District Level Training on Homestead Food Production

Facilitator's Manual
2011

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This manual has been prepared based on the learning and experiences of the Homestead Food Production (HFP) program. HFP was launched as a part of Helen Keller International-Nepal's USAID supported AAMA program (reducing malnutrition through agriculture). HFP emphasizes to improve the nutrition status of children, pregnant and lactating women in food insecure districts of Nepal by increasing Homestead food production for practicing to intake micronutrients rich food in their daily life. Proper use of this manual will not only assists in conducting HFP trainings, but also helps to reduce malnutrition and create healthy and affluent families.

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- SUAAHARA

नेपाल सरकार
कृषि विकास मन्त्रालय

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सिंहदरबार, काठमाडौं
नेपाल ।

पत्र संख्या:

च नं.:

मन्तव्य

नेपालमा खाद्य तथा पोषण सुरक्षा सुनिश्चत गर्न नेपाल सरकार, कृषि विकास मन्त्रालय अर्न्तगतका विभिन्न निकायहरु लगायत अन्य सम्बन्धित क्षेत्रहरुबाट प्राथमिकताका साथ विविध कार्यक्रमहरु संचालन हुँदै आएका छन् । खाद्य सुरक्षालाई नेपाली जनता माझ सुनिश्चत गर्न मात्र आजको आवश्यकता नभई ती खाद्य वस्तुहरुको पोषण स्थितिको पनि लेखाजोखा गर्नु पर्ने हुन्छ ।

नेपालमा विकास हुदै भएको व्यवसायिक कृषि प्रणालीका अवधारणा सँग सँगै बालीनालीका रोग तथा शत्रु कीराहरुको नियन्त्रण गरी उच्च बाली उत्पादन लिनको लागि धेरै मात्रामा रसायनिक बिषादीको प्रयोग भएको पाईन्छ । यसरी धेरै मात्रामा प्रयोग गरिने रसायनिक बिषादीको मानव स्वास्थ्यमा नकारात्मक असर देखापरेको तथ्य अगाडि आएको छ । घरायसी खाद्यान्न उत्पादनको अवधारणाको विकास सगैं कृषक घरधुरी स्तरमा बिषादी रहित खाद्यान्न उपलब्धतामा टेवा पुऱ्याउन जरुरी छ । घरायसी खाद्यान्न उत्पादन सम्बन्धि जिल्ला स्तरीय प्रशिक्षणका सहजकर्ताको लागि तयार गरिएको यस निर्देशिकामा तरकारी उत्पादन, गुणस्तर बीउ उत्पादन, कुखुरापालन, माछापालन, प्राङ्गारिक श्रोतको प्रयोगबाट माटो व्यवस्थापन र बालीनालीका शत्रुजीवहरुको व्यवस्थापन जस्ता पक्षहरु दीर्घकालिन कृषि रणनीतिमा समेत समावेश गरिएको छ । साथै साना आयस्तरमा भएका नेपाली कृषकहरुलाई आफ्नो घरपरिवारको खाद्य तथा पोषण सुरक्षा सुनिश्चित गर्न घरायसी खाद्यान्न उत्पादन कार्यक्रमले सहयोग पुऱ्याउने छ । यस निर्देशिकाले उत्पादन प्रविधिलाई मात्र नसमेटेर उत्पादन पश्चात् घरमा उपभोग गरेर बचेको खाद्यान्नलाई समूहमा संकलन गर्दै बजार व्यवस्थापन गर्ने अवधारणा समेत प्रस्तुत गरिएको सान्दर्भिक छ । निकट भविष्यमा कार्यान्वयनमा आउने नेपाल कृषि तथा खाद्य सुरक्षा आयोजना र सुनौला हजार दिन कार्यक्रमका लागि पनि यो निर्देशिका उपयोगी हुनेछ ।

जिल्ला स्तरीय सहजकर्ताको लागि तयार गरिएको यस प्रशिक्षण निर्देशिकालाई परिस्कृत गर्दै यो रुपसम्म ल्याई पुऱ्याउन सहयोग पुऱ्याउने कृषि तालिम निर्देशनालयका वरिष्ठ बागवानी विकास तालिम अधिकृत श्री गणेश कुमार श्रेष्ठ, बाली विकास तालिम अधिकृत श्री सुदिप खतिवडा, कृषि प्रसार तालिम अधिकृत श्री अनुमा भट्टराईका साथै प्रकाशन तथा तालिम कार्यान्वयनमा प्रत्यक्ष-अप्रत्यक्ष रुपमा सहयोग पुऱ्याउनु हुने सुआहारा कार्यक्रमसँग सम्बधित सबैलाई धन्यवाद दिदै शुभकामना व्यक्त गर्दछु ।

राम प्रसाद पुलामी
सह सचिव
योजना महाशाखा

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हरिहरभवन
ललितपुर, नेपाल

प.स.
च.नं.

