

SMALL SCALE VEGETABLES PRODUCTION

FACILITATOR'S MANUAL

Rakhine Winter Crops Project
Farmer Field School
June, 2020



**RAKHINE WINTER
CROPS PROJECT**



**NEW ZEALAND
FOREIGN AFFAIRS & TRADE
Aid Programme**

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FFS PLANNING & MANAGEMENT:

1. **Objectives of the SSVP program and evaluation results:** There are 3 main objectives of the SSVP program:
 - i. To improve food security and nutrition for small scale farming households by encouraging year round SSVP farming. Evaluation surveys continually show >70% of participants improving food security.
 - ii. To introduce more modern sustainable GAP farming practices to improve yield and income. Evaluation surveys show >65% of farmers improving their yields and net incomes with better results in the less risky winter season.
 - iii. To get some of the best home gardeners excited about GAP and encourage them to scale up to commercial farming. By the end of year 4, >20% of RWCP SSVP participants have scaled up to commercial farming.
2. **FFS training and monitoring schedule:** The FFS manual guides Facilitators to conduct theory sessions in a classroom setting for around 1.5 hours and field work for 1.5 hours with topics related to the timing of the cropping cycle. The 7 sessions should generally be spaced 2 weeks apart but timing should be flexible according to crop development needs. Every second week the field team should be free to visit and monitor individual plots in village discussion groups to record their progress and learn from each other during discussions.
3. **FFS facilitation process:** In cooperation with the Ministry of Agriculture, Irrigation and Livestock, the Rakhine Winter Crops Project (RWCP) is implementing a program aimed at the improvement of agricultural extension services by private and government sectors to improve the yields and income of farmers. This manual guides Facilitators step by step through the cropping cycle following a participative training process using brainstorming, sub groups, and some individual exercises as the main training methods. The Exercises in this 'Facilitators Manual' are copied into a 'Farmer's Work Book' so the farmers have the main notes already written for them, with some blank lines for them to add additional notes. In this way, farmers can listen and discuss, without worrying about writing notes. Facilitators with limited agriculture knowledge can use this manual, as the technical information is already there in the manual and workbook, and the participative training approach means farmers talk 80% of the time, with facilitators just summing up and adding a few more points for 20% of the time. This takes pressure off the facilitators who sometimes think they have to be an agriculture expert to be a trainer. This is not the situation when using this manual. Facilitators should however try to have a general knowledge of agriculture, and study the manual before each session to make sure they are comfortable with the flow and content of each session and activity.
4. **Cluster versus Individual Village approach:** The project targets the 5 best farmers in each of a cluster of 5 villages to attend the FFS training. These Lead Farmers (LF) are expected to be 'early adopters' and return to their villages to practically demonstrate the GAP techniques on their plots and to train others. Demonstration materials are provided by the project. Actual transport costs (not an attendance fee) are paid so transport is not a constraint to attending training at a central location. The lead male and female of each family are registered at the beginning of the training, and the 'doer' of the tasks covered in the training is invited to attend, making the training specifically relevant to them. The household that attends >80% of the trainings gets a certificate. The project has 90-95% attendance at trainings showing the effectiveness of this approach.

Staff's past experience has shown that when using an individual village approach many farmers initially put their hands up to join because this is something new and they are think they are interested. Often

however, half way through the training, farmers start to drop out as they find vegetable growing is too difficult and time consuming for them. Often there are only around 5-10 farmers per village remaining at the training who are really dedicated and respond well to the training. This is why training say the best 5 Lead Farmers first then these LF's training the other Non-Lead Farmers (NLFs) in the cluster approach described above is more successful. Internal evaluation of Lead Farmers training other farmers have shown high levels of satisfaction of empowerment for LF's and increase in knowledge and better farming results from NLFs.

5. **Refresher training:** Farmers are often slow to adopt new technologies, even when targeting LF's. The project has found that a 'refresher' training approach providing training 2-3 times develops stronger results. Refresher trainings do not involve repeating a full FFS again, but follow a less formal 'walk & talk' approach, with facilitators visiting each village for about 2 hours. They can do 2-3 villages in one day. They start with group discussion in a classroom or under a tree, talking about the farmer's priority information needs at that time of the cropping cycle. Facilitators also add points that they see as relevant. They refer to the Farmer's Work Book for answers or other document resources. They then move on to the field for discussion around different farmer's plots asking what is going well, not so well, and how can the farmer improve their performance. Evaluations have shown that farmers who have refresher training have better results. Refresher training however cost money without recording extra beneficiaries, and planners have to take this into account when considering value for money for this development option.
6. **Winter and Monsoon training:** One of the objectives of the Small Scale Vegetable Production (SSVP) approach is to provide opportunities for year round farming with a minimum of 4 crops on rotation to improve food security and nutrition. Adding monsoon training to winter training keeps staff involved all year, but it is challenging to grow vegetables in high rainfall areas during the monsoon. However, if you make sure farmers select non floodable land and use high reinforced raised beds, and select crops suited to the monsoon, then monsoon SSVP can be successful, at least for 65-70% of farmers. One group of farmers can be trained in the winter and a different group in the monsoon to increase beneficiary numbers. The training notes are suitable for both seasons.
7. **Demonstration material provision:** The project provides demonstration materials to all LF's and NLF's. This has led to nearly 100% of all farmers adopting 5 or more GAP interventions. Other projects without sufficient budget for this may consider only funding LF's, or 1 LF per village. This approach costs less money, but will reduce the rate of adoption and results as farmers hesitate to spend their own money and will adapt and adopt what they learn or see to suit their budget, without giving the full package a try first. A 20' x 20' plot size package and a 40' x 20' package are described in the mobilization section of the manual. Most of the SSVP inputs can be sourced locally, but the supply chain for some GAP inputs like Effective Microorganisms (EM) may have to be developed by linking local agro dealers to external input suppliers.
8. **Subsidies:** The use of subsidies, whether it be a full subsidy or part subsidy, helps with adoption and good results in the short term, but many ask whether small gardens are sustainable without subsidy in the long term and are concerned about distortion of market forces. Farmers should be encouraged to scale up to larger plots eg. from 20' x 20' to 40' x 20' or larger areas so they can make the small gardens more profitable and sustainable without subsidies, as there are 'economies of scale'. Additionally, if the refresher approach is used, organizations can consider scaling back the subsidy each year from say 90% in the first year, to 50% in the second year, and 25% in the third year to gradually guide farmers into self-funding for the long term as their knowledge and experience and results should improve year by year.

Alternatively, as new inputs become popular with farmers, there may be no further need to subsidize them.

9. **Gender participation:** While the SSVP is open to participation by both males and females, it is expected that females should attend most of the training as they are most often the ones who take care of the small home gardens. This is because the gardens are usually close to the home, are small and take little time to manage, and the produce directly contributes to food security and nutrition which are of immediate interest to the women who do most of the cooking. Men are often away doing larger or more profitable money earning ventures. However, men often see themselves as heads of the family, and if new opportunities for training like the SSVP occur, the men register and attend even though they do not do most of the tasks. This is why the RWCP registers both men and women at the beginning and invites the 'doer' of the tasks to attend. At the end of the FFS, the project writes the name of both the male and female in the family on the graduation certificate as agriculture is seen as a joint family enterprise and both should be acknowledged. RWCP has had an average of 61% women and 39% men participating in the SSVP FFS over 4 years.
10. **Place and timing for training:** The field team should choose a place and time that suites both men and women. Ethnic preferences should also be considered. Typically, training is held in a monastery or school building, under a shady tree or tarpaulin. Field work sites should be close to the theory training location to save time moving from the classroom to the field. As FFS participants are usually busy in the morning, the timing of training is usually from 12noon to 3pm and sometimes goes on to 4pm if sessions take longer than planned or inputs are being distributed.
11. **Monitoring and evaluation:** An attendance sheet is usually filled in to record participation in training and field monitoring. An adoption form to guide and record results during field monitoring is included in this manual. The final session evaluates the FFS and results, and calls for lessons learned and suggestions for improvement.
12. **The manual development process:** This manual was developed by a 'working group' of people from different levels, backgrounds and knowledge bases, and revised over a period of 4 years. It is proposed that the manual be shared with other organizations to maximize its use in Myanmar in the years to come.

The initial working group included:

Harold Gray	Team Leader - Rakhine Winter Crops Project
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Ye Htun Myint	Field Officer, Thandwe
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Soe Myint	Township Manager, Taungup
Aung Thu Han	Field Officer, Taungup
Soe Thi Ha	Field Officer, Taungup
Si Tar Win Myint	Field Officer, Taungup
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Su Myat Phyo Naing	Field Officer, Thandwe
Thant Lwin Maung	Field Officer, Thandwe
Maung Win Aye	Field Officer, Thandwe
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PART 1: INTRODUCTION

1.1 Component 2 Outline:

Component 2 of the Rakhine Winter Crops Project (RWCP) supports extension activities for the implementation of a Small Scale Vegetable Production (SSVP) program to provide fresh and healthy food to the grower and a potential source of income for their family. Additionally, it is hoped that being part of the SSVP Farmer Field School (FFS) will encourage small holders to become commercial growers in the near future. This manual will assist facilitators to guide growers to produce a set of crops following Good Agriculture Practices (GAP) that are economically viable, environmentally sound, and are socially just and humane. The facilitation process is based on a FFS extension approach which follows the cropping cycle from planting to post harvest using theory and group discussion followed by the practical application of GAP in demonstration sites in the field.

1.2 About the Manual and Workbook:

The SSVP FFS has 2 manuals that support the farmer training delivery process. They include a Facilitator's Manual (this document) and a Farmer's Work Book. The Facilitator's Manual is intended to guide facilitators to strengthen farmers' capacity in Good Agriculture Practice technical and management skills through a group discussion and "learning by doing" approach. It outlines the session objectives, duration, resource material requirements, and describes a series of discussion topics and practical exercises that focus on GAP techniques. Participants will be given their own Workbook, with exercises and notes that correspond to the Facilitator's Manual topics. The SSVP FFS process helps farmers to learn from each other, in small groups, about topics relevant to their own farming environment.

The materials for the SSVP FFS are specially designed to work with limited resources, with an emphasis on organic production. While participants need to be basically literate and numerate, they do not need to have had any significant formal education. Participants will be encouraged to form subgroups of 3-5 people, with each subgroup having someone who is literate, numerate and a fast writer. In this way, exercises can be completed and notes written within each subgroup, where the main learning experience occurs through listening and discussion. Those within the sub group who have not kept pace with the numeric and written exercises, can catch up with assistance from subgroup leaders after the sessions, in their own time. Thus the pace of the meetings can keep moving, and the subgroup leaders learn to become informal facilitators themselves.

1.3 Teaching versus Facilitation:

A core principle of the SSVP FFS process is that facilitation is preferable to teaching. The differences between both approaches are highlighted in the tables below. The aim of the tables is to help facilitators to examine their own training/facilitation styles and guide them more towards a participative facilitation approach rather than a training approach. Facilitation recognizes that the participants themselves have valuable knowledge and experience that they can bring to the group for discussion and learning from each other. The facilitators also have the chance to contribute to the discussion with new ideas not already discussed by the participants. In this way everyone learns from each other and the participants learn not to rely on the facilitators (or experts) for all of the answers. Thus participants learn to solve many of their problems or identify opportunities among themselves.

Teaching	Facilitation
Teaching starts from teacher's own knowledge	Facilitation starts by assessing the knowledge of the group
Teaching follows a pre-set curriculum	Facilitation addresses issues identified by the group or their community and adopts new ideas to the needs and culture of the group
Teachers deliver lectures to a group of students - usually from the front of the room.	Facilitators use practical, participatory methods, e.g. group discussions and activities in which all members of the group participate
Information flows in just one direction, from teacher to student	Information flows in many different directions between the facilitator and participants and between individual group members
Teachers are concerned with students understanding the right answer	Facilitators encourage and value different views
Teachers have a formal relationship with students, based on the status of the teacher	Facilitators are considered as an equal to participants, and develop relationships based on trust, respect and a desire to learn together

Facilitation skills and training techniques

Be ready	Develop and practice your session plan in advance
Be clear	Clearly identify and state your session's objectives and deliver it
Show respect	Through your effective communication skills (verbal and non-verbal)
Be friendly	In responding to questions and relationships
Be honest	Through a confident professional manner
Encourage participation	Encourage quieter participants to share ideas and questions and allow participants to talk more - use open ended questions frequently rather than questions which simply require a "yes" or "no" answer
Communicate effectively	Use simple appropriate words and tones - maintain eye contact and actively listen
Pay attention	Address the needs and feelings of the group
Be time sensitive	Make sure your session plan fits with the group's time available
Use multiple channels	Use different relevant training materials and tools to assist in conveying messages
Summarize	Go over the main session points during and at the end of the session

PART 2: MOBILIZING THE COMMUNITIES

2.1 Contacting the Participants

- a) Invitation to the leader of the group of participants
 1. Find out the person to contact (look in the list of contacts in the data base of the organization or ask the Department of Agriculture for information).
 2. Get an official invitation letter to support the first meeting if required.
 3. Ask an official to attend the meeting to introduce the facilitator and the project if required.
 4. Provide a short information pamphlet explaining the project to the officials so they can discuss the contents before the meeting with villagers.
 5. Call the contact person(s) by phone or make a personal visit. Tell the village administrator that for proportional inclusion we are expecting a minimum of 50% household attendance of the target group including 50% female attendance and 50% of different ethnic groups; otherwise have to have a second meeting for those who did not attend to make up these minimum percentage attendance numbers at the mobilization meetings.
 6. Explain what is the topic of the proposed visit and arrange a date to visit the village.
- b) Confirmation of the meeting

Call the village level contact person 2 days before the meeting to confirm the visit. If needed repeat the phone call one day before the meeting as well.

2.2 Trip preparation

- a) Transport
 1. Be sure you follow the safety procedures for your personal security.
 2. Organize accommodation if needed.
- b) Budget for the meeting

Estimate the cost of all expenditure you will need during the trip
- c) Coordination with other facilitators if working together
 1. Prepare the work plan with the other facilitators.
 2. Discuss the needs of sharing training tools.
- d) Timing of the meeting
 1. Estimate the time needed for facilitator's travel (return trip).
 2. Estimate the time expected for the mobilization meeting (around 1-2 hours). Select a time when most people (men and women), especially so those with access to small areas of land can attend.

2.3 First Mobilization Meeting: Project Overview

Duration: 60 minutes

Objectives:

- a) To explain the project's 5 components
- b) To explain in more detail Component 2: the SSVP model (aims, target group and inputs)
- c) To explain the process of a FFS
- d) To invite interested potential SSVP participants to the next meeting

Materials: Letter authorizing the meeting; Vinyls:

#1 Explaining about the project's 5 components;

#2 The SSVP model;

#3 FFS process

Activity 1: To explain the project's 5 components, SSVP model and inputs (40 minutes) to all village members who attend, not just small scale farmers

- a) Start with general chatting and local issues before the meeting starts.
- b) Ask the official to welcome the attendees and introduce you, the facilitator.
- c) Explain the agenda topics and the duration of the meeting.
- d) Explain about the project's 5 components, the SSVP model, and the provision of a small amount of inputs (on prepared flip charts).
- e) Answer and discuss the questions the participants have.

Vinyl #1:

RWCP's 5 Components:

1. GAP training and demonstration for Commercial Vegetables and Field Crops (Larger land holders)
2. GAP training for Small Scale Vegetable Production (Home gardeners)
3. Irrigation development
4. Market linkage and value chain strengthening
5. Cooperation with the MOALI

Vinyl #2:

Small Scale Vegetable Model

1. A proportional inclusion approach that targets those with access to small areas of land.
2. Invites 5-7 leaders from each cluster village to attend a FFS at a central location (fee for transport paid).
3. Prefer those who do the majority of the work on these small garden plots to come to the training (most likely the women).
4. Provides FFS training over 7 sessions.
5. Provides demonstration inputs for the FFS Lead Farmers (small plot).
6. Asks each Lead Farmer to extend their new knowledge and experience to 3-5 other Non Lead Farmers (multiplier effect). These NLFs must have access to land and water, be of good health, not be too old, be willing to follow the LF's training, and have time to make a success of their small SSVP plot.
7. Inputs for a small plot will be given to these Non Lead Farmers also.

