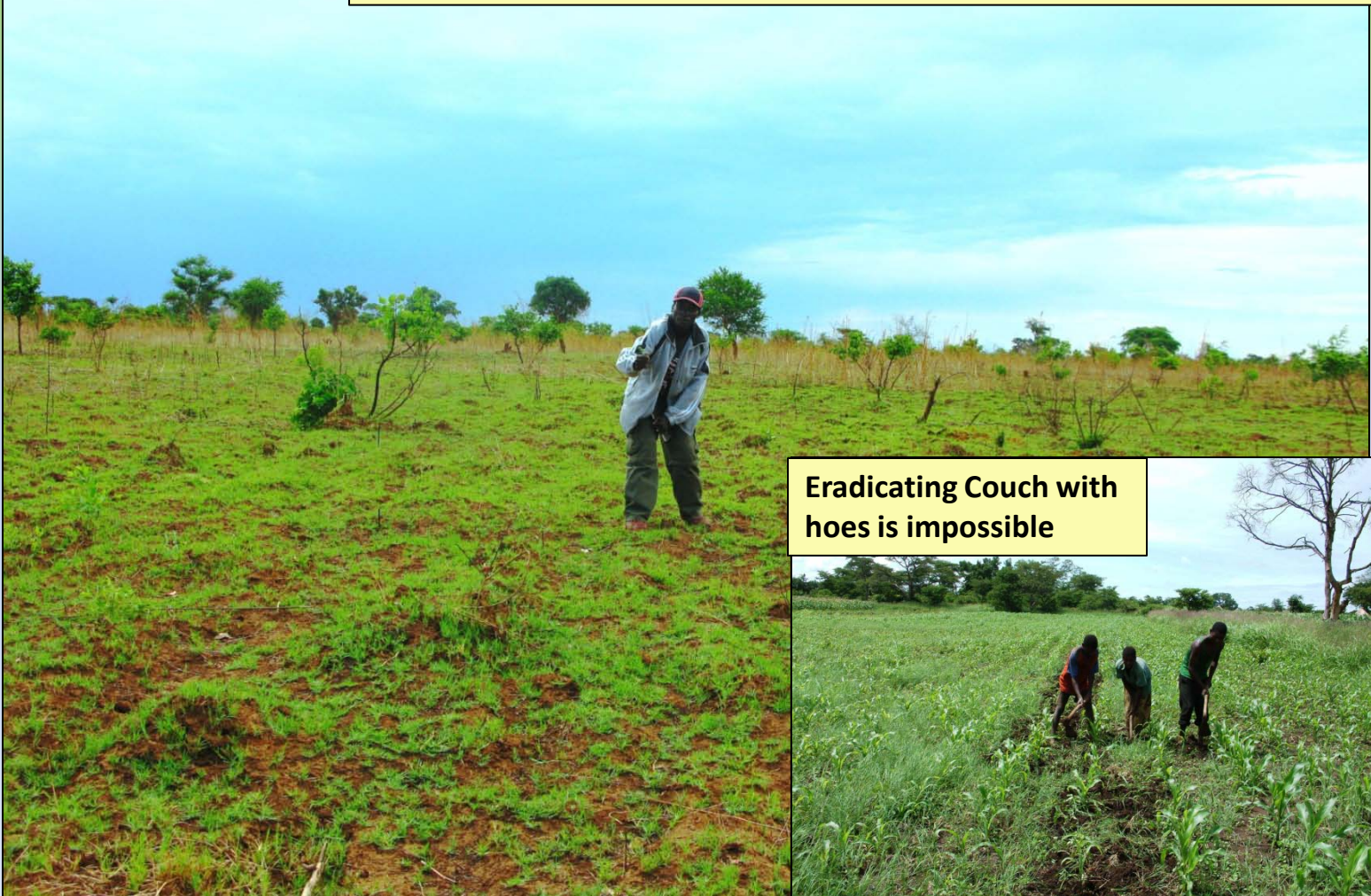
# PLOUGHING AND POOR CROP EMERGENCE



**Seeding behind the plough can lead to poor emergence due to very uneven depth. Deep seeds have failed to emerge. Stand is 40% below optimum.**

# PLOUGHING AND KAPINGA (Couch Grass) INFESTATION

Thousands of hectares of farm land is abandoned due to heavy infestation of Couch



Eradicating Couch with hoes is impossible

Continuous ploughing year after year encourages the spread of Kapinga, (Couch grass), a very competitive weed that can only be eradicated by herbicides.

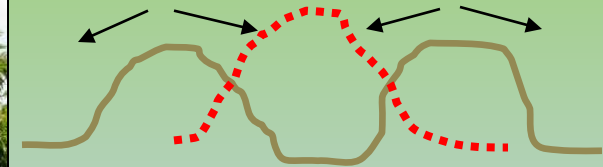
## VERY LATE PLOUGHING AND NITROGEN IMOBILISATION



**Large amounts of weeds ploughed into the soil reduce availability of N to crops because micro-organisms convert inorganic i.e. absorbable N, into non absorbable organic forms**

# CONTINUOUS OVERALL SOIL DISTURBANCE – HOE TILLAGE

Annual Dry Season Ridge Splitting



Annual soil movement  
300 tons/ha  
17 million km of ridges  
built up annually

Common in Eastern Zambia. Labour input 180 to 190 hrs/ha

**No scientifically valid reason has ever been put forward for growing grain crops on ridges on inherently well drained soils**



Ridges often aligned down the slope. Furrows concentrate rainfall and wash top soil away.



No clear scientific justification for ridging for grain crop production has ever been advanced.

In the north of Zambia ridge splitting is done after the rains. These soils are particularly fragile and acidify rapidly when disturbed.

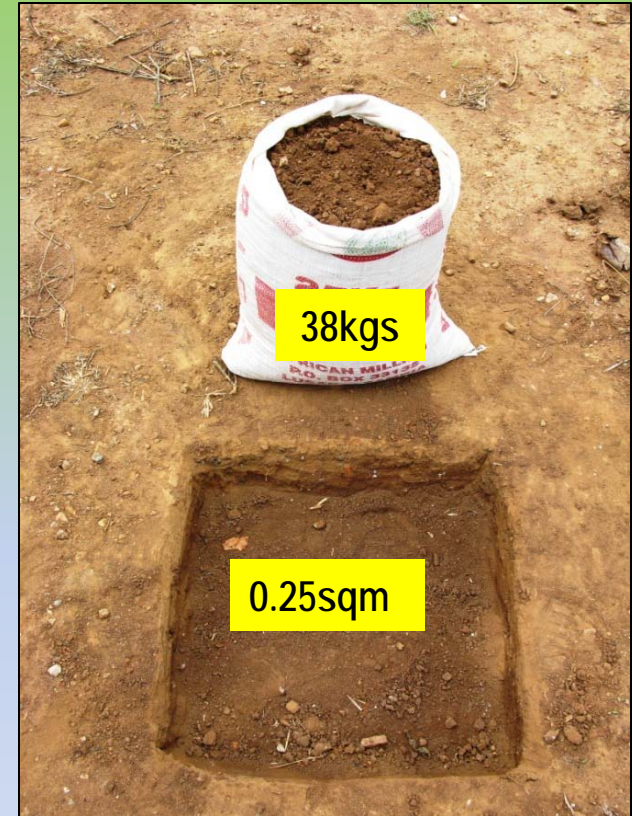


Severe erosion

# Continuous overall Soil Disturbance - Dry Season Hoeing



'This area of hoed land is **150ha +**. **Over 150,000 tons of soil inverted by hand**



Hoeing denser Zambian soils to a depth of only **10cms** as above equates to inverting **1,520 tons/ha**

# Destroying Class A1 soils in Zambia



## TOTAL CROP FAILURE – ABANDONMENT

Maize abandonment **1.7 million** hectares or average of **33%** of Maize planted by small and medium scale farmers 2000-2008



Main reasons include: **(1)** Late planting. **(2)** Planting larger areas than can be weeded on time. **(3)** Planting in soils that are severely degraded due to combination of continuous soil disturbance, Maize mono-cropping and no replenishment of nutrients.