शुभकामना

नेपालमा कृषि क्षेत्रको विकासका लागि निरन्तर रुपमा विभिन्न आयोजना अर्न्तगत कार्यक्रमहरु संचालन भइरहेका छन् । खास गरेर साना कृषकको खाद्य तथा पोषण सुनिश्चित गर्ने उद्धेश्यले नेपालमा धेरै सरकारी तथा गैह सरकारी निकायहरुले प्रयास गरिरहेको भए तापनि कमै नेपाली कृषकहरु तिनको छायाँमा पर्न सकेको देखिन्छ । हाल नेपालमा विदेशी दातृ निकायहरुको आर्थिक सहयोग कृषि क्षेत्रमा लगानी भईरहेको अवस्था छ । यी । लगानीहरुबाट नेपालका सिमान्तकृत तथा पिछडिएका कृषकहरु प्रत्यक्ष लाभान्वित हुनु पर्ने हो । यसै परिवेशमा तालिमलाई कृषि प्रविधि हस्तान्तरण गर्ने एक प्रभावकारी माध्यय मानिएको छ । तालिमले ज्ञान, शीप र मनोवृद्धिमा सकारात्मक परिवर्तन हासिल गर्न मद्दत गर्दछ । तालिमको विधामा तालिम निर्देशिकाको उपयोगिता , सु-आहारा/यु कार्यक्रम को नाममा दातृ सस्थाबाट प्राप्त भै कृषकहरुलाई व्यवसायिक बनाउनतर्फ अग्रसर भएको देखिन्छ । नेपालमा अझै पनि बहुसख्यक जनता कृषकको भएको अवस्थामा साना कृषकको निर्वाहमूखी खेती प्रणालीबाट माथि उठ्न आवश्यक देखिन्छ । यी वर्गका कृषक दाजुभाइहरुलाई व्यवसायिक खेती प्रणालीसम्म डोऱ्याउन नेपाल सरकारबाट निरन्तर रुपमा प्रयास नभएको चाहिँ पक्कै होइन तर प्रयासले कुन समय सम्ममा मूर्तरुप पाउन सक्छ भन्ने कुरा प्रत्येक विकास चाहने नेपालीको मनमा उठेको प्रश्न हुन सक्छ । यसै समयमा यु.एस.एड.को सु-आहारा कार्यक्रमबाट निर्वाहमूखी खेती प्रणालीमा आश्रित साना कृषकहरु माझ घरायसी कृषि उत्पादनबाट पोषण, खाद्य र स्वास्थ्य सुरक्षा सुनिश्चत गर्ने उद्धेश्यले प्रशिक्षण गतिविधिलाई सहयोग पुऱ्याउन प्रकाशित यस प्रशिक्षण निर्देशिकाले घरायसी खाद्यान्न उत्पादनको लागि जिल्ला स्तरीय प्रशिक्षण सहजकर्ताको लागि उपयोगी हुने छ भन्ने विश्वास लिएका छौं ।

अन्तमा, सहजकर्ताको लागि तयार पारिएको यस प्रशिक्षण निर्देशिकालाई प्रकाशन गर्ने ढाचाँसम्म ल्याई पुऱ्याउन सहयोग गर्ने कृषि तालिम निर्देशनालयका श्री गणेश कुमार श्रेष्ठ, श्री सुदिप खतिवडा, श्री अनुमा भट्टराईका साथै निर्देशिका प्रकाशन तथा प्रशिक्षण कार्यान्वयनमा प्रत्यक्ष-अप्रत्यक्ष रुपमा सहयोग पुऱ्याउनु हुने सु आहारा कार्यक्रमका सम्बन्धित सबैलाई धन्यवाद ज्ञापन गर्दै यस कार्यक्रमको सफलताको लागि शुभकामना व्यक्त गर्दछु ।

श्याम शर्मा पौडेल
महा-निर्देशक

नेपाल सरकार

कृषि विकास मन्त्रालय

पशु सेवा विभाग

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पत्र संख्या :-

चलानी नं. :-

नेपालमा पशु विकासका क्षेत्रका लागि निरन्तर रुपमा विभिन्न आयोजना अर्न्तगत कार्यक्रमहरु संचालन भइरहेका छन् । खास गरेर साना कृषकको खाद्य तथा पोषण सुनिश्चित गर्ने उद्धेश्यले नेपालमा धेरै सरकारी तथा गैह सरकारी निकायहरुले प्रयास गरिरहेको भए तापनि कमै नेपाली कृषकहरु तिनको छायाँमा पर्न सकेको देखिन्छ । हाल नेपालमा विदेशी दातृ निकायहरुको आर्थिक सहयोग पशु विकासका क्षेत्रमा लगानी भईरहेको अवस्था छ । यी लगानीहरुबाट नेपालका सिमान्तकृत तथा पिछडिएका महिला र दुइ बर्ष भन्दा कम उमेर भएका बच्चा , आमा र गर्भवती महिलाहरु प्रत्यक्ष लाभान्वित हुने छन । यसै परिवेशमा तालिमलाई पशु विकास प्रविधि हस्तान्तरण गर्ने एक प्रभावकारी माध्यय मानिएको छ । तालिमले ज्ञान, शीप र मनोवृद्धिमा सकारात्मक परिवर्तन हासिल गर्न मद्दत गर्दछ । तालिमको विधिमा तालिम निर्देशिकाको उपयोगिता , सु-आहारा कार्यक्रम को नाममा दातृ सस्थाबाट प्राप्त भै महिला दिदी वहिनी, बच्चा र परिवारहरुको पोषिलो खाने कुराको साथै खाद्यसुरक्षा लाइपनि टेवा पुऱ्याउने अग्रसर भएको देखिन्छ । यु.एस.एड.को सु-आहारा कार्यक्रमबाट पशुजन्य प्रोटिन, भिटामिन र मिनरल उपलब्ध भइ कुपोषण घटाउन मद्दत भइ स्वास्थ्य सुरक्षा सुनिश्चत गर्ने उद्धेश्यले प्रशिक्षण गतिविधिलाई सहयोग पुऱ्याउन प्रकाशित यस प्रशिक्षण निर्देशिकाले घरायसी खाद्यान्न उत्पादनको लागि जिल्ला स्तरीय प्रशिक्षण सहजकर्ताको लागि उपयोगी हुने छ भन्ने विश्वास लिएका छौं ।

सु-आहारा र यसका साझेदारी संस्थाहरुबाट सञ्चालन गरिने घरायसी खाद्यान्न उत्पादन कार्यक्रमले दुइ बर्ष भन्दा कम उमेर भएका बच्चा , आमा र गर्भवती महिलाहरु समूहलाई मध्यनजर गर्दै यो पुस्तिका तयार गरिएको हो । हुन त यस पुस्तकको ज्ञानले यस क्षेत्रलाई मात्र नभएर, देशका अन्य भागहरुका महिला र बच्चाहरु लाई सहयोग पुऱ्याउने छ भन्ने आशा लिएका छौं । साथै यसमा समावेश गरिएका विषय र विषयगत कुरा बारे सम्वन्धित क्षेत्रहरुबाट रचनात्मक सुझावहरुको पनि अपेक्षा राखेका छौं ।

