International Training Workshop

On

“Conservation farming, conservation tillage and soil erosion control” to improve professional skills in land and water management

-- TO IMPROVE PROFESSIONAL SKILLS IN LAND AND WATER MANAGEMENT --

Supported by SADC’s Land and Water Management Applied Research Programme

25th November to 9th December 2007

Harare, Zimbabwe

Skills Training for field and middle level staff
in the
Concept and Applications of Conservation Agriculture in smallholder farming systems

Content and Training Programme
Skills Training for field and middle level staff in the Concept and Applications of Conservation Agriculture

Key learning Questions

Part 1: Appreciation of the problem and justification for concerned

Why should we be concerned with current level in agriculture productivity; What are the issues/challenges on agricultural productivity in your area

What are the underlining causes and process leading to unsustainable farming systems (poor/declining, unstable yields)

Part 2: Do we have alternative options

The Concept: Do we have alternative way to farm (grow crops) getting high yields with no or minimum “damage” to the environment

How do we assess feasibility, viability, appropriateness of identified technical options

Part 3: Facilitating and supporting adoption (technical, socio-economic & cultural considerations)

Approaches/tools to promote/facilitate adoption of proven options

How do we assess feasibility, viability, appropriateness of dissemination/promotion approaches

Examples (case studies) of application of the options/approaches in familiar circumstances

What are the success/failure factors in the application of sustainable agriculture/conservation agriculture options/systems

Planning and facilitating farmer-learning and innovating based on farmer experimentation

Part 4: What we are now going to do differently as a result of this training
1. Introduction

Agriculture is without any doubt the single most important industry in a majority of the developing countries including the SADC region. In these countries, the livelihood of an estimated 90 percent of its rural population is directly dependent on Agriculture. In the SADC region, agriculture employs two thirds of the labor force and 70 % of people in sub-Saharan Africa are engaged in some way in Agriculture. Agriculture can provide both income and food for home consumption. Agriculture remains the most likely source of significant economic growth. For example in Zimbabwe, agriculture accounts for 37 % of GNP and accounts for 50 % of exports. Agriculture can also help stabilize livelihoods and provide families with a safety net during economic down turns. Agriculture is provides an opportunity to address gender imbalances. Women play a particularly important role in Agriculture – they produce 60 to 80 % of food in developing countries.

The early years of human civilization were characterized by traditional subsistence agriculture over thousands of years, more or less in equilibrium with the environment resulting from low human and livestock populations controlled at low levels by deaths due to droughts, diseases and tribal warfare. The lower population therefore allowed for traditional agricultural practices such as transhumance that not only afforded the communities with a livelihood but also was environmental friendly. Modern medicine and other technological advancements have resulted to lower mortality rates The resultant sharp increase in population growth has put increased pressure on the available productive land causing forced migration and farming in marginal areas where soils are fragile and highly vulnerable to erosion. For example in Southern Africa between 2002 and 2020 the population, which is increasing at an annual rate of 2.2-3 %, will have doubled (figure 1) putting more pressure on land resources.

Most of the farmers in the SADC region are in areas that are vulnerable to degradation, which involves a progressive destruction of the biological and physical resources of the land resulting to reduced usefulness of these areas to humanity. It is estimated that in Southern Africa wind erosion, physical and chemical degradation affect 45.4 million ha, 25.9 million ha, 6.4 million ha and 2.6 million ha of land respectively.. The specific human factors causing or affecting land degradation in the drylands have the common underlying feature of people attempting to get a greater yield from the land systems than these systems can bear without being degraded. Most of the smallholder farmers in the SADC region are farming in such areas.

Agriculture can therefore have a tremendous impact on the environment and environmental services. Agriculture is the most important user of environmental services water, forests, pastures and nutrients. Well-managed Agriculture can conserve soil and water resources, preserve trees and biodiversity and contribute to the locking up of carbon (carbon sequestration). Sustainability depends on the availability of water, forests pastures and nutrients. Poorly managed Agriculture can lead to environmental degradation and pollution; deplete natural resources and compromise biological and food safety.