# Conventional Tillage Systems increase Climatic Risks



**In Very Dry Seasons**  
compacted soils stunt  
root development  
causing severe moisture  
stress.

Rainfall cannot infiltrate  
the soil and washes away

# In Seasons with Extended Dry Spells

When wilting occurs in patches in a field after only 7 to 10 days of dry weather, the sub soil has been compacted by years of continuous disturbance. In some soils compaction may be caused by shallow layers of clay or laterite.



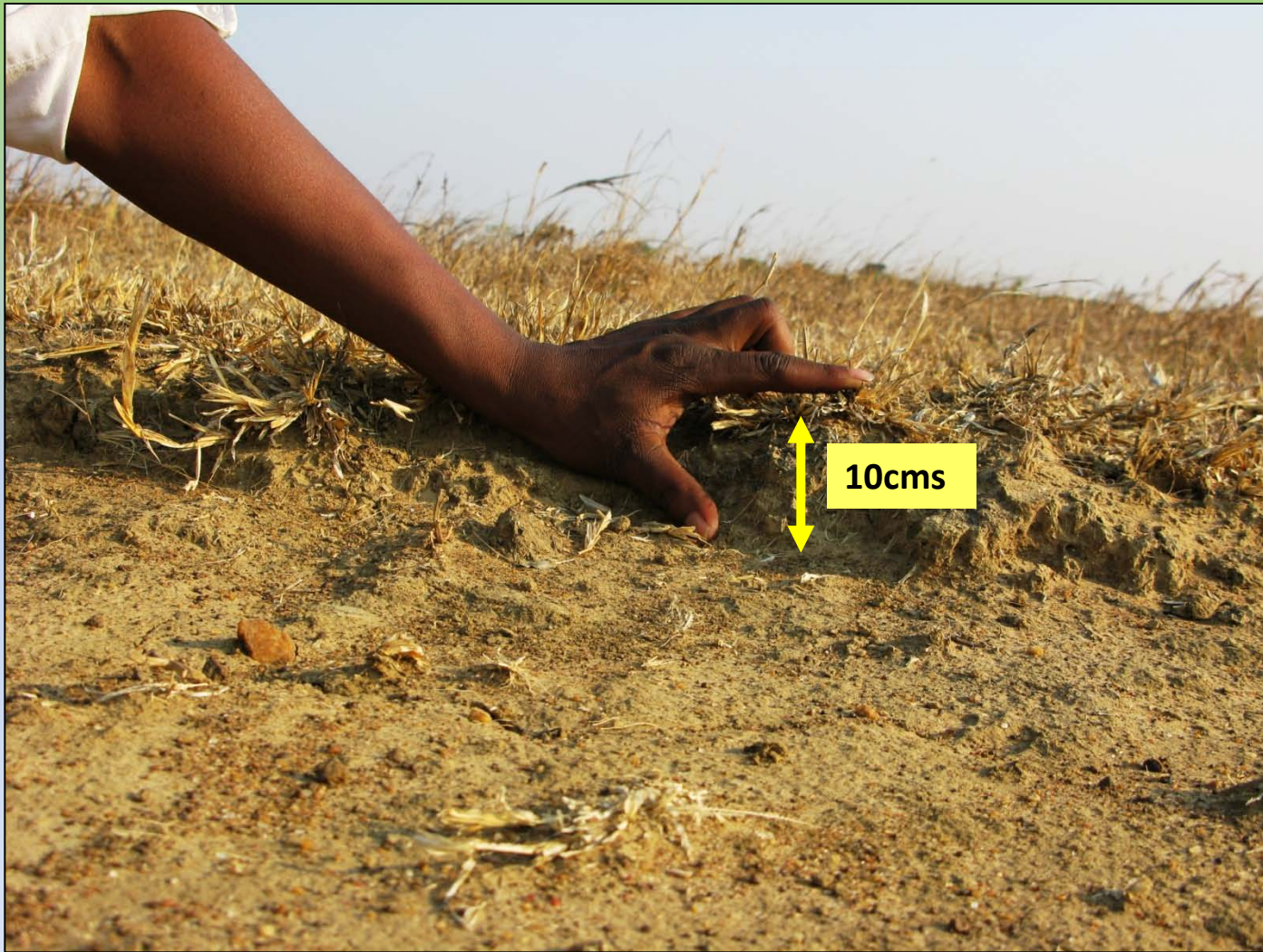
Severe weed competition can also induce wilting

## In Wet Seasons



**Compacted soils cause water logging from impeded drainage**

# Land degradation occurs gradually and we seldom notice the early symptoms



Here it is too late. 10cms or 1,000 tons of top soil per hectare has been lost. Even the toughest weeds struggle to grow.

# Conservation Farming and Conservation Agriculture

Where did the ideas come from and what is CF and CA?



**The American Dust Bowl first made people think about the damage caused by intensive disturbance of the soil by continuous ploughing**

**These immense dust storms were called 'Black Rollers'**



**The Dust Bowl of the 1930's in the Mid West wheat belt was caused by a combination of droughts, continuous ploughing and the loss of natural grasses that held the soil**

# **TYPES OF CF & CA PROMOTED IN ZAMBIA**

**Systems have been developed Hoe, ADP and  
Mechanised farmers cultivating from 0.5ha to  
50ha and above**

**There is also considerable emphasis on private  
ADP and Mechanised MT service provision**

# Definitions in Zambia: Progression to CF & CA

## Improved Reduced Tillage (IRT)

**Inadequate** residues. Either grazed off by communal livestock or burnt off intentionally or unintentionally as a result of uncontrolled bush fires. Insufficient or no rotations with legumes. Correctly spaced **MT permanent planting basins or ox/mechanised rip lines** established across the **slope before the planting rains**. Early planting of all crops.



## Conservation Tillage (CT)

Inadequate or no crop rotations, **residues retained with more or less 30% cover**. Correctly spaced **permanent planting basins or ADP or mechanised rip lines** established across the slope before the planting rains. Early planting of all crops. Soil disturbance **10% Maximum**



## Conservation Farming (CF)

CT with addition of about 30% of cropped land occupied by legumes.