Activity 2: To explain the process of a Farmer Field School (20 minutes)

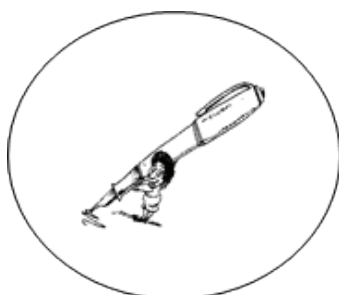
- a) Explain the FFS approach to implement the SSVP model
- b) Answer and discuss any questions the participants have

- c) Discuss and confirm who should come to the next meeting (those with access to small areas of land only), the date, time and place. Make sure the time and place are suitable to both men and women.
- d) Thank all of the people for attending the meeting

Vinyl #3:

Farmer Field School Process:

Around 7 technical training sessions of 2-3 hours in duration, with one session every 1 or 2 weeks. The sessions follow crop cycles from planting to post harvest. The sessions are normally broken up into: (i) classroom discussion and expert GAP presentations - 1.5 hours, then (ii) a visit to a GAP demonstration site to discuss problems and solutions, and to practice the theory they just learned in the classroom session - 1.5 hours), and if time allows, visits to other farmers' fields for "walk and talk" discussions.



TIP for Facilitators

Make sure that those at the meeting understand that this training follows a proportional inclusion approach that targets those with access to small areas of land, and provides only a small amount of inputs, not irrigation, marketing and other inputs provided by other components of the project.

2.4 Second Mobilization Meeting: Identification of Participants - (Just potential SSVP participants attending)

Duration: 75 minutes

Materials: Flip chart paper; pens; vinyls for 2nd meeting used in the first meeting: #2 SSVP model; #3 FFS process; and new #4 Selection criteria; small papers to write name of potential FFS participants on;

Objectives:

- a) To explain again the SSVP model (target group and aim) and inputs the project will provide
- b) To explain again the process of a FFS
- c) To select the participants (25 Lead Farmer and 75-125 Non Lead Farmers) in the cluster to work with SSVP

Activity 1: Review the SSVP model (30 minutes)

- a) Explain Component 2, small scale vegetable production in detail; (prepared on vinyl #2 or flip chart)

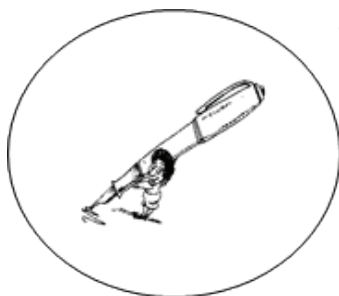
Activity 2: Review the FFS process (5 minutes)

- a) Go over the FFS process on a vinyl #3 or flip chart

Activity 3: Selection of interested people (30 minutes)

- a) Show the participant selection criteria on vinyl #4 and explain the requirements.
- b) Ask participants to nominate on a small piece of paper, 2 names of those who they think should be Lead Farmers and attend the FFS. Assist those who cannot write.

- c) Write the names on a flip chart, highlighting those who are the most popular votes.
- d) Confirm that those selected want to attend the FFS and fit the criteria. If not, select the next person on the list.
- e) Get the husband's and wife's names, village, and contact details.
- f) Ask the selected Lead Farmers to go home and select 3-5 others who they will informally train and who will receive SSVP inputs as Non Lead Farmers.
- g) Agree on a time and place for the next meeting.



TIPS for facilitators

1. The place for the FFS meeting should be a central location in the cluster so people do not have to travel too far and it should be suitable for both men and women.
2. The time of training should be suitable to both men and women.
3. Snacks should be available to keep children quiet if they are brought to the training.
4. Select 3 demo plots for field practice splitting the 25 participants up into 3 groups of 8 or 9 people
5. Contact local agro dealers for input distribution and attendance at the FFs if they want to. This helps to form long term private extension and access to inputs.

Selection Criteria for SSVP Participants

Vinyl #4:

Target Group

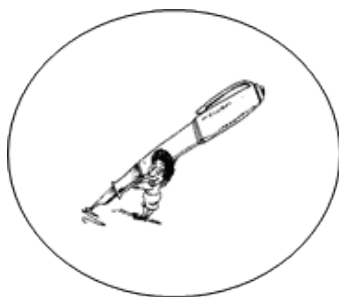
1. Proportional inclusion of Good farmers (Husband and Wife or single headed households, ethnicity) who access or own a small amount of land who want to grow vegetables using modern GAP techniques to feed their families and for sale. Must be strong, healthy and not too old or too busy.
2. Targets the 'doer' of the tasks to attend the training - most likely women.
3. Have a "Can do" attitude, not a "Cannot do because" attitude.
4. Are natural leaders/advisors to whom other families come to for advice.
5. Selected farmers should be literate and numerate so they can follow and participate in the FFS more effectively.
6. Note: If you select 25 farmers from the same village it is likely that some will not be literate and numerate. In this case some of these farmers can join the training but they must work in sub groups with at least 1 literate and numerate person who can record their ideas and report them back to the plenary (group session). In that way they can still play a meaningful part in the sessions.

Activity 4: Registration of Participants

1. Collect the Lead Farmers names and enter them on the registration form. Leave 3-5 spaces for the Non Lead Farmers names that should be collected at the end of Session 1 once the LFs have gone home and identified these other farmers. Remember to write both the husband and wife's name (if married) on the LF record to show that both are involved in agriculture and decision making. However, emphasize that the 'doer' of the tasks should come to the training so it is directly relevant to them. Write the Non Lead Farms names under the LFs names to make it easier to find the NLFs during field monitoring.

Lead and Non Lead Farmer Registration Form

Village	#	Participants Name	Sex	LF or NLF	Farm Land area Owned (O) or rented (R)	Crop/Yrs Experience in CV/CFC. Eg. Chili/2yrs	Age	Education	Water Source and Duration	Ethnicity
Shin Saw Pyin	1.	Husband	M	LF	1 acres (o)	Groundnut/ 10yrs	43	5 yrs	Stream 5 months	
		Wife	F	LF						
	1.1.	Non lead Farmer name		NLF						
	1.2	Non lead Farmer name		NLF						
	1.3	Non lead Farmer name		NLF						
	1.4	Non lead Farmer name		NLF						
	1.5	Non lead Farmer name		NLF						
	2.	Husband								
		Wife								
	2.1	NLF								
	2.2									
	2.3									
	2.4									
	2.5									



Note for Facilitators: GAP Adoption and Results Monitoring Form

Adoption monitoring: Most projects require some form of progress monitoring and evaluation of results. The form below enables the field team to monitor progress of adoption of key GAP interventions. As some interventions have many steps - eg. nursery establishment and care has about 10 steps - it makes sense to ask the farmer (or observe) what steps s/he has taken and write down the

percentage of the total steps that have been followed - eg. 7 out of 10 steps is 70%. The individual farmers' scores for each intervention can be added together at the bottom of the sheet and divided by the number of farmers, to give the average adoption of this intervention across the whole FFS. As there are only 25 Lead Farmers, this higher level of monitoring is possible. But for the high number of Non Lead Farmers (up to 125 farmers), the overall visual results assessment described below is more appropriate to save time.

Results evaluation: The form provides a column for a visual qualitative assessment of each of Lead and Non Lead Farmer's plots giving a number score - 5 for excellent; 4 for very good; 3 for average; 2 for fair; and 1 for poor. We can similarly add the total scores together and divide by the number of farmers to give the average result in the garden plots across the whole FFS. This is useful for results evaluation purposes.

Monitoring process: This form can be printed out with the farmer's names in the left hand column. The field team can carry the form around each day on a clip board, and when they visit any of the plots, they can make a quick assessment. As interventions are only done step by step, the field team only have to assess 2-3 interventions each visit, so it does not take much time. The Field Officers can ask the farmers how they would rate their fellow farmers, involving them in this process also. As the season progresses, the form is gradually filled in, and at the end of the season it should be completed in and ready for the simple analysis described above.

Adoption Monitoring and Results Evaluation Form														
Interventions #		1	2	3	4	5	6	7	8	9	10	LF Rating	NLF Rating	Remarks
Field Officer initials:														
Location:														
LF & NLF's Names:		Village	Pending	Quality Seed	Raised Beds	Nursery Seedlings	Em Bokashi	Basal fertilizer	Trellising	Water management	Pest & Disease control	Pre- Post harvest	Visual Assessment: Excellent (5) Very Good (4) Average (3) Fair (2) Poor (1)	Visual Assessment: Excellent (5) Very Good (4) Average (3) Fair (2) Poor (1)
1														
2														
3														
4														
5														
6														
7														
8														
Overall %														

PART 3: FFS SESSION PLANS

Session 1: Introduction to the SSVP FFS

(Only the Leader Farmers (25) with 5-7 from each village attend)

Duration: 3 hours

Materials:

Flipchart, markers, tape, Attendance Register form; Workbooks for Participants; vinyl #1 Inputs for demos and secondary beneficiaries; Rice Husk, cow manure, rice bran, instant EM & molasses for bokashi making; Cow dung, rice husk charcoal & top soil for seedling mix.

Objectives:

1. To know each other better and to learn from each other
2. To know about the Facilitator's Manual and Farmer's Work Book
3. To know the 4 vegetable varieties that have been selected for this FFS and reason for selection
4. To know the inputs that the project will provide to the Leader Families and secondary beneficiaries
5. To identify topics and a schedule for the training course
6. To understand the meaning of GAP
7. To make EM Bokashi compost and seedling mix
8. To make the training ground rules, time and place for the training course

Activity 1: Getting to know each other (10 minutes)

Plenary

1. Welcome participants to this introductory meeting.

Individuals

2. Ask participants to tell the group their name, spouse's name (if married), and which village they come from. Write their names in a register. Also ask them at the end of the session to give you the names of 5 other small holders who they will extend their new knowledge and pass on the inputs to. Complete the register at the end of the session (see Attendance Register from previous session).

Plenary

3. Inform the participants that we will now look at the years of experience in vegetable growing of the whole group. Do this by pointing out the 4 corners in the room/area, notifying them that each corner represents different years of experience:
 - Corner 1: One years' experience in vegetable growing
 - Corner 2: 2-5 years' experience in vegetable growing
 - Corner 3: 5-10 years' experience in vegetable growing
 - Corner 4: >10 years' experience in vegetable growing
4. Ask participants to go to the corner/area that matches their years of experience.
5. Write down the numbers in each group and multiply the years and make the sum on a flip chart.
6. Conclude that this is the total years of experience of the group, so all the participants combined have a lot of knowledge and field practice skills, thus have a lot to learn from each other during group discussion.

Activity 2: To learn about the Farmer's Work Book (15 minutes)

Plenary

1. Explain to the farmers that to facilitate the FFS we will have 2 documents. A Facilitator's Manual and a Farmer's Work Book.

A Facilitator's Manual	A Farmer's Work Book
This provides facilitators with technical back ground notes and guides them step-by-step through the SSVP FFS Farmer Field School Training Program	The Farmer's Work Book provides key concepts and technical notes. It also provides spaces for participants' exercises

2. Hand out workbooks to all of the participants.
3. Tell the participants that they do not have to write much down because most of the notes for the training are in the workbooks already. Say that there are some spaces to add more notes if they want to, or to complete exercises as directed to do so by the facilitator.
4. Invite them to write their names on the books.
5. Tell them that they must bring this workbook to each FFS session.

Activity 3: Expected Results from the Small Scale Vegetable Production component of the project. (20 minutes)

Individuals

1. Ask participants to write down their expected results from the SSVP component in their workbooks Exercise 1.1. Go around the room to help them if needed. (10 minutes)

Exercise 1.1: Farmer's Expected Results After Attending the FFS Sessions

Expectations:	Circle: 1 Low: 5 Medium: 10 High
1.....	1; 2; 3; 4; 5; 6; 7; 8; 9; 10
2.....	1; 2; 3; 4; 5; 6; 7; 8; 9; 10
3.....	1; 2; 3; 4; 5; 6; 7; 8; 9; 10
4.....	1; 2; 3; 4; 5; 6; 7; 8; 9; 10
5.....	1; 2; 3; 4; 5; 6; 7; 8; 9; 10
6.....	1; 2; 3; 4; 5; 6; 7; 8; 9; 10

2. Tell participants that at the end of the FFS we will look back at their expectations and evaluate if they achieved their expectations or not.
3. For discussion on the project's expected results, refer them to Exercise 1.2 in their workbooks (10 minutes).

Exercise 1.2: The project's SSVP Expected Results

1. Improved agronomic theory and field practice for those with access to small land areas suitable for home gardens)
2. Year round production of vegetables for home consumption and sale
3. Increased net income
4. Greater diversity of crops to reduce risk and improve nutritional intake
5. Motivation for farmers to graduate to becoming larger scale commercial growers using rented or own land

Activity 4: Selection criteria for crops to grow (35 minutes)

Sub groups

1. Ask participants to form 5 subgroups with people from their same village. Suggest that at least one member in each group should write the group ideas in a note book for reporting back later.
Note: Say that it is important to work in same village groups so the farmers get to know each other better and to discuss agriculture together, so together they can go back and lead agriculture development in their village in the future. As individuals their effect when going back to the village is not so visible and effective.
2. Ask the farmers to discuss and write down what crops they grow and why they grow them.
3. Ask some of the sub group leaders to stand and report their answers and discuss (15 minutes).

Plenary

4. Go over the crop selection criteria in Exercise 1.3 in their workbooks. Invite them to add any other of their ideas in the space provided. (5 minutes)
5. Explain the cropping calendar Exercise 1.4 in their workbooks with many options for crop growth in the different seasons. Invite farmers to add other crops they know in the spaces left at the bottom of the table. (5 minutes)
6. Explain Exercise 1.5 in their workbooks to see the list of crops this manual is focusing on and the reasons these crops were selected. (5 minutes)
7. Invite farmers to select one crop from each of the 4 crop families to grow in a 4 year crop rotation to prevent nutrient depletion, reduce chances of infection by soil disease, reduces market price reduction risk, improves family nutrition with a diversity of crops, and if they lose one crop they still have others to harvest. Ask them to help their Non Lead Farmers to select their 4 crops to grow as well. Suggest they discuss their crop choice with their families and report their choices, and those of the Non Lead Farmers, at the next meeting. Remind them that during the monsoon there are only a few crops that are suitable to grow in this high moisture, high disease risk time. (5 minutes)



Selection of vegetables to grow:

1. Market demand, price and timing of planting and harvest to get the best price
2. GAP best practice expected budget analysis to work out the potential profit
3. Family consumption preferences and nutritional value
4. Seasonal planting calendar for many potential crops with consideration for climate variations especially temperature and water availability
5. Soil type preferences or tolerances e.g. acid, neutral, alkaline
6. Availability of quality and reasonably priced inputs
7. Prefer to have one crop from each crop group for crop rotation requirements for soil improvement and disease control
8. Environmental impact
9. Risk assessment
10.
11.
12.

Exercise 1.4: Calendar of Crops for the Different Seasons

Crops	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Group - 1												
1. Yard-long Bean												
2. Okra												
3. Onion												
4. Carrot												
Group - 2												
5. Chili												
6. Tomato												
7. Egg-plant												
8. White Egg-plant												
9. Coriander												
Group - 3												
10. Cabbage												
11. Cauliflower												
12. Broccoli												
13. Radish												
14. Water spinach												
15. Sweet Corn												
16. Mustard												
Group - 4												
17. Bottle Gourd												
18. Snake Gourd												
19. Ridge Gourd												
20. Bitter Gourd												
21. Cucumber												
22. Water Melon												
23. Pumpkin												
24.												
25.												
26.												
27.												

