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Demonstration Plots as an Extension Tool

Putso Nyathi, CA Technical Officer, Southern Africa

Demonstrations are an effective extension tool used to inform farmers of a potentially useful technology. They are usually organized by extension personnel but implemented by farmers under typical farm conditions. Demonstrations are based on the notion that seeing is believing.

There are two types of demonstrations:

- **Method Demonstrations** show how to complete a task (e.g. how to make contours or how to dehorn cows).
- **Result Demonstrations** provide farmers with a way to evaluate a new technology based on its performance. In this article we will focus on result demonstrations for crop production.

For a result demonstration to be effective, there should be a technology which has already been shown to be advantageous, but which needs to be shared more widely. In this sense, they are different from experimental plots which are used to test unproven ideas (see our December, 2017 Newsletter).

How to lay out an effective demonstration

A demonstration should have the following characteristics:

- **Relevant** to the needs and interests of local farmers
- **Representative of the area** - In terms of soils, climate etc.
- **Accessible** – In a location frequented by local farmers, and the hosting farmer should be willing to allow others to come for learning.
- **Hosted by trustworthy farmers** - The host farmer should be trusted and respected in the community.
- **Secure** - Protected from theft, livestock, wild animals, etc.
- **A comparison plot should be nearby** - The new technology will be more convincing next to a traditional plot under the same conditions.

A cover crop demonstration plot in Zimbabwe

Who should manage the demonstration?

A demonstration can be hosted by an individual farmer or by a group of farmers. The advantage of a group demonstration is that more farmers can learn by doing. However, group demonstration plots sometimes suffer neglect when preference is given to personal fields instead of the group demo. Regardless, it is important for participating farmers to be involved in the planning of the demonstration and to understand its objectives.

Host farmers should receive training on how to lay out and plant the demonstration, and general management of the field. The Extension Agent should visit regularly to monitor the performance of the demonstration plot, provide advice, and making sure activities are done properly.

Promotion of demo plots

Demonstration plots should be well marked with signs in the local language explaining what is being shown. For effective knowledge transfer, demonstrations should be combined with field days and special events at stages where the effectiveness of the new technology will be most visible.

At the end of the season the demonstration should be evaluated, and this learning should be shared in the community. Even if the demonstration has not performed to expectation, there is always something to learn. Identify together with farmers what might have caused the outcome, what can be learnt, and how to improve it in future.

References:
Department of Agricultural Extension. 2016. Group Extension Approach. Chapter 10 in: Agriculture Extension Manual, Government of the People's Republic of Bangladesh.
Hancock, J. 1997. Extension Education: Conducting Effective Agricultural Demonstrations. University of Kentucky Cooperative Extension Service.

Fodder Production Complements CA Goals

By Neil Rowe Miller, CA Technical Officer, Eastern Africa

Competition between the needs of livestock and the need to keep soils covered is a common challenge with conservation agriculture throughout the world. Crop residues, grasses, and other foliage are valuable as animal feed as well as for mulching. This competition leads to difficult trade-offs for farmers who grow both crops and livestock. Worse yet, it can cause serious conflicts between pastoralists and crop producers.

Crop management strategies can help minimize this conflict. This might include managing crop residues so that livestock receive the highest quality material, and the rest is left for soil cover. In maize production, we encourage producers to cut the tops of their maize plants just after maturity (but before the grain has dried). Early-harvested maize tops, and the husks around the maize ears, provide a much higher quality forage than dry maize stover collected after grain harvest. The bottoms of the plants, which have low forage value, can be left for soil cover. Similar strategies can be used for other crops, but the principle is always the same: "Give livestock the best, Give the soil the rest!"

Another strategy for meeting the needs of both soils and livestock is to plant grasses or tree species which can be used for forage and/or mulch. Contour bunds, established to slow soil erosion, are often left bare without vegetation. By planting these bunds to grasses or trees, they will be much more effective barriers to soil erosion, and they will provide biomass for fodder and/or soil cover.

Historically, the most popular grass species for contour planting has been Napier grass (*Pennisetum purpureum*). Napier grass produces high amounts of biomass in environments where it receives adequate rainfall. It does not, however withstand drought conditions and repeated cutting as effectively as Guatemala grass (*Tripsacum laxum*). In recent years, Brachiaria grass hybrids have gained attention as a superior forage alternative to Napier grass, especially in drought-prone, acidic soils.

