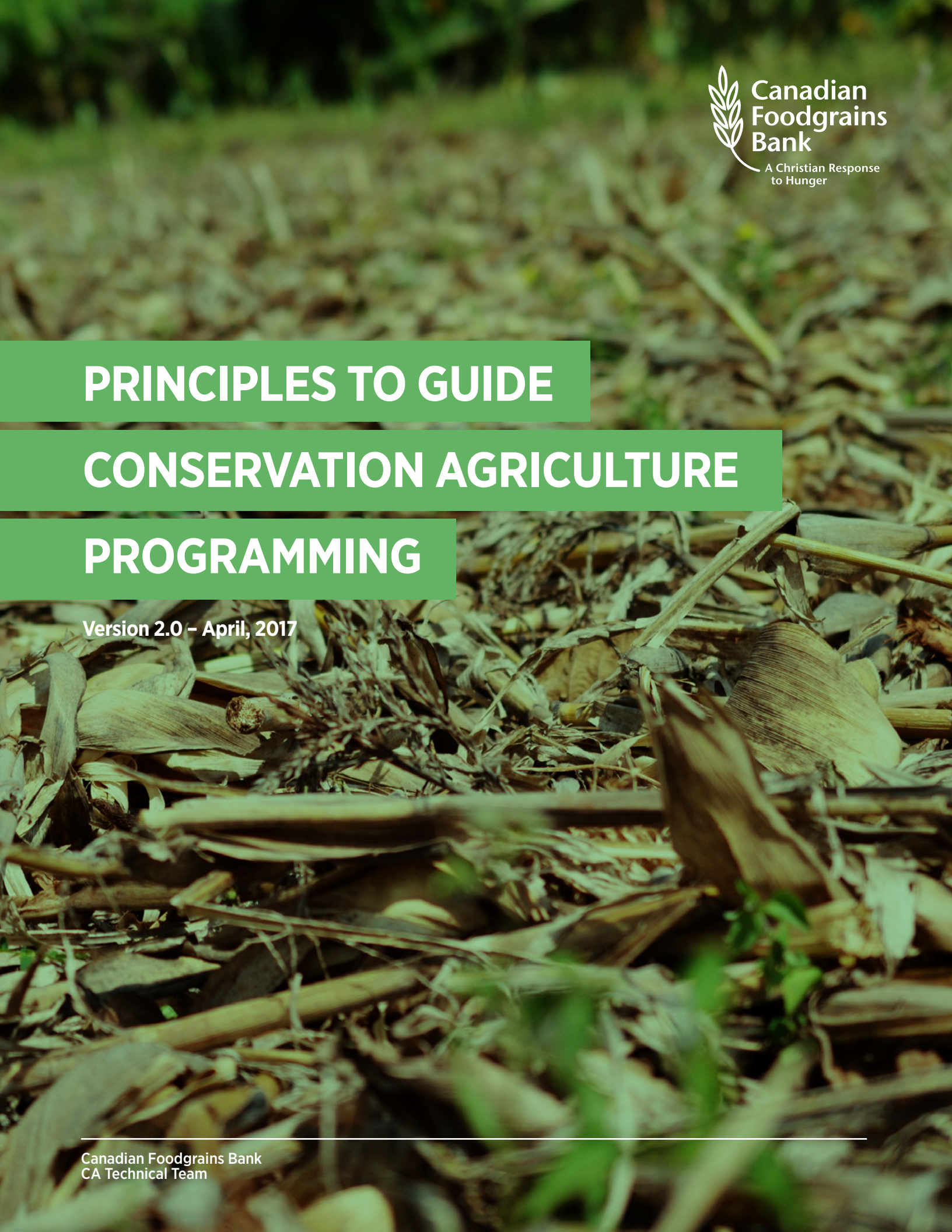

Canadian Foodgrains Bank
A Christian Response to Hunger

PRINCIPLES TO GUIDE CONSERVATION AGRICULTURE PROGRAMMING

Version 2.0 – April, 2017

Canadian Foodgrains Bank
CA Technical Team

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Conservation Agriculture (CA)—characterized by the three linked principles of minimizing soil disturbance, permanently covering the soil, and including crop rotations and associations – has proven effective at restoring soil health and fertility, improving the capture and use of rainfall, and increasing crop yields and farm profitability. Scientific studies and farmer experience have also shown it can improve food security, reduce labour requirements (thus leading to significant benefits for female small-scale farmers), and help build farming systems that are more resilient to climate change. In the semi-arid regions of Africa where much of Canadian Foodgrains Bank programming is focused, CA practices have been shown to improve soil moisture and fertility and lead to substantial yield gains.