Remark:

 Good growing period
 Difficult growing period

Exercise 1.5: Crops Selected and Reasons for Selection

	Crop	Season	Reasons Why Selected
1	Yard Long Bean	Monsoon & Winter	Good market & price; popular to eat; good nutrition; input availability; suitable for many soil types; good for crop rotation & environment; low risk
2	Cucumber	Monsoon & Winter	Good market & price; popular to eat; input availability; suitable for many soil types; good for crop rotation & environment; low risk
3	Radish	Winter	Good market & price; popular to eat; nutritious; input availability; suitable for many soil types;
4	Bitter gourd	Winter	Good market & price; popular to eat; nutritious; input availability; suitable for many soil types; low risk
5	Okra	Winter	Good market & price; popular to eat; nutritious; input availability; suitable for many soil types; good for crop rotation & environment; low risk
6	Chili	Winter	Good market & price; popular to eat; nutritious; input availability; suitable for many soil types; good for crop rotation & environment; low risk
7	Onion	Winter	Good market and price. Popular to eat. Nutritious. Input availability.
8	Carrot	Winter	Popular to eat. Good market and price. Suitable to sandy loam.
9	Tomato	Winter	Popular. Good market and price. Suitable to sandy loam.
10	Eggplant	Monsoon, Winter	Popular. Good market and price. Suitable for many soil type.
11	White eggplant	Monsoon, winter	Popular. Good market and price. Suitable for many soil type.
12	Cabbage	Winter	Popular. Good market and price. Suitable to loamy soil.
13	Cauliflower	Winter	Popular. Good market and price. Suitable to loamy soil.
14	Broccoli	Winter	Nutritious. High price. Suitable to loamy soil.
15	Water spinach	Whole year	Popular. Suitable for many soil types.
16	Bottle gourd	Winter	Popular. Good market and price. Suitable for soil with high compost.
17	Snake gourd	Monsoon , winter	Popular. Good market and price. Suitable for soil with high compost.
18	Ridge gourd	Monsoon	Popular. Good market and price. Suitable for soil with high compost.
19	Pumpkin	Monsoon , Winter	Popular. Good market and price. Suitable for soil with high compost.
20	Water melon	Winter	Popular. Good market and price. Suitable for soil with high compost.

Activity 5: Topics for the training (15 minutes)

Sub groups

1. Ask the sub groups to list the activities they have to do to grow vegetables.

Plenary

2. List these on a flip chart by asking sub group leaders for one or two points each. Go round and around each group to keep every group involved until all of their ideas are listed. Say that most of these topics will be covered in the FFS. Refer them to the list of topics in the table of contents in their workbooks. Go over the topics line by line so all participants understand what is in the workbook. Ask them to add topics if not listed already. Say that the group will try to cover these extra topics if they have time.

Activity 6: Inputs provided by the project for SSVP demonstrations (15 minutes)

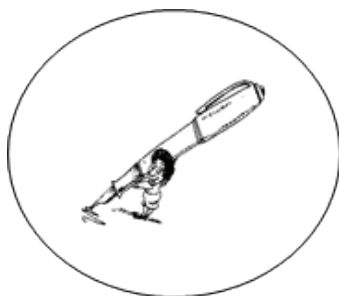
1. Explain to the participants that the project will provide some inputs for demonstration sites to the FFS participants and to 3-5 'multiplier effect' indirect beneficiary farmers per FFS member. Participants can select either the 20' x 20' package or the 40' x 20' package according to the farmer's land availability and labor availability. Say the project may ask them to pay a portion of the costs (eg. 10% or 20% or 50%) to give them ownership and show their commitment to the success of the SSVP demonstrations. Also tell them they can have bigger sites but they must pay the costs for the larger area themselves.
2. Go over the project approved list of inputs on a pre-prepared vinyl Inputs #1. Explain the process by which they will receive the demonstration inputs.

Vinyl # 1 Inputs: Example of 20' x 20' and 40' x 20' input packages which can vary according to farmer situation and project preferences

20' x 20' New Monsoon including long term inputs			
Item	Unit	Quantity	Cost MMK
N:P:K (15:15:15)	5 Kg (pack)	0	8,600
EM	Lit	1	3,500
Molasses	Lit	2	2,000
Rice bran	Bag (12 viss)	1	6,000
Vinegar	250 ml bot	1	500
Hoe	Pcs	1	2,500
Reinforcing for raised bed	Lump sum	1	3,000
Hand sprayer (small)	Pcs	1	3,300
Shade house cloth	Meters	2	2,000
Vegetable crops	Variety	4	6,000
Total			37,400

40' x 20' New Monsoon including long term inputs			
Item	Unit	Quantity	Cost MMK
N:P:K (15:15:15)	5 Kg (pack)	2	8,600
EM	Lit	1	3,500
Molasses	Lit	4	4,000
Rice bran	Bag (12 viss)	2	12,000
Vinegar	250 ml bot	1	500
Hoe	Pcs	1	2,500
Reinforcing for raised bed	Lump sum	1	3,000
Hand sprayer (small)	Pcs	1	3,300
Shade house cloth	Meters	2	2,000
Vegetable crops	Variety	4	8,000
Total			47,400

- Tell participants that the project will link with local agro dealers to help them source, package and deliver the inputs to the farmers in their villages. The first inputs to be ordered will be for making EM bokashi and these should be delivered over the next 2 weeks. Training in how to use these inputs will be given at the end of this session. Say that the remainder of inputs - seed and other inputs - will be ordered at the end of the next Session 2.



Tips for the Facilitator:

Remind the participants that they should have the money for payment for their contribution to the demo plot costs, with the amount in accordance with the project policy. If they do not have the money for their contribution when the inputs are delivered, they will not get the demo materials.

Project staff should help local agro dealers to source inputs if they do not have them in stock already, in this way developing a local GAP input supply chain. Project staff should be aware that inputs bought in bulk should get a group discount. RWCP experience in bulk deliveries to farmers and asking them to apportion the inputs themselves, sometimes results in LF's taking some of the NLF's share of inputs. A solution to this is to have individual packages made for each farmer, and each farmer (LF & NLF) signing that they have received the full amount of inputs provided by the project. Farmers contributions should be collected by the agro dealer, and the project only pay the portion the project is paying direct to the agro dealer. In this way farmer - agro dealer relationships build with the inputs delivery and transaction of money between them. Project staff should supervise the delivery and signing of receipt of inputs and solve any problems that might arise, but should try not to be directly involved as this process should be between the agro dealers and farmers for long term sustainability.

Activity 7: Explain the concept of GAP (15 minutes)

Plenary

- Facilitator talks about the concept of GAP starting with the definition and then explaining the umbrella diagram in Exercise 1.6 in the participant's workbook. (5 minutes)

Exercise 1.6: Explanation of GAP

Definition:

When a farmer follows GAP the food is safe to eat, the practices are safe for farmers and farm workers, the practices protect the environment, and they are profitable.



2. Facilitators asks farmers to read and discuss as a group or by selected individuals the Myanmar GAP protocols in Exercise 1.7 in their workbooks. If there is not enough time, read half of the points, then ask the farmers to finish reading the list for homework. (10 minutes).

Exercise 1.7: Myanmar GAP protocols

MYANMAR GAP PROTOCOLS

1. Site Selection

- The selected site and the near-by must be free from chemical and biological hazard. Site plan and Crop Type Record should be kept.

2. Water

- Water for agricultural use should be analyzed. Water from animal farm, hospital, industrial and municipal waste are harmful to the environment. Should not be used. (If use the recycled water, follow WHO guidelines.)

3. Seed/ Seedlings

- Seeds free from pests and diseases and well adapted to the current location should be selected.
- The source, the amount and received date of the seeds, seedlings and propagated plants should be recorded.

4. Fertilizer and Soil Additives

- Fertilizer and soil additives which use for a specific crop should be free from chemical and biological contamination.
- Use only well decomposed organic fertilizers.
- Mixing, storing of fertilizers and composting the organic fertilizers should not be done on the land near a water source, to prevent contamination.
- The purchased fertilizers and soil additives should be from the Government Approved Lists and Records should be kept on what fertilizer was used, how much and when.

5. Agricultural Chemicals and Other Chemicals

- Follow Integrated Pest Management (IPM) to reduce the use of chemicals.
- For health and environment safety, pay full attention to Pesticide & Fertilizer Law and Regulations.
- Only when necessary, use only the approved chemicals.
- Strictly follow the Pre-Harvest Interval (PHI), according to the chemical used.
- To know how to handle and use the pesticides.
- Purchase, storage, use and disposal of chemicals should be done according to regulations and records should be kept.
- Fuel, lubricants and non-agrichemicals should be used, handled, stored and disposed properly in regards to the prevention of product contamination.

6. Crop Care

- Crop care should be done accordingly to the specific needs of each crop.

7. Agricultural Tools and Materials

- Agricultural tools and materials should not contaminate the products.
- The tools and materials which were used in storing chemicals should be well labeled.
- Do not use the above-mentioned tools and materials when storing other materials or products.

8. Harvesting and Post- Harvest Process

- Harvest the crop at the right time with right means.
- Do not put the products directly on the ground, on the floor of packaging facility, or on the floor of the warehouse.
- Water used in cleaning the products should be clean.
- Grade and pack the products according to the market specifications.

9. Storage and Transportation

- Keep, store and transport the products, away from chemicals, biological and physical damage.
- Do not keep or store the products with fuels, pesticides, fertilizers and farm tools and materials.
- Before transporting, inspect the vehicle is free from chemical spill, pests and diseases and other litters.

10. Construction

- To minimize the damage to the products, packaging, handling and storing facilities should be constructed to specifications and in an approved place.
- The facilities should be well maintained.

11. Control of Farm Animal and Pets

- Domesticated and farm animals should not be in harvest, packaging, and storing area.

12. Evidence and Records

- The producer should keep the GAP record at least two years.
- Daily activities and practices should be noted down on the forms.

13. Traceability

- Significant marking and registration should be kept with the product for traceability purposes.
- Keep a separate record for the destination and delivery date of each produce.

14. Training

- Both the producer and the worker, to attain good skills and knowledge in their respective fields, should attend GAP training.

15. Evaluation

- The producer should conduct an annual evaluation on GAP protocols.
- The producer should settle complaints and keep a complaint record.

16. Personal Hygiene and Welfare of Workers

- Advice on personal hygiene, in bold letters, should be put in a common place, so every worker can see (or) distribute the advice to every worker.
- Sanitary water and waste water should be carefully disposed of.
- Pay full attention to the health and well-being of the workers.

Activity 8: Making EM Bokashi compost and Seedling Mix (30 minutes)

Plenary

1. Tell the group to calculate the timing for planting to obtain the best prices. Trace back the time of the crop duration from the best price time. That will be their planting time as long as they have enough water at this time. Then trace back one more month before planting to allow them time to start making seedling mix and EM bokashi compost which take 3-4 weeks to ferment before application. Therefore, we have to start now to prepare these materials for those who want to plant in 1 months' time.

2. Review Exercise 1.8: Making EM bokashi compost

Exercise 1.8: Making EM bokashi compost

Steps in making Super EM Bokashi (20' x 40')

It is suggested that 1 farmer joins another farmer to make the compost so they can share bottles of EM and molasses together. This is because It is difficult to buy ½ liter bottles.

Materials needed

Rice Husk	-	1 bags
Cow Manure	-	1 bags
Rice Bran	-	1/2 bag
Instant EM	-	1/2.1 Liter
Molasses	-	1/2 Liter
Water	-	40% moisture

Procedure:

1. Find a shady flood-free site big enough for your bokashi making. You need to use at least 600 viss of compost for 1 acre.
2. Water the ground thoroughly before making the compost. Dry soil can suck the moisture out of the compost and it will not be successful.
3. Sprinkle the rice husk on the ground, then mix in the cow manure and bran.
4. Mix the EM and molasses together, then pour it over the dry material and mix well.
5. Add enough water so the mixture can stick together in a ball shape. This will bring the moisture up to 40%.
6. Cover with black plastic or dark colored tarpaulin to prevent light from reaching the mixture. The micro-organisms do not like the light.
7. Bury the edges of the black plastic or tarpaulin to prevent air getting into the mixture because the micro-organisms work better without air.
8. Add some water every 10 days if the mixture is getting dry.
9. After 3-4 weeks from preparation, when the mixture has a sweet-sour fermented smell and forms white fungi filaments on the surface, it is ready to use.
10. If you do not use the bokashi immediately, you can store it in bags in a dry cool place for up to 6 months.

3. Seedling mix

1. Brainstorm with farmers: “What materials do you use to make nursery seedling mixture. Write their ideas on a flip chart.
2. Tell the farmers that we want to introduce them to a simple method of nursery mix recommended by high level agronomists. Suggest they try this seedling mix and their own methods and see which is best.

Exercise 1.9: Making seedling mix

Material needed in equal portions

- | | | |
|-----------------------------|---|-----------|
| 1. Well decomposed cow-dung | - | 1 portion |
| 2. Rice husk charcoal | - | 1 portion |
| 3. Top soil | - | 1 portion |

Making Process

1. Mix together equal portions of well decomposed cow-dung, rice husk charcoal and top soil.
2. Put the mixture in a sealed plastic bag (black color) and heat up for fermentation in the sun light for 3-4 hours. The heat in the plastic bag can also kill some soil diseases.

4. Tell participants that you will now as a group make bokashi compost and seedling mix for the FFS demonstration plots. This will give them experience before they go back to their own homes to make compost for their own demonstration plots.

Note for Facilitators:

Practical work procedure:

1. Divide participants into three groups of about 8 people. Each group should be led by a FFS village demo farmer. Say that participants will stay in these groups doing practical work on the same demo plot throughout the FFS. There will be a competition to see who has the best demo plot at the final FFS evaluation time.
2. Hand out the inputs required to make the bokashi mixture. Ask 1 farmer to read the instructions to make the bokashi from Exercise 1.8 in their workbooks while the others do the tasks. Say that in 3-4 weeks' time the bokashi will be ready to mix into the soil as quality compost.
3. Invite the same groups to follow the instructions in Exercise 1.9 to make the seedling mix.
4. Go back to the training room to finish the session.

Activity 9: Lead Farmers training other farmers (10 minutes)

Plenary

1. Brainstorm ways Lead farmers can train other farmers. Write the participants ideas on a flip chart.
2. Brainstorm the benefits Lead Farmers get from the extra work they should do as Lead Farmers. Write their ideas on a flip chart.
3. Refer the participants to Exercise 1.10 which gives some ideas on how Lead Farmers should train other farmers. Invite participants to write their ideas in the blank lines in their workbooks if not already mentioned.

Exercise 1.10: How Lead Farmers can train other farmers and the benefits of being a Lead Farmer

How to train other farmers:

1. Invite other farmers to come to the Lead Farmers plot and altogether they help the Lead Farmer with practicing GAP - 'learning by doing'.
 2. The Lead Farmer then visits the other farmers plots and helps them with developing their gardens following the process they learned during the training.
 3. Lead Farmers can sit under their house or a shady tree and have a discussion group with other farmers, talking about what was learned during the FFS training.
-
-
-

Benefits of being a Lead Farmer:

1. Gain more knowledge by going to the FFS training.
2. Make strong connections with other participating Lead Farmers during the training, especially those in their same village. Can continue to learn from these farmers after the training finishes.
3. The Lead Farmers gain status in the village by selecting the Non Lead Farmers and being a trainer.
4. Can gain from sharing knowledge and experiences with the Non Lead Farmers.



Lead Farmers and Non Lead Farmers working together in a small plot

Activity 10: Ground Rules of the training course (5 minutes)

Plenary

1. Brainstorm with the participants about which ground rules they should follow during the course. Write their ideas on a flip chart. Refer them to Exercise 1.11 in their workbooks.

Exercise 1.11: Example of Ground rules:

1. Be on time.
2. Participate actively.
3. Listen to what other men and women have to say without interrupting them.
4. Raise your hand to ask a question or to say something - wait for your turn.
5. Be willing to share experiences and learn new thing from others.
6.
7.

Activity 11: Participants' Evaluation of the Session (5 minutes)

1. Ask participants what they thought was good and interesting during the training.
2. Ask participants what was not so good about the training.
3. Ask them how the training could be improved.
4. Write their ideas in a notebook for review of the training notes and processes later on.

Activity 12: Next session topic(s), timing, location and who should come (5 minutes)

1. **Check the schedule** with the participants and agree on the topics, dates, timing and where to have the training. Pay special attention to the suitable timing and place for women who may not be so flexible because of home duties, social and cultural practices.
2. **Who should come to the training:** Tell the participants that you want the 'doer' of the tasks to come to the training so that they get the information first hand rather than the information being passed on from one to the other indirectly when information can be lost or reported incorrectly.