Conventional-tillage based practices have increasingly fallen short in dealing with current challenges and problems of soil degradation, declining soil fertility and increasingly poor yields. Some conventional practices are, in fact, causing soil degradation. In Zimbabwe for example it is estimated that under conventional tillage 4 mm of top soil are removed annually (Grohs and Elwell, 1993) and annual nutrient losses through erosion is estimated at 2.5 million tons of organic matter, 1.6 million tons of Nitrogen and 0.24 million tons of phosphorus (Stocking 1986). In Zambia, it is estimated that the country loses about three million tons of topsoil from conventionally cultivated land each year. In the Orange Free State of South Africa, research showed that cultivated land under conventional tillage lost 66% of its organic matter and 55 % of its nitrogen from the top 15 cm of soil. Conservation Agriculture or Conservation farming provides an alternative to do Agriculture in a sustainable way.

Whilst conservation farming based practices are gaining momentum at various fronts and levels in the region, much of the agricultural training is still running curricula based on conventional farming practices. The graduates, most of whom get to work as agriculturists in farmer support services, increasingly find themselves, ill-equipped in responding to farmers’ needs in meeting challenges on sustainable soil-water management.

To ensure that farmers get necessary and appropriate information support in their efforts to address problems of soil degradation, training and/or re-training of agriculturist involved in providing support
services becomes an urgent and imperative task. It is with such a background that this proposed training on conservation farming will be developed.

2. Background and Rationale

Whilst the no-till – cover crop/mulch – rotations based conservation farming practices is gaining active interest at various “fronts”, training institutions and especially agricultural training colleges still remain offering lessons based on conventional farming practices. Therefore, the graduates, most of whom get to work as agriculturists in farmer support services – extension, training and research, are increasingly finding themselves ill-equipped in responding to farmers’ needs in meeting current challenges on sustainable soil-water management practices. Farmers have felt and expressed the lack or inadequacy in the information-training services. To make matter worse, often inappropriate and sometimes contradictory messages are being offered to the farmers.

The understanding and application of conservation farming/tillage and indeed the conventional-tillage based farming practices which characterise the old and still largely used curriculum has increasingly fallen short in dealing with current challenges and problems of soil degradation, declining soil fertility and increasingly poorer yields. Some practices involved are actually of the causes of the soil degradation being experienced.

Therefore, to ensure that farmers have the necessary and appropriate training and information support as their endeavour to address depressing problems of soil infertility, training and/or re-training of agriculturist involved in providing such support services becomes an urgent and imperative task.

Hence, a farmer’s training and information support service agent with the relevant and appropriate conviction and skills on improved practices for sustainable soil-water management is essential in speeding up the rate and extent of adoption of appropriate conservation tillage practices.

Noting that women are an important player in undertaking various farming activities, and therefore, efforts to enhance wide spread application of CT practices by women farmers will significantly contribute to increased and sustainable soil fertility, increased productivity, higher incomes and better standard of living for farming communities. This training programme will, hence, give special consideration to women staff and farmers.

It is with this background and purpose that SADC’s Land and Water Management Applied Research Programme provides necessary resources for special skills training in conservation agriculture aimed at giving relevant agriculturalists at different levels an appreciation and applied skills.

3. Course objectives and expected output

The training ultimately aims to give the participating staff:

- enhanced understanding of the principles of conservation tillage and the new way to farm, and
- practical knowledge and skill in the application of conservation tillage practices also taking into account a given socio-economic, agro-ecological environment.

The training is also expected to provide the participants the “will” and “technical stamina” to enable them respond competently to farmers needs in the application of CT technologies.

Specifically the training will enable participants:

i. understand the concept of no/minimum tillage based sustainable agriculture,
ii. acquire a stronger and higher CT knowledge-base to facilitate their effective and informed participation and decision making,
iii. boost their extension skills especially as concerns sustainable farming and facilitation of community based CT activities.
After the course and back into their own environment, the participants should be able to apply CT technologies and guide farmers on the same, with confidence. Should also be able to well serve as trainers for fellow staff.

4. Learning Approaches and methodologies

The training workshop conceptually focuses on “learning” than “training”; on the Participants than Resource Persons, takes a practical problem-solving approach. Resources persons are challenged into interactively engaging the participants in learning process that allows them (the participants) to bring out, reflect and build on their own experiences and knowledge level. Dealing with fundamental of farming, the approach also recognizes and aims to induce/change CHANGE in attitudes. The Problem Analysis exercise done within the first lessons is meant to help ensure that learning is “placed” within the context of the participants’ working circumstances. A process approach based on experimental learning aiming to build on participants’ own experiences will be used.

