



MULCH AND SEED BANKS: CONSERVATION FARMING IN ZIMBABWE



Location: Nkayi District, Matebeleland North

Launched in 2006, a conservation farming project has transformed hundreds of farmers' lives in Zimbabwe's Nkayi District. Once food-aid beneficiaries, these farmers now produce enough maize to cover family needs, with some producing an excess for sale. Farmers produce their own maize seed each year, which are made available to others through the community seed banks they have formed.

CHALLENGE

Maize is the staple food and main crop of virtually every Nkayi household, but a confluence of factors has made it increasingly difficult to produce in the past few decades. Traditionally, the Zimbabwe government and international aid programs have promoted the use of hybrid seeds and chemical fertilizers to increase maize production.¹ However, the availability of these inputs has been inconsistent, and their price has greatly increased with the drop of state subsidies and privatization of state seed-producing companies during the 1980s structural adjustment programs. Hybrid seeds must be purchased by farmers at a high price every year, in contrast to open-pollinated varieties (OPV) that can be saved from harvest to harvest.² In addition to making farmers dependent on private suppliers, such inputs have serious shortcomings, as they are often applied using the broadcast method, resulting in uneven and low plant densities as well as poor fertilizer use and consequent environmental degradation. The use of hybrid seeds has also led to great reduction in agricultural biodiversity, which is essential for farming resilience. Other environmental factors have affected Nkayi households. Climate change is producing more and more frequent droughts and some farming practices—burning crop residue and plowing—increase soil erosion and reduce soil fertility. The poorest households often plant crops late because they can't afford to rent oxen on time. Women dedicate inordinate amounts of time to post-planting weeding. Consequently, hunger is commonplace.

RESPONSE

Since 2006, with support from Canadian Foodgrains Bank and United Church of Canada, Christian Care has been promoting a conservation farming (CF) production system based on minimal tillage using a hoe and local open pollinated variety (OPV) maize seeds. Production is increased by digging carefully spaced “planting stations” to which manure is added to boost fertility. Mulch is spread over the field leaving small openings at each planting station. After a significant rainfall, farmers plant three seeds per planting station. Later in the season, the plants are thinned to an average of two plants to achieve the ideal plant density for maximum yield. The thinning technique also improves the quality of the OPV maize seed production by allowing removal of weak, diseased, and excess plants, which, if initial over-seeding is not done, are left in the field to mature and cause accelerated degeneration in the next seed generation resulting from the harvest. In addition, in the years where germination is low due to drought, ants, excessive humidity, poor seed, or other variables, over-seeding is a buffer to fall back on. It works as a very inexpensive insurance policy for good yields and improved seed.

The project started in five wards (a ward is typically five to ten villages), growing from 50 households in the first year to 200 in the second and 500 households by the third year. By 2010, between 50 and 80 percent of all farmers in the project had adopted CF. It was estimated that the number of farmers practicing some form of CF in Zimbabwe had increased from 5,000 in 2005 to 150,000 in 2011.³

The project's two main goals were to use CF to increase the amount of grain produced per hectare, and to produce quality OPV maize seed and make it locally available through community seed banks.

Main Activities

- Participant farmers—69 percent were women—and their spouses received CF and OPV seed production training in community workshops; as well as follow-up training by the project staff and community promoters.
- Farm exchange visits were organized to showcase the most successful CF plots; visits were also made to farmers who had made less progress.
- Community seed banks were established in each ward. Upon entering the program, participants agreed to donate a minimum of ten percent of their annual harvest or 50 kilograms (kg) of seed-quality grain, whichever was smaller.
- Community and district celebrations were organized to create awareness for the project.

Main Inputs

- Individual farmers used their own hoe for land preparation; hardwood stakes and twine to mark their plots; and manure for fertilizer. Farmers fenced plots to protect against livestock, typically using locally harvested brambles and branches.
- Animal manure was the main fertilizer promoted. Many of the poorest farmers do not own livestock, but there were enough cattle and goats in the area to make manure readily available, usually in exchange for labor.
- In the first and second project years, OPV maize seed was provided to the new project farmers. By the third year, the seed banks had sufficient seed to make an initial distribution to new participants, who were then responsible for saving their own seed.