IRT/CT  $\longleftrightarrow$  CF

**NOTE:** Farmers will shift between the above definitions depending on prices, market opportunities, exchange rates, input subsidies, NGO handouts and many other factors that influence the proportion of crops they grow.

## Conservation Agriculture (CA)

CF + the establishment and survival of a minimum of 50 *Faidherbia albida* trees per hectare.



**ADP and Mechanised Zero Till also comply if other requirements are adhered to**



# **Selling the Concept of Conservation Farming to the Small & Medium Scale Farmer in Zambia**

**The CFU focus is on the immediate benefits arising from adoption of CF.**

- Increased yields
- Reduced labour inputs for either 'on farm' or 'hired in' labour
- Reduced labour peaks
- Reduced costs
- Improved returns to labour and purchased inputs
- Improved performance in dry, wet and normal seasons
- Enhanced food security and profitability
- Business opportunities arising from tillage service provision
- Business opportunities for private agro-dealers

# Selling the Concept of Conservation Farming to the Small & Medium Scale Farmer in Zambia

In general too much emphasis is placed on the medium and long term benefits relating improvements in the physical and chemical properties of soils etc i.e. the **Green/Environmental** benefits of CF.

While these are equally important they do not gain traction among hard pressed farmers who are concerned about the **NOW**.

Excessive focus on the medium/long term benefits also gains no buy in from politicians.

There is general misconception among many scientists and promoters that the benefits of (IRT, CT) **CF** take several seasons to emerge. They come in year 1.

# Conservation Farming : Key principles Zambia

1. MAXIMISE SOIL COVER TO THE EXTENT POSSIBLE – NO BURNING OF RESIDUES
2. MINIMISE SOIL DISTURBANCE BY CONVERTING TO MT OR ZT
3. ROTATE WITH LEGUMES TO THE EXTENT FEESIBLE (30% recommended)
4. COMPLETE LAND PREPERATION BEFORE THE PLANTING RAINS
5. ESTABLISH CROPS WITH THE FIRST MAIN RAINS
6. UTILISE HERBICIDES TO CONTROL WEEDS rather than ox cultivators or ridgers.

Any farmers with sufficient labour have a choice to weed with hoes.

## KEEP AS MANY RESIDUES AS POSSIBLE

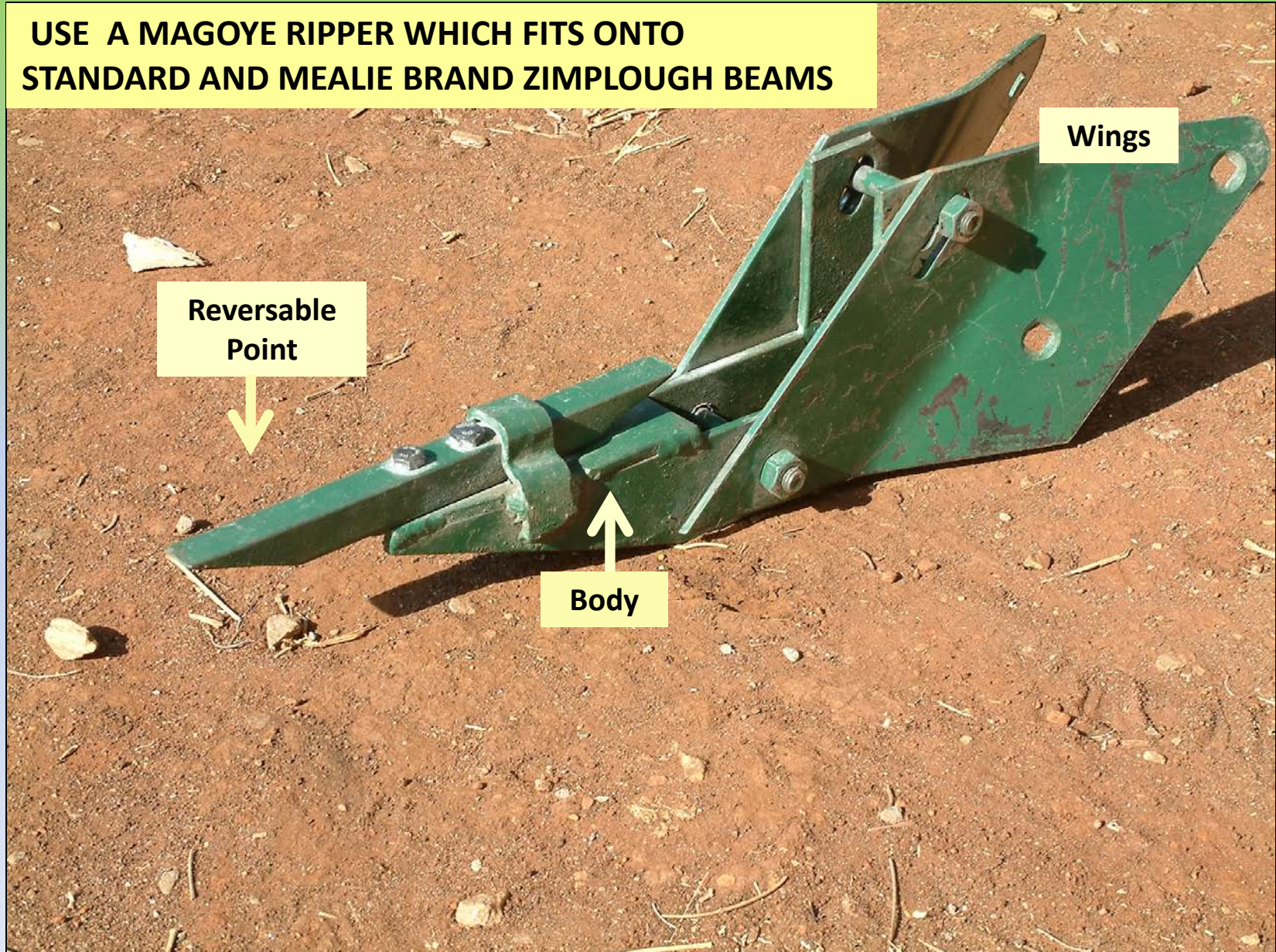


A 7 TON CROP HARVESTED HERE

**Good residue cover minimises sheet erosion and maximises infiltration of rainfall. A high yield cotton crop provides fair amount of residue cover. G/nuts, Cowpeas, and Soya - negligible.**

# MINIMUM TILLAGE FOR ADP (OX) FARMERS

USE A MAGOYE RIPPER WHICH FITS ONTO  
STANDARD AND MEALIE BRAND ZIMPLOUGH BEAMS



**Ripping the same furrows each year is recommended and achievable by skilled operators. (Tramline system)**



**The objective is the same for CF-MT Basins. Improve the physical and chemical properties of the soil in the MT planting zone through targeted application of nutrients lime if necessary and crop rotation. The inter-rows remain un-disturbed as they are occupied by weeds.**

## Early April Ripping through physiologically mature Soya Beans



Here tram-lining is not possible but early and deeper ripping is possible in moist soils

**IF MANURE IS AVAILABLE APPLY IN RIP LINES.  
Basal dressing and lime applied at measured  
rates**



When farmers do MT ripping, they **concentrate manure in the rip lines** (i.e. the plant rows) where it is needed and goes further. When farmers **plough**, they **spread manure** across the whole field first and plough it in. This dilutes its effect and weeds benefit most.

