CONSERVATION AGRICULTURE TOOLBOX FOR ZIMBABWE

The Conservation Agriculture Task Force for Zimbabwe

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Acknowledgements

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About this Toolbox

This Toolbox has been designed to assist stakeholders (government research and extension departments, non-governmental organizations (NGOs), donors and farmers) in developing sound Conservation Agriculture (CA) extension programs/projects in Zimbabwe.

The primary principles promoted for hand-based and draft animal powered CA cropping systems are:

- minimum soil disturbance
- timely execution of operations, particularly planting, fertilization and weeding,
- covering soil with organic materials (crop residues or cover crops) as much as possible,
- not burning crop residues,
- efficient use of inputs, and
- crop rotations.

For the purposes of this Toolbox, we have adopted the following terminology, as it has been noted that many organizations use the terms CA and Conservation Farming (CF) interchangeably in their reports and proposals as if they were the same. However, the two terms are different and are defined as follows:

- Conservation Agriculture is a broader term that encompasses activities such as continuous minimum soil mechanical disturbance, (e.g minimum tillage, reduced tillage and zero tillage), tractor powered, animal powered and manual methods, integrated pest management, integrated soil and water management, and includes CF. It is generally defined as any tillage sequence with the object of minimizing or reducing the loss of soil and water; operationally a tillage or tillage and planting combination which aims to leave a permanent mulch or crop cover on the surface. A more detailed discussion on the CA concept and emerging global definitions can be found on the FAO web site at http://www.fao.org/ag/ca/.

- Conservation Farming refers to the particular technology of using planting basins and soil cover which was developed by Brian Oldrieve. This is a modification of the traditional pit systems once common in southern Africa and is a variation on the *Zai* Pit system from West Africa, which may also be considered as a CF technology.

The focus of this first edition of the Toolbox is on the promotion of CF (basin tillage) through Phase II of the United Kingdom's Department for International Development's (DFID's) Protracted Relief Programme (PRP) and other future donor programs. The ripping tillage can also be practiced, using the recommended standard package. Revisions of this Toolbox will occur as the resources, equipment and guidelines for the promotion of other CA technologies become available.

This edition of the Toolbox is divided into six sections:

1. General Guidelines for Implementing Conservation Agriculture Projects in Zimbabwe
2. Description of the Conservation Farming – Planting Basins Package
3. The Conservation Agriculture Packages Promoted by the Zimbabwean Conservation Agriculture Task Force (ZCATF)
4. A Checklist for Conservation Agriculture Projects use by Donors and NGO staff
5. A Suggested Scoring System to Assist in Monitoring and Evaluation
6. General Guide for a Simple Paired Plot Demonstration

SECTION 1
General Guidelines for Implementing Conservation Agriculture Projects in Zimbabwe

I. Introduction

Many soils in the drier parts of southern Africa are inherently low in natural fertility and characterized by very low soil organic carbon. Consequently, numerous smallholder farmers practice cropping systems that are based on minimum investment of resources to reduce risk. This results in cereal yields of around 500 kg ha^{-1}, even in aboveaverage rainfall years.

To improve crop production in marginal rainfall regions of southern Africa, farmers have to adopt cultural practices that conserve fragile soils, extend the period of water availability to the crop, be it grain or forage, and improve soil fertility. National and international research and development organizations have tried to develop improved genotypes, tillage/soil management systems, and integrated pest/disease management packages. Unfortunately, many of the outputs, although technically sound, failed to perform under farmers' circumstances. They were largely developed and tested in researcher-managed trials, with only limited consideration of the problems and priorities of smallholder farmers for whom they were intended.

Conservation agriculture is being promoted as a potential solution to the production problems facing smallholder farming families in sub-Saharan Africa. Broadly, it is a suite of land, water and crop management practices that aim to improve productivity, profitability, and sustainability. The primary principles promoted for hand-based and draft animal powered cropping systems are:

- Minimum mechanical soil disturbance
- Timely execution of operations, particularly planting, fertilization and weeding,
- Covering soil with organic materials (crop residues or cover crops) as much as possible,
- Do not burn crop residues,
- Efficient use of inputs, and
- Crop rotations.

Conservation Agriculture/Conservation Farming has multiple benefits for the farmer, the environment, and the population in general. The field benefits of the technologies are summarized in the following list of short-term and medium- to long-term benefits:

Short-term benefits

- Reduced traction and labor requirements for land preparation; where applicable savings in labor fuel costs. Note: Hand-based systems such as the planting basins (see Section 2 for details) may require more labor for land preparation and weed control, especially in the first season
- The ability to plant on time as there is no tillage required after the start of the rains; in CA planting furrows/lines/basins are prepared in winter
- Break plow plans that have formed due to shallow tillage
- Ability to apply available soil fertility amendments precisely

- Reduced water runoff and soil erosion due to the increased water infiltration and also the ponding effect of residues
- Increased soil water infiltration due to the protection of soil surface structure by residues and the maintenance of continuous pores with the absence of tillage
- Reduced evaporation of moisture from the soil surface as the residues protect the surface from solar radiation

Medium to longer-term benefits

- Increased and more stable crop yields (Note: yield increases may be immediate under the poor fertility conditions of many smallholders' fields)
- Increased soil organic matter (SOM) resulting in better soil structure, higher cation exchange capacity and nutrient availability, and greater water-holding capacity
- Reduced production costs
- Increased biological activity in both the soil and the aerial environment leading to improved soil fertility and pest control

II. Mindset and frame of mind

Conservation Agriculture/Farming can be difficult for many people to accept because it goes against many of their cherished beliefs. How can crops be grown without plowing the land? Overcoming this mindset of the need for plowing is a major step in achieving successful CA systems.

Conservation Farming is not a simple technology that the farmer can hear about during an extension meeting and understand with just a brief exposure. It involves a change in the whole production system: when land is prepared and how, when weeds are controlled, quantities and methods of application of the inputs, time of planting, use and management of crop residues, crop rotations and even which crops are grown. This, together with the fact that many of the benefits of CA/CF are only apparent after a few years, means that a longer term vision of an extension program for CA/CF is required than is the case for other simple technologies (such as a new crop/variety).

It is not just farmers who have to change their way of thinking. Universities, agricultural training institutions, extension providers, researchers, and the broader farming community itself must change.

Experience has shown that the key to successful extension of CA/CF is only achieved through committed institutions and individuals who believe in the messages they are transferring and are committed to turning around the downward trend in agricultural production. Everyone involved needs to find out how to manage CA/CF systems and stay informed of new advances. Farmer knowledge of CA/CF is the key to success and generally the main avenue that the farmer has to this knowledge is through both NGO and Agricultural Technical and Extension Service (AGRITEX) extension agents.

It is also important to realize that there are important socio-cultural issues involved in any major change of practices within the community. Therefore, it is imperative that the community itself and the existing structures within the community are incorporated into the extension program.

The technology and implementation management systems are radically different to current methods and values. This means that although there may be remarkable improvement in crop performance in the first year, it takes 3 years for participants to wholeheartedly accept the new system and a further 2 or 3 years for them to be able to continue on their own in a sustainable way. In general, one can expect that farmers need to be supported for at least 5 years, especially with respect to information, training, and advice.