Over the last decade, partners of the Canadian Foodgrains Bank network have implemented over 50 CA projects in many different countries across sub-Saharan Africa. This momentum has stimulated the creation of resource materials, annual meetings and other opportunities to share and learn together, and the hiring of six full time CA technical officers.

This CFGB technical team has been collecting learnings and experience of partners, reviewing scientific literature, and talking to others involved in CA programming. They've used these learnings to date to develop the following list of basic principles to guide CA programming. Please note that these are principles (general truths that guide action) and not laws (hard and fast rules about what to do). Accordingly, these principles need to be worked through, used, and adapted to specific situations. We would greatly appreciate your feedback and thoughts on these principles, as we expect to update these on a regular basis.

CFGB CA TECHNICAL TEAM
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INTRODUCTION

Canadian Foodgrains Bank, in conjunction with its members and their partners around the world, works to end global hunger in part by supporting international programs to meet immediate food needs, reduce malnutrition, and achieve sustainable food security. Our experience to date with Conservation Agriculture (CA) – characterized by the three linked principles of minimizing soil disturbance, permanently covering the soil, and including crop rotations and associations – has shown that CA has the potential to significantly contribute towards this goal. CA has proven effective at restoring soil health and fertility, improving the capture and use of rainfall, and increasing crop yields and farm profitability. Scientific studies and farmer experience have shown it can improve food security, reduce labour requirements (thus leading to significant benefits for female small-scale farmers), and help build farming systems that are more resilient to climate change. In the semi-arid regions of the world where much of Canadian Foodgrains Bank programming is focused, CA practices have been shown to improve soil moisture and fertility and lead to substantial yield gains.

Over the last decade, partners of the Canadian Foodgrains Bank network have implemented more than 50 CA projects in many different countries across sub-Saharan Africa. This momentum has stimulated the creation of resource materials, annual meetings and other opportunities to share and learn together, and the hiring of six full time CA technical officers.

This CFGB technical team has been collecting learnings and experiences from partners, reviewing scientific literature, and talking to others involved in CA programming. They've used these learnings to develop the following list of basic principles to guide CA programming for small-holder farmers. These principles are meant to improve the overall effectiveness of our CA programming, and to help ensure that CA contributes towards achieving our overall goal improved food security and strengthened food systems. To facilitate the use of these principles, we've divided them into 4 sections relating to the 4 basic project phases (see Figure 1).

The Canadian Foodgrains Bank is a partnership of Canadian churches and church-based agencies working to end global hunger. As a faith based agency, good stewardship of creation is an important foundational principle of our work.

Our CA programming focuses on smallholder farmers in food insecure, mostly marginal lands where CA can play an important part in not just improving the productivity and profitability of farming systems, but also improving the overall sustainability, equitability and resilience of the farming systems that people's livelihoods depend on.

Jane Wajicko, from Murang'a County, Kenya showing off her conservation agriculture field

Figure 1: The Project Cycle

ASSESSMENT

The first step in the project cycle is developing a thorough understanding of the local situation (generally referred to as a situational assessment). A situational assessment is a multi-stakeholder process through which individuals and organizations jointly assess constraints and opportunities, explore each other's perspectives and perceptions, and create a common understanding of the local food security situation.

PRINCIPLE 1: START WITH ASSESSING THE LOCAL SITUATION

While the general principles of conservation agriculture (permanent soil cover, minimal soil disturbance, and crop rotations and/or associations) are applicable in all CA systems, how (or if!) these principles are applied varies widely depending on the local social, economic, and environmental conditions. A critical step therefore is understanding the local context, and one of the best ways to understand the local context is to conduct a comprehensive, participatory assessment of local needs and opportunities. This assessment should include the following factors[1]:

• Project participants and their value systems	• Related government services
• The local food security situation	• Local social institutions
• Weather and environment	• Gender roles and analysis
• Cropping systems	• Land tenure patterns
• Fallowing practices	• Government policies impacting food security
• Livestock management	• Previous, current or planned food security initiatives by government and other NGOs
• Markets for both inputs and farm production	

