



Conservation Farming Unit

P.O. Box 30395 Lusaka Zambia. Tel (2601)265455, Fax (2601)264781
E-Mail cfu@zamnet.zm

Why small-scale Maize and Cotton yields in Zambia are so low

During the recent ZNFU Congress, the Hon. Ben Kapita highlighted the Government's ambition to see Zambia become a major regional Maize producer. At the same time he noted that on average, smallholder Maize yields remain pitifully low, **1.5 tons/ha**, probably even less? The same could be said of Cotton **600kgs/ha** and for practically all crops grown by smallholders.

The statistics are indeed depressing for anybody familiar with small-scale agriculture in Zambia including we must stress, the cotton ginners. There are of course many farmers particularly CF adopters who consistently outperform this unimpressive average. However the results of these farmers perhaps 100,000 in total are dragged down each season by the 600,000 or so Maize growers many of whom produce less than the average above and often nothing at all.

The photographs below taken during 2004/5 season when February and March rainfall was 57% and 80% below normal highlight this fact. The conventional farmer on the left got nothing whereas the CF farmer on the right achieved excellent results.



Mwachisompola 16th March 2005



Mwachisompola 26th January 2005

When questioned, the farmer on the left blamed the drought, but his farm is less than 1km from the CF farmer on the right! An agronomist might argue that CF the farmer had access to fertiliser whereas the farmer on the left did not. Perhaps so, but look at the Cotton, a crop which is never fertilised by smallholders. The conventional farmer's Cotton cannot even be seen because it has been abandoned to weeds!

Let us for a moment set aside some of the other factors that underlie this stark contrast and focus on one alone, **time of planting**. The farmer on the right **ripped** (not ploughed) his field in the dry season and planted within 2 days of the first planting rains which occurred on the **17th of November**. The farmer on the left waited to **hire oxen** from his neighbour's to plough and planted on the **22nd of December**.

More research has been done on the effects of '*time of planting*' than any other agronomic factor, probably because it is the easiest and most dramatic of all experiments to undertake. Just walk down the treatments note the planting dates and look at the crop. Physical measurements are unnecessary!

Simply put, the farmer loses **1.5%** of Maize yields and **2.0%** of Cotton yields for every day of delay from the first opportunity to successfully establish a crop. So the conventional farmer on the left above lost over **50%** of his potential Maize yield and **68%** of his potential Cotton yield before he even got going. He is simply a non starter. Even if he had applied 8 bags of fertiliser to his Maize crop he would not have achieved 1.5 tons/ha.

So how many non starters do we have? In the traditional Maize and Cotton production belts of Zambia there are about 500,000 farmers. Of these about 60,000, the Dengette survivors, still own oxen, and about 150,000 rely **on hiring** in oxen each season to plough. The deadly combination of oxen hire and ploughing, and therefore late planting, goes a long way in explaining our Minister's frustration.

When we asked for example, how many of these 350 farmers gathered in Kabwe West hired oxen to plough, **75%** of them raised their hands. So there we have it, the lost majority. The discussion was of course about the alternative of CF and the advantages of **dry season ripping** instead of ploughing. The CFU and PROFIT are working together to train farmers in the use of rippers and to make this equipment available to farmers through ZAMAC and other rural retailers.



Although we do not like the way farmers establish their crops in Malawi, (hoe ridging), because of the inevitable damage this causes to soils, we can be assured of one thing. When the first proper planting rains occur next month hundreds of thousands of farmers in Malawi will be in their fields the following day sowing Maize. About 3 million farmers in Malawi cultivate about 2.4 million hectares of land mostly by ridge splitting in the dry season. One can safely assume that 200,000,000 tons of top soil is moved backwards and forwards across compacted sub soil each year by hand. So much unnecessary labour and soil disturbance!



Maize ridges breached by early storm flow in Malawi where land pressure has obliged farmers to encroach hillsides

Here in Zambia, the season will start with more of a whimper than a bang. After some early showers in mid November, a few farmers will be ploughing. After a general planting rain say on the 24th of November activity will gradually pick up. We would expect CF farmers to be in their fields planting as most would have long since completed their land preparation.