Another difference between CA/CF programs and "normal" extension programs is the need to concentrate efforts rather than spread them widely and thinly. There are numerous examples from all over the world of farmers being ridiculed or outcast for trying CA/CF, only to be later approached to teach other farmers how to do it. Having enough farmers in the same community trying CA/CF means that they can support and help each other resist the pressure to return to traditional farming methods. Another reason for concentrating extension efforts has to do with the time commitment of the extension agent. Conservation Agriculture/Farming requires frequent and substantial support from the extension agent; spreading out over a large area will increase costs and make it exceedingly difficult to followup frequently. Therefore, it is better to concentrate efforts in fewer communities than to have only one or two farmers in many communities.

III. Training of extension/change agents

In order to support farmers who are trying out CA/CF on their farms, government extension and NGO change agents must have a good understanding of the principles of CA and must know how to manage the particular CF technologies that they are transferring. This knowledge cannot be obtained by attending just one class or reading a bulletin on CA. It requires an initial training course and regular follow ups to refresh and discuss the principles and practice of CA/CF.

Change agents from most organizations managing CA/CF projects will be able to participate in short courses given by River of Life. These courses are given in three stages – the first for 3 days, the second for 2 days, and the third for 1–2 days. It is vital that the same people attend all three stages of the course; starting at the second or third stage is neither efficient nor practical. Therefore, staff continuity and organizational commitment is vital. Additional on-the-job training is also available to PRP Phase II partners through ICRISAT throughout the cropping season. Specific sessions can be organized upon request during the season for non-PRP trainees who did not attend the first or second sessions.

The aim of all partners promoting CA/CF to smallholder farmers in Zimbabwe should be **'Learning-by-doing'**. It is essential that both change agents and farmers have opportunities to try out the various components of a CA package being promoted, so that they can learn and understand the skills and knowledge required. Section 2 summarizes the eight major components of the CF Planting Basin package currently being promoted in Zimbabwe and a suggested calendar of activities to be undertaken for the first 3 years by the farmers and the extension staff supporting the program.

Both government extension agents and NGO change agents also need training in how to organize and facilitate field days, farmer training exercises, and farmer field schools, how to manage group dynamics and how to implement a demonstration. Once a few farmers become experienced (at least two seasons of practice), competent

and convinced of CA, they will be the best change agents for other farmers, and extension agents need to facilitate farmer-to-farmer information flow rather than trying to be the main teachers.

IV. Starting and managing a CA/CF Program

A CA/CF program will consist of a number of farmers who are trying a CA/CF intervention on one of their own fields, and one or more farmers who host a demonstration plot comparing the CA/CF with conventional practices on the same field (a guide to establishing a simple paired plot demonstration is presented in Section 6).

The key steps in starting and managing the program are described in the following sections. These steps are:

- Defining collaboration with other organizations
- Defining the extension method and training of extension agents in CA/CF and extension approached
- Defining the scale of the project
- Entry into the province, district, ward
- Village selection
- Farmer selection
- Farmer training and knowledge development
- Timing of operations and activities, including input distribution
- Site, land and crop management
- Monitoring of activities and operations
- Data and information gathering
- Reporting

1.Collaboration with other organizations

Two important aspects of collaboration are the training of extension agents and collaboration with AGRITEX. River of Life Church will conduct training on most projects, with the International Crops Research Insitute for the Semi-Arid Tropics (ICRISAT) providing additional in-service support. However, as noted above, it is important that there is continuity in the training; it is neither advisable nor efficient for extension agents to only participate in parts of these courses. Complete dedication to the whole course by interested and enthusiastic technical staff is a necessary condition for the training can be successful.

AGRITEX staff currently have little support in operating funds and service training. However, they are the public extension service and represent the long-term support structure for CA/CF in Zimbabwe. Evidence from many places worldwide has shown that continued support of farmers experimenting with CA/CF has been an important factor in intensifying and spreading CA/CF adoption. Therefore, it is important that AGRITEX staff in the areas where projects are working are also incorporated into the training and participate as equals in all project activities.

2. Extension methods

The three basic methodologies used by organizations working with CA/CF in Zimbabwe are:

1. Extension Agent System: Trained extension staff (NGO or AGRITEX) work directly with groups or clusters of farmers and support them in the implementation of CA/CF interventions on their own fields.

2. Lead Farmer System: Trained extension agents work with lead farmers in a community, and, in turn, these farmers work with farmer groups. The 'Lead Farmer' should have been practicing the CA/CF intervention successfully for at least two seasons.
3. Combined Extension Agent and Lead Farmer System: Some organizations begin working with clusters/groups and from these select the lead farmers who after two to three years of experiencewill in the future lead groups.

Whichever method is used it is extremely important to:

- Ensure the community is fully involved in the change process
- Share the vision with Rural District Council, local authorities, and traditional leaders and seek permission from the District Administrator for conductingactivities
- Involve AGRITEX at all stages
- Train AGRITEX staff and facilitate some simple paired plot demonstrations that they can own
- Keep the program small, simple and manageable with a number of paired plot demonstrations to act as focal points for training activities and group discussions
- Require dedicated staff with agricultural backgrounds at field level

Success is achieved when CA/CF training initiatives and promotion activities feature in the workplans of District AGRITEX Extension Offices.

3. Role of the extension agent

The key element in the extension and promotion of CA/CF is that the farmers conduct their own field studies and experiments (see Section 6). Change/extension agents, be they from NGOs or government, are primarily facilitators, not just teachers. After initial training exercises in the various components of CA/CF, they offer help, guidance and encouragement as and when required. A suggested calendar of activities and visits for Year 1, Year 2 and Year 3 practitioners is presented in Section 2.

Farmers themselves make excellent extension workers. They have practical experience and credibility, and with a little support they can train fellow farmers in CA/CF, organize farmer groups, arrange activities such as field days and field visits etc.

Farmers tend to believe messages they receive from other farmers rather than messages they receive from technical 'outsiders'. Therefore, where possible, AGRITEX and NGO staff should facilitate farmer extension of CA/CF technologies rather than seeing themselves as the main protagonists of the extension system.

However, farmer facilitators should not be seen as an alternative to regular extension service/support; rather they complement and reinforce the work of the government and NGO extension staff. Well-motivated farmer champions can make excellent facilitators once they have had two or three successful seasons of experience.

4. Defining the scale of the project

It is extremely important that any CA/CF project is done properly as farmers who have bad initial experiences will be loathe to change in the future and are often

very vocal in speaking out against the technology. It is better to start small and allow for growth over time, building on each season's success.

It has already been mentioned that to achieve a successful CA/CF program mindsets must be changed and farmers and extensions agents must become familiar and confident with all the facets of the technology. CA/CF technologies are not simple, they are knowledge intensive. For these reasons extension programs that try to reach too many farmers without sufficient intensity of contact/support, learning, and mutual knowledge development, will not be successful.

However, it is impossible to define the optimum size of a particular project because there are many variables such as the readiness of the local population to try new ideas, the energy, commitment and preparedness of the field staff, the distances between communities, transport, and fuel availability etc.

Based on recent experiences the following guides to the maximum size of any project are detailed below, based on the number of dedicated extension staff involved.