PRINCIPLE 2: DETERMINE IF CA IS AN APPROPRIATE STRATEGY

CA benefits are greater in some environments and farming systems than others. The following factors are useful in deciding whether CA is an appropriate strategy in a project area:

a. **Rainfall:** Although the annual rainfall needed for effective implementation of CA is dependent on many factors (including mulch availability, potential evapotranspiration, seasonal distribution of rainfall, soil types, etc.), CA is generally most beneficial in areas with between 400 and 1200 mm of annual rainfall. Below 400 mm, rain-fed crop production may simply not be a viable enterprise. Above 1200 mm, or in areas prone to waterlogging, the benefits of moisture retention are reduced.

b. **Soil slope and texture:** While CA can work in a variety of different environments, it offers some of the highest benefits in sandy soils and on sloping fields. These areas benefit most due to CA's ability to retain moisture and reduce soil erosion. These benefits need to be tempered with the realization that sandy soils have much less potential for increases in soil organic matter (one of the long-term benefits of CA), and that on steeper slopes soil conversation measures like bunds or terraces need to be promoted together with CA.

[1] For more information and advice on conducting a situational assessment, please see CFGB's Program Guidelines document

c. **Livestock management:** Typical smallholder farms contain both livestock and crops, and competition for crop residues between livestock feeding and soil cover is a major cause of the low and slow adoption of CA. The introduction of CA is easier in sites where biomass production is high enough to fulfil demands for both mulch and feed, or where there is enough communal grazing land to satisfy livestock needs.

d. **Land tenure:** Access and control of land by those who farm it (especially women) is critical if farmers are to invest in long-term soil improvement.

e. **Government policies and services:** Supportive and effective agriculture policy, research, and extension services can enhance the effectiveness of CA programming as well as long-term sustainability.

f. **Market access:** In remote or especially food insecure areas, an improved food security motivation may be enough for rapid CA adoption. In many of the areas where we work, however, CA adoption is higher in areas where there is a reliable market for the harvest which seems to strengthen farmers' motivation to invest in new technologies and ways of production.

Livestock play important environmental, economic and social roles for many smallholder farmers.

DESIGN

The second major phase of the project cycle is the design phase (also referred to as the planning phase). Good project design seeks to balance the three major constraints of desirability (what makes sense to and is important for project stakeholders); viability (what is economically, socially and environmentally possible), and feasibility (what is functionally possible given capacity, budget, security and time constraints).

PRINCIPLE 3: INVEST TIME AND EFFORT IN THE DESIGN PHASE

Spending quality time and effort up front in planning can pay huge dividends over the length of the project.

a. **Involve the local community:** all relevant stakeholders should be fully involved in the development of the project through project design workshops, community based planning workshops, advisory committees, etc.. Particular attention should be paid to involving women and girls in project development and planning.

b. **Take a livelihoods approach:** Increasing maize production (or other basic grains) is probably insufficient in most areas for wide scale adoption of CA. Labor inputs, profitability, resilience, crop storage and the ability to sell excess production are some of the other important factors that farmers consider when they make the decision to adopt a new technology, and should also be assessed when designing a project.

c. **Consider and integrate livestock needs alongside CA:** Smallholder farming systems are dominated by mixed crop-livestock systems, primarily because of the positive synergies that result when farms include both crops and livestock. If such systems become unbalanced, these synergies are lost and detrimental effects result. Excessive livestock numbers destroy soil quality and compromise crop production. On the other hand, failure to value the livestock component means foregoing resources that have benefited communities for many years.

d. **Consider other complementary technologies:** CA can work in a complementary manner with many other approaches, including farming with trees, kitchen gardens, inter- or cover-cropping, small-scale irrigation, and savings groups and self-help groups. It is worthwhile working with local stakeholders to determine if

there are particularly important constraints that can be addressed (or opportunities that can be capitalized on) through the addition of other complementary technologies to a project design.

e. **Limit project scope:** While it is important to understand the entire farming system and where best to be involved, community and partner capacity and resources are not infinite. If projects include other elements in addition to CA, these should be limited in number and should be the result of community prioritization. A multi-year project might start year one training with core CA subjects, then add elements such as post-harvest storage, pest management, introduction of new crops, etc. to the training cycle in following years.

f. **Don't duplicate services:** Where and when possible, local government extension services, religious and/or social organizations providing similar services should be considered in the project design. Whenever possible, collaboration with other related projects should be maximized for the sake of learning and mutual support. Including local government actors in particular is a key contributor to sustainability.