(Optional: Play the whisper game where you stand the participants in a circle and whisper a message to the first participant like: "Saw Hla Htwe bought 2 bags of 15:20:0 fertilizer, 6 seed varieties from EW and Golden Seed Companies, a bucket and hoe for cultivating his new garden at the market on Wednesday". Or. "It is recommended to spray 12mls/liter of EM5 spray in the evening or early morning to prevent mealy bug and mite damage on cucumbers and pumpkins." Note that by the time these messages get to the end of the group the words will have changed a lot from the original message. This shows that information passed on from one person to another can often be only partly correct. It is better to have the person to whom the information is most relevant (male or female), that is the 'doer' to attend the training so they get correct information first hand. (Note: You can split into 2 groups of 10-12 people to speed up this whispering process)

Thank participants for attending the training. Remind them to bring their workbooks to each session. Also remind them that EM bokashi inputs will be delivered to the villages. Key contact farmers phone details should be obtained at this meeting so the agro dealers can arrange for the deliveries.

Session 2: Getting Started with Vegetable Growing

Duration: 3 hours

Objectives:

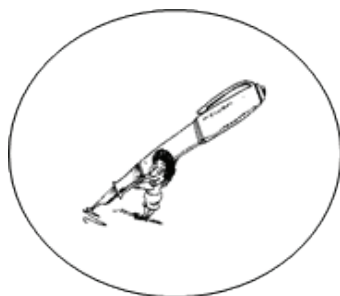
1. To be aware of site selection criteria
2. To know why fencing is important and to learn about practical fencing options
3. To understand soil characteristics and care
4. To know about the advantages of different cultivation techniques - deep cultivation, shallow cultivation, direct seeding
5. To know about organic and chemical soil sanitation and liming

Materials: White board; marker pens; A 4 blank paper for each farmer; tape; 4 x blank flip charts; 1x 3 column flip chart - Fencing Materials-Advantages-Disadvantages; 1 x 2 column flip chart - Soil Degradation Causes - Solutions; 3 x blank flip charts; EM; Molasses; Concentrated Alcohol; Vinegar; Some smelly weeds;

Activity 1: Review of previous session and this session's topics. (5 minutes)

Plenary

1. Invite participants to say what they learnt last session. Write their ideas on a flip chart.
2. Go over the topics for this session (listed below) in the table of contents in their workbooks



Tip for the Facilitator:

This activity gives participants experience in using the Table of Contents so they can more easily find information when they are back in their homes.

Activity 2: Site selection (10 minutes)

Plenary

1. Brainstorm criteria to consider for vegetable growing site selection
2. Write participants' ideas on a flip chart
3. Refer them to Exercise 2.1 in their workbooks. Invite participants to write ideas from the flip chart into their workbooks if not already in the list.

Exercise 2.1: Site selection criteria:

Site selection criteria for: (i) sites close to home (shady) and (ii) in the field (open sites)

1. Not far from home to enable regular visits
2. Free from flooding
3. Near water source
4. Free of pests or disease contamination from their field and neighbors

5. Prefer some shade trees but not too much
6. Suitable size for family consumption and labor availability
7.
8.
9.
10.

Activity 3: Fencing (10 minutes)

Plenary

1. Brainstorm why fencing is important.
2. Write participants' ideas on a flip chart.
3. Compare their ideas with those in Exercise 2.2 in their workbooks. Invite them to write their own ideas in their workbooks if not mentioned already.

Exercise 2.2: Why is fencing important?

GAP reasons why is fencing important?

1. To prevent damage by animals.
2. To prevent contamination by animals.
3. To protect chemically sprayed areas from children and others entering the field and becoming contaminated.
4. To protect workers, children and animals from rubbish (old plastic bags, spray containers etc.).
5.
6.
7.
8.

4. Ask participants to describe different materials for fencing. List these on a flip chart in the first column of a 3 column table. In the second column ask them about the advantages of the materials and list their ideas, and in the 3rd column list the disadvantages that participants stated. Refer participants to the summary in Exercise 2.3 in their workbooks.

Exercise 2.3: Fencing Materials Advantages and Disadvantages

Fencing Materials	Advantages	Disadvantages
Old fishing net	Small mesh provides good protection; Easy to erect	A little hard to get; a little expensive
Bamboo	Can mostly find in the forest or around the home	Hard work to cut and make the fence; Expensive in some areas
Live fencing	Get fruits, leaves for consumption and compost, fire wood source	Requires maintenance, shady and takes nutrients from the soil

Activity 4: What do you know about the soil? (15 minutes)

Sub groups

1. Split into sub groups and ask participants the following 2 questions: (1) “What do you think soil is made of?” (2) “What does a good soil for growing vegetables look like?” Write the questions up on a flip chart and encourage participants to discuss their ideas for 2 minutes on each topic.
2. Then go over the soil characteristic notes in Exercise 2.4 in their workbooks. Ask participants to add their ideas in the blank lines in the table if not already on the list.

Exercise 2.4: Soil Characteristics

Question: What are the main components of the soil?

- Big and small particles of mineral substances (45%),
- Organic matter, micro and macro organisms (5%),
- Air (25%)
- Water (25%)

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Question 2: What does good soil for growing vegetables look like?

- Black, brown and red top soil
- Good smell
- Crumbly texture but not too fine
- Moist but not too wet
- Rich in organic matter which is the home for nutrients, micro and macro organisms

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Plenary

- 3.1 Tell participants that some crops cannot grow well in acidic conditions. Plants cannot take up nutrients at low pH levels.
- 3.2 Refer them to Exercise 2.5 which shows the preferred soil pH levels of plants. Tell them that many soils have low pH of around 4.3, especially in Rakhine, so lime is needed to lift the pH for optimal plant growth.

Exercise 2.5: Preferred pH levels for plants

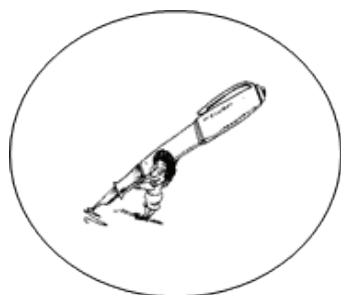
A value of 1 - 7 pH is acidic, while a value of 8 - 14 is alkaline (non-acidic). Apply lime to get proper pH of the soil (optimal is 5.5 - 7 pH), so that plants can take up the nutrients.

Activity 5: The causes of soil degradation and how to deal with it (20 minutes)

Note: Skip this section if you think you are running out of time. You could tell the participants they can study this section for homework.

Sub groups

1. In their same village sub groups, ask participants to draw two equally spaced columns in their note books, or their group leader's note book.
2. In the first column, ask them to write 'Causes of soil degradation' and to write their ideas in this column (5 minutes)
3. Then ask them to think about and write 'Solutions' to solve these problems in column 2 of the flip chart (5 minutes)
4. Refer them to the soil degradation and solutions table in Exercise 2.6 in their workbooks. Compare their answers with those in the workbook and invite them to add any answers if they want to. (10 minutes)



Tips for the Facilitator:

Instead of the facilitator reading the tables in the manual line by line, the facilitator could Vask the whole group or individual participants to read some of the lines to help them better understand by "doing" rather than just listening. Having different people speaking can also make the presentation more interesting.

Exercise 2.6: Soil Degradation Causes and Solutions

Soil Degradation Causes	Solutions
1. Mono-cropping (only having one crop) drains all nutrients specific to that crop	Grow a rotation of different crops
2. Burning surface cover such as leaves and roots kills organic matter	Dig in dried surface matter to decompose and add fertility to the soil
3. Only using chemical fertilizer results in lower fertility and yield in the long term	Use organic fertilizer or a mixture of chemical and organic fertilizer
4. Not covering the soil results in soil erosion, high soil temperature and evaporation	Cover the soil with straw, or plastic. Grow a cover crop between seasons
5. Too much water washes soil and nutrients away	Select flood free sites, have free draining soils, have raised beds and drainage channels
6. Sunlight on the soil results in evaporation of soil nutrients and water	Cover with straw, plastic or a cover crop and have filtered shelter
7. Strong wind causes soil erosion and water evaporation	Have filtered shelter to reduce wind speed. Some air flow is good.
8. Compacting the soil breaks down soil structure making it go hard	Use low impact cultivation and plant care techniques
9.	
10.	
11.	

Activity 6: Site Layout (20 minutes)

Plenary

1. Ask participants why site layout is important? Write their ideas on a flip chart. (5 minutes)
2. Refer to Exercise 2.7 in their workbooks for some answers. (5 minutes)
3. Ask them to write their own site layout in the blank section in the table for homework.

Exercise 2.7: Site Layout Steps:

1. Select a site for annual plants such as Moringa (Drumstick tree), Lemon Grass, Turmeric, and others.
2. Select small plots for the other seasonal vegetables on a crop rotation basis.
3. Make sure there is room for an entry path, and about 0.5m between the plots so you can walk around to take care of the crops.
4. Leave room for a trench around the outside of the garden to drain surplus water or store water for later use.
5. On the eastern (cooler morning sun) side grow low shade crops like sponge gourd, wax gourd and bottle gourd, allowing some sunlight to reach the other plants
6. On the western (hotter afternoon sun) side grow taller shade trees like papaya, Drumstick tree and winged bean.

Draw your own Site Layout Plan:

Example of Site Layout
Greens, onions.



Example of crop rotation of beans, salad



Activity 7: Land preparation (15 minutes)

Plenary

1. Brainstorm the methods of cultivation which participants know about. Write their ideas on a flip chart.

Sub groups

2. Split them into small same village groups (one group per method) to discuss the reasons why they use the different methods. Invite them to report to the plenary.

Plenary

3. Go over the Tips and Reasons in Exercise 2.8 in their workbooks, discussing in more detail the methods they have not already talked about.

Exercise 2.8: Land Preparation Tips and Reasons

Tips	Reasons
1. Clean tools before use	This helps to prevent contaminants such as diseases being transferred from one place to another
2. Clear the land of weeds and keep dry for 1 week	After one week the drier soil will break up more easily during cultivation
3. If there is a good layer of top soil rich in organic matter you can plant directly without plowing - zero tillage or direct drilling approach	This techniques keeps the top soil from mixing with the less rich lower soil and enables more nutrients to be available for the crops
4. Normally roughly plough only 12 inches deep and leave the soil for 7-14 days exposed to the sunlight	The upper layer of the soil is rich in macro and microorganisms and nutrients, so do not mix it with the lower layer which has few organisms and nutrients. Exposure to sunlight can kill diseases in the soil
5. Dig the soil a second time incorporating 1viss 20 Tical /meter of compost, and 8 Tical/meter of lime	For improved aeration, drainage, micro- organism development, nutrient uptake. The lime reduces acidity.
6. For annual crops such as Moringa, Lemon Grass, Turmeric, Sponge Gourd, Wax gourd, and others, dig 12 inch x 12 inch x 15 inch holes. Put 5-6 pounds of compost and dried small pieces of coconut husks into the holes	These plants need deeper holes for root anchorage deep down.
7. For short term seasonal crops (carrot, radish, beans, etc.) pulverize (pound and mix up) the soil into a firm, fine seed bed (but not too fine)	This allows anchorage and protection of the seed, but still provides spaces in the soil for aeration and water holding capacity and drainage
8. For seasonal crops make raised beds about 24 inches wide, 10 inches high with 18 inch furrows between the beds. You could put palm frond walls around the beds to prevent the soil falling down	Raising the plots a bit higher than the rest of the land improves drainage, water efficiency and helps release any excess water away from plant roots reducing flooding risk, and improving aeration, root growth and nutrient uptake
9. Use dry organic matter such as rice straw or sugarcane leaves to cover the bed	Conserves moisture, keeps soil temperature down, and stops the light reaching the soil, thus preventing new weed growth

Activity 8: Control of soil borne diseases (10 minutes)

Plenary

1. Ask participants what they know about soil borne (carried) disease? (i.e. diseases in the soil which are carried from one year to the next)
2. Ask participants to describe the problems which soil borne disease can cause?
3. Ask how these soil borne diseases might be prevented?
4. Go over GAP suggestions in their workbooks Exercise 2.9.

Exercise 2.9: Control of soil borne disease

Organic control:

1. Plough 14 days before planting to let the sun shine on the soil and kill the disease
 2. Use trichoderma fungus (bio agents) application to kill the disease.
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Activity 9: How to make organic pesticide (55 minutes)

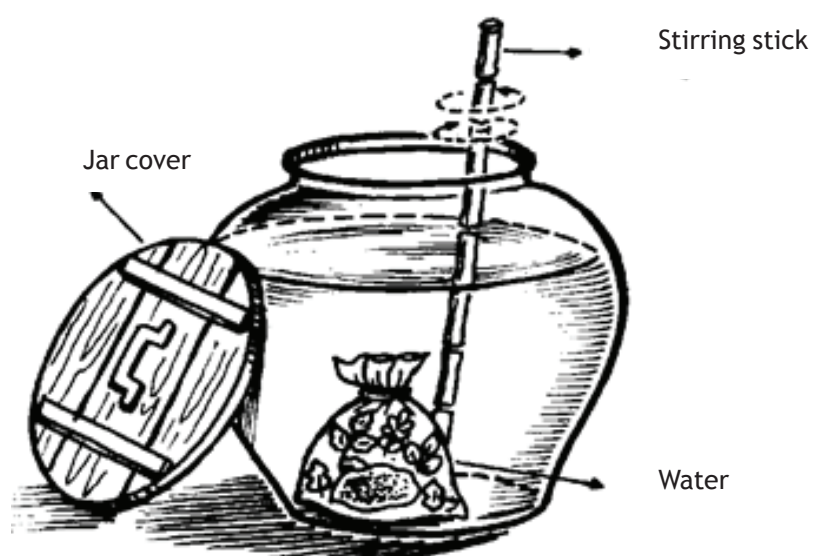
Plenary

1. Refer participants to Exercise 2.10 in their workbooks. Invite selected farmers to read the instructions and discuss the points so everyone understands the process.
2. Say that the farmers will practice making these organic pest control mixtures later in the FFS.

Exercise 2.10: How to make organic pesticide

Option 1: Local inputs only

- Put 10 pounds of organic materials (kitchen waste, cow dung, chopped up plant material) and a heavy piece of rock in an open weave bag and put that bag at the bottom of a jar
- Pour 20 liters (or 5 gallons) of water into the jar.
- Cover the jar with a wooden lid to avoid mosquitoes laying eggs, houseflies and bad smells
- Stir the mixture in the jar twice a day for 2 months until it does not smell so bad
- Apply the pest disease control mixture every 4-5 days during the crop cycle. Dilute with water 1:20 (1 part organic waste to 20 parts of water) for young plants and 2:20 for older plants



Option 2: EM-5 Repellent (takes 2 weeks to mature)

Concentrated Alcohol	-	100 cc
Vinegar	-	100 cc
Molasses	-	100 cc
Concentrated EM	-	100 cc
Water	-	600 cc

- Mix all materials in a 1 Liter bottle and seal tightly from air.
- Keep it in dark, dry, cool place.
- Start to use as repellent after 2 weeks and re-apply weekly.
- The rate is 1:500-1:1000 (EM-5: Water) to apply.
- To suppress diseases and pests in early phases of infection: Spray on to plants at a dilution of 1:100.
- It is not a pesticide, only a repellent.
- It can be used for up to 3 months before it is no longer effective.