A general understanding of the problem of land degradation provides the basis of the development of the learning. Participants and their institutions will be facilitated to relate the general problems to their specific conditions through experience sharing. The conservation farming concept, principles and practices are discussed and their application in dealing with identified land degradation problems demonstrated (Figure 1).

The training will be highly practical with most lessons involving practical work (using real life training aids, e.g. implements, draft animals, etc...). The training-learning will also include a Farm Visits were the participants will have discussions with farmers, Participants will also be exposed to realities of farming. This is expected to give the participants a holistic and within-context appreciation of CA options. The approach will assist participants analyze and decide on the “what”, “why” and “how” of CA.

The following are the key features of the learning-training methodologies:

i. Plenary lecture presentations/discussions will be used to stimulate discussion and provide to the participants new information and experiences including research findings/explanations.

ii. Small group working sessions: Participants will for a lot of practical work, assignments and discussions be divided into smaller groups. This is also to ensure that everybody participants – whether it is physical work on just discussions. Part of the group work involves participants developing case studies on CF application/effects in their work areas, which is then presented and discussed with rest of the main group. At the end of the training-learning, participants, again working in smaller groups are required to develop individual and collective action plans – to be followed up after the training.
iii. **Demonstrations and practicals**: Most CF principles and practical options will be demonstrated, unless or otherwise using real life aids. In feasible cases, participants will also be expected to each try out in practical sessions. Appropriate fields, draft animals, implements and other requirements are prepared in advance. The right practical fields is one of the key criteria for selection of the training venue.

iv. **Field Visit**: For a full day in the learning programme participants will visit institutions/farmers practicing CF. During this visit participants shall also engage in almost unguided discussions with farmers on the concept and principles and especially on their applicability in the local circumstances.

5. **Who is to be trained**

The training is specially designed for front line agriculturalists involved in the provision of extension and training services to farmers. These are staff who have graduated from agricultural colleges and mostly having come through a curriculum based on conventional tillage farming practices.

Each course will take a maximum of sixteen (16) participants and will be organised at regional level.

6. **Course Fees**

For self-sponsored participants, a training fee of one thousand five hundred US dollars (US $1,500) per participant is charged. This caters for full boarding and lodging, tuition fee and cost for all the learning materials to be provided to the participant.

Travel costs to and from the training venue and pocket money are a responsibility of the participant’s sponsors and should be handled directly between the Sponsor and the participant/s.

The Training Fee could be paid through Bank transfer (details below) OR by cheque on arrival, i.e. during registration. Cheque should be prepared as payable to: African Conservation Tillage Network (ACT)

Electronic Bank transfer to the following Bank details.

<table>
<thead>
<tr>
<th>BANK:</th>
<th>Stanbic Zimbabwe Limited</th>
</tr>
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<tbody>
<tr>
<td>BRANCH:</td>
<td>Belgrevia Branch, Harare</td>
</tr>
<tr>
<td>NAME OF ACCOUNT:</td>
<td>African Conservation Tillage Network (ACT)</td>
</tr>
<tr>
<td>ACCOUNT No:</td>
<td>022 296 848 201</td>
</tr>
<tr>
<td>SWIFT CODE:</td>
<td>1009</td>
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Through the SADC Land Management Programme Sponsorship is available for a few participants. These will be identified through in-country SADC National Coordinators in liaison with relevant institutions involved in the promotion of conservation agriculture.

7. **Course content**

The course content outline given below will form the basis for any one course. For each course planned this will be refined within the context of the participants’ background and level. It will also take on board expressed training needs and expectations from the participants themselves and from the employers and possibly from the farmer communities they work. Participants-to-be will be expected to provide some relevant information through a simple questionnaire filled-in during the preparation of the course.

