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Conservation Agriculture with Vegetables

Putso Nyathi, CA Technical Officer, Southern Africa

Conservation Agriculture (CA) has been promoted in Africa with crops such as maize, sorghum, pearl millet, cowpeas, groundnuts, some green manure cover crops and lately with root crops. Although CA can be applied to vegetables, fewer CFGB partners are promoting CA with vegetables than with grain crops. The application of the three CA principles of minimizing soil disturbance, maintaining soil cover, and rotating or intercropping; coupled with timely and efficient management in the production of vegetables; can help: 1) reduce labor for watering and land preparation; 2) increase production as well as incomes; 3) improve the nutrition of small holder farm families. Vegetables provide essential vitamins and nutrients in quantities not found in most of Africa's staple starchy foods. It is therefore imperative that we consider how to apply CA principles with these crops.

Minimum Soil Disturbance

The first principle of CA is to disturb the soil as little as possible. There are many ways that tillage can be minimized. The most common methods for most small holder farmers are digging planting basins, use of dibble sticks, and use of rippers. Planting basins allow for efficient use of water as the farmer only waters the basin and makes efficient use of soil fertility amendments such as manure or compost.

Raised beds in Mdumezulu, South Africa.

Minimum soil disturbance can be maintained on permanent raised beds commonly used for vegetable production. Once a raised bed has been formed, there is no need to keep on making new beds in subsequent seasons. Instead, farmers grow their crops in the same beds year after year, reducing the labour of digging new beds and improving soil quality. In areas prone to waterlogging, permanent raised beds are particularly effective.

Soil Cover

Farmers can use grass, crop residues, tree leaves, wood shavings and even non-organic materials such as plastic mulch to cover the soil. In irrigated vegetables, mulching reduces the frequency of watering, and allows vegetables to be grown later into the dry season

when prices are highest. Other benefits of mulching include protection of soils from direct sunlight, creating a micro-environment conducive for crop growth through buffering of soil temperatures, preventing weed growth, improving soil fertility, increasing water infiltration, and reducing rain drop impact and erosion. In Mozambique, where mulching material is scarce, the Christian Council of Mozambique, a CFGB/MCC Partner, trains farmers to target mulching material immediately around the plant instead of spreading it all over the soil surface.

Crop Rotation and Intercropping

The principle of crop diversification can also be applied to vegetables. Farmers should grow different types of vegetables in the same field, either through crop rotation or intercropping. In planning a rotation, it is important to understand the growth pattern of your vegetables and their plant family. Deep rooted crops should not follow each other, because they feed from the same root zone and can deplete nutrients at that root level. Vegetables of the same family should not follow each other because they can often be attacked by the same pests and diseases. For example, tomatoes should not follow potatoes, peppers or eggplant in a rotation as they are all in the solanaceous family. Neither should kale follow cabbage nor broccoli as they are all in the brassica family, and this depletes nutrients and allows pest and diseases to thrive.

Although there are many ways in which vegetables can be classified, including according to taxonomy/family or according to use of plant parts, in this article, vegetables are classified into four simplified categories based on their edible parts to help you plan your rotations.

Type	Description	Examples
Root crops	Edible parts produced underground	Carrots, sweet potato, onions, garlic, beetroot, potato
Leafy greens	Edible parts are leaves, stems, or buds	Kale, cabbage, spinach, lettuce, amaranth
Fruiting crops	Produce edible fruits which can be eaten cooked or raw	Tomatoes, peppers, eggplant, okra, squash
Legumes	Produce seed and also fix nitrogen in the soil	Beans, peas

Intercropping is also encouraged with vegetables as it maximizes production from one piece of land. One common intercrop is growing onions or garlic with leafy vegetables such as kale or lettuce. This helps to control pests through the repelling effects of onions and garlic. The best intercrops combine crops of differing growth habits and maturity together. For example, fast growers such as beans, lettuce, or spinach can be intercropped with late growers such as maize, cabbage, kale, or tomatoes. In the hot season, intercropping tall plans like maize can provide dispersed shade for less heat-tolerant crops like tomatoes.

Management

Timeliness in planting, irrigation scheduling, pest and disease control, soil fertility management are all important for successful vegetable production. Whereas they are not part of the three CA principles, they should be followed as complementary practices.