Keys to Success

- **Mulch:** An organic layer of mulch, at least three centimeters thick, covered 100 percent of the soil. Mulch was made of local materials, such as corn stalks, dried grass, or tree leaves.
- **Organic fertilizer:** Two cupfuls of manure were applied to each station prior to planting.

OPV vs. Hybrid Seeds

Hybrid seeds are costly to produce, which can translate into unaffordable prices for farmers. Under ideal soil moisture and fertility conditions, the best hybrid maize seed can produce significantly greater yields than the best OPV seed; however, under the typical conditions in Nkayi—no irrigation and limited fertilization—yields are comparable. In addition, hybrid seeds cannot be saved after harvest for replanting. As a result, farmers lose the ability to reproduce their own seeds and depend on the industry to plant their fields every year. For these reasons, the project trained farmers to perpetuate home production of OPV seed. The community seed banks help spread the OPV seed from one trained farmer to another in need of seed. They help farmers increase their income, as they won't have to purchase new seeds every year, and also serve as a buffer in times of drought and individual and community crop failure. Finally, contrarily to homogenous industrial seed production, OPV seed banks promote agricultural biodiversity by preserving and facilitating the sustainable use of local indigenous seeds.

“We now sell the excess grain for cash. We send all of our children to school in proper uniforms, with shoes, and with school fees paid.”

– Tsverukai Mundonde, a 45 year old woman farmer, after using CF for 5 seasons

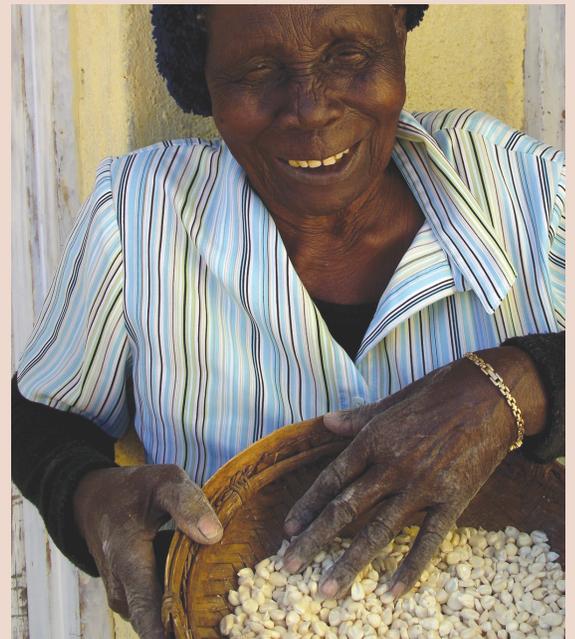
- **Plant population:** Preparing planting stations—15 x 15 centimeters in size with 90 centimeters between rows and 60 centimeters in row spacing—and thinning the plants to an average of two plants per station created ideal plant populations for this climate zone.
- **Time management:** Preparing the fields—planting stations, manure and mulch—during the dry season, made them ready for planting immediately after the first effective rains. This meant the fields could be appropriately thinned and weeded after plant emergence.
- **Reliance upon local materials:** Mulch was locally procured on the same fields or on surrounding communal lands. In the first years of production, most CF farmers sourced maize stalks, grass, thatching material, and tree leaves to reach adequate mulching levels. In subsequent years, crop residues provided most or all of the necessary mulching material. Manure was also procured from local livestock.
- **Broad-based enthusiasm and community building:** A number of activities created enthusiasm, camaraderie, and community building. The formation of community seed banks created great pride among farmers who became key CF promoters, providing their communities with seed. Farmer-to-farmer visits showcased achievements and even encouraged the highest level district officials—headmen and chiefs—to prepare their own CF plots and partake in field days.

RESULTS

Increased Maize Production

Record keeping of farmers in both their conventional and CF fields showed that participants exponentially increased their maize harvest per hectare in the CF fields. Average yields for the conventional fields during the three year period was 0.4 ton of maize per hectare, while the average yields for their CF plots was 4.3 tons per hectare—more than 10 times the conventional yield.