Farm business advisors, L to R. Gordon Mulongo, Cephus Mahongo, and Simon Moomba help plan a marketing strategy

g. **Work with service providers:** Service providers are organizations or individuals that provide services for a fee to farmers. In some instances, it can be worthwhile to train and support entrepreneurial farmers to provide CA services to other farmers, especially ripping, herbicide application, and zero-till sowing. Service providing can be a good income generating activity for lead farmers.

h. **Plan for the long term:** While most projects are defined by 3 year planning cycles, 3 year plans often need to be repeated within a longer-term plan for CA to be widely adapted and incorporated into the local farming system. A new technology becomes self-sustaining after 40-50% of farmers in an area are using it, and 3 years is usually insufficient to reach this level of adoption. In addition, an exit strategy should be developed to ensure continuity after the project ends.

i. **Market access:** An efficient supply chain for tools and inputs as well as ready markets for surplus produce will facilitate CA adoption[2]. If the Situation Assessment identifies any of these as lacking, the project should plan to link beneficiaries to markets. This is particularly critical with cover crops (e.g. pigeon pea and lablab) whose acceptance may depend on the ability to sell them as a cash crop. Ready market access will also open up business opportunities that may attract younger or more entrepreneurial farmers.

j. **Realistic budgets:** Budgets should be detailed, realistic, and cost-effective. Capital expenses such as vehicles, computers or office equipment should be minimized but if necessary need to be consistent with CFGB policies.

IMPLEMENTATION

The implementation process operationalises the strategy detailed in the project design. Important principles to consider when implementing a CA project are:

[2] http://www.ctic.org/media/pdf/WCCA/016%20Identifying%20Recommendation%20Domains_%20Kindie%20Tesfaye.pdf

PRINCIPLE 4: CA MUST BE ADAPTED TO THE LOCAL CONTEXT AND REMAIN FLEXIBLE OVER TIME

CA cannot be packaged into rigid rules that are multiplied and disseminated across multiple contexts. Adoption of CA requires adaptation to a local farmer's specific context and circumstances. Encourage farmers to continuously experiment with new tillage methods, plant spacing, fertility practices, cropping systems, etc. Intentionally learn from how farmers are adapting what you promote to match their context-specific priorities and constraints: by doing this you can encourage them to continue innovating, help them address any technical challenges that arise, and help disseminate learnings to others.

PRINCIPLE 5: INVEST TIME IN PROJECT PARTICIPANT SELECTION

Project participant recruitment strategies should be clearly described, with targets disaggregated by gender. Specific recommendations include:

a. **Start small and increase farmer numbers in response to demand:** In early stages of a project, start with a maximum of 30-50 farmers per extension agent depending on the capacity of the implementing partner (see Principle 7 below)[3]. Spontaneous adoption by non-trained farmers is the best indicator to guide the pace of scale-up. Project plans should estimate the pace of CA uptake, and have enough flexibility to allow projects to slow down or speed up this pace depending on local demand for training.

b. **Don't exclusively target the most resource poor:** While the overall goal of the Foodgrains Bank network is to improve food security for those who are food insecure and vulnerable, it can sometimes be counter-productive to limit agricultural programming to these groups. For example, working with just the most resource poor farmers in an area may create the perception that CA is a poor-person's technology. Resource-poor farmers are often more risk-averse, but may follow the lead of opinion leaders. Project participation should be open to all interested farmers including community leaders and opinion makers.

c. **Don't select all beneficiaries at the beginning of the project:** Successful CA promotion will generate interest among farmers who were not targeted by initial training. These "spontaneous adopters" should be incorporated into the project in subsequent years. Projects which restrict programming to a set of farmers identified at the beginning of the project will miss this opportunity, often resulting in lower CA adoption rates.

PRINCIPLE 6: PAY ATTENTION TO GENDER ISSUES

While it's critically important to pay attention to gender throughout the project cycle, specific issues during the implementation phase include:

a. **Ensure women's access to resources and training:** This may involve adjusting the timing and location of training to fit women's schedules. In some cultures it may necessitate use of female trainers or separate training for men and women.

b. **Don't exclude men from CA training:** In some cases men are not involved in CA projects, and yet they are the main owners of land, and make decision on what to grow and how to grow it. When they are excluded they may limit their spouse's ability to apply what they have learned.

c. **Hire female field officers/extension staff as well as placing women in key leadership positions:** This will necessitate providing staff benefits such as child care and family leave.