References

Ben G. Bareja. 2015. What are the Different Types of Vegetables, Their Distinctions?
Dryden G.W. 2013. Farming God's Way Vegetable Guide

Facilitation Methods for CA Promotion

Neil Rowe Miller, CA Technical Officer, Eastern Africa

Newcomers to our conservation agriculture (CA) training workshops are sometimes surprised to find that our facilitators present more questions than facts! We firmly believe that the best learning comes when facilitators and participants join together in a genuine dialogue. Facilitators may bring knowledge of the scientific world, but farmers best know the reality of their local community and farming system. In a question-posing approach, lectures (where a teacher talks and the students passively receive information) are replaced by genuine dialogue. All parties discuss the reality of their lives and work together to identify solutions and action plans. Since CA systems are complex and location-specific, it is especially critical that they are developed and promoted using such farmer-participatory processes.

How Does Question-Posing Facilitation Work?

This approach, which grows out of the work of Brazilian educator Paulo Freire and others, relies on asking critical "open-ended" questions, for which there are many possible answers, rather than "leading questions," which a teacher might use to lead a student to a pre-determined answer. It is crucial for the facilitator to allow the group members to take time to present their ideas, and only add to them if the group is struggling to fully understand the issue being discussed. Posters and farmer booklets can help these discussions by illustrating the issue at hand, but they should also be used in a question-posing mode, allowing participants to discuss and discover what they represent rather than to have the facilitator explain what they mean.

Ultimately, the question-posing process should lead participants to develop an action plan for their own farms and communities. After putting their plan into practice, they should return and discuss what they have learned from their experiences. This cycle of reflection

followed by action, followed by more reflection should be repeated throughout the training period and will result not only in profound learning, but also a high degree of ownership by the farmers of the solutions which they have helped to develop.

Tips on facilitating a question-posing training

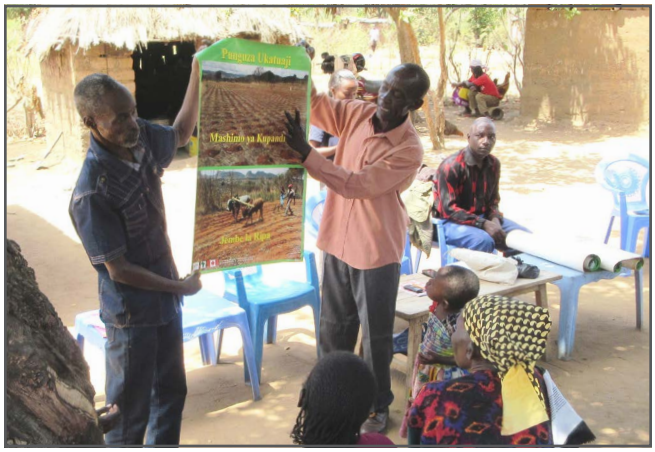
- In order to allow all participants to contribute to the discussion, groups should never be larger than 25-30 farmers. An ideal group size is 15-20 farmers.
- These lessons MUST be taught in the mother tongue/local language. Spend time researching and preparing terminology that all villagers will understand. Do NOT use technical terms you may have learned in another language.
- Prepare yourself thoroughly to ask the critical questions in your training outline, but be ready for group members to take you in other directions! If participants raise unexpected, but related issues that contribute to the learning process, let the discussion flow in that direction. If, on the other hand, a participant raises an issue that distracts from the topic at hand, bring the discussion gently back on track.
- Prepare yourself thoroughly by reading background resources and discussing with your colleagues and mentors, but be ready to say "I don't know" when participants raise questions beyond your experience. They will respect you more if you tell them you will return with an answer, than if you try to make something up!

Roles of a Facilitator: In order for a facilitator to lead an effective learning process, they need to do the following:

1. Ask critical questions that lead the group to discuss and analyze their situation or a problem they want to resolve
2. Keep the discussion on track
3. Allow **all** participants to be heard, including women and youth
4. Summarize the conclusions of the group

Qualities of a good facilitator

- A good listener
- Values farmers' opinions
- Does not lecture but instead facilitates
- Pays attention to gender and other social dynamics: youth, different ethnic groups, poor and rich, etc.
- Technically competent and resourceful
- Trusted by farmers



Lead farmers facilitate CA training in Tharaka-Nithi, Kenya.

Resources for Question-Posing Training Approaches

CA Facilitator's Guidebook: Core Curricula Complete www.caguide.act-africa.org
Freire, P. 1970. Pedagogy of the Oppressed. New York: The Continuum Publishing Corporation.
Global Learning Partners: www.globallearningpartners.com/resources
The Freire Institute: www.freire.org/paulo-freire/concepts-used-by-paulo-freire

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Partner Profile: Peace and Development Network - PDN/Rwanda

Jean Twilingiyumukiza, CA Technical Officer, Central & West Africa

Peace and Development Network (PDN) is a network of five local organizations, each with a long history of peace and community development in Rwanda, which joined together in 2013. PDN has been partnering with Mennonite Central Committee (MCC), a CFGB member, since its inception. Although PDN is based in Kigali, its five member-organizations are based in five different districts of Rwanda.