अन्तमा, सहजकर्ताको लागि तयार पारिएको यस प्रशिक्षण निर्देशिकालाई प्रकाशन गर्ने ढाचाँसम्म ल्याई पुऱ्याउन सहयोग गर्ने कृषि तथा पशु तालिम निर्देशनालय कर्मचारीहरुको साथै निर्देशिका प्रकाशन तथा प्रशिक्षण कार्यान्वयनमा प्रत्यक्ष-अप्रत्यक्ष रुपमा सहयोग पुऱ्याउनु हुने सु आहारा कार्यक्रमका सम्वन्धित सबैलाई धन्यवाद ज्ञापन गर्दै यस कार्यक्रमको सफलताको लागि शुभकामना व्यक्त गर्दछु ।

डाक्टर बहादुर रजवार
महा-निर्देशक

PREAMBLES

Malnutrition is one of the major health problems in children of Nepal. Almost half of all children under the age of five are found to be malnourished immediately after their birth. The early stage malnutrition may lead to other health deficiencies, physical and mental growth and development problems that might be extensive and irreversible. The cycle of malnutrition may also lead poverty in the future. Health awareness among expecting and lactating mothers is extremely low in Nepal which might be one of the main reasons of poor health indicators in children. Therefore the government of Nepal has always prioritized programs to improve the health condition of children and women. Since Nepal is an agricultural country, in this context food based approach is the best way to address malnutrition issues in the country. Specially, homestead food production can play an important role to access essential micronutrients in the household.

Homestead Food Production is defined as the production nutrients rich vegetables, fruits, meat and eggs around home primarily for domestic consumption. Although vegetables are major source of nutrients, in many parts of Nepal consuming them on a daily basis is still considered a luxury. Accessibility to animal sourced protein is limited given the low purchasing power of thousands of Nepalese families. In this context homestead food production is considered as major foundation to increase access to nutritious food. In view of these issues Helen Keller International has been promoting homestead food production as its major program across the Asia Pacific region. With the support of USAID it has been running SUAAHARA program focusing on homestead food production across nine food insecure districts in Nepal. The program aims to ensure accessibility of vegetables, eggs, meats including other nutritious foods for improving nutritional status of women and children. Since this program can be embraced by people from marginalized communities, the program has focused on poultry farming as a major source of animal protein.

This is a practical manual developed for SUAAHARA's district level trainings in order to promote homestead food production. We hope that this manual will be useful to bring about change in families' dietary behaviour and improve the overall family nutrition of their daily meals.

This manual is especially developed for extension worker (JT/JTA) of agricultural and livestock sector who are directly involved to uplift the life of the community people.

This manual will also be useful for people working in different agricultural sectors, farmers, decision maker in the families and agricultural social mobilizers. It can also be used by those who are concerned about the health of their families and who aspire to prove homestead food production as the best model of ensuring family nutrition. The main objective of this manual is to develop the required knowledge and basic minimum technical skills to increase homestead food production among participants.

In order to make this manual effective and user friendly it has been prepared in simple language with relevant dialogue, illustrations and instructions. . This manual provides the opportunity for participants to discuss issues of food and nutrition security, malnutrition, sustainable management of local resources and improving actions of HFP. The main aim of this manual is to encourage facilitators to coordinate and collaborate with concerned bodies in order to improve homestead food production.

The subject matter in this manual is presented through dialogues in each session. These dialogues are used in order to set the context, present the local scenario, encourage discussion and provide simple solutions. Pictorial stepwise instructions are used to increase participants' capacity for homestead food production. The list of 'Do' and 'Don't' at the end of some important sessions will help the participants to focus on specific subject matter. Group exercises and presentations during the training aim to increase the participants' confidence to transform their learning to the community with practically doable and easily deliberation.

Training agenda

This facilitator guide outlines six day's training. Each session includes: learning objectives, activity details, a list of required materials, and the time required for the completion of each session.

Training methodology

The foundation of this training manual is based on small doable and easily adoptable activities of daily life that form the basis of homestead food production methods. The manual has special emphasis on vegetable and poultry farming for enhancing technical knowledge and skills to the participants. Each training session includes demonstrations, practice, group work, group discussion, role-plays and case studies. Based on the manual the facilitator can modify relevant content specific practices as per need of that location (somewhere poultry is not possible but fishery is possible in this case they can modify). Respect for individual trainees is central to the training, and sharing of experiences is encouraged in the training. Participants complete pre and post training assessment questionnaires and discuss their evaluations at the end of each the training.

Participant training materials

The facilitator guide has a complete set of materials mentioned in each session that are provided to the trainees. During the training the participants can use other exiting locally available materials.

Training Location

Wherever the training is planned, a community based site should be readily available to support the practicum for use of local community information regarding homestead food production as well as enable practical training sites. When conducting practical activities appropriate areas of kitchen gardens also need to be managed. Proper light in the training venue also need to be ensured to make things easier for the participants.

Review Energizers

1. This activity is useful for reviewing learned material.. First the facilitator and participants should assemble into a round circle, the. One facilitator will have a small ball which he/she will throw at one of the participants and ask a question relating to the material. Once the answer is considered satisfactory for all participants, the person holding the ball will then throw it to someone else. Continue this pattern of questions and answers until all of the learning material has been covered.
2. Form 2 rows facing each other. Each row represents a team. A Participant from one team/row asks a question to the Participant opposite her/him in the facing team/row. That Participant can seek the help of her/his team in responding to the question. When the question is answered correctly, the responding team earns a point and then asks a question of the other team. If the question is not answered correctly, the team which asked the question responds and earns the point. Questions and answers are proposed back and forth from team to team.
3. Form 2 teams. Each person receives a written statement. These statements are answers to questions that will be asked by a Facilitator. When a question is asked, the Participant who believes she has the correct answer will read the answer. If correct, s/he scores a point for her/his team. The team with the most correct answers wins the game.
4. From a basket, a Participant selects a question and answers it; feedback is given by other Participants. Repeat the process until all questions are answered.