It is particularly interesting to note that yield increases had more to do with mulching—a key component of conservation farming—than fertilizer type or application. Chemical fertilizer was distributed during the project’s first year, in combination with training on CF techniques, which led to doubling of maize yield (0.8 ton per hectare compared to 0.4 ton per hectare). In the subsequent two years, chemical fertilizer was abandoned in favor of organic fertilizer (manure), which enhanced yields and was a lot cheaper and readily available to farmers. During this time, maize yields increased to an average of 5.6 tons per hectare. Other organizations promoting CF in the region also reported greatly improved yields—from 2.8 to 3 tons per hectare.⁴



Sarah Kumbula, 94 years old, had tremendous yields increase after 2 years of practicing conservation farming. © Chris Woodring

“The yields are amazing! [...] I harvested 6 bags (300 kg) of maize from my CF plot while the much larger conventional plot produced only 1 bag (50 kg).”

– Sarah Kumbula, a 94 year old woman farmer, after using CF for 2 years



Tserukai Mudonde in her conservation farming fields. © Chris Woodring

Under the CF system, farmers needed less land to produce enough maize for household consumption. Traditional farming practices required between 1.5 to 2.3 hectares of land to provide a household's annual grain needs (between 600 and 900 kg). Farmers were also vulnerable to drought and often reliant upon animal power rented from wealthier neighbors. In contrast, the CF system enabled them to produce the same basic grain yields with between 0.1 and 0.2 hectare of land. The participating farmers were also less vulnerable to drought and more likely to have a good harvest even if there was less rainfall. They also did not have to rent animals as hoes sufficed for their work.

During the 2013-2014 season, the CF program in Chimanimani allowed 1,060 households to harvest 16 months worth of grain. This was enough to cover the entire year's consumption and remain with an additional 232 kg available to sell.⁵ This is a trend that has been growing since the program's inception and continues today.

Self-Production of OPV Maize Seed

All participant farmers produced OPV maize seed, which was saved for the following planting season and stored in community seed banks. Seed banks grew rapidly, increasing stock from 0.5 tons in the first year to 3.5 tons in the second year and 4.3 tons in the third year. A year later, these seed banks produced 3.5 tons of seed for their own communities and also donated 3.1 tons of seed to communities outside their wards where CF was being promoted. In 2010, this third generation maize seed yielded an average 4.1 tons per hectare, far above the regional average of 0.3 ton per hectare.

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Families maintain small livestock for manure and milk production.
© Chris Woodring

“There is a big change in what we eat. We now eat 3 meals a day. [...] We eat a lot more eggs now, when they are in season, and we will eat chicken every two months or so. Now we always have cooking oil to prepare our food.”

—Tambudzai Makocho, a 34 year old woman farmer, after using CF for 4 years

FOR MORE INFORMATION

www.oaklandinstitute.org

www.afsafrica.org

Canadian Foodgrains Bank

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ENDNOTES

- 1 Zerbe, Noah. "Seeds of hope, seeds of despair: towards a political economy of the seed industry in southern Africa." *Third World Quarterly* 22. 4 (2001): 657–673.
- 2 *Ibid.*
- 3 *Conservation agriculture and micro-dosing in Zimbabwe*. International Crops Research Institute for the Semi-Arid Tropics, 2013. http://www.ard-europe.org/fileadmin/SITE_MASTER/content/eiard/Documents/Impact_case_studies_2013/ICRISAT_-_Conservation_agriculture_and_micro-dosing_in_Zimbabwe.pdf (accessed September 21, 2014).
- 4 Twomlow, S. *et al.* "Lessons from the field – Zimbabwe's Conservation Agriculture Task Force." *Journal of SAT Agricultural Research* 6 (2008): 1-11.; FAO. *Conservation Agriculture*. http://www.fao.org/fileadmin/templates/tc/tce/pdf/Conservation_Agriculture.pdf (accessed September 21, 2014); Farming God's Way. *Farming God's Way Overview*. http://web.archive.org/web/20121229092702/http://www.farming-gods-way.org/FGW_files/Overview.htm (accessed September 21, 2014).
- 5 Email correspondence with Chris Woodring.

FRONT PAGE PHOTO:

Tsverukai Mudonde, a conservation farmer. © Chris Woodring