Activity 10: Summary (5 minutes)

Plenary

1. Summarize the activities of the day (10 minutes)

Activity 11: Explain the distribution of inputs process before closing the meeting. (5 minutes)

Plenary

1. Hand out a blank sheet of A4 paper to each participant. Ask them to write down their seed choices and those of their Non Lead Farmers. Collect these papers so you can place an order for the seed and other inputs as soon as possible so the seed can be delivered and ready for planting at the next session.
2. Review again the distribution of inputs process (2 minutes)

Activity 12: Evaluation (5 minutes)

Plenary

- a) Ask participants what they thought was good and interesting about the training
- b) Ask participants what was not so good about the training
- c) Ask them how the training could be improved
- d) Write their ideas in a notebook for review the training notes and processes later on

Activity 13: Confirm the topic and timing and who should come to the next session. (5 minutes)

Plenary

1. Confirm place and time and who should come (the 'doer of the tasks') to the training.

Session 3: Preparation for Planting

Duration: 3 hours

Objectives:

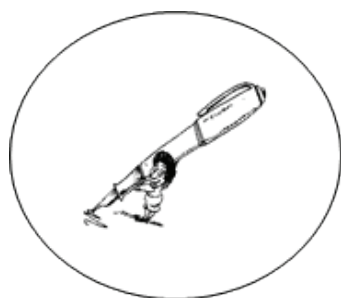
1. To Know how to establish a nursery
2. To know how to make raised beds for vegetable planting
3. To know the different options for fertilizer use
4. To know about mulching
5. To know how to plant nursery seedlings and seed directly into the field
6. To know the water requirements for young plants

Materials: Flip chart paper; marker pens; tape; Cucumbers (Good shape vs. Nutrient imbalance shape);
Field Work materials

Activity 1: Summary of the last session (10 minutes)

Plenary

1. Ask participants to recall what they learnt from last session. Write their ideas on a flip chart.
2. Invite participants to look at Session 3 Table of Contents in their workbooks. Ask an individual participant, or different participants, to read the table of contents.



Tips for Facilitators

Guiding participants to use the table of contents helps them to look up information in their “Farmer’s Work Book” more easily when they are at home.

Activity 2: Nursery Establishment (35 minutes)

Plenary


1. Ask participants “Why are farmers changing from planting directly into the field to planting in a nursery?” Write their ideas on a flip chart. Answer: Because seedlings have advantages over other methods. These advantages are discussed below: (2 minutes)
2. Go over the comparison of using seedlings of direct seeding in Exercise 3.1 in their workbooks (8 minutes)





Exercise 3.1: Advantages and Disadvantages of Seedlings and Direct Seeding

	Seedlings	Direct Seeding
Amount of seed used	Less	More
Water application	Less amount used	More amount used
Weather/pests effect	Easy to control, low impact	Difficult to control, high impact
Productivity	High productivity, good uniformity in quality	Uneven productivity in plants; lower quality
Crop season in field	Shorter	Longer

3. Brainstorm with participants the question: “What is the best way to establish a nursery?” Write their ideas on a flip chart. (5 minutes)
4. Refer them to Exercise 3.2 asking different farmers to read out the tips and reasons to keep them involved. Provide clarification if needed. (20 minutes)

Exercise 3.2: How to Establish and Maintain a Nursery

Tips	Reasons
1. Select a raised or slightly sloping, secure site close to water.	Water can run off to prevent flooding. Fencing protects plants from damage. Water is essential for plant growth.
2. Do not put your nursery close to guava or banana plants.	These plants harbor pest and disease.
3. Build a nursery table from local materials to save cost.	

<p>4. Put shade cloth or palm leaves on top of the seedling table for 30% shade and plastic for protection from rain.</p>	<p>Direct sunlight dries the soil quickly and high temperature stresses the young seedlings. The rain can wash out the seedlings. Too much shade makes long stemmed weak seedlings, while too much light stresses young plants and they do not grow well. Airflow from the sides reduces moisture and disease.</p>  <p><i>Too much shade produces elongated seedlings</i></p>
<p>5. Put a ring of an ash and oil mixture around the nursery seedbed to prevent ant invasion.</p>	<p>For improved aeration, drainage, micro- organism development, nutrient uptake. The lime reduces acidity.</p>
<p>6. Grow seedlings in separate small pots with water drainage holes like a plastic seed tray, bamboo joint, newspaper, or other small homemade containers with holes in the bottom.</p>	<p>These plants need deeper holes for root anchorage deep down.</p>
<p>7. Seedling Mix and seed planting:</p> <ol style="list-style-type: none"> Put together equal portions of well decomposed cow-dung manure, rice husk charcoal and top soil. Put the mixture in a sealed plastic bag (black color) and heat up for fermentation in the sun light for 3-4 hours. Gently sprinkle the mixture into a seed tray or other container. Don't press the soil mixture, but shake the container 3-4 times after putting the mixture to help it settle. Fill up the mixture to the top of the container. When the seedling mix is ready, poke a hole about 2 x the seed diameter below the surface with a sharp stick, then plant and cover the seed. Water the soil by using a gentle sprayer until very wet. Transfer the seed containers to the nursery house and cover the trays with nipa palm leaf or tarpaulin or newspaper sheet until germination. Then remove the cover with part (30%) shade for the young seedlings. 	<p>Special seedling mix helps germination and healthy seedlings to grow. Seed depth is important - too deep or too shallow and the seed will not grow well. A wet, warm, dark place is ideal for stimulating seed germination.</p> 
	

8. To get weekly income from seasonal vegetables, stagger your sowing time in the nursery so that seasonal vegetables will not be competing in the market. Selling over a long period evens out fluctuations in income, rather than selling all at one time for one price.	This method grows just enough to eat each week over a number of weeks. Not have every plant ready for harvesting at the same time.
9. Keep the nursery seedlings moist by lightly watering 2-3 times per day. Make sure the seedlings are not too wet or too dry, just moist. Check for, and control for pests and disease by picking up and destroying them manually.	Plants need water for growth but too much water rots the roots and base of the stems and attracts disease.
10. Seedlings are ready to transplant when there are 3 fully open leaves (do not count the first round leaves)	If seedlings are planted too early they are weak with small root development, while old seedlings can develop tangled roots which restricts growth.
11. 2 days before transplanting, reduce watering to 1 x per day and increase the light exposure.	Helps adjust the seedling to life outside the nursery.

Activity 3: Making Raised Beds (15 minutes)

Plenary

1. Brainstorm with the group the question: “Why is it important to make raised beds?” Write their answers on a flip chart.
2. Review the answers in their workbooks and discuss.

Exercise 3.3: Why is it recommended to have raised beds?

It is recommended that farmers have raised beds because:

1. Soil is loosened while making raised beds. This creates more spaces between the soil particles for air, so the roots can breathe more effectively.
2. Excess water can initially drain away from the plant reducing the chance of disease and water logging stress, and excess water does not block air spaces.
3. The excess water that drains into the furrows can slowly soak into the bottom of the bed and then move up towards the plant roots. Therefore, the excess water is not lost.
4. Roots can grow quickly toward the water in the bed. Long roots improve the feeding and production of the plant.
5.
6.
7.

Activity 4: Fertilizer Options and their Use (55 minutes)

Plenary

1. Brainstorm the question: “What affects nutrient uptake by plants?” Write participants’ ideas on a flip chart. Go over the answers in Exercise 3.4 in their workbooks. (10 minutes)

Exercise 3.4: Factors that affect nutrient availability for plants are:

	pH Level	Soil texture	Soil Moisture	Temperature	Saltiness
Not good For Plants	Acid (value below 5) or alkaline (value over 7)	High in Silt	Uneven	Over 35°C	Very salty
Good For Plants	Neutral (value of around 5.5-7.5)	Sandy to Loamy	Constant	Under 30°C	Low salt

2. Brainstorm the question: “What are the solutions to the problems affecting nutrient uptake by plants?” Write their ideas on a flip chart. Ask participants to write the answers from the flip chart in the spaces provided in Exercise 3.5 in their workbooks if they are not recorded there already. (5 minutes)

Exercise 3.5: How to change bad growing conditions to good growing conditions

1. Reduce acidity by adding lime which is alkaline - Show them some lime that you will use in the field work.
2. Improve soil texture by adding compost.
3. Improve soil moisture by regular watering. Not too much, not too little.
4. Reduce soil temperature by mulching.
5. Reduce salinity by selecting low salt soils & do not use salty water

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3. Explain to the farmers the table in Exercise 3.6 in their workbooks on the main nutrient requirements for plants and how these nutrients contribute to plant growth. (5 minutes)

Exercise 3.6: The most important chemical fertilizer requirements for plants are:

1. Phosphorous (P) is the most needed nutrient and is good for roots, flowers, fruit setting
2. Nitrogen (N) is the second most important nutrient and is good for growing leaves, branches and fruits, and
3. Potassium (K) is the least needed but is useful in regular small amounts for all growth stages

Additional fertilizer elements that may be useful as side dressings.

1. Calcium is used for better growth of plants.
2. Magnesium is a component of chlorophyll that makes the leaves green for efficient photosynthesis
3. Sulphur is sometimes used for better general growth of plants.
4. Other nutrient elements that can be useful are boron, chlorine, copper, iron, molybdenum, nickel, zinc, silica and manganese.

- Brainstorm with the group: “What different fertilizer options do they know of?” Write their ideas on a flip chart. The main responses (headings) we are looking for are: Chemical: Organic: Crop rotation (5 minutes). After brainstorming, write these 3 headings on the flip chart.

Sub groups

- Split participants into 3 groups to discuss the positives and negatives of: (i) Chemical fertilizer (ii) Organic fertilizer and (iii) Crop rotation option. (10 minutes)
- Ask leaders of the groups to report back to the plenary. Write their ideas on a flip chart in 2 columns (1) Strengths and (2) Weaknesses. (10 minutes)

Plenary

- Then go over the table in Exercise 3.8 in their workbooks, focusing on GAP ideas that have not been discussed already. Ask them to add any other points not mentioned, in the blank spaces provided in their workbooks, after the session. (30 minutes)

Exercise 3.7: Fertilizer types, their strengths, weaknesses, and GAP application recommendations:

Fertilizer Type Strengths	Weaknesses	GAP Recommendations
Chemical Fertilizer:		
Usually there are many different chemical supplements available to buy.	Neutral (value of aro Some markets do not supply the full range of quality fertilizers. und 5.5-7.5)	Form linkages with quality suppliers so you can get the fertilizers you need.
Farmers do not have to spend time making the fertilizer. They can buy it.	The cost is usually quite high.	Use the minimum amount of fertilizer specific to the crop and soil needs so that you do not waste money on too much fertilizer.
Very effective if applied at the right time in the right amount.	Farmers do not know how or when to apply the fertilizer.	Use multi-nutrient or single nutrient fertilizer at the right planting time to stimulate root, leaf and fruit growth.
Rakhine soils are acidic (less than 5.5 pH) and require lime to be added.	Have to buy the lime	3-5lbs per 25 yards squared, to raise pH by 0.5 pH unit.
Chemical fertilizer feeds the plant, but not the soil.	Chemical fertilizer does not encourage improvements in soil structure, or make a home for beneficial micro and macro organisms, nor does it develop long term natural nutrient growth.	Combine chemical fertilizer with organic matter to promote natural soil health and joint fertilizer effectiveness.

Most chemical fertilizers are natural products like phosphates, lime, and potassium and in limited amounts, are not directly harmful to the soil.	Some fertilizers are artificially made like Urea from the underground gas refining process. This fertilizer is harmful to the organic matter in the soil in the long term. Fertilizer can be washed into streams creating problems for fish and other river life.	Do not use artificially made fertilizers. Do not use too much fertilizer, especially close to waterways.
Organic fertilizer:		
Organic fertilizer feeds the soil so that the soil can produce its own nutrients for a long time.	It is difficult to make the large amounts of organic fertilizer required to meet all of the plant needs.	Make as much organic fertilizer as possible and supplement it by chemical fertilizer if required.
The solid form (compost) can be made for free in a pit filled with chopped up natural plants, mixed with animal manures, water and air.	Takes a lot of work and long time (3-6 months) to make.	Follow the GAPs for making organic fertilizer efficiently (sweet smell with a crumbly dry texture) Do not apply raw manure directly to the crop as it has harmful bacteria and can make you sick. Never use human waste as this can be very dangerous for your health.
The liquid form is a mix of the above but is put in a large container fermented for a specific period. It can be applied as a foliar fertilizer.	Takes time to make and the farmer has to buy a sealed container.	Follow the GAPs for making organic fertilizer efficiently. Only apply organic fertilizer when it is fully composted.
Organic fertilizer is made from many dangerous raw materials like cow dung, rotten leaves etc.	Organic material remains toxic during the decomposition process until it is fully decomposed. During the decomposition process, sometimes toxic water can drain into the garden or waterways, and people and animals can touch the decomposing compost and get sick.	Keep the compost pit away from the garden. Do not use human waste. Fence the compost pit to keep humans and animals away. Do not let toxic waste water from the process drain into waterways or touch the vegetables.
Effective Micro-organisms (EM):		
Farmers can buy this liquid product as a concentrated mix of beneficial micro-organisms made from the fermenting of special bacteria, lactic acid and yeast.	Sometimes it cannot be bought in local agro dealer shops and has to be ordered from outside suppliers.	Improve linkages with the supplier so that it is easy to get. Buy in bulk so it is cheaper.
The concentrate can be diluted up to 1:100 and still be effective.	Some people dilute it too much and it loses its effectiveness.	Follow the recommended dilution guidelines according to the use of EM.

EM can be added to rice husks and molasses to make good super nutrient bokashi compost which is fermented under black plastic for only 2-3 weeks.	Farmers often do not follow the guidelines correctly so it is not so effective.	Follow the EM guidelines correctly.
EM (500ml), molasses (500ml) and 4kg fresh chopped up plant material can be mixed with 20 liters of water in a sealed container to ferment for 3 weeks to make a liquid organic fertilizer and pest control product.	Some farmers do not prepare it properly and then it is not so effective.	Follow the EM guidelines closely.
EM decomposed faster than organic compost and is less toxic	Cost around 3,000 MMK/liter to buy	Much quicker decomposition time, is safer for humans, animals and the environment.
Crop rotations		
Crops should be rotated every year so the soil is not stripped of the same nutrients every year and disease cannot be transferred between the same crops.	Farmers do not take care to record the crops and areas where they have been grown, so are not clear about rotation management.	Follow GAP and record where and when you have grown your crops and rotate them every 1 year.
Grow crops that improve the soil structure and nutrients like legumes (groundnut, mung bean, soy bean) which put back nitrogen into the soil.	It takes time and money to grow these crops.	GAP recommends the growth of legumes such as beans and groundnut from which you can make a profit and improve the soil at the same time.
Cover crops can be grown to conserve soil water and control temperature, and before they are mature you can dig them into the soil to form compost over the next few months.	It takes time and cost money to grow and dig back in cover crops with no apparent immediate return.	Understand that cover crops are good for the long term benefit of the soil and crop yields, even though in the short term the benefits cannot always be seen.
Keep records.	Farmers usually do not keep records.	Keep records of chemical and organic fertilizer application and crops rotations so you know what has gone into your soil and what crops you have grown. People who eat the products can be shown how your crop was grown.

Plenary

8. Tell participants that nutrient imbalance can sometimes be identified by the way plants grow. Ask them what crop nutrient imbalance signs they know of? Write their ideas on a flip chart. Refer them to Exercise 3.8 in their workbooks and discuss the examples.

Exercise 3.8: Nutrient imbalance symptoms.

Common examples of incorrect nutrient balance:

- Too much foliage and poor fruit set is related to excessive nitrogen.
- Too much fruit but small in size indicates potassium deficiency.
- Good number of fruits but inconsistent size or them being misshapen is caused by potassium deficiency.
- Few female flowers and too many male flowers and yellow leaves can show nitrogen imbalance.



Potassium deficiency cucumber



Nitrogen deficiency - yellowing



Healthy plant - green color

9. Tell participants that in the next session they will be applying N:P:K as a basal fertilizer just before planting to give the plant a wide range of nutrients for better plant growth.

Activity 5: Go to the field for more discussion and field practice of GAP (45 minutes)

Sub groups

1. Demonstrate forming raised seed beds according to the site layout and cultivation notes from Exercise 2.7 to 2.8.
2. Demonstrate making some EM pest control solution using their manuals as a guide. This solution needs to be stored for 2-3 weeks before use. Go over the EM guidelines in their workbooks Exercise 2.10.

Activity 6: Summarize the session (10 minutes)

Plenary

1. Ask farmers what were the key points they learned during the session. Write them on a flip chart.

Activity 7: Evaluate the Session: (5 minutes)

Plenary

1. Ask participants the questions below and write their answers in your notebook for review of the training material later on.
 1. What worked well in the lesson?
 2. What did not work so well?
 3. How could the lesson be improved?

Activity 8: Remind participants of the topic, time and place for the next session. (5 minutes)

1. Confirm topic, time and place for the next session. Remember to invite the 'doer' (husband or wife) to come to the session so that they get the information first hand.
2. Close the session and hand out demo materials if appropriate.