An extension agent (NGO or AGRITEX) who is dedicated fulltime to the project should oversee a maximum of 60 farmers, of which a maximum of 20 should be farmers trying CA/CF for the first time (first year farmers), 20 are second-year practitioners and 20 third-year practitioners. Extension agents who have little experience of CA should handle fewer farmers as the extension agent him/herself will be learning, especially during the first season. These numbers are based on the Monitoring and Evaluation (M&E) protocol presented in Section 5. This can be followed closely or discussed with the host community and modified accordingly, depending on the project goals.

If the project chooses to use lead farmers as intermediate change agents, then each extension agent should work with a maximum of 20 lead farmers, and each lead farmer should work with a maximum of 10 farmers. Even working with 10 farmers will involve a considerable amount of the lead farmer's time, if it is done properly. Therefore, lead farmers should receive some remuneration for their work. This will help them see their efforts as an important part of the project. (This remuneration should be more than a bag of seed and a bag of fertilizer.)

Obviously a lead farmer must be an experienced CA/CF practitioner. Therefore, a lead farmer will never be a first-year farmer trying CA/CF and often will have been practicing CF for at least 2 if not 3 years. Lead farmers should be selected from the CA/CF project farmers and will normally be the most dynamic, hard-working, and committed individuals.

A completely new program, introducing CA/CF concepts for the first time into a community should not contemplate the use of a 'Lead Farmer Approach'.

5. Entry into the Province, District and Ward

It is essential that the NGO management team introduces the project at both provincial and district level to ensure complimentarity with Provincial and District Development plans. This will also enable Provincial and District Officials to have some say in the coordination of activities and the allocation of their own resources. Provincial and District Administrators will also be able to direct the project to

specific wards and villages, without overcommitting their field staff. Once CA/CF begins to appear in the annual workplans of District Staff the project can be deemed successful.

However, it is recommended that the NGO also liaise with the Zimbabwean Conservation Agriculture Task Force (ZCATF), as the Task Force keeps a database of what each NGO is doing in each district at the ward level to ensure that other NGOs are not already promoting CA/CF in that locality.

6. Village selection

When first introducing CA/CF into a ward, it is important to choose villages that are easily accessible and do not have any other CA/CF projects within them. This makes supervision easier, allows more people to come to see the demonstrations, and makes it easier for suppliers to deliver the required inputs on time. Once the community has become experienced and is practicing the approach on a wide scale, the change agent can move to another area, using farmers from the first as resource persons. Remember that it takes at least 2 years for a farmer to become comfortable/familiar with the CA/CF technology, and a further 3 years before they are able to stand on their own. This assumes that the associated development of input/output markets occurs.

7. Farmer selection

It is important to select several farmers in the same village/community, rather than to spread efforts out too sparsely.

To start a CA/CF program in a village/community the first step is to call a community meeting to elicit information on the farmers' cropping problems and to link these with the benefits of CA/CF. This is an important step as the willingness to participate will be much greater if farmers see how the new technology addresses some of their most pressing problems. During this meeting the project itself is described, together with a discussion of the resources available (and not available) to the project. This helps clarify for the community what the project can do and its limitations in terms of resources.

Once the benefits, principles, and practice of CA/CF have been described, then state how many farmers the project would like to work with in the village. The characteristics of the farmers should be representative of the target group within the community[1] and be interested in CA/CF. Being able to read and write is an additional advantage. If there are more farmers interested than can be accommodated, then it is preferable that the community itself selects the participating farmers. It is not advisable to select well-resourced households that have no draft power limitations to try out hand-based CF interventions.

The selected farms should be close enough to each other, so that farmers can visit each other easily, and the extension agent can visit each of the fields in a 2 to 3 day period following a training session on one of the key components of the CA/CF (see See Section 2 on planting basins). Also, if all the selected farmers live in close proximity they can easily and regularly discuss the practice of CA/CF and any problems which may arise, and can reassure and learn from each other, and assist each other during the first year of implementation. A group of 5 or more farmers

[1] For PRP II the target group are vulnerable households and one of the aims of the program is social protection

attracts more attention in a village/community than if only one or two are testing the technology. The extension agent can focus efforts on this village for one or two weeks a month, rather than trying to cover too wide an area[2].

If only one or two demonstrations are run per year, it may take several years to learn all of the mistakes.

8. Farmer training and knowledge development

The current CF method of 'Planting Basins' being promoted revolves around a zero-till/reduced tillage system that does not require expensive equipment and chemicals (see Section 2). This method is most effective when adopted as a system rather than just a set of component technologies. Many of the principles of CA/CF and the way they need to be managed are radically different to conventional crop production practices, and consequently require intensive efforts from the training staff to convince the farmers/community it is beneficial to switch.

It is important to understand that there are some serious socio-cultural issues that will have to be addressed during the promotion of CA/CF. It is important to discuss these from day one and ensure a series of paired plot demonstrations are conducted in each locality so that the whole community can visit and observe (see Section 6).

Issues that will need to be discussed include:

- Benefits of early planting
- Damage plowing can cause in terms of plow pans, loss of organic matter and proliferation of some weeds such as Couch Grass
- How soils rich in organic matter are more stable than soils that have been plowed for many years and have lost their organic matter
- Benefits of mulch and how crop residues can be protected during the non-cropping season when cropped lands revert to communal grazing[3].

A possible location for a demonstration plot that is often overlooked is the local school's garden. If the school children are exposed to the concepts being promoted to their parents they help reinforce the learning.

The success of CA/CF depends more on attitude, knowledge and precise management than it does on high levels of external inputs. However, in reality, farmers are often preoccupied with the issue of inputs and this can significantly affect the long-term success and sustainability of a program.

The establishment of excellent demonstration plots is the best way to showfarmers that high and consistent production levels are possible. The training staff has to make sure these plots are not sub-standard. Also, both farmer and extension agent experimentation should be encouraged. All parties should be afforded the opportunity to discover and thus convince themselves that CA/CF works.

Training should be provided on the general concept of CA/CF well before the season, and then on each particular aspect shortly before the farmer needs to apply this practice. **It is no good providing training on topdressing in October, when**

[2] The number of visits per farmer will depend on the monitoring and evaluation to be undertaken. An example M&E programme is outlined in Section 5.

[3] For the PRPII target groups of vulnerable households this will be essential as they have little voice in the community as they will not be wealthy livestock owners.

topdressing occurs in late December through to early February (depending when planting occurred). This training should be done just before the appropriate time in the community.

Training for CF extends from land preparation through the whole crop cycle, harvest and even the postharvest period when weed and residue management practices need to be covered. A simplified CF calendar is provided in Section 2 for a 3-year period, highlighting key areas where support, training and M&E visits are required to ensure the successful implementation for first, second and third year practitioners.

Remember that attitude and knowledge is the key to the success of CA/CF. Farmers need to understand the "why" of practices, not just the "what"! This will hopefully lead to a belief among the farmers that the practices are the best way to farm.

9. Demonstration plots.

'Tell me and I will forget! Tell me and show me and I might remember. Tell me, show and let me try – then I can make an informed choice'

– Adapted from Confucius.