Fodder trees can also be planted on contour bunds, and nitrogen-fixing trees can produce even higher quality forage than the above grasses. *Calliandra calothyrsus* and *Leucaena* spp. are popular among dairy producers because of their high protein content. *Gliricidia sepium* is less palatable for livestock, but more drought tolerant, and also serves as excellent live fence posts since it can be planted from woody cuttings.

Key management strategies which can maximize the benefits of these forage species include harvesting

Kenyan farmers harvest and transport dried grasses for livestock feed.

early and drying for storage through the dry season. Similarly, wild grass species can be cut and dried during the rainy season, when they are most abundant and most nutritious for animals. Traditionally, farmers often allow plants to mature and dry before cutting, which may increase biomass and reduce labor, but results in a poorer quality forage. By storing high-quality forages as hay for the dry season, farmers can leave their crop residues for soil cover, and still have excellent feed for their livestock.

Table 1. Best-Bet Species for Tropical Forage Planting on Contour Bunds

Species	Uses	Planting details	Notes
Grass Species			
Napier grass *(Pennisetum purpureum)*	Fodder	Use cuttings @ 20 cm spacing	High biomass, can spread and compete with crops. Dies if cut too frequently.
Guinea grass *(Panicum maximum)*	Fodder	Use cuttings @ 20 cm spacing	Won't spread.
Guatemala grass *(Tripsacum laxum)*	Fodder		Drought tolerant.
Setaria *(Setaria sphacelata)*	Fodder	Sow seed after leaving dormant for 2 months	Won't spread, poor drought tolerance, withstands flooding, mid to high altitude.
Brachiaria grass *(Brachiaria spp.)*	Fodder	Sow seed after several months dormancy, seed viability is low. 100 g of seed plants 250-300 m Plant rooted tillers @ 25 cm spacing	Acid tolerant, poor drought tolerance, spreads if not controlled, interspecies hybrids are most vigorous.
Vetiver grass *(Vetiveria zizanioides)*	NOT edible for livestock	Separate shoots, cut 20 cm above roots, plant 15 cm apart.	Won't spread.
Tree Species			
Leucaena spp.	Fodder, N fixation	Scarify seed with boiling water, direct seed @ 10 cm spacing. 100 g of seed plants 2-500 m	*L. leucocephala* = lowland, *L. diversifolia* & *L. pallida* = highland
Gliricidia sepium	Fodder, N fixation, fencing	Seed loses viability quickly, do not scarify, plant woody cuttings @ 20 cm spacing	Lowland species (0-1500 m), highly drought tolerant
Calliandra calothyrsus	Fodder, N fixation	Soak in cool water 48 hrs, direct seed @ 10 cm spacing. 100 g of seed plants 100 m	
Sesbania sesban	Fodder, N fixation	Scarify seed with acid or abrasion, plant @25 cm spacing	Short lived (<5 yrs), grows well in a wide variety of conditions
Tree Lucerne *(Cytisus proliferus)*	Fodder, N fixation, firewood	Scarify seed with boiling water, direct seed @ 20 cm spacing. 100 g of seed plants 500 m	Acid tolerant, susceptible to waterlogging

Partner Profile: African Christian Church and Schools

By Neil Rowe Miller, CA Technical Officer, Eastern Africa

The African Christian Church and Schools (ACC&S) was founded in 1948 with an emphasis on educating its members in addition to preaching the gospel. Today, ACC&S has grown to 150 churches, with approximately 50,000 faithful in central and eastern Kenya. The church's development wing takes an integrated approach, including HIV/AIDS awareness, curative and preventive health care, water development, and agriculture. Its mission statement includes "transformation of human life in all its dimensions in order to enjoy life to its fullness as promised by Christ."

Following a 2009 food relief project in Maai Mahiu. ACC&S identified a need for longer term solutions. With support from Canadian Baptist Ministries and CFGB, a four-year sustainable food security project emerged, including CA to address the changing climatic conditions. A second project began in Embu in 2014, reaching 600 farmers with CA training and provision of drought tolerant varieties of maize, pigeon pea and cowpea. The Embu team works closely with the Kenya Agriculture and Livestock Research Organization (KALRO), which conducts CA research and training. By year two of the Embu project, 478 farmers were applying all three principles of CA on at least 1/4 acre. Many farmers are using CA on 0.5-2.0 acres (100% of their farm) and have thus moved from "implementation" to true "adoption" of CA as their preferred method of farming. The first cohort of farmers

Maua and Paul Kamata, 4th year CA farmers, plant Brachiaria grass

will graduate in 2018, and 60 of them will be selected as lead farmers to train a second cohort of 600 farmers as part of a three-year extension project.