# The Benefits of MT Ripping compared with ploughing

## Ripping



**1 Hectare**

**Time taken to Rip: 4 hours**

**Cost of Ripping: ZMK 125,000 – ZMK 200,000\***

**Ripping Window: 5 months**

### Benefits

- Cheaper, faster and better use of scarce Oxen
- Early planting, higher yields
- Less soil disturbance and erosion
- Potential for service provision as a business
- Better for service provider, better for client

*\* (When ripping is done again to deepen or re- shape)*

## Ploughing



**1 Hectare**

**Time taken to Plough: 14 hours**

**Cost of Ploughing: ZMK 225,000 – ZMK 300,000**

**Ploughing Window: 2 weeks**

### Disadvantages

- More expensive, minimal use of scarce Oxen
- Late planting, lower yields
- Excessive soil disturbance, erosion
- Minimal potential for service provision
- Danger of crop failure for clients in dry years

# ADP (Ox Drawn) Zero Till Fitarelli



Some farmers have established 20 ha of crops with this planter using 1 pair oxen

Adoption will remain modest. 75 units in use now.

Manufacture in Zimbabwe started

Herbicides essential

Wait for rains, plant and basal dress in 1 pass. Apply glyphosate before crop emergence. Apply selective herbicides afterwards as necessary

**Cowpeas planted with Fitarelli. Weeds killed with Glyphosate before emergence  
Providing temporary 'in-situ' mulch**



# Minimum Tillage for Hoe CF Farmers

Planting positions or 'Basins' opened in **same place** each year



Land preparation can commence in June, spreading labour inputs. Work for 2 hour each morning. In Zambia rains normally commence in late November

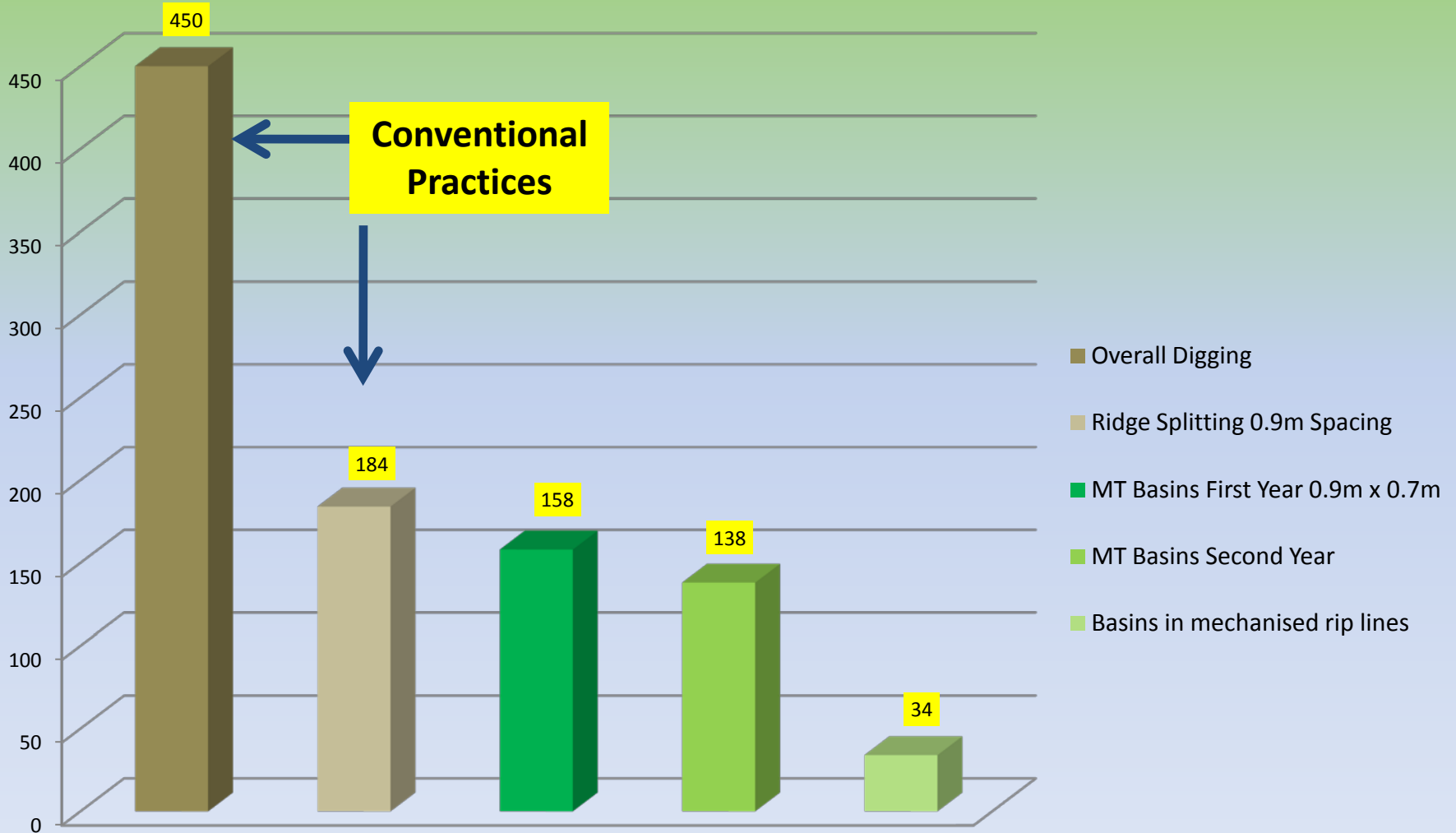
**Zambia:** Basins approx. 12cms wide x 30cms long x 20cms deep to **break pans** Only **10% of soil disturbed** . Soil movement is **90 tons per ha (+-)**



**Labour input 30 to 45 SPD's year 1, reducing from year 2 as soils in Basins soften. Variation in labour inputs substantial depending on soil type age of workers etc**

# Zambia: Comparison of Labour Inputs – Hoe Dry Season Land Preparation

## Hours per hectare – Moderately Compacted SCL soils



**MECHANISED MIN-TILL SERVICE PROVISION**

**THE NEXT STEP FOR SMALL SCALE AGRICULTURE  
& CF**

Between the 1970's and mid 1980's numerous ***government sponsored*** mechanisation schemes aimed at providing ploughing services to small-holders were introduced in many countries across Africa.

**Predictably these schemes failed and in general mechanised tillage is considered inappropriate for small-scale agriculture**



# Mention of mechanisation in the small-holder context usually falls on deaf ears!

- How can mechanisation be relevant to small-scale farmers?
- How can they afford it?
- How could it have a major impact?
- Small farmers use hoes and animal draft power what's in it for them?
- Why should it succeed when it has failed in the past?