Well-managed demonstration plots are very useful in both the training and the M&E process. However, these must be conducted at a very high standard of implementation, care and supervision. Apart from the farmer experiments where project farmers are trying CF on their own fields according to the defined method and calendar (see Section 2), it is important to have in each community one or more paired demonstration plots (see Section 6). These demonstration plots compare, under similar conditions, the present farmers' practices with the CF basins. Again it is important for the community to decide on whose field(s) these demonstration plots are to be conducted. However, the farmer with the demonstration plot must be enthusiastic and hardworking. He or she must live close to the site.

Demonstration plots are more important as a tool to convince other farmers (on whose field the demonstration is not placed) rather than the farmer on whose field the demonstration is conducted. It helps farmers visualize the difference between the crop grown under CA/CF and conventional practices. To reduce confusion, both plots should get the same levels and types of inputs (fertilizer, manure, variety etc.) and be the same size (see Section 6). Remember the local school gardens as a possible location.

10. Inputs

The issue of inputs is very important in CA/CF programs in Zimbabwe and needs to be given significant thought and planning to assure success and sustainability. The delivery of inputs should not create dependency; instead the aim of the program should be for the farmers to be able support themselves without the help of the NGO by the program's end. The problem in Zimbabwe is that obtaining inputs, particularly fertilizer, is extremely difficult, especially for rural farmers. The main options are:

1. The NGO supplies the inputs to the farmers for free every year.
2. The NGO does not supply the inputs at all and encourages the farmers to source their own.
3. The NGO supplies inputs on a credit basis that is repaid from the profits of the harvest.

The first method is highly risky because it will create dependency. Experience has shown that many farmers join the program purely to get the inputs. As a result

they will not truly embrace CF and instead sell the inputs on the market to obtain cash for other things. Also, giving handouts can act as a false incentive to join the program and once the handouts stop many will stop practicing CF.

The second method, if accompanied by input market development, may help longer term sustainability and a better return on donor investments, and avoids the dependency syndrome. Farmers can be stimulated and taught to source inputs for themselves. For example, farmers can be taught to utilize what they have, such as manure. However, it must be recognized that the farmers' fields will have very low soil fertility as a result of years of plowing, so it will be very difficult for them to achieve good yields without fertilizer at the beginning.

Also, if the program wants to target the very poor, then it will face the problem of working with households who have very little – people who cannot afford to buy seed or fertilizer and who may not even have a hoe. In this situation, the lack of inputs becomes a barrier to adoption. Method three seeks to solve this situation by sourcing the fertilizer for the farmers and providing it as a loan. This also provides a short cut to expansion for many farmers as the more seed and fertilizer they are provided with the more land they can harvest a crop from.

It is suggested that if inputs are provided in any form there must be conditions which the farmer must fulfill to prove s/he is practicing CA/CF to the standard agreed by the community. For example, fertilizer is only supplied after farmers have dug the planting basins in the 'Planting Basins Package' described in Section 2.

It is clear, therefore, that careful consideration must be given to this issue. There is no clear answer so the program's approach will vary from community to community and even within a community depending on the situation of the target beneficiaries. Therefore, it is crucial that NGO staff are knowledgeable of this issue so that a solution which holds the communities' long-term prosperity at its center can be found.

11. Trading and Marketing

Any CA/CF program should be aiming for and encouraging farmers to make a profit from their farming. Otherwise, they will not make progress or be able to provide for their families in other ways, such as education or medicine. Making a profit also provides a farmer with enormous self worth and is the key to their release from the poverty trap.

Unfortunately, a country's infrastructure, food policy and economy can severely limit a farmer's ability to make a profit. For example, dirt roads increase transport costs and reduce the farm gate price, particularly if there is no central collection point and traders have to spend time moving from farm to farm to collect a household's surplus production. A government controlled pricing policy can also influence a farmer's profit, as the grain must be sold to a Government Controlled Authority at a set price. When the economy is strong this might not be a major issue, but during times of hyperinflatation, the government's pricing policy may not reflect the real cost of productions and may have detrimental impacts on a farmer's ability to source seed and fertilizer in time for next season's planting.

Therefore, the NGO should consider how to help the farmers in their programs overcome some of these impediments to sustainable development. It may mean a change in crop/variety to meet the needs of a private sector partner and the introduction of some aspects of contract farming. NGOs are encouraged to partner with a private organization to solve problems and provide an extra service to the farmers.

Section 5 summarizes a series of crop rotations for the different Natural Regions in Zimbabwe and the CF packages recommended for households with different resource statuses.

12. Timing of Operations & Activities

The technology of CF/CA, based on the non-inversion (plowing) of the soil and mulch cover, is extremely effective and is often readily accepted and embraced by the target group. The great challenge is to get the participants to actually implement the system effectively. Precise and good management is a key factor determining the success of CA/CF. Therefore, it is extremely important to stress the need for conducting all operations well and on time at all farmer training events. **It also means that all extension activities must be conducted precisely and on time**. One cannot expect farmers to do a good job of their plots if the training is late or sub-standard, the inputs are not available on time, and/or the extension personnel do not visit at the agreed times.

A detailed calendar for the promotion and support of CF 'Planting Basin' is provided in Section 2 and should be followed closely. If there are differences of opinion on when things should be done, these should be reported to your organization and discussed before the next season. The calendar should be followed in the present season.

13. Monitoring of activities and operations

It is very important that extension agents visit all participating farmers regularly and **at least** once per month. A field book should be kept with a page dedicated to each farmer for whom the extension agent is responsible. A suggested M&E protocol is presented in Section 5. This can be followed closely or discussed with the host community and modified accordingly, depending on the goals of the project. If it is followed closely it is not possible to support more than 20 first-year farmers, 20 second-year farmers and 20 third-year farmers.

The suggested scoring system in Section 5 identifies weaknesses of individual farmers and monitors their progress. This then helps the extension worker to provide better one-to-one training/mentoring, and revised future training sessions. The scoring system can also be used to make host farmers accountable to the community who selected them and identify where vulnerable households (the elderly, orphan-headed or HIV-AIDS affected households) may require community support to implement some aspects of the promoted package.

For more development-focused programs, where better-resourced farmers are becoming involved in cash production, often on a contract basis[4], the scoring system provides accountability and at times it may be necessary to suspend farmers from the program. This should be done if and when farmers consistently do not meet the required crop and field management standards. Farmers should be

[4] The Farmers Union Project coordinated by the FAO Emergency Office.

warned twice (at least) before suspension and shown the scores made on the previous visits so that the farmer understands clearly and completely why (s)he is being suspended from the program. The threat of suspension spurs farmers on to achieve higher standards.

Program supervisors should regularly visit the project sites, visit some of the farmers, and revise the field books. This is to ensure that the required project quality is maintained, to identify and resolve any problems as soon as possible, and to make sure that their impact on the project as a whole is minimized.

14. Reporting

The main reporting required from the extension agents are the completed data sheets for each of the farmers incorporated into the program and the scores of farmer operations that are made on each field visit.

Field days should be held at selected fields in each community to highlight particular aspects of CA/CF. Results can be shared with District stakeholders at their regular meetings and through them with the ZCATF.