During the initial three-year project, food security indicators improved and crop yields increased dramatically with use of CA methods. Minimum tillage using planting basins was particularly successful with many areas abandoning conventional tillage entirely. Soil cover has been more challenging. Consequently, the follow-up project will include training on how to reduce competition between crop residue as cover and as livestock feed. Improved forages including *Brachiaria* hybrids, *Calliandra* and *Leucaena* will be promoted as fodder crops. Cover crops have been promoted, but uptake was relatively low with pigeon pea and cowpea being most successful.

Extension methods have included training seminars, demonstrations, field days and farmer exposure visits. ACC&S Embu has made a deliberate effort to involve and empower women which resulted in a large number of women purchasing hermetic (PICS) grain storage bags without waiting to be given by the project. In 2015, Embu CA farmers harvested a bumper crop of maize. After hearing about crop failures due to drought in nearby Ukambani, they responded by collecting 3.6 tons of maize for distribution to their less fortunate neighbors. In 2016, Embu CA farmers donated 4.5 tons of maize for local children's homes. They are proud to have moved from being recipients to being donors!

Discussions from the Network

Mikael Norton: In Zimbabwe we are trying to identify why in some instances we are getting a drop in yields on the long term after conversion from conventional to CA practices. We suspect this is related to soil acidity, which is exacerbated through microdosing and intensification. Has anyone else found similar effects?

Matt Gates: Are you liming?

Deo Shirima: First you have to do soil analysis to know...then if it's acidity liming is the solution.

Matt Gates: Could also be N immobilization, not acidity. You may need to slightly increase N application in the short term.

Neil Miller: I agree on the importance of testing. In general, CA tends to increase soil organic matter which buffers pH compared to a lower OM soil. So over the long run, you should have less pH problems, not more. But stop wondering and get a soil test!!

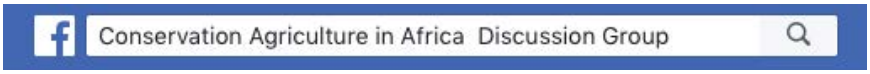
Mikael Norton: The most problematic soils are sandy textured which do not accumulate organic matter well. 80% of our communal soils are below pH 5 and 10% below pH 4...Lime can take up to 5 years to reach 10cm down (if applied to the surface)...Soil acidity is not a big issue elsewhere in SSA. But it will be in years to come.

Matt Gates: The irony is that you may have to till to lime effectively.

Mikael Norton: Yes strategically using tillage in rotation with CA may be necessary. This can also benefit controlling perennial weeds, and is something that No-till farmers in Western countries are starting to do.

Kjell Bjørgen Esser: There is no obvious reason for pH to be significantly different in CA and conventional fields. Our research in Zambia shows no pH effect of CA.

The CA Technical Officers manage a Facebook Discussion Group from which the above conversations were copied. If you'd like to join the discussion, sign up at www.facebook.com/groups/CAinAfrica.



CA Technical Officer Travel Schedules

PUTSO NYATHI

March 9-17, 2018
Lilongwe, Malawi
CFGB Annual Conference

May 6-12, 2018
Tete, Mozambique
Project Evaluation & Gender Training

May 27 - June 2, 2018
Johannesburg, South Africa
CFGB Situational Assessment Training

JEAN TWILINGIYUMUKIZA

March 1-3, 2018
Nairobi, Kenya
CFGB CA Annual Conference

March 19-23, 2018
Bukavu, DR Congo
CEPAC CA Project visit

May 21-25, 2018
Kiramutse, Rwanda
CA & Sustainable Farming Workshop with ECHO

NEIL ROWE MILLER

March 1-8, 2018
Nairobi, Kenya
CFGB CA Annual Conference
ACC&S CA Project Visit

March 9-17, 2018
Lilongwe, Malawi
CFGB Annual Conference

April 9-12, 2018
Tharaka Nithi, Kenya
NCCK CA Project Visit

May 13-19, 2018
Arba Minch, Ethiopia
SCORE CA Project Visit

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