Daily evaluations:

At the end of each day facilitators will ask the participants about what they have learned. The following questions provide an example of how to get the most participation out of the participants'.

- Did you learn anything useful today, specifically anything that can be applied to your work? What did you learn today that will be useful in your work?
- What was something that you liked? Topic or activity did you like most?

- Give suggestions for improving today's session? What would you suggest in order to improve today's session?

Ask participants to briefly write their responses to these questions. Once all the responses have been collected, the facilitator will mix them up in a bowl. Redistribute them and - asked to read a response. Or collect participant's answers, summarize and provide summary on the following day. Alternatively the facilitator can also ask the participants to prepare a list of their reactions and ask them to draw similar conclusion after evaluating the training sessions the next day.

	Time	Content	Training Methodology	Responsibilities
Day 1	9:00-10:15	Registration, introduction, pretest, participant expectations and learning objectives, ground rules	Participatory	SUAAHARA Team
	10:15- 10:45	Training inauguration	Participatory	SUAAHARA Team, District Agriculture Development Office (DADO), District Livestock Services Office (DLSO)
	10:45-11:00	**Tea break**		
	11:00- 11:45	Common agriculture challenges in the district • Overview of the agriculture process • Current situation of the production of nutritious vegetables and fruits • Problems and challenges	Theoretical	District Agriculture Development Office
	11:45- 12:30	**Lunch break**		
	12:30-1:15	Current situation of livestock farming in the district • Overview of livestock farming • Poultry farming • Meat and egg production • Problems and challenges	Theoretical	District Livestock Services Office
	1:30- 2:15	Brief Introduction of SUAAHARA program • International and National nutrition • Objectives • Strategies • Major programs (homestead food production, essential nutrition and sanitation actions and health) Characteristic of the Program specialties	Theoretical	SUAAHARA Team
	3:00-3:15	**Tea break**		
	3:15- 3:45	Strategies based on food and malnutrition • Food security and homestead food production	Theoretical	SUAAHARA Team
	3:45-5:00	Introduction to homestead food production • Essential actions for homestead food production	Theoretical and practical	SUAAHARA Team

Day 2	9:00-9:15	Revising the previous day's lessons		
	9:15-10:45	Gender issues in homestead food production	Participatory	SUAAHARA Team
	10:45-11:00	**Tea break**		
	11:00-12:30	Selection of appropriate crops and farming technology • Diversification of nutritious vegetables, seasonal vegetables and crop calendars • Strategy for crop selection-cost of use, availability of nutrients and characteristics	Theoretical and practical	
	12:30-1:30	**Lunch break**		
	1:30- 3:00	Nursery management • Nursery categorization based on seasonality, , family size and condition • Timely strategic management	Theoretical and practical	
	3:00- 3:15	**Tea break**		
	3:15-5:00	Garden layout • Garden layout and management • Appropriate crop selection	Theoretical and practical	SUAAHARA Team
Day 3	9:00-9:15	Review the previous day's lessons		
	9:15-10:45	Integrated pest management using locally available resources • Identification of major insects and diseases • Integrated pest management • Preparation of organic bio-insecticide	Theoretical and practical	SUAAHARA Team
	10:45-11:00	**Tea break**		
	11:00-12:30	Accessible and affordable irrigation management • Rain water harvesting • Waste water collection • Plastic pond • Family nutrition kit • Drip irrigation	Theoretical and practical	SUAAHARA team
	12:30- 1:30	**Lunch break**		
	1:30- 3:00	Sustainable soil management • Compost, farm manure • Collection and use of livestock urine	Theoretical and practical	SUAAHARA Team
	3:00-3:15	**Tea break**		
	3:15- 5:00	Vegetable seed production	Theoretical and practical	SUAAHARA Team

Day 4	9:00-9:15	Review of previous day's learning		
	9:15-10:45	Recommended chicken breeds	Theoretical and practical	District Livestock Services Office
	10:45-11:00	**Tea break**		
	11:00-12:30	Improved poultry farming management practices • Coop management • Importance of coop • Types of coop • Building coops • Budget for building coops	Theoretical	District Livestock Services Office
	12:30- 1:30	**Lunch break**		
	1:30-3:00	Feed preparation at the local level • Feed preparation for chicken • Materials required for the feed • Use of locally available materials	Theoretical	SUAAHARA Team
	3:00-3:15	**Tea break**		
	3:15-5:00	Prevention and control of major diseases affecting chickens • Identification of major diseases and their symptoms • Vaccination • Treatment (How to reduce further damage after some symptoms of the disease is seen)	Theoretical	District Livestock Services Office

Day 5	9:00-9:15	Review the previous day's lessons		
	9:15-10:45	Breeding strategies • Reproduction of better breed of chicken at household level • Essential elements required for reproducing better chicken breeds	Practical	SUAAHARA Team
	10:45-11:00	**Tea break**		
	11:00-12:30	The Village model farm concept	Theoretical	SUAAHARA Team
	12:30- 1:30	**Lunch break**		
	1:30- 3:00	Coordination with local service providers • Institutionalization of village model farm • Coordination and partnership with different concerned authorities such as agro.- vet., agriculture/livestock service center, NGOs working at the local or VDC level • Group registration • Develop village model farm into as resource centre (capacity building , trainings, seed production, vaccination, medicine, chicks, eggs) • Identification of stakeholders' participation (public-private partnership) • Community driven perspective • Breeding centre, feed, vaccination management	Participatory	SUAAHARA Team
	3:00-3:15	**Tea break**		
	3:15- 5:00	Collective marketing for additional income	Participatory	SUAAHARA Team