# Zambia – Mechanised Ploughing



Tractor ownership by small & medium farmers in Zambia is minimal. **Perhaps 100 to 150 units?** Many are severely dilapidated.

Ploughing is done mainly after the onset of the rains. Effective operating window is 2 to 3 weeks only. **Diesel consumption is 12 to 15 litres/ha. Hire cost **US\$90 - \$120/ha****



## Rovic Leers 3 Tine Ripper – dry season ripping



# Example of Ripping Test

## 60HP 2WD Tractor. Gear 4 Low

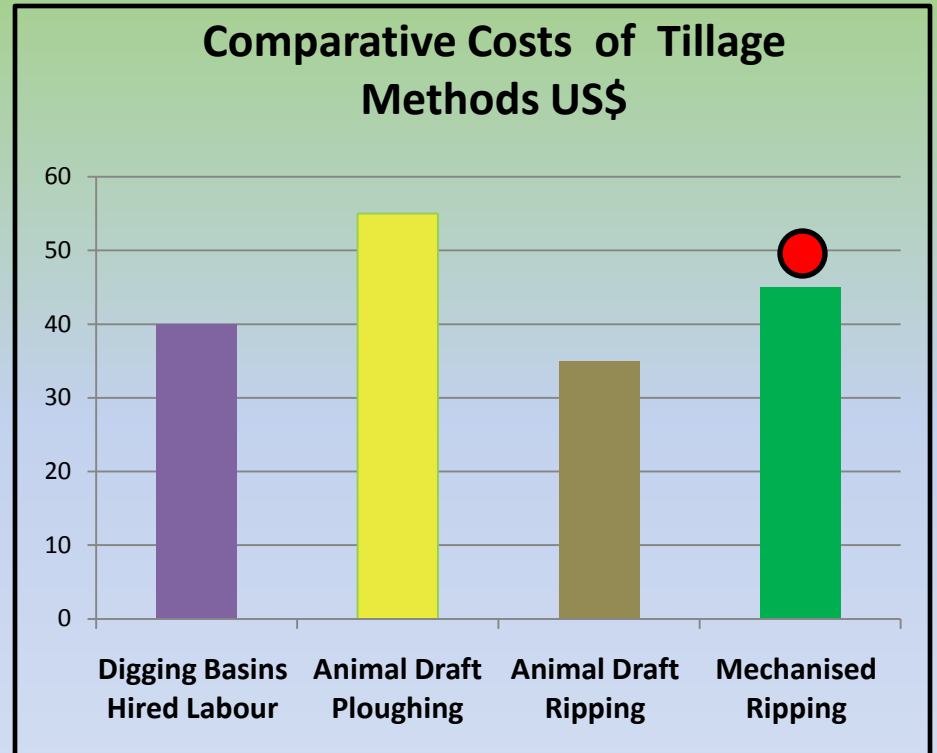
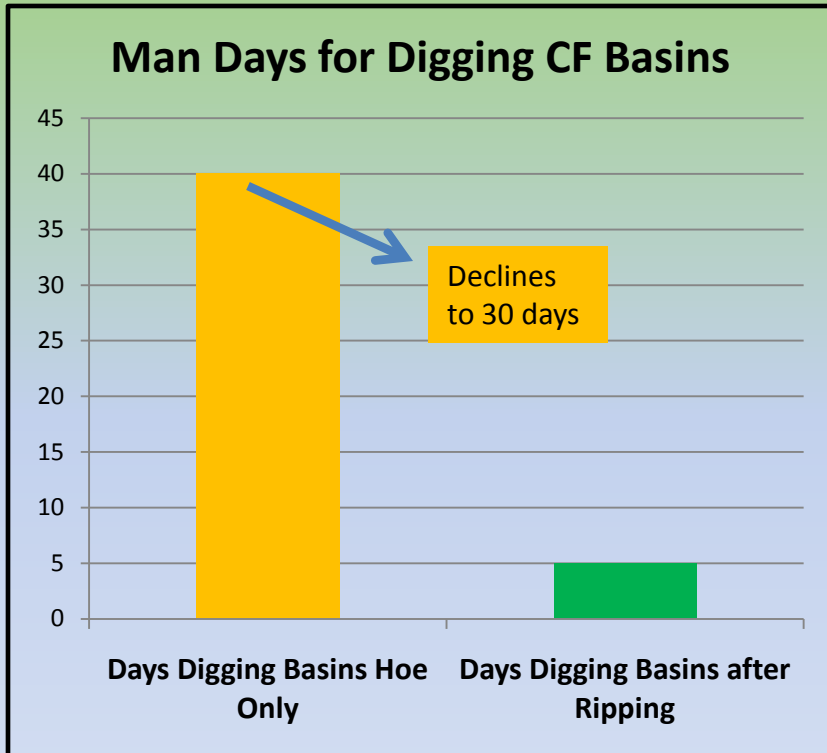
Test 1: Dry Ripping	BP 2 Tine Ripper with Close Set Crumblers	
Condition	Soil Dark Hard Clayey Loam. Heavy residues 60% cover	
Time/ha - Hrs	1.29	
Fuel/ha litres	5.8	
Cost Fuel/ha on site	\$8.12	ZMK 40,600
Cost Fuel Including Return Travel to Site + 50%	\$12.18	ZMK 60,900
Charge to Client Fuel x 3.5	\$42.63	ZMK 213,150 Up to \$50.00/ha
Depth	21cms- 24cms	
Clogging of trash	NIL	

Diesel ZMK 7000/litre. Rate ZMK 5000 = \$1

# Example of Wet Ploughing Test - Same Tractor

Test 3: Wet Ploughing	Baldan 2 Furrow Disc Plough
Condition	Moist Brown Clayey loam. 3 days after full irrigation. No residues
Time/ha - Hrs	3.15
Fuel/ha litres	12.79
Cost Fuel/ha on site	\$17.91 ZMK 89,530
Cost Fuel Including Return Travel to Site + 50%	\$26.86 ZMK 134,295
Charge to Client Fuel x 3.5	\$94.00 ZMK 437,032 Up to \$100/ha
Depth	19cms - 20cms