After the end of the season it is important to hold a meeting of farmers practicing CA/CF in each village to discuss the results, their observations, any problems that may have emerged and possible solutions to these problems. Reports on these meetings should be forwarded to the supervisor so that all reports can be consolidated nationwide and analyzed. This is the mechanism whereby the project can be improved and modifications brought into the program.

Section 2
Conservation Farming – Planting Basins Package

The central component of the this package is the planting basin. Seeds are sown, not along the usual furrow, but in small basins – simple pits that can be dug with hand hoes without having to plow the whole field. The technology is particularly appropriate to southern Africa, given that the majority of smallholder farmers struggle to plant their fields on time because they lack draft animals. The Planting Basin concept was first developed by Brian Oldrieve in Zimbabwe in the late 1980s and subsequently modified and promoted in Zambia by the Zambian Farmers Union Conservation Farming Unit. The basic components of the CF practice agreed by the ZCATF are listed in Box 1.

Planting of the basins occurs in Nov/Dec after the basins have captured rainwater (and then drained naturally) at least once. Smallholder farmers without draft power can plant soon after an effective rainfall event,[5] rather than waiting for draft animals to become available several weeks into the season. In addition, farmers are encouraged to spread whatever crop residues might be available as a surface mulch to prevent soil losses early in the season, conserve moisture later in the season, and enrich the soil with nutrients and organic matter as the residues decompose. A suggested Conservation Farming Calendar for first-, second- and third-year farmers, and the associated extension activities follow.

For the majority of vulnerable households it is recommended that in the initial two to three seasons the program should focus on the production of staple cereals to address food security issues. Initial plots sizes should not exceed 0.2 ha, but smaller plots can be used.

[5]. An effective rainfall event is 30 mm for sandy soils and 50+ mm for heavier soils (Twomlow and Bruneau, 2000).

Box 1. Components of CF Planting Basins Package promoted in Zimbabwe

1. *Winter weeding*
The first step in preparing a field using CF methods is to remove all weeds. This should be done soon after harvesting in May/June. Weeding is done using implements such as hand hoes and machetes that disturb the soil as little as possible. The importance of weeding before land preparation is to ensure that the plot is weed-free at basin preparation and also to prevent the dispersal of weed seeds.

2. *Digging planting basins*
Planting basins are holes dug in a weed-free field into which a crop is planted The basins are prepared in the dry season from July to October. The recommended dimensions of the basin are 15×15×15 cm, spaced at either 75×60 cm for Natural Region II and either 75 x 75 cm or 90×60 cm for Natural Regions III, IV and V. The basins enable the farmer to plant the crop after the first effective rains when the basins have captured rainwater and drained naturally. Seeds are placed in each basin at the appropriate seeding rate and covered with clod-free soil. The advantage of using basins is that they enhance the capture of water from the first rains of the wet season and enable precision application of both organic and inorganic fertilizer as it is applied directly into the pit and not broadcast.

3. *Application of crop residues*
Crop residues are applied on the soil surface in the dry season, soon after harvesting. The residues must provide at least 30% soil cover. The mulch buffers the soil against extreme temperatures (thereby reducing soil evaporation), cushions the soil against traffic, and suppresses weeds through shading and improves soil fertility.

4. *Application of manure*
Fertility amendments are applied soon after land preparation in the dry season. In CF, the application of both organic and inorganic fertilizers is recommended as they complement each other. Organic fertilizers such as manure and/or composts are applied at a rate of at least a handful per planting basin. More can be used in wetter areas.

5. *Application of basal fertilizer*
Inorganic basal fertilizer is also applied soon after land preparation before the onset of the rains. One level beer bottle cap is applied per planting basin and covered lightly with clod-free soil. This is equivalent to 80 kg of compound fertilizer per hectare. Application rates can be increased in wetter areas and may depend on crop types.

6. *Application of topdressing*
Nitrogen fertilizer is applied to crops at the 5 to 6 leaf stage soon after the first weeding at a rate of one level beer bottle cap per basin. This is equivalent to 80 kg of ammonium nitrate fertilizer per hectare. Application is done on moist soils. Precision application ensures that the nutrients are available where they are needed. Application rates can be increased in wetter areas and may depend on crop types.

7. *Timely weeding*
In conventional tillage systems, farmers plow/cultivate repeatedly in order to suppress weeds. With reduced tillage, weeds can be a problem requiring more effort initially. One strategy is to weed in a timely manner (ie, when the weeds are still small) preventing the weeds from setting seed. Timely weeding in combination with mulch should eventually lead to effective weed control.

8. *Crop rotation*
Rotating crops is one of the key principles of CF. Cereal/legume rotations are desirable because the cereal benefits from nitrogen produced by the Rhizobium associated with the legume, and the legume benefits from the residues produced by the cereal. The advantages of crop rotation include improvement of soil fertility, controlling weeds, pests and diseases, and producing different types of outputs, which reduce the risk of total crop failure in cases of drought and disease outbreaks.

Conservation Farming Calendar - First-Year Farmer												
Farmer Activities	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**
Winter weeding												
Mark out												
Mulch/residue management												
Land preparation/dig basins												
Apply manure/fertilizer (lime where necessary)												
Pre-plant weeding, if necessary												
Plant												
Postplant weeding												
Apply N topdressing at 5 to 6 leaf stage												
Post topdressing weeding												
Clean weeds at harvest time												
Harvest												
Implementing Partner/Extension Activities												
Contact and sensitizing communities												
Need assessment planning												
Targeting/ID Farmers												
Order inputs												
Deliver seed and basal fertilizer												
Deliver topdressing												
Attend training of trainers at RoL												
Attend training of trainers at ICRISAT												
Field days/cross visits												
Farmer training/methods demo/field visits												
Introduce CF to community												
Laying out paired plot and land preparation/application of basal fertilizers												
Visit each farmer's field to check whether basins have been dug												
Visit each farmer's field after distribution of basal fertilizer												
Demonstration of pre-plant weed control and planting												
Visit each farmer field at/just postplanting												
Demonstration of post plant weeding/topdressing at 5 to 6 leaf stage												
Visit each farmer's field after weeding/topdress demonstrations												
Visit to each farmer's fields pre-harvest to check on weeds etc.												
Field days/results report back												

Conservation Farming Calendar - Second-Year Farmer												
Farmer Activities	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**
Winter weeding												
Mark out												
Mulch/residue management												
Land preparation/dig basins												
Apply manure/fertilizer (lime where necessary)												
Pre-plant weeding if necessary												
Plant												
Postplant weeding												
Apply N topdressing at 5 to 6 leaf stage												
Post topdressing weeding												
Clean weeds at harvest time												
Harvest												
Implementing Partner/Extension Activities												
Agree modifications to demos												
ID which year farmers do what												
Order inputs												
Deliver seed and basal fertilizer												
Deliver topdressing												
Attend training of trainers at RoL												
Attend training of trainers at ICRISAT												
Field days/cross visits												
Farmer training/methods demo/field visits												
Introduce rotations to 2nd-year farmers												
Laying out paired plot and land preparation/application of basal fertilizers												
Visit each farmer's field to check whether basins have been dug												
Visit each farmer's field after distribution of basal fertilizer												
Demonstration of pre-plant weed control and planting												
Visit each farmer's field at/just post planting												
Demonstration of post plant weeding/top dressing at 5 to 6 leaf stage												
Visit each farmer's field after weeding/topdress demonstrations												
Visit each farmer's fields pre-harvest to check on weeds etc.												
Field days/results report back												
Discuss how facilitate access to inputs for year 3 and beyond												