Session 4: Crop Care and Water Management

Duration: 3 hours

Objectives:

- To know how to apply basal fertilizer and compost
- To know about mulching
- To know how to plant nursery seedlings and seed directly into the field
- To know the water requirements for young plants
- To know different methods of trellising
- To know the importance of weeding
- To know the techniques for thinning

Materials: Flipchart, markers, tape, Field work materials

Activity 1: Review of previous session and this session's topics. (10 minutes)

Plenary

1. Invite participants to say what they learnt from the last session. Write their ideas on a flip chart.
2. Go over the topics for this session in their table of contents. This gives the participants experience in using this method of finding information. Ask a farmer to read the topics out loud.

Activity 2: Basal fertilizer and compost application (10 minutes)

Plenary

1. Brainstorm how to apply basal fertilizer and compost. Write participants' ideas on a flip chart.
2. Tell them to refer to Exercise 4.1 in their workbooks. Ask individual farmers, or the whole group, to read the guidelines.

Exercise 4.1: Applying fertilizer

1. Basal dressing

Basal fertilizer is applied in a 10' wide furrow, 4 inches below the surface line where you want to plant. This is where the water is applied and where the roots will grow towards the water. Basal lime, NPK or compost should be applied in this furrow 1-2 weeks before planting. All fertilizers should be covered by the soil to prevent chemicals being lost by evaporation from the heat of the sun. It is also important that the soil is kept moist. Fertilizer does not release nutrients if the soil is too dry or too wet. Fertilizer will burn the roots if it comes in direct contact with them so it has to be placed a little away from the roots, especially those of young plants.

2. Side dressing

This is used in sandy soils which do not hold nutrients well and when plants require additional nutrients for growth eg when flowering. Side dressing can be made either in a narrow furrow 6" away from the row of plants or applied around each plant or mid way between each plant. Side dressings should also be covered by the soil to prevent evaporation of nutrients. An N:P:K 5:5:5 is a good general purpose choice for fruiting crops. Use 1 or 2 tablespoons / plant or 1 - 2 lbs for every 25 feet of row. For leafy greens use a fertilizer with more nitrogen eg N:P:K 20:5:10 .

3. Important tips:

1. Too much fertilizer can be more harmful than too little. Excess fertilizer accumulates in the soil in the form of salts and damages plant roots.
2. Don't add fertilizer during a dry period of weather if you can't irrigate your field, because without adequate soil moisture, roots can't take up nutrients.

Activity 3: Mulching (10 minutes)

Plenary

1. Brainstorm with participants - "What is the meaning of mulching?" Write their ideas on a flip chart.
2. Brainstorm - "Why should farmers use mulching?" Write their ideas on a flip chart.
3. Ask: "What different types of mulching do they know of?" Write their ideas on a flip chart.
4. Refer them Exercise 4.2 in their workbooks, focusing on the ideas they have not covered already and the photos showing different types of mulch.
5. Tell them that you will be mulching in the demo plots later in the session.

Exercise 4.2: Mulching

Definition of mulching:

Mulching is the covering of the soil to prevent stress to the plant.

Question: Why should farmers use mulching?

1. To prevent the soil temperature rising, causing stress to the plant and reducing nutrient uptake
2. To prevent water loss through evaporation
3. To protect the soil from wind erosion
4.
5.

6.

What different types of mulching are there?

Organic mulch



Plastic mulch



Note: Organic mulch should be 6” deep at the beginning. It will collapse down to 1-2” in a few days’ time and is much more effective than a thin layer of mulch from the beginning. Plastic mulch is expensive and is not good for the environment.

Activity 4: Transplanting seedlings, direct seeding. (25 minutes)

Plenary

1. Ask participants to refer to Exercise 4.3 in their workbooks and to look at the guidelines for transplanting seedlings and direct seeding. Explain that they will practice these techniques in the field in the demonstration plots. (5 minutes)

Exercise 4.3: Planting methods

Transplanting

1. Two days before transplanting, wet field beds until saturation and add trichoderma.
2. Prepare the trichoderma solution mixing 7g trichoderma in 10 liters of water. Slowly add 40 ml of trichoderma solution to each seedling pot; don’t let the solution drain out of the seedling pot.
3. Transport the seedlings carefully to the field. Select only the healthy seedlings for planting.
4. Make a hole in the mulch and soil bed 2 inches wide and deep enough for the seedling to rest at ground level (not below ground level). Space plants the width of the adult plant. If you plant too close, you get thin weak plants; if too wide, weeds can grow fast stealing plant nutrients and light. If you plant too deep, water can fill the hole causing stem and root disease and reduces oxygen.
5. Take the seedling from the pot by the crown of the plant without bending or



pressing too hard. Drop the seedling into the hole at the same level as the soil. Cover the seedling completely with soil; add water to make the soil wet; gently press with your hands up and down around the wet ground around the seedling to wash the soil close to the roots.

6. Try to transplant seedlings after 3:30 pm to avoid dehydration.

Direct Seeding:

1. Mark straight lines using string or another technique.
2. Make a groove in the soil at twice the seed diameter in depth, following a straight line.
3. Plant seeds carefully trying to get the correct spacing.
4. Gently cover the soil over the seeds and press firmly.



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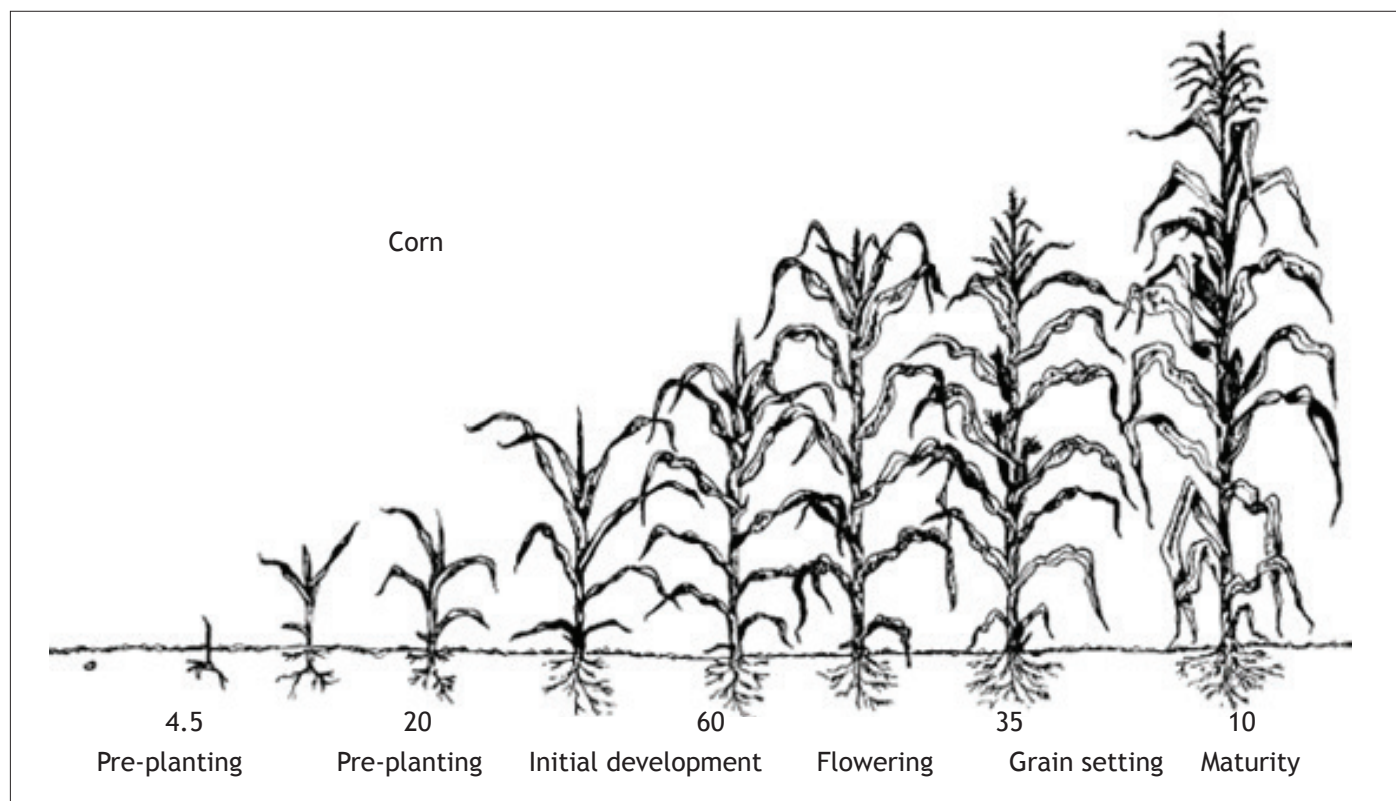
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Activity 5: Water Management (35 minutes)

Plenary:

1. Ask participants to look at the pictures of corn plants in their workbooks Exercise 4.4 and ask one farmer to tell the group what it means. (Answer: Plants have different water needs through the growing cycle. E.g. Soak the soil thoroughly at the beginning, then after “puddling in” new seedlings, the need for water is low for young seedlings, then rapidly increases from the young plant stage to flowering and fruiting. Requirements generally reduce close to harvesting. (5 minutes)

Exercise 4.4: Plant water requirement through their growth stages



2. Summarize by asking the group to together read the following guidelines in Exercise 4.5. Stop to ask for questions at the end of each step. Also discuss the soil moisture test Exercise 4.6 (15 minutes)

Exercise 4.5: Basic guidelines for plant watering

Amount of water:

The total amount of water needed to produce a crop depends on the specific requirements of the crop, the growing time and the characteristics of the soil. There are some rules to follow for water but farmers also need to learn how to read their plants and the soil conditions to best judge when and how much to water.

Guidelines for plant watering:

1. Watering is best in the early morning because water will be available to the plants as the sun gets hotter and the plants start to draw more water out of the soil
2. At regular intervals take a handful of soil 4 inches below the soil and squeeze it. Drop it from 4" above the ground. If the soil holds together it has enough water. If it crumbles it needs more water (See diagram 4.6 in their workbooks). And, as a general rule, look at the plants at mid-day, and if they look thirsty, water some more.
3. Sandy soils need more water than soils with clay.
4. If direct seeded, soak the seeds overnight.
5. Fully wet the soil before direct seeding or transplanting.
6. Puddle water around newly transplanted seedlings to push the soil close to the roots.
7. After that, as a simple guideline, young plants need to be moist but not wet, watering every 4 days for 1-2 weeks, then every 3 days in week 3, every 2nd day in week 4 water every day from week 5 onwards until harvest. Generally, the more leaf area, the more water is required.
8. Keep the soil around the plant loose so that water is easily absorbed.
9. Crops that are harvested dry should not be watered as harvest approaches.
10. Too much water during fruiting may cause fruit splitting.
11. Watering the leaves of some plants e.g. okra may cause rotting.
12. If using inter-bed furrow irrigation the beds should not be too wide as water cannot spread into the center of these wide beds.
13. If plants are too dry the leaves will wilt but they will recover quickly when watered.
14. If plants are overwatered the leaves will wilt because the roots have become rotten and they will not recover quickly. Try to avoid over watering!
15. In the monsoon, drainage is more important than watering. Plant on flood free low land or sloping higher land in high reinforced raised beds, draining water away from the beds.

3. Go over "Testing soil moisture" Exercise 4.6 in their workbooks. (5 minutes)

Exercise 4.6: Soil moisture test

Soil Moisture test:

- Select at random (in different rows) at least 6 points to check the soil for moisture.
- Select a point between two plants and about 8 inches away from the line of plants.
- Dig a hole 4 inches deep and then pick a little sample of soil between the fingers.
- Squeeze the soil sample very hard (don't rub it).
- Drop the sample into your other hand from about 4 inches. If the sample:
 - Blows as dust, the soil needs water immediately
 - Breaks in small pieces, it will need water in less than 4 hours
 - Doesn't break and falls in one piece, the soil has moisture for at least 24 hours.



- Monsoon plastic tent option for protection from too much rain (10 minutes)
 - Tell participants that sometimes there is too much rainfall, especially in the monsoon, and it is difficult to grow crops, especially high value crops sensitive to overwatering like tomatoes and coriander. Discuss the advantages and disadvantages of the plastic tent option shown in the photo in Exercise 4.7 below.

Exercise 4.7: Advantages and Disadvantages of Plastic Tents

Option 1: Full cover - suitable for sheltered areas as this is susceptible to wind damage



Option 2: Half cover suitable for exposed sites. Wind can more easily escape with open sides.



Advantages

1. More crop diversity possible
2. High profit from high value crops
3. Structure lasts 2-3 seasons if looked after well.

Disadvantages

1. Cost (around 50,000 MMK 20' x 20')
2. Sometimes difficult to build
3. Structure only lasts 1 season if not looked after well.
4. Wind and water collecting in the plastic can destroy the roof. Has to be well constructed and maintained.
5. Need to grow high value crops to get the maximum benefit.
6. Suitable only for the best farmers as it takes time and dedication to be successful.

Activity 6: Trellising (20 minutes)

Plenary

1. Brainstorm with participants the question: "Why is trellising important for some crops?" and "Which crops are suited to trellising?" Write their ideas on a flip chart.
2. Ask participants what different types of trellising they know. Write their ideas on a flip chart.





Sub groups

3. Split participants into sub groups and ask each group to discuss the advantages and disadvantages of one trellising method per group.
4. Invite group leaders to report back to the plenary.

Plenary

5. Refer participants to the photos in Exercise 4.8 in their workbooks that show different trellising methods. Go over methods, advantages or disadvantages, focusing on those points not already mentioned to save time. Inform participants that they will practice trellising in the field later in the session.

Exercise 4.8: Analysis of Trellis Designs

Vertical Bamboo Trellis	Net trellis	String Trellis	Horizontal Trellis
			
Low cost if bamboo is easily available but labor intensive to build. Usually need new bamboo each year.	Easy to manage and handle. This is a substitute for bamboo if bamboo is not easily available. Can use for a few years. Expensive compared to bamboo but saves on labor.	Easy to handle and low cost in materials and labor.	Suitable for gourds but can be costly as a lot of material and labor required.

Activity 7: Weeding (15 minutes)

Plenary

1. Ask participants to define what a weed is? Write their ideas on a flip chart.
2. Refer them to the definition point 1 in their workbooks Exercise 4.9.
3. Brainstorm “Why is weeding important?”
4. Go over the other points in Exercise 4.9 in their workbooks that shows the main Tips and Reasons for weeding. Ask participants to add their ideas in the blank lines in the table if their ideas are not already on the list.
5. Tell participants that later they will go to the field to practice weeding.
6. Say that it is better to weed manually for aerating the soil. Suggest they avoid chemical weeding if possible because chemicals are not so good for the farmer’s health or the environment.

Exercise 4.9: Weeding

Tips	Reasons
1. Definition: A weed is a plant that is in the wrong place at the wrong time.	If you are selling your crop, buyers want single species products, not mixed with other products so you have to 'weed out' the species that is in the wrong place at the wrong time.
2. Why is weeding important?	Weeds compete for light, nutrients, and can be hosts for pests and disease.
3. Pull weeds by hand or dig them out with a hoe or other tool.	Manual weeding loosens the soil and in this way improves aeration and plant growth. Weeding also reduces competition amongst vegetables for nutrients and light.
4. Make sure the weeds are not tangled up in the seedlings.	When you pull the weeds you may pull out the seedlings as well.
5. Leave the weeds without seed heads laying down on the surface of the soil. Take weeds with seed heads away and burn them.	Laying weeds without seed heads on the soil surface allows the sun to kill these weeds and provides shade to the soil to prevent water loss and soil temperature increase. Over time these weeds will break up into compost and improve the soil.
6. Keep some strong smelling weeds to chop up to make organic EM insect repellent.	Strong smelling weeds are good ingredients for this mixture.
7. Chemical control: spray weeds with a selective herbicide if other methods of control are not possible.	Too difficult to hand weed a large area. Follow the instructions on the container on how to mix and use the chemical safely.
8.	
9.	