# Labour and Cost Comparisons



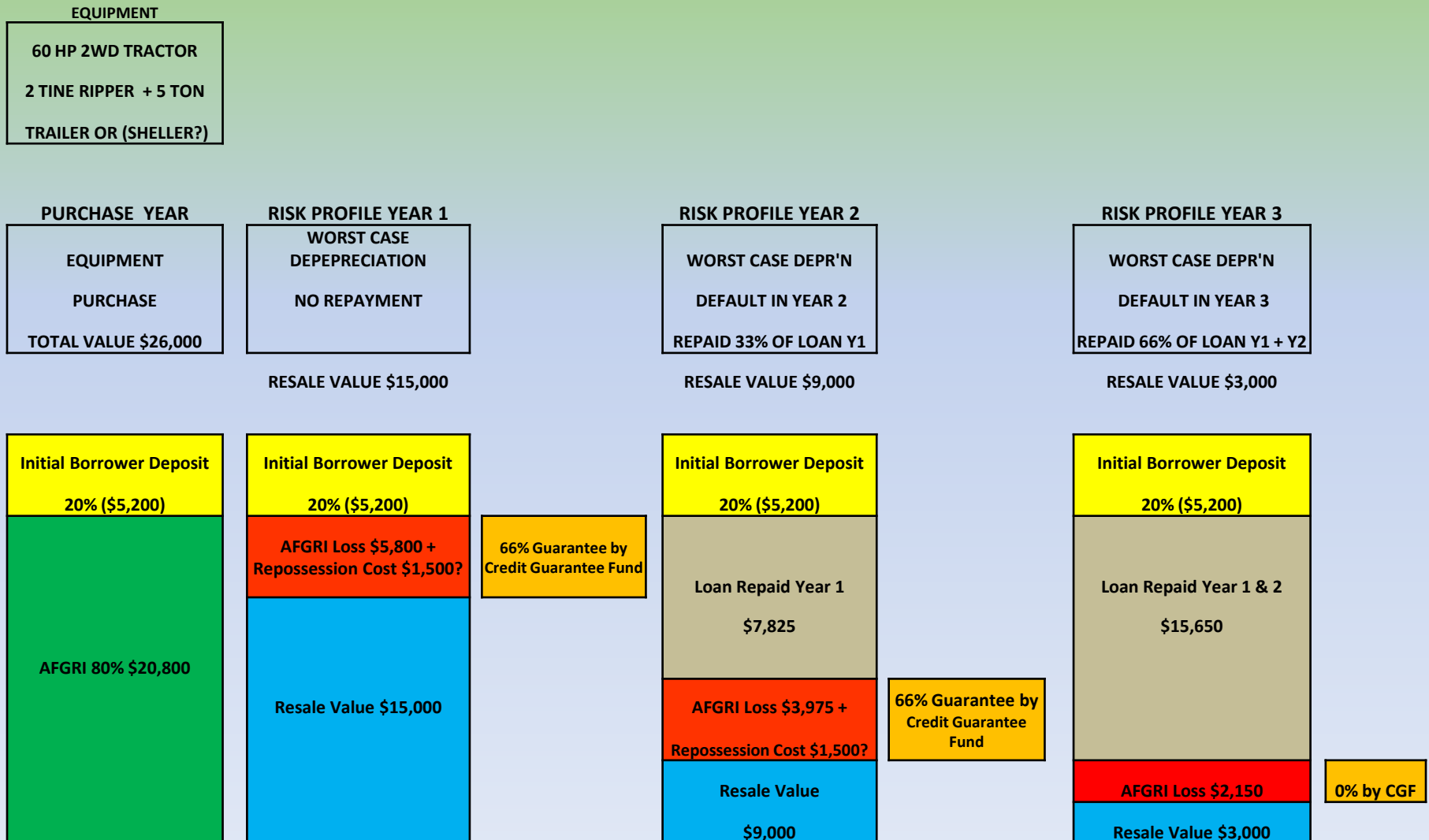
● Fuel consumption can be reduced further with more efficient tines

# EMERGENT FARMER EQUIPMENT LEASE TO PURCHASE MODEL FOR SERVICE PROVISION - MINIMUM TILLAGE, HAULAGE, (MAIZE SHELLING) – WITH CFU-CAP CREDIT GUARANTEE FUND

RISK PROFILE: WORST CASE SCENARIO ON RESALE VALUE OF REPOSESSED EQUIPMENT

AFGRI/JOHN DEERE –  
CFU SCHEME

*Acknowledgement: Modified from PROFIT modelling*



# EMERGENT FARMER EQUIPMENT LEASING SCHEME MODEL FOR SERVICE PROVISION – MINIMUM TILLAGE, HAULAGE, (MAIZE SHELLING?).

## Additional Requirements:-

- Service contract & insurance built into lease/purchase model
- Individual beneficiaries grouped in close localities
- Careful pre-screening and final selection
- Comprehensive business and technical training
- Regular monitoring and support

## Gross Income:

250 ha of ripping p.a. over 5 months + haulage?

## Main Challenge:

- Lack of entrepreneurship and business acumen. Kinship expectations!

## MT and Herbicides – an Essential Combination

In Zambia the CFU estimates that 1 million families spend in total **60 million SPD's** hand weeding crops each year. Much of this work is done by women and children.



# Pre crop emergence treatment of early weeds with glyphosate in field of CF-MT Basins



# Examples of Effective Herbicide Use



With careful training small-scale farmers can use herbicides effectively.

The cry that '*herbicides poison soils*' is because farmers use the wrong products in the wrong manner at the wrong time. NO TRAINING.

Knowledge and absolute attention to detail is critical

**Silent Chibinga: 2 litres/ha *Glyphosate 460*. Post weed/Pre crop treatment . First time user**

## Examples of Effective Herbicide Use



When properly used herbicides slash labour inputs, cut costs when labour is hired for weeding, increase yields and enable farmers to expand cropped area.

**Mr Inran chimimsa. Post emergence with 3litres/ha Atrapack Plus Maize selective. First time user! More residues would have preferable!**

# Comparative Costs of Herbicides and Hand Weeding

## WEED CONTROL AND COSTS – GLYPHOSATE

### Non selective applied prior to crop emergence

	\$-HA
Maintenance/Depreciation Sprayer (20 ha)	4.0
Cost of Glyphosate 360 at 3 litres/ha	30.0
Total Cost:	34.0 (ZMK 170,000)
Hand Weeding subsequent weeds <b>(15 man days)</b>	14.0 (ZMK 70,000)
<b>TOTAL</b>	<b><u>\$48.0 (ZMK 240,000)</u></b>

### HAND WEEDING ONLY

Man Days Hand Weeding, 3 Rounds **(60 to 70 days)**

**Cost of Hand Weeding Hired Labour** **\$60.0 (ZMK 300,000)**

# Comparative Costs of Herbicides and Hand Weeding

## WEED CONTROL AND COSTS – MAIZE SELECTIVE

*Atrazine/Cyanazine* formulation applied before or soon after crop emergence - 4 leaf stage

	\$-HA
Maintenance/Depreciation Sprayer (20 ha)	4.0
Cost of Herbicide at 3 litres/ha	33.0
Total Cost:	37.0 (ZMK 185,000)
Hand Weeding late weeds ( <b>10 man days</b> )	9.3 (ZMK 46,500)
<b><u>TOTAL</u></b>	<b><u>\$46.3 (ZMK 231,500)</u></b>
<b>HAND WEEDING ONLY</b>	
	\$-HA
Man Days Hand Weeding, 3 Rounds ( <b>60 to 70 days</b> )	
<b><u>Cost of Hand Weeding Hired Labour</u></b>	<b><u>\$60.0 (ZMK 300,000)</u></b>

## The anti-herbicide lobby

**Herbicides are not perfect but continuous overall soil disturbance is far more damaging**

Those who campaign against herbicides should recognise the social implications of their actions. In Africa millions of women and children spend many days hand weeding crops often in situations where HIV/Aids has decimated the labour force.