Day 6	9:00-9:15	Reviewing the previous day's lessons		
	9:15-11:00	Training methodology	Practical	SUAAHARA Team
	10:45-11:00	**Tea break**		
	11:00-12:00	Micro teaching methodology	Practical exercise	SUAAHARA Team, District Agriculture Development Office, District Livestock Services Office
	12:00- 1:00	**Lunch break**		
	1:00- 2:00	Closing ceremony	Participatory	SUAAHARA Team, District Agriculture Development Office, District Livestock Services Office
	3:00-3:15	**Tea break**		
	3:15- 5:00	post test and evaluation	Participatory	SUAAHARA Team

SESSION 1
INTRODUCTION, PRE-TEST, PARTICIPANT EXPECTATIONS AND LEARNING OBJECTIVES AND GROUND RULES

Learning objectives:

By the end of the session, participants will be able to:

- Recognize other participants, their names, resource person and facilitators.
- Establish a harmonious relationship between trainers and participants.
- Discuss their expectations for the training.
- Understand the objectives and aims of the training.

Time: 1 hour 30 minute

Required materials:

- Newsprint, marker, masking tape.
- Meta cards and food cards assembled in pairs the game.

Detail activities

1.1 Introductory game.

Method: Matching pairs.

- Cut each food card two, and then mix with the other cards. Hand each participant a card and instruct them to look for their cards matching pair. Once everyone has found their matching pair, ask them to exchange information about their name, address, affiliated organization, job title favorite food and share something information about the food of the matched card. They gathered while looking for their matching pair.

1.2 Participant expectations.

Method: Personal expectations

- Distribute metacards to the participants.
- Ask the participants to write down their expectations for the training on the cards. If metacards aren't available you may use brown paper or a board.
- Glue the metacards to newsprint.
- The facilitator will review which of these expectations will be met during the training period and which won't.

1.3 Pre-test.

Method: Personal, pre-test.

Ask the participants to form a circle with their backs facing the centre.

- Instruct participants that they will be asked questions. If the answer to the question is a 'yes' then they will raise their hands with an open palm, if the answer is 'no' then they will raise their hands forming a fist. If they do not know the answer then they will raise only two fingers.
- One facilitator will need to read the questions allowed, while the other facilitator will record participant answers and make note of areas where the participants seem unclear.
- Inform the participants that topics that were left unclear will be covered during the training.

Note: The facilitators should keep the local context in mind when preparing the pre-test.

1.4 Presenting the objectives.

Method: Presentations to generate feedback.

- The facilitator will present the training objectives and compare it with participants' expectations.
- The facilitators should be careful about conducting each session keeping in mind these objectives and expectations.

1.5 Forming ground rules

Method: Voluntarily by the participants.

- Ask one participant to volunteer and ask other participants to discuss what rules they believe should be followed throughout the training period. Write down these rules on newsprint paper.
- These rules will then be pasted in the training hall where everyone can see them.

SESSION 2
MALNUTRITION AND FOOD BASED STRATEGIES

Learning objectives:

By the end of this session, participants will be able to:

- Differentiate children suffering from malnutrition from healthy children.
- Adopt and prioritize food based strategies to reduce malnutrition.

Time: 1 hour 30 minutes.

Required materials:

- Newsprint, marker and masking tape
- Visual materials: Pictures of Healthy child and malnourished child

The following conversation discusses the various problems caused by malnutrition in rural areas.

Sita : Namaste Hira Miss! Please have a seat.

Hira Miss: Thank you!

Sita : Be quiet children, why do you guys cry all the time?

Hira Miss: Sita didi, you should not shout at your children that way.

Sita : What else can I do, they always disturb me at work and one of them even refuses to eat.

Hira Miss: How old are your children didi?

Sita : My daughter two years old and my son is 11 months old.

Hira Miss: Your children look very frail. It seems they might have malnutrition.

Sita : What is it Hira Miss, what does malnutrition mean?

Hira Miss: Don't worry, I will explain what malnutrition is, its causes, ways to reduce it and how it affects people.

1. What is malnutrition?

Malnutrition is a condition that develops when the body does not get right amount of vitamins, minerals, carbohydrate, protein, fat and other nutrients to maintain healthy body.

Malnutrition occurs when people are either undernourished or over-nourished. Undernutrition is caused when the body doesn't receive enough essential nutrients or when the nutrients are used rapidly before being replenished. Overnutrition results from eating too much, eating too many of the wrong things, not exercising enough, or when the body has receives more nutrition than the actual requirement.

2. How does malnutrition affect people's life?

Globally malnutrition is considered the biggest risk factor for illness and death, contributing to more than half of all child deaths worldwide. The following are the effects of malnutrition:

- Stunting (low height for given age): Evidence shows that chronic malnutrition leads to stunting in 52% of all children under five in Nepal's far western region.
- Wasting (low weight for height): In Nepal's far western region, low weight for height stands at 16.7%

and low weight for given age stands at 44%.

- Hindrance in children's physical development leads to adverse effects in their overall physical and mental strength.
- Impairing children's physical growth and educational potential which will result in reduced productivity and earnings.
- Malnutrition significantly reduces immunity levels.

3. Causes of Malnutrition

- The staple Nepalese diet is mostly comprises of carbohydrate rich foods (maize, wheat etc.), this leaves out other essential nutrients required for the body.
- Limited access to quality and diverse protein sources in animals and plants.
- Lack of purchasing power to buy the required amount of food.
- Limited knowledge on the importance of nutrition and health.