Conservation Farming Calendar – Third-Year Farmer												
Farmer Activities	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**
Winter weeding												
Mark out												
Mulch/residue management												
Land preparation/dig basins												
Apply manure/fertilizer (lime where necessary)												
Pre-plant weeding if necessary												
Plant												
Postplant weeding												
Apply N topdressing at 5 to 6 leaf stage												
Post topdressing weeding												
Clean weeds at harvest time												
Harvest												
Implementing Partner/Extension Activities												
Encourage farmers to expand area												
ID which 3rd-year farmers do what												
ID what inputs required												
Facilitate access to inputs												
Attend training of trainers at RoL												
Attend training of trainers at ICRISAT												
Field days/cross visits												
Farmer training/methods demo/field visits												
Introduce rotations to 3rd-year farmers												
Visit each farmer's field to check whether basins have been dug												
Visit each farmer's field after distribution of basal fertilizer												
Visit each farmer's field at/just post planting												
Visit each farmer's field after weeding/topdress demonstrations												
Visit to each farmer's fields pre-harvest to check on weeds etc.												
Field days/results report back												

Section 3
Suggested Conservation Agriculture Packages

The ZCATF has developed Conservation Farming Packages for Natural Regions II through IV. These packages are goals that programs should try to achieve within 5 to 7 years. The recommended packages are summarized in Table 3.1.

Table3.1. Conservation farming cropping packages recommended by Natural Region in Zimbabwe

Natural Region	Rainfall (mm)	Rainfall characteristics	Cropped area	Crops/rotation
II	650 to 800	Good distribution	3 by 0.25 ha	Maize-Cotton-Legume (Groundnuts[6]/Soybean)
III	650	30 to 40 rain days		Maize-Cotton-Legume (Groundnuts/Cowpea/ Soybean)
IV	500 to 650	30 rain days		Maize/Sorghum/Pearl Millet Groundnuts/Cowpea Sunflower/Cotton
V	Less than 500	16 to 30 rain days		Sorghum/Pearl Millet/Maize Groundnuts/Cowpea

Based on the possible crop rotations outlined in Table 3.1, three CA packages are recommended by the ZCATF for households with different resource statuses:

- 'Full package' (households with no labor, draft power or financial constraints) – see Table 3.2 for comprehensive agronomic details.
  - Three by 0.25 ha plots
  - Cereal–cash crop–legume rotation

- 'Standard package' – see Table 3.3 for comprehensive agronomic details.
  - 2 by 0.25 ha plots
  - Cereal–legume rotation

- Package for 'Vulnerable Households' – The focus of the Protracted Humanitarian Relief Initiative – see Table 3.4 for comprehensive agronomic details.
  - 0.25 ha plot
  - 0.2 ha cereals, 0.05 ha legume
  - Option for cereal–legume intercrop
  - In years one and two it is recommended that the program focus only on staple cereals to address food security constraints.

[6] Groundnuts are not recommended at the moment for the Planting Basins Package as spacings are incorrect and leave the groundnuts susceptible to disease and pests.

Table 3.2. ZCATF detailed cropping recommendations for households with no financial or labor constraints, the full package

Full package		NR II	NR III	NR IV	NR V
Plot size		3 by 0.25 ha	3 by 0.25 ha	3 by 0.25 ha	3 by 0.25 ha
Crops	Cereals	Maize (0.25 ha)	Maize or red sorghum (0,25 ha)	Maize, millet or sorghum (0.25 ha)	Millet or sorghum (0.25 ha
	Legume	Soya, Gnuts (0.25 ha)	Soya, Gnuts, Cowpeas (0.25 ha)	Cowpeas, Gnuts (0.25 ha)	Cowpeas, Gnuts (0.25 ha)
	Cash	Cotton, sunflower (0.25 ha)	Cotton, sunflower (0.25 ha)	Cotton, sunflower (0.25 ha)	
Spacing (Maize/Cereal/Cash Crop)		75 by 60 (44,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)
Spacings (Legumes)		Same but plant 5 seeds per basin	Same but plant 5 seeds per basin	Same but plant 5 seeds per basin	Same but plant 5 seeds per basin
Fertilizer for cereals Compound D/Topdress		A minimum of 80 kg ha^{-1} compound (1 level beer bottle cap per basin) A minimum of 80 kg ha^{-1} Ammonium Nitrate (1 level beer bottle cap per basin)			
Liming		Based on soil samples			
Planting date		Early to mid November with first good rains	Mid to late November with first good rains	Late November to early December with first good rains	Early December with first good rains

Table 3. 3. ZCATF detailed cropping recommendations; the standard package

Standard package		NR II	NRIII	NRIV	NRV
Plot size		2 by 0.25 ha	2 by 0.25 ha	2 by 0.25 ha	2 by 0.25 ha
Crops	Cereals	Maize (0.25 ha)	Maize or red sorghum (0,25 ha)	Maize, millet or sorghum (0.25 ha)	Millet or sorghum (0.25 ha
	Legume	Soya, Gnuts (0.25 ha)	Soya, Gnuts, Cowpeas (0.25 ha)	Cowpeas, Gnuts (0.25 ha)	Cowpeas, Gnuts (0.25 ha)
Spacing (Maize/Cereal/Cash crops		75 by 60 (44,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)
Spacings (Legumes)		Same but plant 5 seeds per basin	Same but plant 5 seeds per basin	Same but plant 5 seeds per basin	Same but plant 5 seeds per basin
Fertilizer for cereals Compound D/Topdress		A minimum of 80 kg ha^{-1} compound (1 level beer bottle cap per basin) A minimum of 80 kg ha^{-1} Ammonimum Nitrate (1 level beer bottle cap per basin)			
Liming		Based on soil samples			
Planting date		Early to mid November with first good rains	Mid to late November with first good rains	Late November to early December with first good rains	Early December with first good rains

Table 4. ZCATF detailed cropping recommendations for vulnerable households, the vulnerable household package

Vulnerable households		NR II	NRIII	NRIV	NRV
Plot size		0.25 ha	0.25 ha	0.25 ha	0.25 ha
Crops	Cereals	Maize (0.2 ha)	Maize or red sorghum (0.2 ha)	Maize, millet or sorghum (0.2 ha)	Millet or sorghum (0.2 ha
	Legume	Soya, Gnuts (0.05 ha)	Soya, Gnuts, Cowpeas (0.05 ha)	Cowpeas, Gnuts (0.05 ha)	Cowpeas, Gnuts (0.05 ha)
Spacing (Maize/Cereal/		75 by 60 (44,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)	75 by 75 or 90 by 60 (37,000 p/ha)
Spacings (Legumes)		Same but plant 5 seeds per basin	Same but plant 5 seeds per basin	Same but plant 5 seeds per basin	Same but plant 5 seeds per basin
Fertilizer for cereals Compound D/Topdress		A minimum of 80 kg ha^{-1} compound (1 level beer bottle cap per basin) A minimum of 80 kg ha^{-1} Ammonimum Nitrate (1 level beer bottle cap per basin)			
Liming		Based on soil samples			
Planting date		Early to mid November with first good rains	Mid to late November with first good rains	Late November to early December with first good rains	Early December with first good rains

Note: In initial years plant cereals to address food security issues. Consider introducing the legumes in year 3 or 4.