**In Zambia weeding tasks commence as early as 5am and coincide with the school term, hardly a recipe for children to be in a fit state to absorb knowledge!**

# CF AND CLIMATE CHANGE ADAPTATION

**2004/5 WAS DECLARED A DROUGHT YEAR AND FOOD RELIEF WAS DISTRIBUTED IN MANY AREAS BY WFP AND NGO'S**

## Rainfall Chibombo District 2004/5 Season

Month	Oct	Nov	Dec	Jan	Feb	March	Total
Rain days	3	5	13	16	6	3	46
Rain mm	15.0	94.0	304.0	245.0	71.0	31.0	760.0
Mean	22.0	79.0	177.0	212.0	163.0	157.0	810.0

**February Rainfall: 57% below normal**

**March Rainfall: 80% below normal**

# 2004/5 SEASON CONVENTIONAL OX FARMING

Chibombo District Conventional Farmer



Prepared for climate change?  
Not a chance!

**16th March 2005: Conventional Ox Tillage – Hired Animals. Yield Zero**

## 2004/5 SEASON CF OX FARMING. DROUGHT?

CF ADP farmer. Distance from Conventional Farmer 1 km



**25<sup>th</sup> January 2005:** Yields would have been remarkable in a normal season.

## 2007/8 SEASON CF HOE FARMING. FLOODS?



**Situmbeko:** 1520mm of rain with **860mm** falling in December and January alone.  
Normal **annual** mean **800mm**. CF is also superior in wet years

# RESEARCH RESULTS CF



# **Yield Increases from CF MT systems based on same input regimes as conventional alternatives**

**25% to 100% ++ in year 1 for all crops depending on pre-adoption situation of the farmer, condition of soils, previous farming method, resources etc.**

## **Main agronomic reasons for productivity increases**

- Land prep in dry season
- Precise and targeted application seeds, basal nutrients and lime
- Early planting immediately after first heavy rains as one rapid activity
- Benefit of early Nitrogen flush
- Rapid and more even crop emergence, more optimal populations, less re-seeding
- Early rainwater harvesting
- Less crop stress in dry spells

## **Accumulative benefits over time**

- Improved physical and chemical properties of soil in MT permanent planting zones
- Reduced weed populations

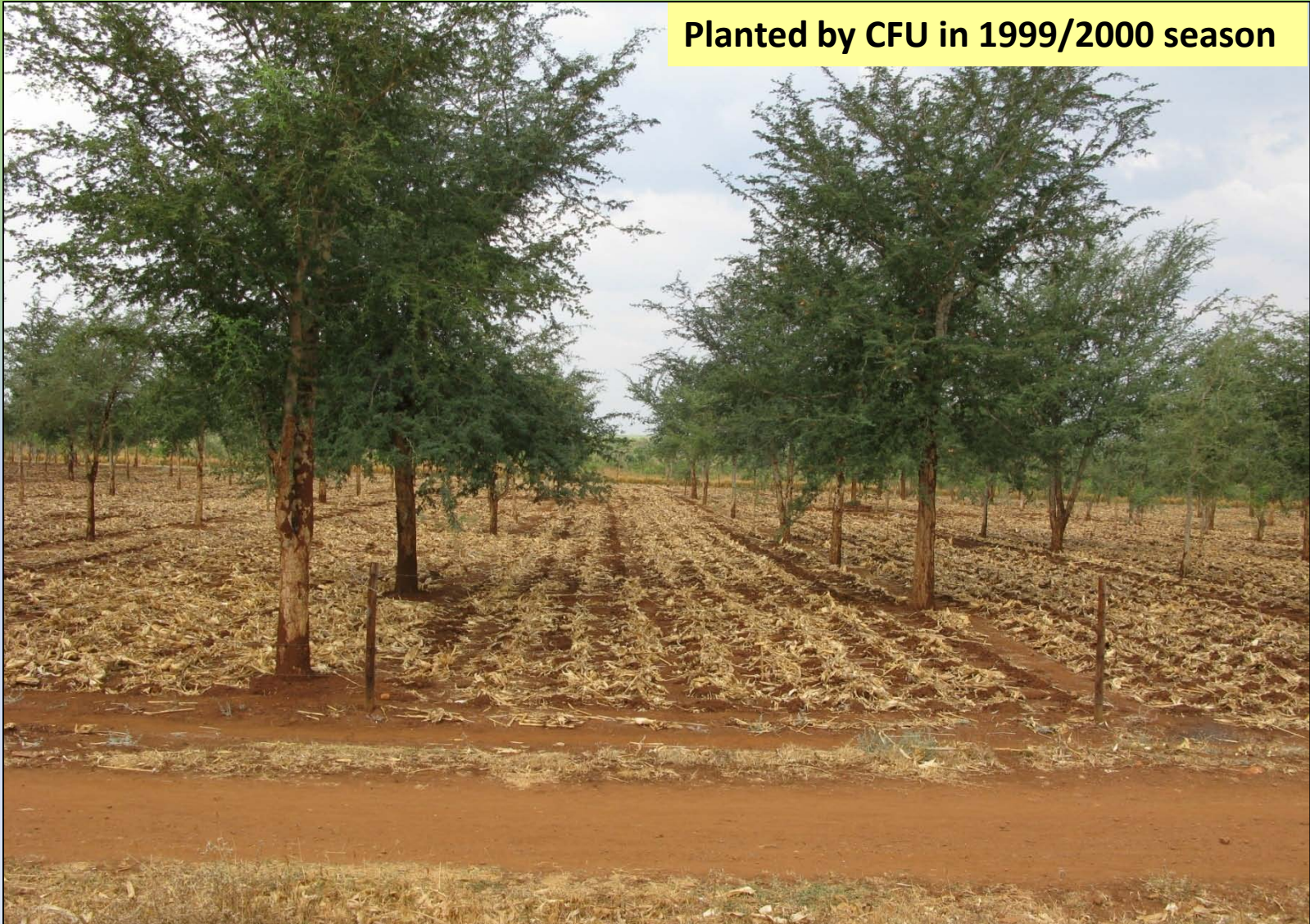
# The Step to Conservation Agriculture with *Faidherbia albida*



60 years of research shows on each hectare, mature trees supply the equivalent of 300kg of complete fertiliser and 250kg of lime.

