CONSERVATION AGRICULTURE IN TANZANIA

Location: Arusha Region, Northern Tanzania

The Eotulelo Farmer Field School participants increased yields dramatically and improved resource management through erosion-control technologies, sustainability measures, improved cattle and goat sheds, fodder planting, and new income sources.

CHALLENGE

In the late 1990s, northern Tanzania's Arusha region was encountering serious threats to farming and food security. As a result of crop failures and erratic rainfall, communities had increasing difficulties meeting their food needs through the year and were unable to pay for social services such as school fees and medicines.[1]

The fragile nature of the soil and land formation made the area highly vulnerable to erosion, which was eating into the fields. Herds of cattle roamed the area, eating whatever they could find. There were few trees left: the rest had been cut down for firewood. Poor farming practices, which failed to yield rewards for farmers, made soil erosion worse while the area experienced heavy soil structure destruction, soil fauna depletion, and soil moisture loss.

RESPONSE

In 2001, 20 farmers in Likamba launched their own self-help organization, the Eotulelo Farmer Field School (FFS). Eotulelo translates to "come and join us" in the local Maasai language. The original motivation to start the Eotulelo FFS came from experiences of the neighboring village, Ngorbob, where the Regional Land Management Unit (RELMA) had started working with the community on soil and water conservation in 1997.

The initial objectives of the Eotulelo FFS were to involve members in collective activities including soil erosion control, environmental protection (reduction of gullies), income generating activities and improving traditional agriculture to increase yield.

To meet these goals, the FFS participants conducted the following:

- Employed erosion-control technologies such as tree planting (including creating tree nurseries to raise and care for tree seedlings), construction of soil and water conservation structures, such as collecting ponds, and building of contour bunds.
- Adopted sustainability measures such as rain harvesting techniques, crop rotation, and inter-cropping (legume intercropping, especially of sweet beans and lablab was new for the farmers and was highly popular as it provided a very profitable and easy to sell crop).

- Received training on how to construct improved cattle and goat sheds and learned fodder-growing techniques including planting Guatemala grass on contours to serve as livestock feed and to stabilize the contours.
- Developed new income sources such as beekeeping, vegetable production, and raising chickens.[2]

After formally registering in 2002, the Eotulelo members approached the Arusha-based Selian Agriculture Research Institute (SARI) for assistance. SARI included Eotulelo in its broad initiative—the CA-SARD project (Conservation Agriculture for Sustainable Agriculture and Rural Development)—to use conservation agriculture to improve food security and rural livelihoods for small and medium scale farmers.

To determine best agricultural practices, the Eotulelo group rented an acre (0.4 hectare) of land as their field school site. After dividing the field into five plots, they experimented with a different combination of techniques. Each week, a subgroup checked on the crops in their plot and then reported back to the whole group. The entire group monitored the differences among the plots and discussed each subgroup's findings and solutions. By the end of the season, the farmers decided that it was best to rip the soil, then plant maize intercropped with *Lablab*. Ripping uses a chisel-shaped implement pulled by oxen to break the surface crust and open a narrow slot or furrow for planting, without disturbing the soil between the planting rows. This enables rainwater to infiltrate, while minimizing soil erosion. The *Lablab* covered the soil well, protecting it from the sun and rain, and reduced erosion dramatically. Ripping combined with maize and pigeon pea was also productive, though the pigeon peas took longer than *Lablab* to cover the soil. The ripped furrows allowed rainwater to seep into the soil, producing an excellent crop stand.

The farmers then implemented at least one of the three principles of conservation agriculture on their own land. The most popular practices were minimum soil disturbance (ripping or using no-till direct planters or jab planters) and keeping the soil covered (not burning crop residues, not allowing animals to graze freely, and planting *Lablab*). In mid-2005, 18 of the 22 group members ripped their fields; four rotated their crops; and all of them planted *Lablab*. During the regular weekly meetings, they were able to share their experiences and compare notes with the other group members.

Intercropped grains with legumes. © Michael Farrelly

RESULTS

- In Likamba, the project has directly benefited 22 households through the Eotulelo group. Indirectly, another 15 village households improved their livelihoods.[3] In Arumeru, Karatu and Bukoba districts, the benefits directly reached about 900 families and 300 indirectly.[4]
- Conservation agriculture has led to an increase in food security. Food availability data analyzed for 144 households impacted by CA-SARD between 2004 and 2006 showed that the number of households suffering severe food shortage declined from 75 percent in 2004 to just over 50 percent in 2006. The overall food deficit period declined from four months to three months.[5]
- Participating Likamba farmers found that their conservation agriculture fields produced 50 percent more than their conventionally plowed fields.[6]
- Crop production now provides a more viable business. Livestock produce manure—an average household has one cow, five goats and/or sheep, five chickens, and one donkey—and can be sold for quick cash needs. A maize-plus-*Lablab* intercrop provides food for the household as well as income. In an average season, a household harvests fifteen to twenty 100-kg bags of maize grain from one acre. A family with three acres harvests at least 4,500 kg (45 bags x 100 kg/bag) of maize grain and sells about 40 percent of this harvest. The same family would harvest up to five bags (120 kg per bag) of *Lablab* beans. *Lablab* is ranked first among legumes because it is highly drought tolerant and grows well as an intercrop. Additionally, the young leaves can be eaten as a green vegetable whereas *Lablab* beans can be made into *loshoro* (mixed with pounded maize plus

milk) or makande (mixed with pounded maize only). *Lablab* is also used as a medicine to cure various illnesses, and by pregnant and lactating women (to produce more milk). Finally, *Lablab* is a readily available fodder that women can harvest daily in fields to feed animals, saving time for other activities.[7]