The general course content framework includes:
## Training content outline

### Module 1: What are the problems/issues/challenges in application of sustainable agriculture

<table>
<thead>
<tr>
<th>Learning Benchmarks</th>
<th>Content</th>
<th>Time and materials required</th>
<th>Resource Person/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trainees’ work areas and circumstances: Situational analysis</td>
<td>Situation analysis/Identification of problem/s, issues/challenges</td>
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</table>
| i. Situation analysis: what are the central factors in the life of a typical person in the area: Highlighting | - Physical (geographical location, roads, rivers, other physical landmarks)  
- Climate (rainfall, temp)  
- Peoples (settlement, size, culture-traditions, occupations including pass-time, etc…)  
- Agriculture (crops, livestock, fields, implements, etc…)  
- External inputs/interventions (development programmes, agric. Inputs, interaction with urban centre, markets)  
- Survival strategies |  |  |
| ii. Problem analysis (using information from (i) above) | - Describe (in one brief paragraph) the current status and trends in the past 2-3 decades of agriculture in your area  
- Develop a chart illustrating how agricultural performance is relating to social problems such as poverty, food insecurity, HIV-aids, etc…  
- List in priority order factors (constraints/opportunities) limiting agricultural production-productivity in your area  
- For the first factor on your priority list identify on (i) causes of the problems and causes of causes (ii) effects of the problem (problem tress analysis) |  |  |

**How (Methodology)**

This is a practical highly involving exercise. The exercise is explained and guiding queries presented. Then is the work is done in smaller groups (on the basis of their work areas; this is important so that the discussion are not arbitrarily

i. Situation analysis: participants work in small groups develop chart using illustrations – avoiding words (should discuss why as they go on)

ii. Problem tree: Questions are answered with open group discussion and visualised on flip chart; with the problem tree chart as the final product

The group works shall them be presented (as brief notes) in plenary. The work will remain posted on the boards for the duration of the T/Workshop

Conclusion to highlight the main features in all the group work and begin the linking of technical agricultural limitations to agric. Performance and then to poverty, etc…

**Agriculture and development in Africa**

- role of agriculture in economic and social development in Africa  
- performance of the agricultural sector and trends  
- strengths and weakness in the current agricultural policies, strategies, patterns and practices

**How (Methodology)**

- an interactive presentation followed by plenary discussion

| Time: | 15 min. introduction  
- 1 hr. group work  
- 15 min per group presentation  
- 10 min rap-up |
| Materials | flip chart paper and boards  
- markers  
- tape/pins |
**Remarks**

- Situation analysis is important exercise in laying foundation for the training. Therefore, this exercise should be thorough, with the participants facilitated into detailed and critical analysis.
- In this regard, more time may be required.
- Consider more presentations/discussions by participants.
- Possibility of case study presentation by a participant.
- Ensure that participants well understand the exercise (some illustration/example of the assignments could be given in the initial introduction of the exercise).
- Ensure clear and logical linkage of a problem and situation analysis.

**Module 2: What are the underlining causes and process leading to unsustainable farming systems (poor/declining, unstable yields)**

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<tr>
<td>Conventional farming and its short and long term impact on natural resource sustainability</td>
<td>1. Farming practices leading to unsustainable farming systems 2. Farming/crop production in nature; as a series of natural processes (water cycle, nutrient cycle, etc...) natural processes of degeneration-regeneration 3. Challenges/limitation in natural processes to provide for growing human needs – basis for human interventions 4. Effects of human interventions (i.e. tillage, fertilizers, seed, chemical, management – monocrop, residue removal, etc...)</td>
<td>1. Total of 2.5 hours (including time required for group work – 30 minutes) 2. Total 3.5 hours (including a 2 hrs practical session)</td>
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**How (Methodology)**

1. Presentation/Discussion followed by group exercises and then synthesis of the session by RP (no plenary presentation); RP uses the group work outputs in the synthesis.

2. Group discussion questions: Each group picks up one factors from the human interventions (tillage, fertilizer, seed, chemical, etc...) and develops a chart of effects-effects (distinguished between short and long term effects)

   Presentation/Discussion: illustrated presented, i.e. with many real life pictures. The principles provides basis for presentation/discussion and analysis of SA/CA options

3. Practical session: expose participants to some effects; e.g. pre-prepared profile to show compaction/hard pan; demonstrations trays – erosion; soil cover-infiltration

4. Field visit checklist to include challenge to participants to identify some of the effects of human interventions discussed.
## MODULE 3: What technical options are there to address the problems/Do we have a different way to farm