4. What can be done to reduce malnutrition?

a. Essential nutrient supplements (vitamin A capsule, minerals etc.) can be made available.
b. Planning food based strategies:
    - Food fortification increase nutrients in staple foods (iodized salt, adding iron in food materials).
    - Organic methods to increase natural nutrient in food such as, bio-fortification (breeding crops to increase their nutritional value).
c. Agriculture based nutrition interventions like dietary diversification through homestead food production. This includes producing a wide array of food that contains essential nutrients; these should be encouraged to intake in the daily diet.
d. Adopting measures to control diseases.

Among the above strategies, homestead food production can be taken as a proven model to sustainably increase intake of nutritious foods as well as improve the nutritional status of people in developing countries.

Group Exercise

- In this session participants are asked to identify children suffering from malnutrition in their locality. Instruct participants to list the households and symptoms of malnutrition.
- Next, instruct participants to justify the following statement with logical arguments: "supplementary nutrients are not a reliable measure to improve the nutritional status of people in developing countries like Nepal. "

SESSION 3
INTRODUCTION TO HOMESTEAD FOOD PRODUCTION

Learning objectives:

By the end of the session, participants will be able to:

- Define the homestead food production system.
- Differentiate types of homestead gardens and prioritize them to address nutrition security.

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Visual material: Traditional garden, improved home garden.

The following conversation discusses more about homestead food production

Rita Chaudhary : Namaste Hari Maya Miss!

Hari Maya Miss : Namaste! Welcome to our office, how can I help you?

Rita Chaudhary : I heard about homestead food production and want to understand what it is and how it benefits farmers like us?

Hari Maya Miss : So glad that you are interested to learn about it. I will explain to you all about homestead food production, its advantages, and its challenges.

1. Homestead food production

Homestead food production is defined as a system which emphasizes production of diverse and nutritious foods like vegetables, fruits, meat, milk and eggs around the homestead area primarily for domestic consumption. Generally, it includes home garden integrated with some livestock like poultry, goats and cows.

Traditional home garden Improved home garden

Home gardening is not a new practice for us. In Asia; it has been an integral aspect of rural farming system for centuries. It contributes to fulfill the s daily vegetable demands of the family; however the extent of its contribution depends on the type of home gardens. Broadly, these gardens can be differentiated into traditional and improved home gardens.

The structure, composition and diversity of crops in home gardens are influenced by socio-economic factors and cultural values of the households in varying communities. Different types of home gardens are explained below.

a. Traditional Garden

- Seasonal cultivation.
- Requires limited care and management.
- Cultivation of a limited number of crop species (mustard, pumpkin, radish, beans).

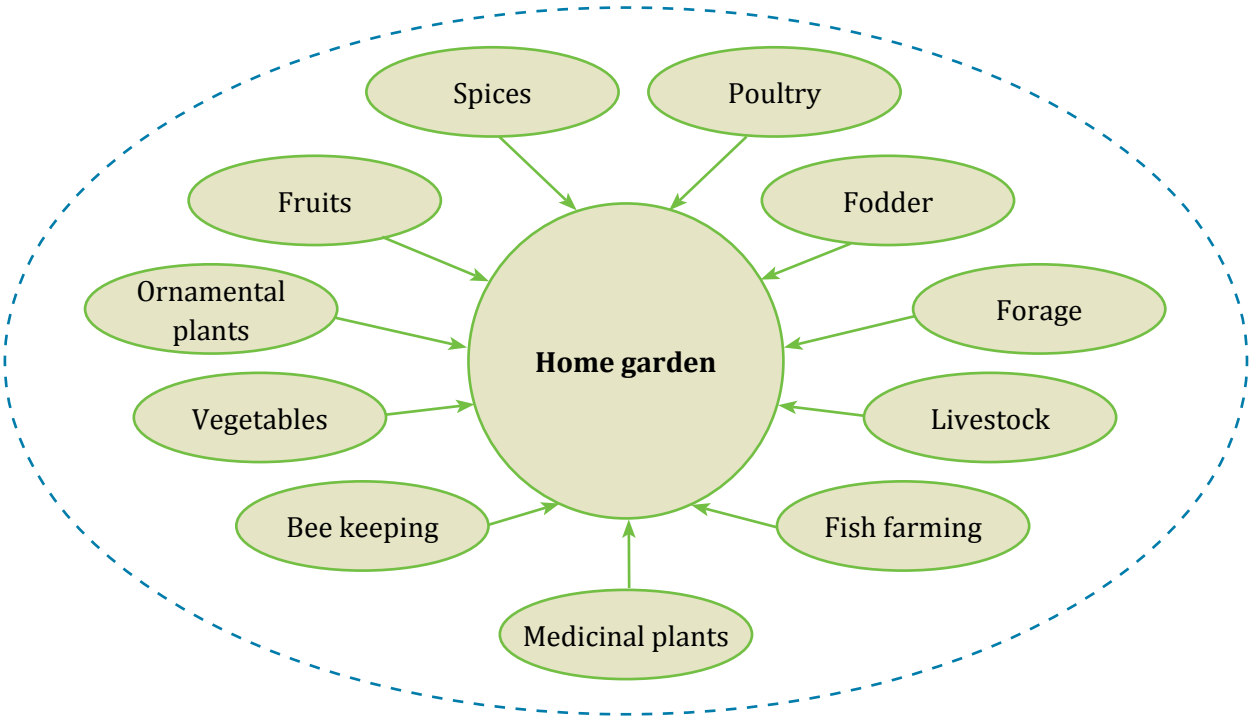
b. Improved Garden

- Primarily for household consumption, surplus garden produce is used for income generation.
- Focus on year round supply of nutritious foods through diversification of locally available plant and animal sources. Maintaining crop diversity in both plant species and variety.
- Crop selection is based on nutritional value and adaptive traits suited for local and harsh conditions.
- Low cost and easily doable management practice are prioritized (example: using waste water for irrigation).
- Integrated pest and soil management using organic methods.