However, a significant number might delay in hope of accessing FSP inputs? Having experienced the dramatic responses to fertiliser conferred by CF, those who fail to access it might wonder why their diligent investment in sound husbandry practice is not awarded. After all, fertiliser channelled to the farmers in the photos below will produce the results Hon. Ben Kapita rightly expects, **4 to 7 tons of Maize/ha.**



CF Basins Mumbwa – September 2007. Ready and waiting to go!



CF Ripping Mumbwa – September 2007. Ready and waiting to go!

It is now early December and as we drive past many households all we see are weeds growing in abundance. With Christmas around the corner, ploughing continues. By now, knee high weeds are being ploughed in locking up any residual Nitrogen that has not already leached away and the Maize emerges as yellow as an MTN advertisement! We turn the corner into January. Hope springs eternal and some Tonga farmers are planting Sunflower into rough cloddy fields turned over by the plough. Later when the flowers emerge they are no larger than Marigolds!



Monze 28th December 2006. Ploughing with hired oxen – oh dear!

So what could be done in the short term to reverse this depressing and seemingly inescapable scenario? So long as **ploughing coupled with oxen hire** is the primary tillage practice in Zambia's grain belts we will never progress and each year we shall be confronted by the same depressing statistics. A solution that would have an immediate impact would be for every farmer with a plough to replace it with a Magoye Ripper.

Ripping Versus Ploughing – Summary of Benefits

Ripping:

Time taken to rip 1 hectare:	4.5 hours
Hire Ripping Window:	May to November – 7 months
Hire Charge per Hectare:	ZMK 100,000
Hire Charge per Hour:	ZMK 22,200
Potential Customers per season:	40 or 40 hectares (or more)
Potential Income for Season	ZMK 4,000,000 (or more)

Ploughing:

Time taken to plough 1 hectare:	14 hours
Hire Ploughing Window:	Dec 1 st to Dec 20 th – 3 weeks
Hire Charge per Hectare:	ZMK 275,000
Hire Charge per Hour:	ZMK 19,640
Potential Customers per Season:	4 or 4 hectares
Potential Income for Season:	ZMK 1,100,000

Charges for ploughing vary from place to place. Nevertheless the difference between the costs of ripping and ploughing is always about the same. Ripping is faster, cheaper and benefits the service provider who makes more money and the customer who pays less per hectare and can get his crops planted with the first rains. If every ripper purchased translated into say 15 hectares of dry season land preparation and 15,000 of the 60,000 farmers who own ploughs converted to the ripper next year we could in theory achieve 225,000 hectares of dry season land prep, wouldn't that be something? It seems to me this conversion is the fastest route available to increase Maize and Cotton yields because it makes good business sense. A farmer with a ripper which can be fixed to most common plough beams costs ZMK 175,000 and the owner can pay off this capital investment in 3 days so long as he gets the money course!

Indeed, the removal of VAT on Magoye rippers to encourage conversion would be a very sound investment by Government. The loss in revenues for 15,000 rippers sold would be ZMK 460 million. If we assume this conversion enabled 225,000 farmers who would otherwise have achieved 1.5 tons of Maize to plant on average 20 days earlier, this would translate into an additional 100,000 tons of Maize worth ZMK 76 billion.



On some soils, those grey compacting *acrisols* common around Kabwe and parts of Southern Province dry season ripping to the prescribed depth of 15cms to 18cms is difficult especially if the soils have suffered years under the plough. But the solutions to this exist as highlighted in the photographs below. They involve early ripping through harvested or standing legumes including Soya beans Cowpeas and Groundnuts, early ripping through Sunnhemp fallows or ripping a bit later after Velvet Bean fallows. The argument that fallows are unpopular because the land occupied by them could be planted to food or cash crops does not hold water. The majority of small-scale farmers in Zambia occupy far more land than they cultivate and often cultivate more land than they can properly manage. Just ask them!



March ripping through Sunnhemp fallow



April ripping through mature Soya Beans



Velvet beans ideal to suppress weeds, and fix Nitrogen for next year's crop

Let's do away with the wretched plough for once and all it's a millstone around our necks and a ball and chain round our ankles.

P.J. Aagaard CFU