CONSERVATION AGRICULTURE NEWSLETTER

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Farmer Experimentation

Putso Nyathi, CA Technical Officer for Southern Africa

Although participatory approaches have been in existence for quite a while, extension agents still promote technologies to smallholder farmers that have been tested with on-station trials, but have not been tried in farmers' contexts. Extension approaches are often prescriptive, instructing farmer-recipients what to do and what not to do. Development practitioners often undervalue local knowledge and the ability of farmers to adapt technology to local conditions. This results in low adoption and/or poor performance of innovations being promoted.

Encouraging farmers to experiment is crucial in ensuring that new technologies are owned by local farmers and adapted to local conditions. Farmer experimentation has many advantages:

- The conditions are realistic, so the technology is tested in real-world conditions.
- Farmers will choose to test things that they value, and feel they can do and afford.
- People learn best by discovering for themselves, rather than being told or watching someone else.
- Farmers can use the same approach to test other innovations.
- Their results will be more credible to other farmers than researchers' results.
- Instead of being passive participants in research, they own the process.

Development agents can encourage experimentation by:

- Prioritizing problems together with farmers before introducing a technology
- Identifying solutions to problems together with farmers
- Helping farmers to test which identified solutions work best in their area
- Encourage experimentation as a group, like in farmer field schools, or individually

Farmers should experiment on a modest-sized portion of their farm. A 20 x 20 m plot, for example, is not big enough to cause undue risk or draw management resources from their main farm, yet it is not so small that they underestimate labour or overestimate yield.

Make sure the plots are as uniform as possible. If a portion of the field had a legume as the previous crop, for example, either all or none of the treatment plots should include part of the area covered by the previous legume crop. Experiments should be conducted on uniform soil, with no anthills and away from trees. The main reason for maintaining uniformity is to avoid introducing other factors other than the one we are testing.

Inyenyeri FFS in Rwanda experiments with different combinations of mulch and fertility

Be sure all plots receive the same management except for the treatment variable (mulch level in the example below). All plots should be planted at the same time, receive the same fertility, the same crop/variety, etc.

Include a meaningful control plot. Many CA projects have farmers begin by planting a CA plot beside a conventional control. This is a good way to document the initial benefits of CA. If farmers are convinced of the value of CA, they should use last year's CA technique as their control, and experiment with other factors (e.g. intercrops, plant spacing, fertility inputs, etc.) which may improve and adapt CA to their local context.

Experiments should be as simple as possible. Avoid introducing many treatments into the experiment. In the above example, the only variable is mulching. If we had also varied tillage methods, it would have increased the number of plots and complicated the experiment.

Farmer observations and data should be collected on a regular basis. Measurements to be taken are guided by the objective of the experiment - what you want to learn or address. Train farmers to record their observations, and consider supplying them with a record-keeping form.

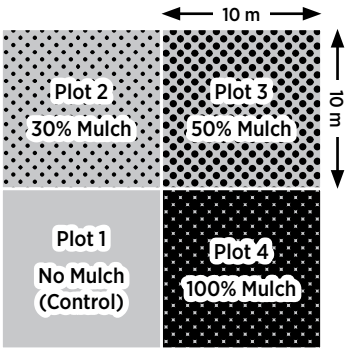
Evaluate results together with farmers. What differences did they notice between the tested technologies (e.g. drought tolerance, growth habits, days to maturity, pest incidence, yield, weed density etc.) What did they learn, what will they apply, and what modifications will they make? These evaluations can take place individually or in a group.

Non-field based experiments, such as storage methods or livestock management, also follow the same basic guidelines listed above: Start on a small scale, compare options with a traditional control, select uniform treatments, take observations, and conduct evaluations.

Example: How to layout a mulching experiment

Objective: This is a simple experiment to test the effects of mulching levels on weed pressure.

	Plot 1 (control)	Plot 2	Plot 3	Plot 4
Summer land preparation under the same tillage system	Planting Basins	Planting Basins	Planting basins	Planting basins
Treatments	No mulch (control or normal practice)	30% soil cover	50% cover	100% cover



Fall Armyworm: A New Threat to African Food Security

By Neil Rowe Miller, CA Technical Officer, East Africa

Fall Armyworm (FAW), or *Spodoptera frugiperda*, first arrived in West Africa in 2016, but has spread throughout most of sub-Saharan Africa in the past year. FAW damage has been mostly confined to maize fields up to now, but its host range includes 80 other crops, raising concerns of widespread damage in the coming year.

Take action when the caterpillars are young: Armyworms can devastate maize and other crops if not controlled at a young age. In maize, during the first half of their life, the caterpillars feed on the surface of the plant, or in the upper part of the funnel. This is when control methods

Figure 1. Stalk borer (left) and Fall Armyworm (right): Note difference in color of the inverted "V" on head capsules and the square of spots (red arrow) on the rear segment of the FAW.

are most effective. Once armyworms grow larger than about 15 mm, they enter deep into the funnel, or bore into the stalk or cob where they're much more difficult to control because sprays can't reach them. For these reasons, you should begin scouting maize fields when the plants are 20 cm tall, and continue on a weekly basis.

Keys to identification: In order to distinguish FAW from other caterpillars, you should look for two characteristics: First, armyworms have a light cream to yellow colored, inverted "Y" on their heads (**Figure 1**). Stalk borers have an inverted "Y" but it is darker in color. Secondly, the FAW has sets of 4 spots on each body segment that distinguish it from the African Black Armyworm (*S. exempta*). These spots are arranged in a square on its 2nd to last body segment, but in a trapezoid shape on the other body segments.

Since you need to identify these features when the caterpillars are very small, you may need a magnifying glass. It is very difficult to distinguish between FAW and other caterpillar species based on color alone, since the color of each species can vary significantly (**Figure 2**). For more on FAW identification, consult the CABI-Plantwise website.