Section 4
A Checklist for Conservation Farming Projects for Use by Donors and NGO staff

1. Introduction

These guidelines have been designed to assist stakeholders (NGOs, extension agents, donors and farmers) in developing sound CF extension programs for phase 2 of the Protracted Relief Program and other future programs.

Describe and Specify Intervention:

1. Projects should follow CA principles: minimal tillage and soil movement, surface soil cover with crop residues, rational crop rotations. These imply no burning of crop residues and require high management standards.
2. Projects should define CF as: agricultural systems based on the preparation of planting basins during the winter period, a set of precise management practices, at least some crop residue retention, crop rotation, and the perennial use of the same planting basins.

Project Objectives:

1. The following objectives should be discussed and analyzed in the project: food security, risk reduction, diversification, social protection, community empowerment, sustainable production, and marketing of surplus production.
2. In the project proposal, the agricultural results (benefits) should be clearly articulated and should be divided into the short-term (1–2 years) and long-term: (5+ years) activities.

2. Program management and timing of activities

Program outline and funding:

1. In order to achieve the desired impacts a 3–5 year timeframe is strongly advised (even if funding is not assured for the full period, a plan for continuation should be developed).
2. Any project should be designed so that the farmers starting in the first project year will be supported by the project for at least 3 years and then gradually weaned off from support.
3. For CF farmers to graduate and be weaned off project input support, there is need to assist with development of an input supply market so that farmers can purchase seed and fertilizer
4. CF farmers should, within a timeframe of 3 years, adopt all the CF principles and begin to invest own resources and expand the area under CF.
5. Any project should be designed so that a farmer can graduate into a CF trainer.

Staff numbers (extension agents)

1. The project should clearly define the extension system (e.g., lead farmer/extension agent/cluster) and approach to be used. The following paragraphs indicate the maximum recommendable scope of the project. Every position (e.g,. assistant trainer, trainer, lead farmer) should have a clear job description that clearly defines roles, tasks, and responsibilities.
    a. *Extension Agent System* (non-farming employed extension worker): Project should put the ratio between trained extension workers and CF

farmers at most 1:60 (of which at most 20 will be 1st year practitioners, 20 2nd year practitioners and 20 3rd year practitioners/potential lead farmers). These figures are based on the M&E guides presented in Section 5. The extension agent should report to, and be supported by, qualified supervisory Implementing Partner (IP) staff, who should not oversee more than six extension agents.

b. *Lead Farmer System:* The ratio between lead farmer and CF farmer should not exceed 1:10. The CF supervisor (IP staff) should not oversee more than 20 lead farmers.
    i. Lead farmers should have practiced CF on their own fields for at least 2 years, i.e., they should be experienced farmers.
    ii. The project should define payments of lead farmers either in cash or kind to adequately compensate for the extra work. The payment must be more than just inputs for a CF plot.
    iii. Where CF is introduced into a ward for the first time it is strongly advised that the implementing NGO does not try and use a lead farmer approach in years 1 and 2 of the program.
c. *Combined Agent and Lead Farmer System*: The ratio between extension agent to lead farmer to CF Farmer should be at most 1:20:200. The CF Supervisor in this combined system should not oversee more than 10 extension agents.

Training of extension agents:

1. Supervisors and extension agents should undergo and complete all phases of basic CF training (e.g., that offered by River of Life), followed by in-service/on the job support (e.g., that offered by ICRISAT).
2. CF projects should have a training calendar for both their extension agents and beneficiaries in place.
3. The extension agent selected for training should have a work contract of at least 1 year, but preferably 2 years, from time of training to ensure the acquired knowledge and skills will be passed on.
4. The training calendar for farmers should show that training on particular aspects/activities is done shortly before the activity is to be implemented at field level.

Farmer selection:

1. Projects should clearly state that the selection of farmers will be done by the community in collaboration with the project staff, once the objectives of the project have been described.
2. Projects should state that groups of at least five farmers, who live in close proximity to each other in a village, will be formed.
3. New projects initiating CF activities should ensure that their initial clusters are easily accessible by project staff and other villagers.
4. Project should make a reference to the clustering of CF groups (3–4 farmer groups in a cluster).

Input supply and distribution:

1. The project should outline a workplan of support to ensure that all inputs are distributed to farmers well before the first rains – basal fertilizer should be applied before the rains, seed should be available when the rains start, and

topdressing fertilizer must be made available by late November to early December.
2. A project should specify how long a cluster will be supported for and develop a clear exit strategy for project support indicating where future extension support will come from and where farmers will access inputs of seed and fertilizer when the project ends.
3. Enough legumes should be included in the package to allow effective rotation (1 year in 4) with cereals by year 3 of the program.

3. Field Management:

Timing of operations and activities

1. The Conservation Agriculture Calendar described in Section 2 should be used as the model.
2. According to the Natural Region, the proposed CF Calendar can differ, but it should include all the steps of the model and alterations should be justified.
3. A detailed CF work and extension plan should be drafted in the CF planning (extension and training should be done shortly before farmers have to apply the skills).

Land and crop management

1. Land and crop management should follow the three basic principles of CA.
2. There is no fixed model for CF, but basic techniques (crop rotation, basins, weeding, fertilizing, seeding, etc.) should be similar to existing experiences.
3. The initial plot size for a vulnerable household should be no bigger than 0.25 ha (0.2 ha of cereal and 0.05 ha of legume) irrespective of the Natural Region.
4. Technical recommendations of the ZCATF should be reflected in the proposal (see seeding and fertilizer rates outlined in Section 3).

Need for paired demonstration plots

(This only for selected sites; not every CF beneficiary)

1. Paired demonstration plots should be implemented comparing CF with normal farmer practices (see Section 6).
2. Demonstration plots need extra care in order to achieve the intended results. The proposal should clearly express this fact and indicate how the demonstration plot will be managed, e.g., one paired demonstration site per lead farmer or one per cluster.
3. The extension plan should show clearly how the plots will be used for training purposes (timing of field days, etc.).

Implementation of extension and training activities and farmer knowledge development:

1. Expansion in numbers of farmers should respect the ratio of trainer: – farmers (see above). Numbers will depend on how many farmers meet the criteria and are willing to become trainers.
2. Work teams (farmers working together in a group) should be encouraged to ease the labor challenges and facilitate knowledge sharing as well as ensuring effective use of inputs provided.
3. In extending CF, training invitations should include non-targeted community members.

4. All spontaneous adopters should be included in subsequent CF programs regardless of their wealth rank (the package will vary from training only to full house depending on wealth status).

Monitoring and Evaluation:

1. M&E strategies should be in place (frequency and reporting)
2. NGOs and extension officers should develop a community-based tracking system that defines people practicing CF in a given area (see Section 5 for an example).
3. A clear feedback system should be in place to share information (experiences, innovations, results) with all stakeholders, including beneficiaries.