Advantages of the improved homestead garden

- Ensures a regular and reliable supply of vegetables, fruits and eggs for the family. - helps to generate extra income from surplus production.
- Provides healthy and quality food required for pregnant women and young children to ensure healthy bodies.
- Saves time from shopping for vegetables, fruits and eggs.
- Access to diverse nutrient rich green vegetables even when they aren't available in the market.
- Money saved from buying vegetables can cover other household expenses.
- Helps to reduce the need to purchase more expensive food and readymade nutritional supplements because home grown produce is rich in vitamins and minerals.
- Generates employment for family members, particularly for women (free time can be utilized).
- Working in the homestead garden is a good way to exercise and can contribute to keeping the family physically fit.
- Plays important role in agro biodiversity conservation and minimizing the negative effects of climate change.

Our aim is to increase the availability of nutritious foods by establishing homestead gardens and supplemental components.



Elements of homestead garden

Group work

Divide participants into different groups and ask them to complete the following tasks.

- Differentiate the types of garden based on the featured garden types.
- Prepare a crop calendar based on the crops planted throughout the year.
- Discuss what can be done to convert an existing traditional garden into an improved garden.

SESSION 4
ESSENTIAL ACTIVITIES FOR HOMESTEAD FOOD PRODUCTION

Learning objectives:

By the end of the session, participants will be able to:

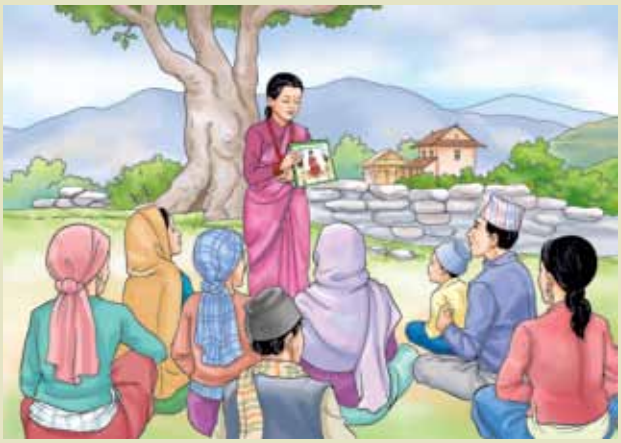
- Decide which component of homestead food production should be emphasized in their homestead.
- Outline the activities needed to enhance homestead food production in a sustainable way.

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Visual materials: Forms, pictures showcasing the elements of homestead food production.

If you want to enhance homestead food production and productivity in a sustainable way then you should follow the six essential actions mentioned below.



1. Assessment of existing resources for homestead food production:

There are many aspects that need to be analyzed before starting your home garden; the following questions provide an example of some of these aspects:

- First of all you have to think about the size of land available and how much land you can allocate to the cultivation of diverse vegetables, fruits and other crops.
- Although there is no fixed criterion for the amount land needed, land size will affect the availability of produce required for the family.
- Is an irrigation facility is available?
- How will you manage labor force required for home garden, will family members be involved?
- Is the market accessible to purchase seeds, saplings, and chicks?
- Is there a nearby market to sell the surplus produce from the home garden?
- If yes then how will manage the transportation?
- Is there access to technical service providers and are they available for consultations?

2. Exploration and selection of components to maximize homestead food production:

- Based on the availability of resources, you should decide which components should be integrated in your homestead food production. For example, if the land is limited and there is little opportunity to diversifying the vegetable cultivation, you could instead focus on the integration of poultry and pig farming in the garden. If the available land is swampy and not suitable for growing vegetables then you can integrate a fishery to help supply essential nutrients in daily meals. If you have land and water resources then you could integrate vegetable, fruit and other livestock components. If there is enough hay/straw then you can

also go for mushroom production.

- Integrating as many components as possible is best; however, the strengths, weakness/ challenges, opportunity and threats of each component need to be thoroughly analyzed if you wish to successfully implement an improved home gardening.

3. Strengthening capacity on integration of livestock, poultry, fishery, vegetable, fruits, mushroom (opportunity to ensure year round supply of nutritional sources):

After analyzing the pros and cons of each component, you need to decide how many components would be possible for integration. If you don't have the sufficient knowledge, experiences, skills or capacity to implement the integration of all the components you should approach a local government organization, NGOs, INGOs or other local community organizations for training or orientation. You should be aware of the concepts and the process that are involved in integrated home gardening before stepping on the field. For example if you have water and waste land and want to integrate home fish in your production system, you must know the breed of fish, pond size, type of feed and what kind of management will be required after the pond is built. Consulting with organizations working on fishery construction and management will help you to gain the required knowledge and support.

Note: In this manual you will find details on backyard poultry farming and diversification vegetable gardening for year round availability of nutritious foods.

4. Work on a detailed plan to increased availability and increase productivity for integrated gardening of integrated components and access to productivity:

Once you know the technical components of how to integrate the various components of a home garden you should start working on detail plan, for example on how to begin diversifying vegetable production. The plan of action must focus on the following:

- Selection of crops based on a crop calendar (which crop to plant).
- How to prepare land and what crop rotation/intercropping to select (when to prepare).
- Layout of the available area for maximized production (which crop to plant where).
- Identification of low cost management technologies (which practice is more affordable and sustainable).
- Labor management (who is involved for what activities).

5. Developing self-reliance:

You should always think about how to make production sustainable. Material support by any organization is done only once so you will have to explore ways to sustain production without their support. Listed below are some suggestions on how to make your production system sustainable:

- Seed production- If you can produce your own seeds then you won't have to rely on certain projects that distribute seeds.
- Information on seed availability- You should be proactive and explore information regarding how you can get different types of seeds. You could also work to establish a seed production center at the community level.
- There should be a reproduction plan for chicken breeds.
- Capacity enhancement for coordination and collaboration to work together and searching for local available resources.
- Group registration (District Agriculture Development Office, Department of Livestock Services Office, District Women Development Office etc. are some of the places for registration)

6. Review the outcomes and plan for improvement

You should review your activities, what you have achieved and areas that still need work and analyses reason of success and failure.