Hand Tools for weeding:



Activity 8: Thinning (15 minutes)

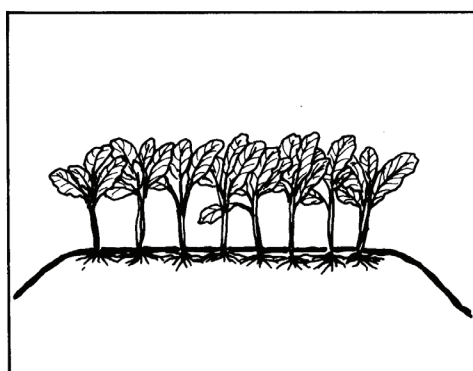
Plenary

1. Ask participants: "Why is thinning important?" Write their answers down on a flip chart (5 minutes)
2. Review the thinning tips in Exercise 4.10 in their workbooks. Compare their answers and ask them to write in their ideas that are not in the table already. (10 minutes)

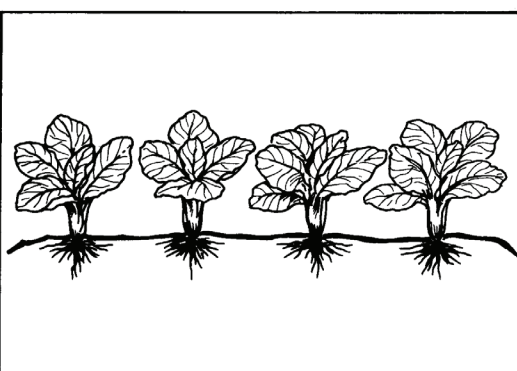
Exercise 4.10: Methods and Purpose of Thinning

TIPS	REASONS
1. When planting small seeds, mix them with fine sand and then plant them.	Reduces the amount of seed planted and thinning requirement.
2. Pull out carefully the plants that are not at the correct spacing. Try not to disturb the plant that is left behind too much.	Plants that are too close together result in small weak plants because they compete for nutrients, light and water.
3. Leave plants at a spacing that is the same as the fully grown adult plant.	This provides enough room for sufficient nutrients, light and water for good plant growth, and maximizes the amount of plants per plot maximizing yield and income.
4.	
5.	
6.	

Too close making plants thin



Good spacing resulting in strong plants



Activity 9: Field Work (30 minutes)

Sub groups

1. Go to the demo farmer's fields for more discussion and field practice of GAP including:
 - 1.1 Basal fertilizer and compost application. Refer to the relevant Exercises in their workbooks.
 - 1.2 Mulching. Refer to the relevant Exercises in their workbooks.
 - 1.3 Transplanting seedlings, direct seeding. Refer to the relevant Exercises in their work books.
 - 1.4 Crop watering. Go over the soil moisture test in the relevant Exercises in their workbooks.
 - 1.5 Erect some trellis using the workbook photos as a guide.

Activity 10: Summarize the session (5 minutes)

Plenary

1. Summarize the session on a flip chart, emphasizing the main learning points. Ask if there are any questions.

Activity 11: Evaluate the Session: (5 minutes)

Plenary

1. What worked well in the lesson?
2. What did not work so well?
3. How could the lesson be improved?

Activity 12: Confirm the topic and timing and who should come to the next session. (5 minutes)

Plenary

1. Confirm place and time and who should come (the 'doer of the tasks') to the training.

Session 5: Pest & Disease Control

Duration: 3 hours

Objectives:

1. To know the main types of pests and diseases in the target crops
2. To know 5 methods of insect and pest control
3. To know the proper techniques for mixing and spraying chemical insecticides
4. To review the GAP Crop Management Tips on fertilizer and watering maintenance requirements

Materials: Flipchart, marker pens, tape, Vegetable Pest and Disease control Booklets; Some paper for exercises; Protective clothing set; RWCP Crop Management Tips booklets for all Lead Farmers.

Activity 1: Review of previous session and this session's topics. (10 minutes)

Plenary

1. Invite participants to say what they learnt last session. Write their ideas on a flip chart.
Go over the topics for this session in the workbook Table of Contents. Ask a farmer, or all of the farmers together, to read the topics to give them practice at using this reference guide.

Activity 2: Pest and Disease Identification. (15 minutes)

Plenary

1. Hand out pest & disease identification booklet if you have them. The DoA sometimes has booklets they can sell for a reasonable cost to other organizations. Some NGOs also have produced good booklets.
2. Review together the pest and disease identification books. Say that you will be using them in the field to identify problems and control measures.

Activity 3: Insect, pest and disease control (40 minutes)

Subgroups

1. Write on a flip chart the following 5 methods of insect, pest, and disease control: (1) Prevention; (2) Companion planting; (3) Physical/mechanical control; (4) Organic pesticide application; (5) Chemical control
2. Form 5 subgroups, to discuss what participants know with regard to one of the control measures per group. (15 minutes)

Plenary

3. Invite group leaders to report to the plenary (15 minutes). Write their key ideas on a flip chart.
4. Refer to the table in Exercise 5.1 in their workbooks, acknowledging the points participants have made already, and further discussing the points they did not mention.

Exercise 5.1: Insect, Pest and Disease control

Important Note for Participants:

1. Use preventative and organic methods of control where possible. Only use chemicals as a last resort because chemicals are dangerous for the farmer's health, can be dangerous for the consumer's health, and they are also dangerous for the environment.
2. Learn which are the good insects and which are the bad insects. Only kill the bad insects.
3. Recognize the pests and diseases in the crops early and how to control them. (See Pest and Disease Handbook)

TIPS	REASONS
1. Prevention: It is a good idea to reduce the chances of insect, pest and disease attack by: (1) crop rotation; (2) sterilizing the soil by burning rice husk on top; (3) having enough air ventilation to dry the vegetable leaves since disease forms in wet conditions; (4) sterilizing seeds by treatment with EM solution (dilution 1:1000, soak 2-3 hrs.) or buying chemically treated seeds to protect the seeds from disease; (5) using disease resistant seeds and varieties; (6) planting at a time of year when there is less disease; (7) transplanting only healthy seedlings so they are strong enough to fight disease and pest attack; (8) protecting young plants from extremes: not too hot, not too wet, physical damage from animals; (9) inspecting your crop regularly to detect and control problems early, not when it is already too late; (10) removing weeds as they can be hosts for pests and disease; (11) flooding the field before sowing to drown insects; and (12) leaving a week between cultivations for the sun to dry the soil and kill some disease.	Prevention is easier and less costly than having to find a cure and reduces the chance of losing some of the crop.
2. Companion planting: Some plants have natural substances in their roots and flowers that can repel or attract insects. They can also provide nutrients to the plants beside them. Open cupped flowering plants are most attractive to beneficial insects. Examples are: marigold (repellent) and sunflower (attractant)	This is a good natural way to protect your plants from pests and diseases. Companion planting provides balance to the environment and can even make your crops taste better.
3. Physical/mechanical control: 1. In small gardens you can look around each plant and squash the bad insects between your fingers or cut off the diseased part of the plant. Remember to leave the good insects. 2. Remove and burn the diseased plants. 3. Use light and water bucket insect traps.	These methods do not harm the environment and cost very little.
4. Organic control: In small gardens it is better to use only organic control. Some examples are: neem extract, fermented plant juice, Fermented Fruit Juice, Tobacco, soap solution and EM5.	Creates a balance in the environment, is low cost and not dangerous to your family's health if applied properly.

<p>5. Chemical control: Use only as a last resort when pest and disease levels are very high and other methods of control are not working. Remember that chemicals kill both good and bad insects, and are dangerous to the environment and your family's health. The main steps for control are: (1) Identify the pest or disease and select the chemical suited to control that specific problem. (2) Buy only as much chemical as you need. It is dangerous to store poisonous chemicals around the house. (3) Follow the instructions on the labels on the containers. If you put on too much it is a waste of money and bad for the environment: too little and it will be ineffective. (4) Use registered/permitted agro-chemicals only. (5) Expired or deteriorated chemicals should never be used. (6) Keep children and pregnant women away from agro-chemicals. (7) Use protective clothing when using agro-chemicals. (8) Wash your body and spraying equipment after chemical application. (9) Timely observation and action reduces the amount of agro-chemicals to be used. (10) Respect agro-chemicals' pre harvest interval (PHI). (11) Do not enter into the crop area immediately after applying chemicals. (12) Store small amounts of chemicals in a sealed container away from children or animals, and larger amounts of chemical in a separate, lockable, well ventilated shed with hazard warning signs. (13) Store chemicals separately from fertilizers and other inputs. (14) Wash old chemical containers three times, then make holes in them so no other person uses them. (15) Dispose of old containers in a deep hole or at an approved disposal site.</p>	<p>At times the level of pest and disease is so bad you have to use chemicals or risk losing the whole crop. However, you must be careful handling chemicals to protect the health of the farmers, the consumers and the environment.</p>
<p>Additional note: Recording: Write down the type of organic and chemical pest & disease application and date in a record book.</p>	<p>Accurate records let your family or a product buyer know what was put on the crop and when to make sure the crop is safe to eat. You may get a higher price for your crop if you have cared for it safely.</p>

Activity 4: Safe use of chemicals (30 minutes)

Plenary

1. Invite participants to discuss health problems they may have experienced or heard of when using chemical applications on their vegetables. Write their ideas on a flip chart.

Subgroups

2. In small groups ask them to draw a picture and name the different types of protective gear they should wear to reduce the effect of chemicals on their health (hand out paper for this exercise).

Plenary

3. Compare their drawings with the photo in Exercise 5.2 their workbooks and discuss the main points.

Exercise 5.2: Safe Use of Pesticides

ပိုးသတ်ဆေးများကို ခန့်မှန်းစာရင်း သိမ်းဆည်း ကိုင်တွယ်သုံးစွဲ နိုင်ရမည်။

<p>သတိပြုရန် ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး မြန်သော်လည်း မလွန်သော တိကျစွာဖြင့် သုံးစွဲရမည်။</p>	<p>ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>မလွန်ရ ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>မလွန်ရ ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>မလွန်ရ ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>မလွန်ရ ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>
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ပိုးသတ်ဆေးများကို အသုံးပြုရန်

<p>ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>မလွန်ရ ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>မလွန်ရ ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>	<p>ပိုးသတ်ဆေးများကို အရန်ထောက်ထားပြီး သုံးစွဲရမည်။</p>
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4. Explain the idea of using chemicals only when the pest/disease incidence has reached the “economic threshold”. This means, when the cost of spraying is less than the amount of damage. E.g. Spend 20,000 MMK for spray to save 100,000 MMK crop loss. That is, you are 80,000 MMK better off. If there are just a few plants infected, you do not have to spray the whole crop. Just deal with the individual plants. This saves money, your health and the environment.

Activity 5: Water requirements revision (5 minutes)

Plenary

1. Review Exercises 4.5 and 4.6 for water requirements.

Activity 6: Field Work (60 minutes)

Subgroups

1. Go to the GAP demo farmer’s fields for more discussion and field practice.
2. Inspect the GAP fields for pest and disease problems using the pest and disease guide books.
3. Refer to the workbook tips on how to control the problems.
4. Demonstrate the right protective clothes to wear.
5. In demo plot sub groups calculate the amount of chemical required and mix the appropriate amount of chemical in a sprayer ready for use.
6. Spray some organic, and if required, some chemical pest control mixtures.

Activity 7: Summarize the session (10 minutes)

Plenary

1. Summarize the key points of the session on a flip chart. Discuss if necessary.

Activity 8: Evaluate the Session: (5 minutes)

Plenary

1. What worked well in the lesson?
2. What did not work so well?
3. How could the lesson be improved?

Activity 9: Remind them of the topic, time and place for the next session. (5 minutes)

1. Confirm the topic, time and place of the training. Remember to invite the ‘doer’ (husband or wife) to come to the session so that they get the information first hand.

Session 6: Pre & Postharvest Crop Care

Duration 3 hours

Objectives:

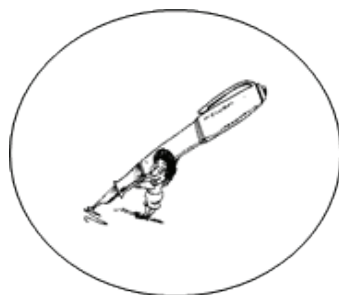
- To know the meaning of pre and postharvest crop care
- To know different options for pre and postharvest
- To know how to save seed for next year

Materials: Flip chart paper; marker pens; tape.

Activity 1: Summary of the last session and topics for this session (10 minutes)

Plenary

- 1 Ask participants to recall what they learnt from last session. Write their ideas on a flip chart.
- 2 Invite participants to look at Session 6 Table of Contents in their workbooks. Ask a participant, or different participants, to read the table of contents.



Tips for Facilitators

Guiding participants to use the table of contents helps them to look up information in their “Farmer’s Work Book” more easily when they are at home.

Activity 2: The meaning of Pre and Postharvest Crop Care (55 minutes)

Plenary

- 1 Brainstorm with the group, the question: “What does Pre and Postharvest Crop Care mean? Ask participants to give examples. Write their answers on a flip chart. (5 minutes)



Subgroups

- 2 Split participants into 6 subgroups. Group 1: Quality Standards; Group 2: Harvesting; Group 3: Cleaning and Sorting; Group 4: Packing; Group 5: Transporting; Group 6: Storage. Ask them to discuss methods they know under their group heading. Ask the group leaders to write the groups ideas down. (15 minutes)
- 3 Invite group leaders to present their ideas, summarizing the main points on a flip chart. (10 minutes)

Plenary

- 4 Then go over the table in Exercise 6.1 in their workbooks congratulating them on points already raised and emphasizing points not discussed already. Invite them to write extra ideas in the blank rows in the table. (25 min.)

Exercise 6.1: Pre and Postharvest Techniques

GAP Tips	Reasons Why
1. Quality standards:	
1.1 Produce should meet the standards demanded by the market sellers and consumers. Find out what the standards are, and make sure your produce meets these standards.	Higher demand and higher price for your quality products.
1.2 Pre Harvest Interval (PHI). If you use chemical spray or animal manure you should not harvest the crops until 1 or 2 weeks after your last application. Check the chemical labels for specific PHIs.	So you do not poison the consumer with spray or manure until it has broken down to a harmless state.
1.3 GAP records showing fertilizer (both chemical and organic) applications and timing should be kept for each crop.	The record shows the buyer or consumer what has been applied to the crop and when. If they see you have followed the GAP rules for chemical and organic inputs they may pay a higher price!
	
2. Harvesting:	
2.1 Handle crops carefully. Do not throw them or drop them.	Prevents bruising and other damage.
2.2 Harvest at the cool morning part of the day.	Produce is fresh and not dehydrated.
2.3 Do not harvest in the afternoon.	Produce has dried out during the hot day.
2.4 Cut the stalks a quarter inch up from the fruit.	If you break the fruit off at the fruit body disease can enter the hole left by the stem.
2.5 If wet or humid, dry produce in a shady place.	Moisture can cause disease and your produce will spoil.



3. Cleaning & Sorting:

3.1 Pickers should have clean hands free of disease.

Disease can spread through the produce causing ill health to customers.

3.2 Do not pick and pack produce that has been on the ground. You have to clean it first.

The produce could be contaminated by contact with the soil causing ill health or disease in the produce during storage.

3.3 Spread produce on a flat clean surface to help heat to dissipate before packing.

Heat causes dehydration and a reduction in quality.

3.4 Remove leaves, long stems, flowers, damaged or diseased produce.

Cleaned disease-free produce is more attractive and can sell more easily at a higher price.

3.5 Sort into grades according to market requirements.

You may get a higher price overall if you do this.

3.6 If washing produce, make sure it is dry before packaging.

Moisture attracts disease.



4. Packing:

4.1 Put in well ventilated basket or crates using liners such as banana leaves or paper to protect the produce.

Produce can be damaged in transport or storage resulting in disease, wastage, and a lower price.

4.2 Avoid over filling the crates or baskets and stacking on top of each other unless they fit exactly on top.

Can cause bruising, disease and overheating resulting in dehydration and low storage life.

4.3 Canvas and polypropylene sacks should be avoided as they restrict ventilation. Wide weave containers that let air circulate are better.	Produce heats up and spoils quickly in tight weave containers.
	