Section 5
A Suggested Scoring System to Assist in Monitoring And Evaluation

1. Preamble

Monitoring and evaluation is very important to the successful implementation of CA/CF, both by the implementing agency, and also (if possible) by the beneficiaries themselves. There are certain key components that determine its success and indicate that true CA/CF is being implemented, including such factors as non-inversion of soil, crop residue management, attention to planting detail, winter weed control, and timeliness. Management is the overriding factor that determines the success of CA/CF.

With this in mind, a monitoring score sheet tool has been developed to aid the setting of standards, determine what is key to make CA/CF work, provide a means of factual feedback on progress, and for farmers to see where they have succeeded and where there is room for improvement. The scoring tool can be used to set minimum standards, to determine how well CA/CF has been understood and is being implemented, and as a teaching tool to show the farmer where s/he has done well, and where there are weaknesses in his/her implementation.

In addition, to what extent should an implementing agency expect accountability from benefiting farmers? Should they be included even if they continually do not practice what is being taught? Different agencies will interpret this differently; however, should a minimum acceptable standard over a period of time be desired, the monitoring score sheet is a tool that can be used to determine this. A word of caution in its use for requiring accountability: the first step in assessing poor performance is to ask the question whether the implementing agency or extension staff is at fault or has been negligent (e.g., inadequate or poor training done) and to put that right first before penalizing the farmer.

It can also be used to identify where vulnerable households (elderly, orphan headed, HIV and AIDS affected) require greater assistance from the project and the community.

2. Monitoring Score System

Two alternatives are provided:

(1) The first is an abbreviated score sheet making it fairly quick and easy to assess individual farmers, then collate by site, then collate by district or NGO (forms CF1, CF2 and CF3).

(2) The second is the detailed score sheet for those who want to do a more thorough assessment.

Implementing agencies should choose one system and stick to it. They may wish to adapt or modify or even design their own score sheets using the same principles of scoring.

(1) Score sheets CF1, CF2 and CF3

- Allows monitoring of individual farmers throughout the year (once per month during winter months, twice per month during the growing season, a total of 16 visits) – see sheet CF1.
- Focuses on key parameters relevant to the time of year/season
- Allows collation and summary of scores for sites or wards (sheet CF2)
- Allows for collation of scores for the NGO across a number of sites/wards (see sheet CF3).
- Based on three forms: CF1, CF2, CF3 (see spreadsheet attachment)
- CF1: CF MONITORING SCORE SHEET – Individual farmer
- CF2: CF MONITORING SCORE SHEET – Summary of site/ward for one period
- CF3: CF MONITORING SCORE SHEET – summary for NGO.

Example

An NGO has 10 farmers at each of three wards: how does the NGO use the Monitoring Score System?

- Need: 30 x CF1 forms, one for each of the 30 farmers
- CF2 forms: need one for each site/ward, with the 10 farmers listed on each. Thus, for each period, three forms for the three sites/wards are needed. Therefore, the total number of CF2 forms needed is 3 x 16 periods = 48.
- CF3 forms: need one to summarize each period; a total of 16.
- For each farmer there will be a CF1, which will be used throughout the year. On each visit (preferably as per the recommended periods), complete just the column for that period, and only the blanks, not the shaded boxes. Add the figures in the column and write the total in the bottom box. Farmer and NGO monitor will need to sign at the bottom.
- Repeat for each visit to each farmer.
- Now take these scores and copy them onto CF2, column by column, farmer by farmer. Then add the columns and fill in the total; then add the rows, fill in the total. Finally calculate the averages.
- Now transfer the averages to CF3 and calculate totals and averages. Only three columns should be used, representing the three sites/wards.
- The results of CF3 are for the use of the NGO. However, it is requested that these summary sheets be either emailed (as Excel spreadsheet) or faxed to FAO for monthly collation and presentation at the monthly Agricultural Coordination Working Group meeting.

(2) Detailed score sheet

See attached sheet showing more detailed information to be assessed.
Note that a column is included for "Multiplication factor". This is so that the relative score can be weighted in terms of its relative importance. For example, records of rainfall may be deemed of less comparative value to winter weed control, so the multiplication factor for rainfall records may be one, whereas for winter weed control it may be three. If this weighting causes confusion, it could be left out so that all multiplication factors are effectively one.

Score sheets need to be added

Section 6
General Guide for a Simple Paired Plot Demonstration

Objective:
Demonstrate to farmers and extension staff the benefits of basin tillage

- A paired plot layout with an area of 0.1 ha (0.25 acres) for planting basins and another 0.1 ha (0.25 acres) for the control treatment (farmer practice) without basins is needed.

- **Planting basins** should be spaced at 90 by 60 cm, giving a total of 1850 basins per 0.1 ha (0.25 acres) in unplowed land.
  - Apply basal fertilizer at land preparation – either manure or compound fertilizer
    - Apply a handful of manure per planting basin.
    - Cover the manure with a thin layer of soil. Leave the basins open until you receive the first effective rains.
    - The NGO may need to buy manure for some of the participating farmers.
    - If Compound D is available apply a level beer bottle cap per planting basin (8 kg for 0.1 ha).
  - Maize or any other cereal grain should be planted soon after the first effective rains.
    - Sow immediately after receiving a good rain that fills the basin.
    - Sow maize/cereal seeds in the basins at rate of three seeds per basin and cover with clod free soil until basin is level with the soil surface. (2.5 kg maize/0.25 acre, 1 kg sorghum, 0.5 kg millet).
      - Place one seed at each end of the planting basin and one in the middle; remove weakest seedling at first weeding.
    - Apply ammonium nitrate, try a level beer bottle cap per planting basin (8 kg for 0.1 ha) at 5 to 6 leaf stage.
  - Leave crop residue between the planting rows if available.
  - Keep plots weed free, at least two hand weedings at 2 and 6 weeks: more will be probably necessary in year 1 when weed pressures may be heavier.
    - Weeding of the entire plot should be completed in 1 or 2 days.
    - Make sure that no weeds set seed later in the season – year-round weed control is necessary

- **Farmers' own practice**
  - Host farmers apply the same quantity of manure or basal fertilizer to the farmer practice plot as in the CF plot, but in the manner they define.
  - Host farmer plants the other 0.1 ha of cereal as s/he normally would and manages accordingly. This plot does not have to be planted on the same day as basin plot.
  - Farmer top dresses with 8 kg ammonium nitrate if the basin plot is top dressed.

Possible plot layouts are 20 m by 50 m by 2

0.1 ha maize/sorghum or pearl millet plus planting basins
0.1 ha maize/sorghum or pearl millet farmers' own practice

Inputs the NGO needs to provide in Natural Regions IV and V to establish demonstrations

Item	**Per farmer**	**Per ward (5 farmers)**	**Per district (10 wards)**
Maize seed	5 kg	25 kg	250 kg
Compound D*	16kg	80 kg	800 kg
Ammonium Nitrate	16 kg	80 kg	800 kg
Planting line	1	5	50
Tape measure		1	10
Spring balance – 50 kg		1	10

* if manure is available encourage farmers to use this resource