



POTENTIAL IMPACTS OF CONSERVATION AGRICULTURE FOR AFRICA

Introduction

The recent crisis on soaring food and fuel prices around the world has brought agriculture back into the world agenda as more people become concerned on its ability to sustainably feed the ever increasing world population. It is in this context that Conservation Agriculture is assuming enormous importance derived from its potential to deliver a host of benefits that are increasingly desirable in a world facing environmental degradation, rising energy costs, soaring food prices and climate change, among other daunting challenges



Alarming food security in Africa.

Conservation agriculture results to immediate and efficient use of resources/inputs

Timeliness of farm operations

The negative effects of late planting of any crop have been researched and documented for hundreds of years. Typical yield losses are 1.5% of potential yield for each day of delay from 1st opportunity to plant for maize. Farmers using the ox plough or hand hoe can only start with onset of the rains. If they have to plough twice and loose 16 days, they would already have lost 24% of the potential yield.

CA allows spreading of the labour peak, enabling activities to be done during the low labour demanding dry season and plant with onset of the rains. Utilisation of the full extent of the rain season and the nitrogen flux are attained.

Precision planting

Planting basins jab planters or other no till seeders have setup and precision metering mechanisms for precise metering of scarce seeds, fertilisers or manure to reduce wastage. They also position seeds and fertilisers at pre-defined optimal spacing for agronomic requirement that will neither scorch the seed nor deprive the plant of vital nutrients. This is essential at a time when seeds and fertilisers prices are escalating.

Improved rainfall capture, infiltration and insitu soil moisture retention. Wheel ruts and hoof prints of compacted soil are not conducive to good crop development as they will restrict crop root development and inhibit the movement of gases and water in the soil. They need to be removed as a pre-condition by digging the planting basins to below the normal ploughing depth (15 cm), subsoiling or ripping. Mulch or vegetative cover on these soils will cushion the erosive raindrop impact; enhance rainwater, capture, infiltration and retention for

plant use in times of moisture stress. Improved soil moisture has the potential to increase fertiliser use efficiency.

Reduced production costs

Tilling the soil is expensive. Fuel and fertilizer prices and labour costs rise continuously, while market prices of farm products have fallen. Many farmers cannot recoup their production costs by selling what they produce, so they end up making a loss. Conservation agriculture helps these farmers cut costs while increasing their yields.

Table 1. Saving proportioned by no-till system adoption in Southern Brazil

| Factor | Saving/unit |
|----------------|--------------------------|
| Labour | 4.8 hours/hectare/year |
| Machinery hour | 5.3 hours/hectare/year |
| Fuel oil | 59.4 litres/hectare/year |
| Nitrogen | 13.8 kg/hectare/year |
| Phosphorous | 9.6 kg/hectare/year |
| Potassium | 13.6 kg/hectare/year |

Source: Rainoldo A Kochhann and J. E. Denardin, 2008.

Other direct results of CA to farmers in the region

- Improved erosion control arising from the vegetative soil cover.
- Ability to increase area under cultivation due to spreading of labour peaks and saving labour. Increased and more stable yields.
- Figure 1 illustrates the consistently higher maize grain yields in Zimbabwe (ICRISAT, 2006).



Figure 1. Maize grain yields obtainable in drought-prone, semi-arid parts of Zimbabwe with and without basin tillage technology, based on crop modeling confirmed by farmer-managed demonstration trials, 1980-2015. Source: ICRISAT, 2006.



Facilitate sequestering millions of tones of carbon (from smaller amounts of say 0.5 tones per hectare per year multiplied by millions of adopters) and contribute effectively to reduction of global warming. Help reduce erosion, allow recharge of aquifers and thus constant water flow into rivers and re-activation of wells.

Clear Karkloof Valley River Waters

Almost all farmers in in the Karkloof Valley in KwaZulu Natal South Africa practice conservation agriculture. As a result, the river running through the valley is reported to be visibly clearer than rivers in neighbouring areas, and the number of fish species in the river has increased

Impacts due to conservation agriculture

1. Increased food availability

Conservation agriculture offers a number of additional crop production benefits discussed above, that eventually lead to increased household food production and security.

Production of more food at the household level mitigates needs for high transportation costs of food in poor rural infrastructures and guarantees affordable access of this vital need for resource poor farmers.

Feeding of the 204 million poor and hungry people in sub Saharan Africa addresses millennium development goals 1 and 3. Sufficient food produced at household level has the potential to reduced child labour and low-paying poverty mired employment jobs for women.

It is the scramble for food and other resources that leads to wars and conflicts which further displaces and impoverishes many an African people. Adoption of CA and the resultant increased availability of food have the potential to reduce regional conflicts, have more healthy people and longer life expectancies.