5. Transporting:	
5.1 Vehicles should have a roof or cover over the produce.	Provides shade.
5.2 Vehicles should have separate shelves so produce is not stacked on top of each other.	Stacking can cause bruising and low price.
5.3 Transporters should handle produce carefully.	Prevent bruising and other damage.
5.4 Transport quickly after harvest in the cool parts of the day or at night.	Reduces dehydration and crop spoilage.
5.5 Produce should be kept separate from contaminants like fertilizer, pesticides, animals etc.	You don't want to poison the produce or the consumer.
	
6.Storage:	
6.1 A wet cloth over a storage basket can reduce the temperature.	Prevents dehydration.



	

Activity 3: Seed collection for next season (25 minutes)

Plenary

1. Ask participants: “Where can they get seed for next season?” Answer: Keep their own, exchange seed or buy packet or tinned seed from the market. Write their ideas on a flip chart. (5 minutes)
2. Ask participants “What is the difference between seed they grow and keep for themselves, and packet or tinned seed from the market?” Write their ideas on a flip chart. (5 minutes)
3. Draw some pictures on the white board to show the difference between open pollination and hybridization. Further explain that hybrid seeds are developed in the laboratory and cannot be reproduced with the same characteristics in nature. Therefore, do not keep the seeds produced from hybrid plants. (5 minutes)
4. Refer participants to Exercise 6.2 in their workbooks which describes the difference between open/cross pollinated seed and hybrid seed (see below).

Exercise 6.2: Difference between Open and Cross Pollinated and Hybrid Seeds

Open pollinated / Cross Pollinated Plants	Hybrid Packet of Seeds
	

Open/cross pollinated seeds carry the characteristics of the parent plants, just like a baby carries the characteristics of the mother and father.	Produced in the laboratory by scientists. Farmers cannot produce these seeds with the same characteristics themselves. Need to buy new seeds each year.
Seeds can be kept each year but after 2-3 years their characteristics can differ widely from the parent plants.	If farmers kept hybrid seeds for the next year, the characteristics would not be the same. They would have low germination, low yield and low disease resistance. DO NOT KEEP HYBRID SEEDS FOR THE NEXT CROP.
1.3 GAP records showing fertilizer (both chemical and organic) applications and timing should be kept for each crop.	The record shows the buyer or consumer what has been applied to the crop and when. If they see you have followed the GAP rules for chemical and organic inputs they may pay a higher price!

5. Ask participants: What are the advantages and disadvantages of open/cross pollinated seed and hybrid seed?" Write their ideas on a flip chart.
6. Refer participants to Exercise 6.3 in their workbooks and go over the answers. **Exercise 6.3: Advantages and Disadvantages of Open and Cross pollinated seeds and Hybrid Seeds.**

Exercise 6.3: Advantages and Disadvantages of Open and Cross pollinated seeds and Hybrid Seeds.

	Advantages	Disadvantages
Open/Cross Pollinated seeds	1. good tolerance/resistance to local diseases 2. Farmer can produce own seeds	1. Less tolerance/resistance to imported diseases 2. Low production
Hybrid seeds	1. High production and high quality 2. Highly resistant to most pest and diseases	1. Limited access to sellers and have to pay 2. Farmer can't keep their own seeds for next season

7. Ask the farmers: "Can they keep seed from the plants they have grown during the FFS. Why? Why not?"
Note: Facilitators should bring some seed packets showing OP and Hybrid F1 &F2, so the participants can see the difference. Hand them around for participants to look at.
8. Ask participants "If they kept the seeds, how should they collect and store them? Write their ideas on a flip chart.
9. Refer participants to Exercise 6.4 in their workbooks that describes GAP Tips for seed collection and storage.

Exercise 6.4: Seed Collection Tips

GAP Seed Collection Tips	Reasons Why
<p>The fruits that will be kept for seeds should be healthy, have a good shape, and be mature but for most fruits they should not be left in the field for too long.</p>	<p>Hopefully the good characteristics of the parent fruit will be passed on to the seeds.</p>
<p>Wax Gourd and Pumpkin can be harvested for seed when the fruit has a white powder covering. One week after harvesting, remove the seeds and soak them overnight, then clean and dry them for 2-3 days, but not under strong sunlight.</p>	
<p>For Egg Plant, Cucumber, Bitter Gourd, Tomato and Chili, the fruits should be kept until the color has turned red or yellow. After harvest, immediately remove the seeds from the fruits, soak overnight, clean well and then dry for 2-3 more days before storage.</p>	
<p>Pak Choi (Chinese Cabbage), Green Mustard, Lettuce, Yard Long Bean are partly dry when ripening in the pods or seed heads. After harvesting, sun dry the pods for 1 or 2 more days. Then remove the pods and any unfilled or damaged seeds. Continue to dry for another 2-3 days before storage.</p>	
<p>For Wing Bean, Sponge Gourd, Rugged Gourd, Bottle Gourd, the fruits need to very mature before harvesting for seed. Dry and keep the whole fruit for 2 or 3 days, without removing the seed from the fruits.</p>	
<p>Damaged seed (pests and seed-borne diseases) can be detected by visual examination with the naked eye, or by using magnifying lenses (15X).</p> <p>Spread the seeds on contrasting color paper. Gray or white coloration on the seed surface indicates fungal contamination. Remove these seeds.</p> <p>Shriveled, small, irregular shaped and other colored seeds should be rejected as they might correspond to specific mutations.</p>	



Activity 4: Seed Storage. (10 minutes)

Plenary

1. Brainstorm "What are the different methods of seed storage?" Write their ideas on a flip chart.
2. Brainstorm "What factors can cause bad quality of seed storage?"
3. Refer them to Exercise 6.5 in their workbooks for some storage ideas. Go over the advantages and disadvantages.

Exercise 6.5: Storage of seeds

Seed storages tips

Dry all non-sealed packs and newly harvested seeds before storage. This helps to prevent moisture caused deterioration of the seeds.

Store seeds at low temperature (below 15°C) and low humidity (8%) preferably in an air tight container. Write the date of storage on it. Place the container in a dark place, for example in a clay pot or basket with a lid.

	Dark	Light	Humidity	Heat
Unsealed seeds	Good germination	Reduces germination	High reduction in germination	Reduces germination
Sealed Seeds	Very good germination	Transparent pack reduces germination	No effect on germination	Reduces germination

The table above shows that it is better for germination to have seeds stored in sealed non-transparent containers rather than in unsealed packets or containers.



Unsealed Storage



Sealed storage methods

Activity 5: Go to the field for more discussion and field practice of GAP (65 minutes)

1. Conduct 'Walk and Talk' around the demo plots and other farmer's plots, discussing any topics of interest.

Activity 6: Summarize the session (10 minutes)

Plenary

1. Summarize the key points of the session on a flip chart and discuss points that are still unclear.

Activity 7: Evaluate the Session: (5 minutes)

Plenary

1. What worked well in the lesson?
2. What did not work so well?
3. How could the lesson be improved?

Activity 8: Remind them of the topic, time and place for the next session.

1. Confirm the topic, time and place for the next session. Remember to invite the 'doer' (husband or wife) to come to the session so that they get the information first hand.

Session 7: FFS Evaluation Session Plan

Objectives:

- To measure farmers' ideas about what they learned from the FFS process (Farmers' expected result)
- To measure FFS results against the project's indicators
- To make farmers aware of the project's future plans and activities and how current participants' villages could be further involved
- To discover farmers' plans for the next monsoon or winter seasons

Materials: Flip chart paper; marker pens; Attachment # 7.1: Achievement of Farmers Expectations; Attachment # 7.2: Achievement of outcomes against the project's indicators;

.....

Activity 1: Introduction: (15 minutes)

Plenary

1. Welcome the participants to the final FFS meeting.
2. Congratulate those who attended 80% of the sessions for being eligible to receive their graduation certificates.
3. Quickly summarize the FFS process on a flip chart from the participants' selection process, through the 7 or more meetings, study tour and field days where appropriate. Include mention of the process of distribution of inputs.
4. Explain that the project wants to (i) learn from the farmers if they achieved their expectations with regard to what they achieved from the FFS and other activities, and (ii) gain suggestions for improvement to help the facilitators do a better job in the future.

Activity 2: Farmer's personal evaluation of the FFS results (40 minutes)

Individual

1. Ask participants to look at Exercise 1.1 in their workbooks to review their initial expectations that they had at the beginning of the FFS. Ask them to circle the number from 1 to 10 that best rates their achievement against their expectations. Say that if they achieved little then put 1 or 2, if medium around 4-6, and if very high 9-10. Walk around the class to make sure individuals understand this and are marking their achievement of expectations correctly.

Plenary

2. After 10 minutes, ask some farmers if they achieved their expectations or not. Discuss reasons why or why not with the plenary.
3. Optional:
 - 3.1 If the project wants to keep a record of the achievement of farmer's expectations, hand out a separate expectations evaluation sheet provided by the facilitator. See Attachment #7.1: Achievement of Farmers Expectations.
 - 3.2 Ask the farmers to copy their expectations and ratings onto the paper. Collect the papers when they have finished.

Subgroups

4. Ask the participants to form small groups and to answer the following questions:
 - (i) What were the most important topics they learnt and why?
 - (ii) What were the topics they prefer to leave out and why?
 - (iii) What changes to the FFS do they suggest to make the FFS more effective?

5. Ask group leaders to present their suggestions to the whole group. Facilitators should take a record of these suggestions as lessons learned for next time. (30 minutes)

Activity 3: Achievement of outputs against the project's indicators (30 min.)

Individuals

1. Explain to the participants that the donor has asked staff to measure the achievement of results from the FFS against key project results indicators.
2. Hand out Attachment #7.2: Achievement of outputs against the project's indicators. Ask individuals to fill in their answers to the questions.
Note: If possible, get participants to specifically note by how much the indicators have changed and to explain their answer? E.g. Yield increase from 45 baskets to 65 baskets and the reason why this happened; or Food Security went up or down, and why it did. Circulate the room and assist participants when necessary.
3. Collect the individual papers for analysis and reporting later.

Activity 4: Description of the project's future activities (30 min.)

Plenary

1. Write key points about the project's future activities on a flip chart, and explain how the participants might be involved in these activities. (This shows that the project might not be leaving them now but is able to invite them to join future activities)

Activity 5: What are the FFS participant's future plans? (30 min.)

1. Refer to the cropping calendar in Exercise 7.3 in their workbooks. Invite farmers to circle what crops they might grow next season. If time allows, invite some farmers to explain why they selected particular crops.

Activity 6: Summary and closing question and answer session: (35 min.)

1. Summarize the lesson.
2. Ask participants if they have any further questions and provide answers where you can.
3. Thank participants for their attendance and participation. Hand out certificates if appropriate.

Close the FFS and wish them well for the future.

Attachment# 7.1: Achievement of Farmers' Expectations

Lead Farmer's Expectations of the FFS	Level of Achievement of Expectations
1.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
2.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
3.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
4.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
5.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
6.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
7.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
8.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
9.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
10.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
11.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High
12.....	Circle 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 Low Medium High

Attachment # 7.2: Achievement of outputs against project indicators

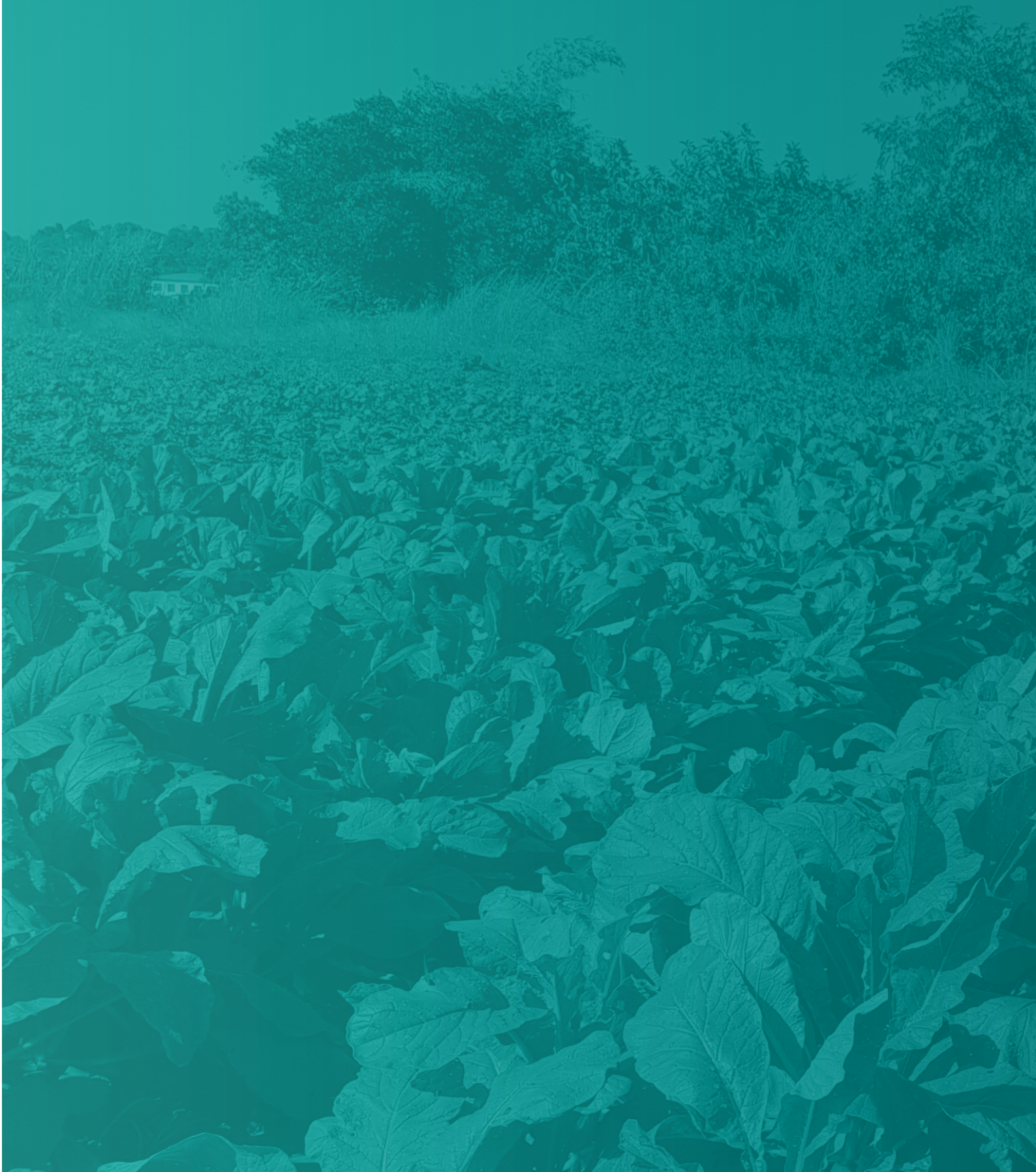
Indicator	Change (Circle)	If possible, write changes specifically in terms of how much change, or explain your answer and give a reason for the change Eg. From 45 baskets to 65 baskets; or food security increased by 2 months and reason.
1. Net Farm Income after costs	Less: Same: More	
2. Months of enough nutritious food to eat	Less: Same: More	
3. Amount of crops grown	Less: Same: More	
4. Labor required for farming	Less: Same: More	
5. Changes in land area cultivated	Less: Same: More	
6. Volume of crops sold	Less: Same: More	
7. Yield of crops	Less: Same: More	
8. Number of agriculture practices being used	Less: Same: More	
9. Private sector services - inputs supply, extension, finance etc	Less: Same: More	
10. Government extension services	Less: Same: More	

Exercise 7.1: Calendar of Crops for the next seasons

Crops	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Group - 1												
1. Yard-long Bean												
2. Okra												
3. Onion												
4. Carrot												
Group - 2												
5. Chili												
6. Tomato												
7. Egg-plant												
8. White Egg-plant												
9. Coriander												
Group - 3												
10. Cabbage												
11. Cauliflower												
12. Broccoli												
13. Radish												
14. Water spinach												
15. Sweet Corn												
16. Mustard												
Group - 4												
17. Bottle Gourd												
18. Snake Gourd												
19. Ridge Gourd												
20. Bitter Gourd												
21. Cucumber												
22. Water Melon												
23. Pumpkin												
Other Crops:												

Remark:

☐ Good growing period
☐ Difficult growing period



**RAKHINE WINTER
CROPS PROJECT**



NEW ZEALAND
FOREIGN AFFAIRS & TRADE
Aid Programme