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| Conservation agriculture: The concept and principles | What is sustainable farming  
- Why SA/CA; the Concept of SA/CA  
- How does CA differ from other agricultural interventions (e.g. implements, seed, fertilizer)  
- What are the benchmarks in achieving SA/CA; Principles of SA/CA - (i) minimum/no soil disturbance; (ii) rotations; (iii) soil cover; (iv) soil organic matter replenishment; (v) integration management including timeliness  
- Why these principles (how are they universal; relationship to differences in agroecological zones and to farmer socio-economic circumstances, etc…) | 1. Total 10 hours (including a 12 hrs practical session) |  |
| Soil fertility and nutrient management | - agricultural definition for soil quality (what is soil fertility)  
- soil fertility: physical factors  
- soil fertility: biological factors  
- soil fertility: chemical factors  
- soil pH and how it affects soil fertility  
- factors affecting soil pH  
- nutrient availability and soil pH  
- lime materials and lime use | |  |
| Management for physical and biological soil quality (fertility) | The presentations to identify and reflect CA practices. The following category could be used.  
- Tillage options in conservation agriculture  
- Rotations  
- Soil cover  
- Soil organic matter management/replenishment | |  |
| CA Applications: minimum/no soil disturbance | Cross-cutting effects of minimum soil disturbance  
- effects on rain water management  
- effects on soil nutrient status and trends  
- effects on soil life and organic matter status/trends  
Options for reduced soil disturbance  
- hand/animal/tractor options in different agroecological situations  
- hand/animal/tractor options in different land/sand and topographical situations  
- hand/animal/tractor options in annual/perennial and other crops, e.g. root crops | |  |

### Materials
- a prepared profiles  
- soil blocks  
- samples from fields with different use history – glass bickers - water  
- In class: (flip charts; markers; power point presentation system)
## MODULE 3: What technical options are there to address the problems/Do we have a different way to farm

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| CA applications: Soil cover | Cross-cutting effects of soil cover  
- effects on rain water harvesting/management  
- effects on soil nutrient status and trends  
- effects on soil life and organic matter status/trends  
- effects on household livelihood parameters (e.g. labour, incomes, cost of farming, etc…)  
Options for reduced soil cover  
- options in different agro-ecological situations  
- dead mulch options  
- live cover crop options  
Technical/social challenges in achieving sufficient soil cover on arable fields | | |
| CA applications: Rotations | Cross-cutting effects of rotations (i.e. role of rotations in sustainable natural resource use)  
- effects on soil physical properties  
- effects on soil nutrient status and trends  
- effects on disease and pest control  
Options for rotations/intercropping  
- possible rotation combinations with financial and environmental protection benefits  
- key considerations in deciding rotation/intercropping mixes | | |
| CA application: Interactiveness and Management | Integrated application in the three principles  
Timeliness  
Quality/quantity in applications of inputs | | |
| Some key cross-cutting agronomic considerations | - planting (timeliness and density)  
- appropriate cover crops: characteristics  
- Weed control,  
- Crop-livestock integration (synergistic relations under CA)( T. Simalenga)  
- Pest and disease control under CA | | |
| Water management (rain water) | - understanding rain water in agriculture (in dry land agriculture)  
- why should a farmer care about water  
- soil and water infiltration and retention  
- rain water harvesting for agriculture productivity  
- practical options for rain water harvesting and efficient use | | |
| Farm power and machinery in Conservation agriculture | Machinery in hand, animal and tractor power systems:  
- ripping/sub-soiling machinery  
- planting/direct planting machinery  
- weed management machinery  
- residue and cover crop management machinery | | |
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| Approaches/tools for facilitating enhanced adoption of proven CA options | • Reflect the conceptual change/development in agricultural extension dynamics,  
• Presentation of concepts and approaches  
• What are the benchmarks in the new approaches – farmer participation, farmer as key partner (not just receiver of support); extension staff as facilitator; information driven as opposed to input driven; empowerment; local organisation/institutional development  
• Present the whole cycle of PEA/Land care approach as examples were the basic principles of the “new” approaches  
• Ensure the approaches/tools relate to soil and water conservation (case study)  
• New roles of the extension worker  
• New roles of the farmer  
• Field visits to expose participants to experiences with approaches and options/practices  
• Farmer field schools (the FFS approach, key concepts and principles of FFS, Implementing FFS) | | |
| Farmer experimentation and on-farm research | Why farmer experimentation  
- what is farmer experimentation  
- supporting farmers to undertake research  
- roles and responsibilities for farmers and for support staff  
- guidelines and considerations in undertaking on-farm experimentation in CA | | |
| Learning benchmarks | • Reflect the conceptual change/development in agricultural extension dynamics,  
• Presentation of concepts and approaches and cases of practical application  
• What are the benchmarks in the new approaches – farmer participation, farmer as key partner (not just receiver of support); extension staff as facilitator; information driven as opposed to input driven; empowerment; local organisation/institutional development  
• Present the whole cycle of PEA/Land care approach as examples were the basic principles of the “new” approaches  
• Ensure the approaches/tools relate to soil and water conservation (case study)  
• New roles of the extension worker  
• New roles of the farmer  
• Field visits to expose participants to experiences with approaches and options/practices | | |
### Module 5: How do we assess feasibility, viability, appropriateness of identified technical options