# ***Faidherbia* trees at GART in Zambia over Hoe CF**

Planted by CFU in 1999/2000 season



Combination of CF + *Faidherbia* - best climate change adaptation technology



Elemani Mumba's Conservation agriculture Fields

Image © 2010 GeoEye  
© 2010 Google  
© 2010 LeadDog Consulting

Google

Imagery Date: Aug 3, 2009    15°39'18.44" S    28°14'39.57" E    elev 1097 m    Eye alt 1.42 km

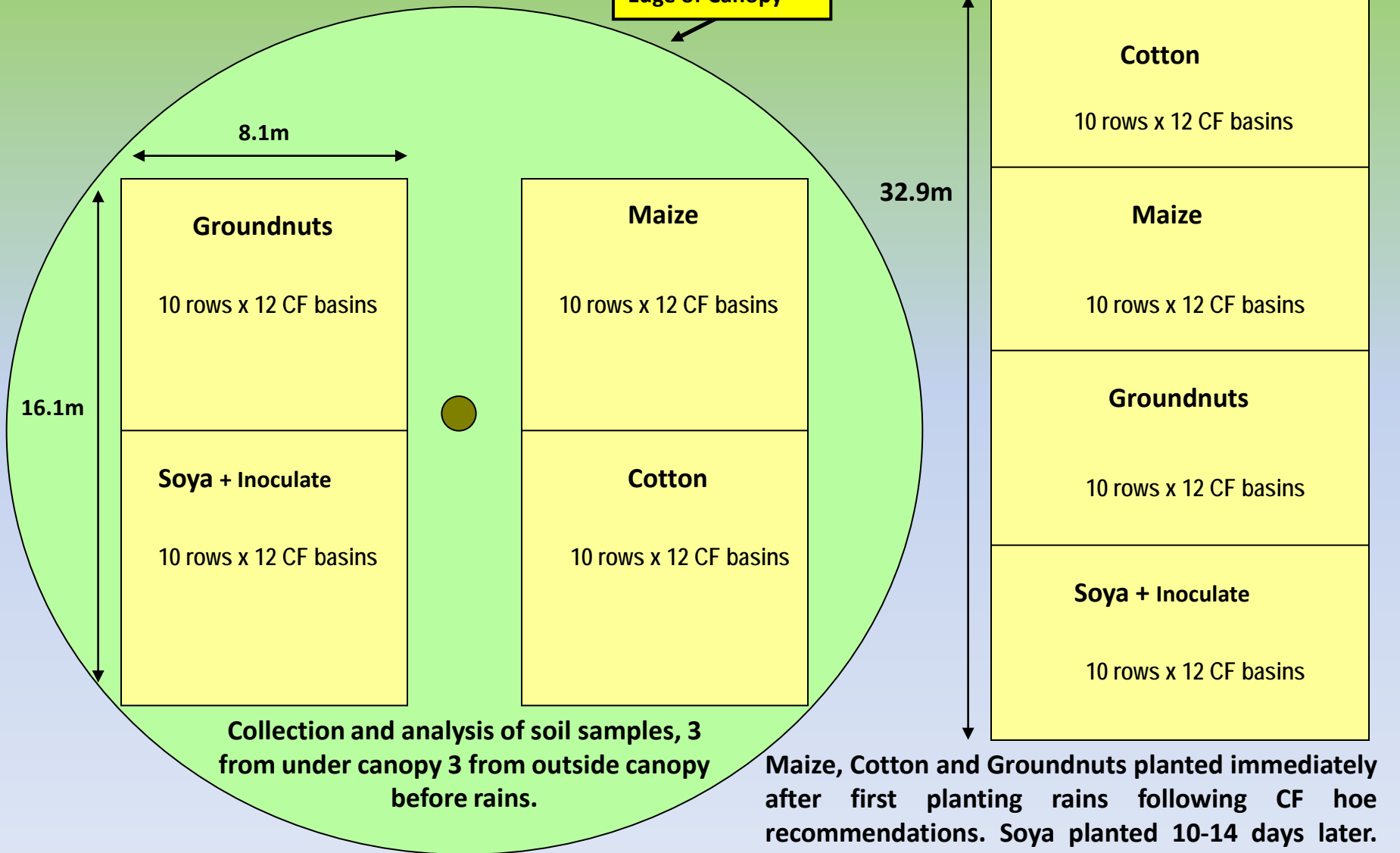
# Small-scale CA . Re-filling gaps always necessary to get full stand

Young *Faidherbia* trees on CF smallholder farm



# Mature *Faidherbia albida*, On-farm Trials - ZERO FERTILISER

## Detailed Trial Design:



Maize, Cotton and Groundnuts planted immediately after first planting rains following CF hoe recommendations. Soya planted 10-14 days later. Fertiliser **zero** all plots. Same day planting.

# 40 CFU Trials under Mature Trees for 3 season – Management Excellent

4 Crops. All plots Zero Fertiliser & CF basins



Maize outside tree

Maize Under tree

## Results of CFU Trials Under Mature *Faidherbia albida*, 2008/9 season 40 trials

Region	Maize Yield (mt/ha)			Cotton Yield (mt/ha)			G'nut Yield (mt/ha)			Soya Yield (mt/ha)		
	Under	Out	Sign	Under	Out	Sign	Under	Out	Sign	Under	Out	Sign
Central	4.85	2.07	*	0.87	1.64	ns	1.05	1.77	ns	1.57	1.17	ns
East	5.68	3.41	*	1.88	2.77	ns	1.43	1.61	ns	1.53	2.05	ns
South	5.80	2.79	*	1.33	1.59	ns	0.61	0.65	ns	1.61	1.24	ns
West	3.75	1.96	*	1.03	1.11	ns	1.35	0.93	ns	1.18	0.78	ns
Overall	5.12	2.65	*	1.30	1.84	*	1.09	1.29	ns	1.50	1.36	ns

**Notes:**

Sign refers to significance of t-test at 0.05 level of significance

\* indicates significant difference between mean yields at 0.05 level of significance

ns = no significant differences between mean yields at 0.05 level of significance

Overall = across the various regions

## 2009/10 *Faidherbia* Trial Results

**Maize:** Under canopy **5,640 kg/ha**. Outside **2,360 kg/ha**

**Soya :** Under canopy **1,665 kg/ha**. Outside **1,570 kg/ha**

**Cotton:** Under canopy **1,113 kg/ha**. Outside **1,314 kg/ha**

**G/nuts:** Under canopy **1,293 kg/ha** Outside **1,493 kg/ha**

More detailed results and interpretation available from CFU & TLC Malawi

### Getting farmers to establish *Faidherbia* a major challenge:

- Benefits take at least 10 years to emerge and maybe 16 to 18 for full impact
- Not a SSF priority so attention to nursery management & transplanting poor
- Also mistaken weeding out young seedlings, predation by livestock and bush fires

**CFU goal of 240,000 ha of minimum 50 contiguous trees/ha set back to 2015**

Nursery and planting techniques available from TLC Malawi who developed them or the CFU

# CAP ADOPTION STATISTICS NORAGRIC- IMCS M&E SURVEYS

## Summary of Projected Adoption of CF by 2010/11 CFU Interpretation

Hoe CF - MT Basins	Number	Hectares
Number of Adopters - CAP Beneficiaries	109,200	56,400
Number of Adopters - Spontaneous	16,380	8,460
<b>Total</b>	<b>125,580</b>	<b>64,860</b>
ADP CF - MT Ripping		
Number of Adopters	42,000	63,000
Number of Adopters - Spontaneous	4,200	6,300
<b>Total</b>	<b>46,200</b>	<b>69,300</b>
<b>COMBINED TOTAL</b>	<b>171,780</b>	<b>134,160</b>
<b>2006/7 Baseline CAP Districts - Hoe CF*</b>	<b>51,000</b>	<b>12,750</b>
<b>2006/7 Baseline CAP Districts - ADP -CF*</b>	<b>5,200</b>	<b>1,300</b>

\* Unsubstantiated and problematical

**Note: Excludes adoption generated by many other agencies trained by CFU**