Conservation Agriculture leads to increased food availability.

2. Environmental resilience

The health of the people living on a piece of land cannot be separated from the health of the land itself. A large share of the world's 852 million hungry people live on land with soils worn thin by erosion.

Tillage accelerates decomposition of soil and soil surface organic matter into carbon dioxide and soil moisture loss. Reduced or zero tillage has therefore the potential for less carbon dioxide emissions into the atmosphere. The outcome is reduced global warming which makes global weather patterns more reliable.

Crop biomass is generally 40 to 50% carbon absorbed from the atmosphere. Besides acting as a sink for carbon dioxide and alleviating the problem of global warming, carbon sequestered by biomass increases soil organic matter the primary energy source for soil fauna and microbes. These factors enhance infiltration rate, available water holding capacity of the soil and resistance against erosion by wind and water.

3. Overcome shortages of labour and farm power

Many farm households suffer from a severe lack of labour and farm power. Hunger and malnutrition combine to make people weak, unable to work hard, and vulnerable to disease. Young people are moving out and HIV/AIDS and malaria create a severe labour shortage. Lack of farm power forces farmers to look for other ways to farm. Reduced drudgery and labour requirements are a proven benefit under CA since little or no tillage or weeding is required (refer to Figure 2).

| Activity | System and labour input (hours ha ⁻¹) | | Labour saved by CA over conventional (hrs ha ⁻¹) | |
|-----------------------------|---|---|--|-----------|
| | Conventional | CA | hours | % |
| Land preparation | Slash and carry off the field 115 | Slash and 1 herbicide application 52 | 63 | 55 |
| Land clearance and planting | Digging with hand hoe and planting 120 | Planting with jab planter 47 | 73 | 60 |
| Weeding | Hoe and panga rousing 172 | Hoe and panga rousing 54 | 118 | 70 |
| TOTAL | 407 | 153 | 254 | 60 |

Table 2. Labour saving by CA under smallholder farming
Source: Bishop-Sambrook et al., 2004.



The potential impacts are:

- Free time can gainfully be utilised /invested for diversification to other income generating activities such as poultry, livestock production, agro-processing, trading, making honey and vegetable production.
- Saved labour can result to increased production due to timeliness and precision of the farm operations or using the time to increase area under crop production.



CA saves on labour

4. Stimulation of rural employment

The value of labour saved by adoption of CA is greatly amplified when farmers have meaningful and rewarding employment opportunities. Creation of rural employment opportunities is therefore paramount to ensure that not only do farmers ensure food self sufficiency, but are empowered to eradicate poverty. Typical rural employment impacts include:

- Increased demand for CA inputs and services will trigger emergency and rural employment of new input stockists, local artisans, manufacturers, CA service providers and equipment hire operators.
- Emergence of stronger / vibrant SACCOS that attract investment by Banks and Micro credit organizations while providing affordable physical and financial access to credit for the technology inputs.
- Reduced input requirements and costs under CA will result to better cash flows and savings. These will inadvertently result to increased spending, stimulation of markets and growth in the local and national economy. Farmers will increasingly invest in CA inputs, prompt payment of school fees, purchase home appliances and even build houses.

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CA leads to poverty eradication

5. Gender balance and equity

- The arduousness of labour inherent with the dominant hand hoe cultivation in sub Saharan Africa coupled with the HIV/AIDS and malaria pandemics makes farming unattractive for the youths; transferring responsibilities of feeding nations to the sick, orphans and the elderly.
 - CA does away with ploughing (most labour intensive) and hence reduces drudgery, making it more attractive for orphans, the elderly or those sick due to HIV/AIDS and Malaria pandemics.
 - Eliminating ploughing (a men's work) can reduce dependency of women on men
- Reduced hand hoe weeding under CA will allow pupils to attend to school and reduce absenteeism during the weeding months.



CA giving voice to women



6. Policy implications

- More policies and conventions supporting no till will be developed and implemented
- Increased awareness on CA - political campaign messages talking about CA as a selling point.
- Increased on-farm verification and adaptation for scaling up under government support



Conservation Agriculture leads to increased food availability while conserving the environment.

7. Economic impact

As tractor use is reduced, substantial savings will be made on diesel fuel resulting to massive savings in of hard currency used for diesel imports. By adopting the no-tillage system Brazil increased its grain production by 67.2 million tons in 15 years, which, assuming conservative average prices of US\$ 150/t, means additional revenue of about 10 billion dollars (Derpsch, 2003).

It is clear from the foregoing that the region can benefit immensely through wide-scale promotion and eventual adoption of CA. The core issue to be addressed is why the region is not benefiting from CA? What are the key constraints that need to be addressed? These and other issues are discussed in Technical Briefing Number 3.

References

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