PDN's members share a commitment to peace in Rwanda and believe that food security and economic well-being is an indispensable component of this mandate. Early in its history, PDN partnered with MCC to form Village Savings and Loans Associations as a tool to fight against poverty by improving the savings culture and provide loans.

Conservation agriculture (CA) programming started in 2013 with support from MCC and CFGB. The project operates in eight districts, training small holder farmers on CA, and currently reaches 2,072 farmers, of which 1,403 are women. It uses Farmer Field Schools (FFS) where each group garden becomes a hands-on classroom for training and

FFS group in Rubavu experiments with CA potatoes on their study plot.

experimenting with different techniques. The project also integrates other best agronomic practices, such as soil fertility management and proper plant spacing.

The FFS experiments and CA practices are used for the predominant crops grown across Rwanda including beans (bush and climbing), maize, potato and vegetables (carrots, cabbage, onion, amaranth, etc.) CA adoption has increased dramatically, mainly due to the dynamic, well-formed, and trained FFS groups. The effect of CA is greatest in districts with low rainfall. CA vegetable production is most widespread at higher altitudes in the districts of Gicumbi, Burera and Rubavu.

The project's long-term goal is to increase its participants' months of adequate food provisioning from historical levels of 7.6 months (women) and 7.9 months (men) to 11 months. Since achieving food security demands more than increased production, PDN is incorporating nutrition and gender topics into their new training project. CA vegetable production in kitchen gardens will take a foremost place in such trainings since they are typically controlled by women, and contribute directly to household nutrition.

Discussions from the Network

Assegid Gebrewold: Small holders are trying CA with animal drawn tools in southern Ethiopia, It reduces labor and time.

Fidel Apraku: I'm interested in the implement and how it work. It looks like a ripper to me.

Assegid Gebrewold: The tool is mounted on the existing local plow by removing wings to reduce pulverizing the soil.

Carl Wahl: Where are you working? There might be some potential to link you with our Concern Worldwide staff in Wolaita.

Assegid Gebrewold: I'm happy to hear this, I'm working for Terepeza Development Association. We introduced CA in 4 districts of Wolaita Zone.

Carl Wahl: That's great, we are also in Kindo Koysha and Humbo. I will link you to our team.

Markos Bassa: Does CA start by ploughing the land?

Carl Wahl: Ripping is best described as only ploughing where you want the seeds to be planted and leaving the rest of the ground untouched.

Putso Nyathi: Thanks for sharing. Good adaptation of CA to local context.

Areg Peter: Wow nice to see this!

Conservation Agriculture in Africa Discussion Group

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

9-15 September
Machanga, Mozambique
CA training for MCC Partner

6-8 October
Nairobi, Kenya
CA Team meeting and planning

9-13 October
Johannesburg, South Africa
2nd African Congress on CA

21-24 October
Mwenezi, Zimbabwe
FRB partner visit

25-26 October
Masvingo, Zimbabwe
Christian Care Visit-Tentative

29 October-3 November
Gwanda and Binga, Zimbabwe
CDS and KMTC CFGB Partner visit

Late November (Tentative)
Northern Malawi
Partner visit with PWS&D

NEIL ROWE MILLER

2-6 September
Entebbe, Uganda
CFGB Climate Resilience Project Planning

30 September-5 October
Nairobi, Kenya
Scale-Up CA Mid-Project Reflection

6-8 October
Nairobi, Kenya
CA Team meeting and planning

9-13 October
Johannesburg, South Africa
2nd African Congress on CA

21-31 October
Toronto, Ontario
CFGB Member Meetings and Growers Group presentatons

19-23 November
Tharaka Nithi, Kenya
NCCK Partner visit with UCC

JEAN TWILINGIYUMUKIZA

13-14 September
Nyaruguru-Kiramutse, Rwanda
Partner visit and follow up

24-28 September
Koti, Burkina Faso
Project field visit

1-5 October
Ouagadougou, Burkina Faso
CA and Gender Training

6-8 October
Nairobi, Kenya
CA Team meeting and planning

22-26 October
Katana, DR Congo
CA Project visit with CEPAC

4-10 November
Goma and Bwito, DR Congo
Projects Visits to ECC & CBCA

19-23 November (Tentative)
Bujumbura, Burundi
CA Training, Help Channel Burundi