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<tr>
<td>Factors influencing selection and successful adoption of CA options</td>
<td>i. Technical&lt;br&gt;- climate (humid, arid, semi-arid, etc…)&lt;br&gt;- soil (soil type, extent of degradation, problem soils; etc…)&lt;br&gt;- topography,&lt;br&gt;- crops and cropping systems (annual/perennial crops; legumes; root crops; tree crops; etc…)&lt;br&gt;- etc..&lt;br&gt;ii. Socio-economic factors&lt;br&gt;- short term and long term economic/financial costs in the application of CA&lt;br&gt;- types of costs and benefits&lt;br&gt;- cost-benefit at farm level&lt;br&gt;- cost-benefit at community level&lt;br&gt;- cost-benefit at national level&lt;br&gt;- the economics of labour-machinery use in conservation agriculture&lt;br&gt;- conservation agriculture and overall cost of production&lt;br&gt;iii. Cultural and tradition factors (risks, resources, local institutional support, etc…)&lt;br&gt;iv. Gender issues, social factors such as HIV-AIDS etc&lt;br&gt;v. How do farmers assess and value benefits of CA/farming&lt;br&gt;- key technical considerations in adopting&lt;br&gt;- key social-cultural considerations in adoption&lt;br&gt;- key livelihood considerations in adopting&lt;br&gt;vi. Policy factors&lt;br&gt;- Need for supporting policies&lt;br&gt;- Infrastructure support</td>
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<tr>
<td>Methods of assessing feasibility, viability appropriateness of identified CA options and dissemination approaches</td>
<td>Evaluating appropriateness (including reasons for adopting/not adopting proven options) of identified CA practices and dissemination approaches&lt;br&gt;- guidelines to assess feasibility and viability&lt;br&gt;- Participants should be able to say whether a technology could work in my area; what can make it work or fail&lt;br&gt;- Benchmarks in introduction of CA; starting in virgin fields; starting on already degraded lands</td>
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### Module 6: What are practical examples (case studies) of application of the options/approaches

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| Analysing CA adoption/non-adoption | - Adoption, application of the approach; technical options; approaches and impact  
- Participants should interact with farmers  
- Identify places to be visited: starting with what information or things we want to learn and provide information about places to be visited (1 page per area) | | |

### Module 7: Which of these options/practices are feasible/appropriate in your area/circumstances. What is your action plan

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</table>
| CA options/practices feasible and appropriate in your area; Action planning | Action planning and after-training follow-up programme  
For the action planning, the participants gets backs to the day-one groups (situation analysis groups) and using the problem tree develop an action plan:  
<table>
<thead>
<tr>
<th>Problem/Factor responding to</th>
<th>What</th>
<th>Objective of the What</th>
<th>Target group and area</th>
<th>How</th>
<th>Partners</th>
</tr>
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| - reflect critically how your action will impact at farmer level;  
- decide on some action within your existing capabilities  
- explain how and what support you may require in implementing the plan  
- "the problem/factor responding to" and hence the action decided on should aim at eliminating cause/s | | 1.5 hours of group work and 1 hour of presentations | |

**How (Methodology)**

Participants gets backs into the day-one groups (situation analysis groups) and using the problem tree, on one side, and lessons learnt on the other, identify WHAT is feasible for them (groups or individuals depending on area of work) to do once back home.

After the group work, the output will be shared with the rest in plenary presentations. The larger group looking out for feasibility, that real problem are understood and are being addressed, appropriateness of approaches/technical option; offer information to strengthen the plan.