[3] http://www.ctic.org/media/pdf/WCCA/June%2024%20Erick%20Ruwona.pdf

PRINCIPLE 7: GOOD STAFFING IS CRITICAL

a. **Farmer-Trainers:** Farmers generally learn more and are more willing to accept the advice of other farmers. Incorporating farmers (sometimes called 'Lead Farmers') who are experimenting or have adopted CA into the project extension approach is often a very effective way of CA promotion. Some projects do this on a volunteer basis, while others pay honorariums or other support.

b. **Project staff need to be accessible and credible:** Staff should live in the communities where they work, have thorough familiarity with the language and culture of the people they serve, and practice the same farming techniques which they promote to farmers.

c. **Staff to Farmer Ratios:** The number of farmers each extension staff can effectively work with varies widely depending on the complexity of the program, its geographic spread, and whether the project makes effective use of farmer-trainers. In the early stages of a project, before effective farmer-trainers have been identified, an extension agent may only be able to train and support 30 to 50 farmers. Once farmer-trainers are helping with training and follow-up, each extension agent may effectively support 100 to 200 farmers. Farmer-trainers (or lead farmers) can usually effectively work with 5 to 15 farmers.

d. **Staff Development:** CA is a knowledge intensive technology, and all project staff should have at least a basic understanding of CA. Project extension or field staff should either have extensive training and experience in CA or a plan should be in place for CA training and accompaniment. Continued professional development, including regular refresher training on CA can also be useful for improving the knowledge of staff on CA.

PRINCIPLE 8: HAVE EFFECTIVE EXTENSION/PROMOTION STRATEGIES IN PLACE

a. **Encourage farmers to experiment:** Helping farmers learn to innovate is a key step in assuring their long-term resilience. We recommend that farmers start in year 1 with a 20 m x 20 m to 40 m x 40 m CA plot on their own field[2]. We do not generally recommend communal or project-run demonstration plots, since they have less ownership and credibility. Inclusion of a conventional plot side by side with CA helps farmers to understand the process of experimentation. In subsequent years farmers should be encouraged to increase the CA plot size, but to continue experimenting with other factors (plant spacing, varieties, etc.) on small plots.

b. **Promote farmer to farmer learning:** most successful projects utilize CA farmers as trainers. These farmers should be chosen based on their success in implementing and promoting CA, not selected by their community group at the outset of the project. They should be well trained and equipped by the project. Be sure there is also budget allocation for exchanges between farmer groups and other projects[4].

c. **Develop effective lesson plans and training materials:** These need to be available to all training staff including farmer-trainers. Training materials should be practical, entertaining, and produced in a local language.

d. **Training cycles:** Projects should prepare a detailed calendar for training and follow up so that field activities (e.g. land preparation and collection of mulch) are completed well ahead of planting time. Multi-year projects should develop multi-year curricula where each year of training builds on the previous year, while still being able to offer training to new participants. To fully implement a multi-year curriculum, a project will likely need to plan for more than one 3-year project cycle.

e. **A variety of promotional approaches should be used:** lead farmers, cluster approaches, farmer field schools, government and NGO extension worker training, brochures, field days, radio programming, etc. should all be considered.

[4] http://www.ctic.org/media/pdf/WCCA/03_Neil%20Rowe%20Miller.pdf

PRINCIPLE 9: USE INPUTS JUDICIOUSLY

In acute food insecurity or emergency contexts, providing inputs such as seeds, tools, or other agricultural inputs can be a useful (and sometimes necessary) way to help people maintain or develop new livelihood options. In more developmental or chronic contexts, however, giving out inputs can often be detrimental to the long-term and wide-scale adoption of a new technology.

a. **Minimize or eliminate input subsidies as much as possible:** If necessary, use inputs as a reward for adoption (e.g. a graduation present) rather than an incentive for adoption of new technologies. Farmers should adopt CA for its own benefits, not because they want to receive free incentives. If projects need incentives to get farmers to attend training, or try CA, this is an indication that something is wrong with the technology being promoted or the extension methods being used. (Unfortunately, it can also be an indication that previous projects have created unrealistic expectations.)

b. **Mulch:** In most contexts, maintaining soil cover provides the biggest benefits of any CA practice, however it is also one of the most challenging principles to implement. Importing mulch from other fields or farms may be effective for initial small-scale trials, or in areas where there are sufficient quantities of high quality mulch. In general, however, the use of crop residues, inter-crops and cover crops[5] should be promoted as a more sustainable and labor-sparing method of maintaining soil cover.