Figure 2. Variation within species can make them difficult to distinguish based on color alone.

Fall Armyworm management: As noted above, the first principle in FAW management is to identify their presence and take action early. According to a CABI review, treatment may be warranted if plants are still in vegetative stages, and more than 5-20% of plants have FAW feeding (the threshold rises as plants get older). On sorghum, the treatment threshold is higher (1-2 larvae per plant). Spray in the late afternoon since FAW larvae are active at night, and recheck your fields 2-3 days after spraying to judge whether your treatment was effective.

Because FAW can produce a new generation of caterpillars in 30-45 days, one treatment may not be sufficient. Also, if your neighbors don't manage their FAW effectively, they may migrate to your field next, so try to mobilize your entire community when a problem arises.

Because FAW populations quickly become resistant to insecticides, use a different class of insecticide (synthetic or natural) each time you spray, or better yet, spray insecticides with different modes of action together at the same time. Consult your local extension specialists for specific recommendations of insecticides available in your area.

Although FAW is new to Africa, we can expect that it will remain with us for the foreseeable future. We need to develop management strategies that will remain effective for many years to come!

Partner Profile: Spiritan Community OutReach in Ethiopia (SCORE)

By Neil Rowe Miller, CA Technical Officer, East Africa

The Catholic Church of Gamo-Gofa and South Omo have been running development activities since 1979. In 2009, Spiritan Community OutReach in Ethiopia (SCORE), their development agency based in Arba Minch, approached CFGB through CAFOD, SCIAF and Trócaire (CST), the development agencies of the Catholic Church of England-Wales, Scotland and Ireland and the Canadian Catholic Organization for Development & Peace (CCODP) for support for a Conservation agriculture (CA) project in Gamo-Gofa. A four-year project proposal was approved by CFGB in January, 2017.

Kibe Kifle shows off his excellent CA faba bean and barley crops.

SCORE has more female animators (lead farmers) than men.

The project focuses on five kebeles near Arba Minch, most of which lie at 2,000–2,500 metres above sea level. In the 2017 season, 20 farmers were trained in each kebele, and while most of them planted CA maize, roughly 20 farmers planted wheat or barley, and many planted faba bean on smaller CA plots.

The first season of any new CA project is challenging, but 10 Animators (Lead Farmers) and 100 farmers were trained, and despite some initial skepticism, virtually all have tried CA this year. Farmer enthusiasm is palpable, and many new farmers are interested to join the project in 2018.

A culture of learning exists among SCORE staff and farmers. Most of their CA plots have a control plot with the same crop nearby. These comparisons are a valuable learning tool, and also a good way to convince people of the value of the CA techniques being used. Staff have also conducted soil testing and cover crop trials with faba bean and climbing common beans.

Developing methods of CA for small grain cereals may be among SCORE's most significant learning experiences. Barley, wheat and teff dominate agriculture in the area, and farmers have reduced their tillage from five passes to just one pass with the traditional maresha plow, followed by use of a hoe to prepare lines for sowing seed. One of the most impressive differences between CA and conventional plots is a marked improvement in weed control. Farmers consistently state that weeding was easier since the crop was planted in rows.

Interest in vegetable (kale) production under CA is also growing, and since kale is a cash crop grown primarily by women, its production under CA accomplishes other positive objectives beyond soil improvement and sustainability. The project is also to be commended for promoting women's leadership by hiring more female than male animators.

SCORE has made a remarkable start in this first year. Challenges will mount as they add 400 more farmers in 2018. However, given the high level of commitment and creativity of everyone from CST down to the farmers, I believe they are up to these challenges!

Discussions From the Network

Neil Rowe Miller: Spiritan Community OutReach in Ethiopia (SCORE) has less than one year of CA programming experience, but they're already helping re-write the book on small-grain CA methods. This year 20 farmers planted wheat or barley with CA and many planted faba bean on smaller plots. The project is also to be commended for promoting women's leadership by hiring more female than male animators.

Putso Nyathi: Sounds like a lot of adaptation of the CA package is happening here

Peter Woolner: Lot's of potential to share experience!

Kennedy Chipoya: Can you extend the project into Zambia?

Frew Beriso: SCORE is doing a good job. Congratulations!

Assegid Gebrewold: SCORE confirming that CA works in all agro-ecology. Right?

Hizkel Toru Haniche: Go on! I appreciate your idea practicing CA in other crops rather than corn.

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.

CATO Schedule

PUTSO NYATHI

17-22 December, 2017
Kwazulu Natal South Coast Port Edward- RSA
MCC Retreat

8-12 January, 2018
Megaliesburg, RSA
MCC Indaba Workshop

21-27 January, 2018
Zimbabwe
Partner visits

11- 16 February, 2018
Malawi
Partner visit

JEAN TWILINGIYUMUKIZA

11-15 December, 2017
Bujumbura, Burundi
Help Channel Burundi project visit

15-19 January, 2018
Ouagadougou, Burkina Faso
ODE Field Staff Workshop

22-26 January, 2018
Monrovia, Liberia
WRC Partners' training workshop on Situational Assessment

5-9 February, 2018
Musanze, Burera, Bugesera and Kirehe, Rwanda
AEBR & PDN Projects visits

21-23 February, 2018
Kigali, Rwanda
CFGB Annual CA gathering for Central and West Africa

NEIL ROWE MILLER

11-15 December, 2017
Bujumbura, Burundi
Help Channel Burundi project visit

January, 2018
Lake Zone, Tanzania
Project visits

27 February – 1 March, 2018
Machakos, Kenya
CFGB Annual CA gathering for Eastern Africa