- Crops grown with conservation agriculture were less vulnerable to drought than those grown in the conventional fields.[8] Rainwater seeped into the soil through the ripped lines, retaining soil moisture for longer. During the 2004 drought in Likamba, even though adequate cover was not attained, farmers who had ripped their land and planted *Lablab* with maize were able to harvest at least five to eight bags of maize per acre, while conventional farmers harvested nothing or less than a bag per acre.
- Households have also reported easy availability of water—both for domestic use such as washing clothes and utensils and for their livestock. Previously, villagers had to walk up to eight km to fetch water. Water availability extends beyond the practicing households, as even non-practicing neighbors can utilize water from the collecting ponds.[9]
- Conservation agriculture has resulted in less work. Ripping requires less labor than plowing—two people instead of three—and can be done a lot faster—in only one to two hours per acre versus two days for the same surface for plowing. Without plowing, the farmers could quickly sow their seed after the first heavy rain, which meant earlier harvest, thus avoiding the risk of drought at the end of the growing season. Those who practice conventional farming have to wait until the soil allows them to plow, resulting in a three to seven day delay.[10]
- Conservation agriculture also resulted in savings, as farmers reduced their use of inputs and saved money by not having to buy expensive fertilizers and herbicides.
- The Likamba farmers also learned management and financial skills and gained knowledge on various topics such as HIV/AIDs, goat raising, credit management, banana production, and building improved latrines.
- Coming together to adopt these conservation practices has enabled farmers, both individually and collectively, to take on new activities that provide them with immediate income. Farmers also used this opportunity to take on other communal activities such as pit latrine construction, raising chickens, and tending vegetable gardens.
- Communities have developed by-laws to control livestock grazing and bush fires.[11] These include measures for self-governance, which facilitate transparency and encourage collective responsibility and provide poor, female group-members equal voice and leadership opportunities.[12]

Conservation agriculture is a system of farming that conserves, improves, and makes more efficient use of natural resources, through integrated management of available soil, water, and biological resources. It combines three principles:

- Disturb the soil as little as possible rather than plowing.
- Keep the soil covered with cover crops, crop residues, or mulch.
- Rotate or mix crops—planting a cereal such as maize and a legume such as pigeonpea or lablab.

Conservation agriculture fields produced 50 percent more than their conventionally plowed fields.

Tree nursery at a primary school. © Michael Farrelly

Since launching its FFS, the Eotulelo group has actively encouraged other village members to try conservation agriculture, disseminating the practices at informal marketplace gatherings and church and funeral services.[13] In 1996, Eotulelo helped establish the Upendo Nyuki group in a neighboring village. In early 2005, Upendo Nyuki started its own FFS. All of its 24 members—10 men and 14 women—are now following the FFS process and conservation agriculture. The Upendo Nyuki group also convinced its village government to establish livestock management bylaws similar to those in Likamba village.[14]

In a farmer field school, farmers learn how to improve production by observing, analyzing, and trying out new ideas on their own fields. They meet every week from planting to harvest, to check on how the crops are growing, examine soil moisture, count the number of pests and beneficial creatures such as earthworms and spiders, and strategize possible solutions to the problems encountered.

Tree planting and protection. © Michael Farrelly

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ENDNOTES

1 Bwalya, M. *Self-assessing local good practices and scaling-up strategies of sustainable agriculture: Eotulelo Farmer Field School Group Likamba Village.* FAO, 2005. ftp://ftp.fao.org/docrep/fao/008/ag141e/ag141e00.pdf (accessed October 13, 2014).

2 Owenya, M. and M. Semlowe. *The Eotulelo Farmer Field School: Learning and promoting conservation agriculture.* FAO, 2006. ftp://ftp.fao.org/docrep/fao/008/ag140e/ag140e00.pdf (accessed October 13, 2014).

3 *Ibid.*

4 *Ibid.*

5 *Conservation Agriculture for SARD and Food Security in Southern and Eastern Africa (Kenya and Tanzania)*. FAO, 2006. http://www.fao.org/ag/ca/doc/ca_sard_web.pdf (accessed October 13, 2014).

6 Owenya, M. and M. Semlowe. *Op. Cit.*

7 *Sustainable agriculture: A pathway out of poverty for East Africa's rural poor: Examples from Kenya and Tanzania*. GTZ, Sustainet, 2006. http://www2.gtz.de/dokumente/bib/06-0712.pdf (accessed October 13, 2014).

8 Owenya, M. and M. Semlowe. *Op. Cit.*

9 Bwalya, M., *Op. Cit.*

10 Owenya, M. and M. Semlowe. *Op. Cit.*

11 *Ibid.*

12 *Ibid.*

13 *Ibid.*

14 *Ibid.*

FRONT PAGE PHOTO:
Magoye Rippers open narrow furrows without disturbing the soil. © Dr. Francis Njau