Ensuring an adequate mulch cover can be a challenge in many tropical CA systems

c. **Fertilizers:** Fertilizers may be appropriate in situations where other fertility sources (e.g. manure) are limited and where the supply chain for fertilizers is reliable and economical. CA is not equal to organic agriculture and training should not deride or discourage the use of fertilizers. Fertilizers should, however, be used sparingly[6], in combination with organic inputs like manure and crop residues, and they should not be subsidized by the project.

d. **Compost:** Compost may be an appropriate fertility source for high value crops. However, the labor requirement to produce compost on a large scale generally makes it difficult to use as the only fertility source for basic grain production. CA projects targeting staple crops should promote the use of manure, cover crops and/or fertilizer as the primary fertility source for these crops.

e. **Herbicides:** There are many strong opinions on whether chemical herbicides are an effective and appropriate technology to promote in CA projects. In general, herbicide use has been positively correlated with the ability to practice CA on larger plots of land, and with an overall reduction in labor, especially women's labor. However, environmental concerns (including the development of herbicide tolerant weeds and health and safety concerns) are issues, particularly if herbicides are not used with care. The decision to use herbicides should be the farmer's, but that decision needs to be based on having good, unbiased information on both the negative and positive impacts of herbicide use. If farmers do decide to use herbicides, proper application and safety measures should be covered by the project.

[5] Inter-crops (also referred to as green manure/cover crops) are crops that are planted together with the main crop (which is usually a basic grains or cereals crop). They can be planted at the same time as the main crop (intercropped) or just before these crops are harvested (relay cropped). Cover crops are crops that are planted after or before the main crop, usually during a season when the growing conditions are not optimal for the main crop.

[6] For example, following the principles of Integrated Soil Fertility Management, or through techniques such as micro-dosing (see: http://ag4impact.org/sid/ecological-intensification/precision-agriculture/microdosing/)

f. **Seed of new crops and varieties:** Introduction of new crop species (e.g. inter-crops or cover crops) or varieties (e.g. new drought tolerant cultivars) may be difficult without support from the project. When farmers are given seed, this should only be as a once-off gift, after which they are expected to keep their own seed (but remain flexible in case of crop failure). Schemes wherein farmers return seed to the project are generally time-consuming and often result in poor quality seed. A better approach is to encourage farmers who have received seed to share, in turn, with a neighbor.

g. **Seed of varieties already grown in the area** should never be distributed as part of routine CA programming except in a relief situation following a natural disaster or civil disruption. If farmers have trouble accessing such seed, the project should consider helping farmers develop individual seed storage or community seed banks using their own production. Another effective strategy may be to work with local seed suppliers to ensure the accessibility of high quality seed in the community.

Conservation agriculture can help reduce labour (for example hoeing), but it can also add to it and both men and women's labour burden should be monitored carefully.

h. **CA equipment:** Ripper points, jab planters, and other CA specific tools may be an important component of a CA project. To maximize sustainability, projects should work with local suppliers to access and distribute these tools. If these tools are new and unproven in a community, projects may want to help the supplier provide them on a loan basis to farmer groups, with the understanding that they will buy or return them at the end of one season.

i. **Non-CA equipment:** Hoes, machetes and other tools commonly available in the community should never be distributed as part of routine CA programming except in a relief situation following a natural disaster or civil disruption. If farmers have trouble accessing such tools, the project should consider working with local merchants or blacksmiths to ensure the accessibility of such tools in the community.

PRINCIPLE 10: DEVELOP STRONG M&E SYSTEMS

Programmes and projects with strong monitoring and evaluation components tend to stay on track, detect problems earlier, and reduce the likelihood of having major cost overruns or time delays later. More importantly, a good monitoring and evaluation strategy allows us to determine if a project or program has made a real improvement in people's food security, how and if CA contributed to this, and what changes need to be made to improve current or future programming.

a. **Continuous, participatory evaluation:** evaluate programs throughout the life of the project together with all project stakeholders. This process is important for keeping the project on track and for early detection of problems, but it should also include asking the tough questions including truly understanding why people are (or are not) adopting CA.

b. **Consider farm based research support:** While an effective and useful monitoring strategy is needed for all CA projects, it can be useful to ensure that data is collected carefully and following scientific principles to better inform future decisions on the technology or to justify and convince government policy makers. Projects can help to support this process through specific trainings, facilitating linkages with research organizations, or by hiring specific project personnel or consultants.

c. **Monitoring and evaluation frameworks should track women and men separately:** This applies to both tracking participation in, and impact of, the project.

d. **Monitor the project's impact on women's labour:** Labour for tillage and weeding are often different for men, women, and youth, with labour input for men often reduced, but women's labour increased with weeding of CA fields, especially during the transition years to CA when weeds can be a major issue. Discussions at the community level to deal with this challenge – which may include the introduction of other labour saving technologies or challenging conventional gender norms – should be on-going throughout the life of the project.