Group Work

Divide participants into three groups. Each group will give one case study and should work as a group to answer the question to the best of their existing knowledge, practices and experiences.

Case study 1:

- Mrs. Hari Maya Khatri is a low income farmer from Darbar Devisthan in Gulmi district. Her home garden is surrounded by sloppy land which causes soil erosion and hinders irrigation. Due to these problems, she can't cultivate crops and often depends on her neighbors for vegetables. There are no vegetable markets around the village and even if there were she couldn't afford to purchase vegetables. In such a situation, how would you help a family like Hari Maya Khatri's to manage their daily vegetables needs?

Case study 2:

- An NGO is implementing a project to promote high yielding fruits species (mango, litchi, jackfruit, papaya etc.) in Kanchanbari. The citizens of Kanchanbaris are resource strapped with less than 20 square meters of farming area and many of them suffer from acute malnutrition. As a development worker, what would you suggest in order to promote the fruit biodiversity in the area?

Case study 3:

- A family with a small home garden that lacks an irrigation facility is provided with different fruit species (mango, litchi, jackfruit, banana, papaya, pomegranate etc.) and vegetables by an organization. What components should the family integrate in their home garden?

SESSION 5
GENDER ISSUES IN HOMESTEAD FOOD PRODUCTION

Learning objectives:

By the end of the session, participants will be able to

- Define and understand gender in their local context.
- Recognize the importance of HFP from a gender perspective.
- Outline different gender friendly HFP activities.

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape
- Visual materials: Various pictures depicting gender inequality and gender equality

Read the conversation below

Kabita Miss: What are you doing Goma?

Goma : I am tilling the field for vegetables.

Kabita Miss: Okay! Are you doing it alone or is there somebody to help you?

Goma : for vegetables only, I usually cultivate by myself alone.

Kabita Miss: That sounds great. What about planting rice, maize and cereal then?

Goma : Earlier when my husband was here he led of rice plantation would sometimes help him, but since he has been working in India for the last two years I have taken over his responsibility in the field. During the rice plantation I sometimes need to hire laborers when my relatives are not able to help.

Kabita Miss: Ah! I see, this is why, gender related problems in agriculture are surfacing a lot lately.

Goma : What is gender? Oh Ram babu (brother in law) is also here.

Ram : What are you two talking about? I am going to the VDC (Village Development Committee) meeting. Can I join the conversation on gender too? What is gender really, everyone seems to be talking about it these days.

Kabita Miss: Sure, everyone should understand about gender.

Goma : Ok! Is it more about distinguishing the male and female sex?

Kabita Miss: No no…it is different than that. Sex is merely the biological differentiation between men and women but gender is

more about the differences between the roles of men and women due to socially their constructed value, culture, norms. So, while your sex as a male or female is biological, the gender role of men and women in a society can be quite different across societies based on culture, religion and value systems.

Ram : Okay, so you mean that a women's gender role would be to cook and clean, take care of children and elders in the house?

Kabita Miss: Yes exactly. So is it true that in most village households, women are responsible for homestead food production along with household chores and men are responsible for the planting of cash crops like rice, maize, wheat?

Goma : Yes Miss that is how it works. Usually men don't make decisions related to homestead food production. Women decide on which crops to plant, when to harvest, and how to cultivate the crops in the homestead. Women are also responsible for poultry farming.

Kabita Miss: I know that's why women are the major custodian of homestead food production. I think, strategically it is very important because women are the ones who are responsible for cooking and they can also able to think about health and nutrition security of the family and also can decide which micro nutrient rich crops will best supplement their family's health. On the other hand the HFP improvement program also helps to empower women since they have control over the homestead produce and make decisions on improved practices. Nutrition education contributes to the adoption of improved nutritional value in daily meals and can directly benefit children's health.
So, homestead gardens can be a means to reach women in order to address food security and nutrition issues.

Unfortunately, despite their large contribution women aren't recognized as food producers in the country and aren't apart of the decision making bodies on the community level. .

Goma: You are right! While my husband was here, he was the one who used to attend trainings, workshops and meetings.

Kabita Miss: So do your children also help you out the home garden?

Goma: My daughter collects fodder, cleans sheds, waters crops, feeds the chicken, and helps me with other household activities. My son however, doesn't really seem bothered to help around with anything.

Kabita Miss: I think you should not discriminate and instead divide work equally among your son and daughter. You can also explore other options, for example, try and convince your family members to support you in your

homestead food production endeavors.

Ram : if we think deeply, there are lots of other gender issues in our community, I really did not notice about it till now.

Kabita Miss: yes, I have often seen that in many homes women are the last ones to eat and usually have to nothing but leftovers for themselves. This is actually a very bad practice and we need to discourage it. Everyone needs quality nutritious food, particularly young children, pregnant and lactating mothers. Nowadays women are more responsible in the farmlands, so they need more nutritious food to support the added physical labor. So we need to take care of these things and think of ways to maximize the nutritional components in HFP through improved practices and have all the family members lend their support to women.

Ram : I never thought about these things in such a way. It is a good thing you pointed out such aspects of our daily lives, I will surely share these facts at the village meeting today.

Kabita Miss: Glad to hear that. If everyone becomes aware of the gender issues it will not be difficult to build equal society and that also will help to take some burden off woman's work load. Because women have their plate full with household chores and working in the field, our HFP program needs to be gender friendly to ensure mechanisms that encourage other family members to help women in their workload. If women are responsible for homestead food production then male household members can sell the surplus produce on the condition that women will still have the right over how to use the supplementary income.

Group Exercise

Ask participants to list out activities specific to men and women and as well as those activities which can be done by both.

SESSION 6
USEFUL POULTRY BREEDS FOR FAMILY NUTRITION

Learning objectives:

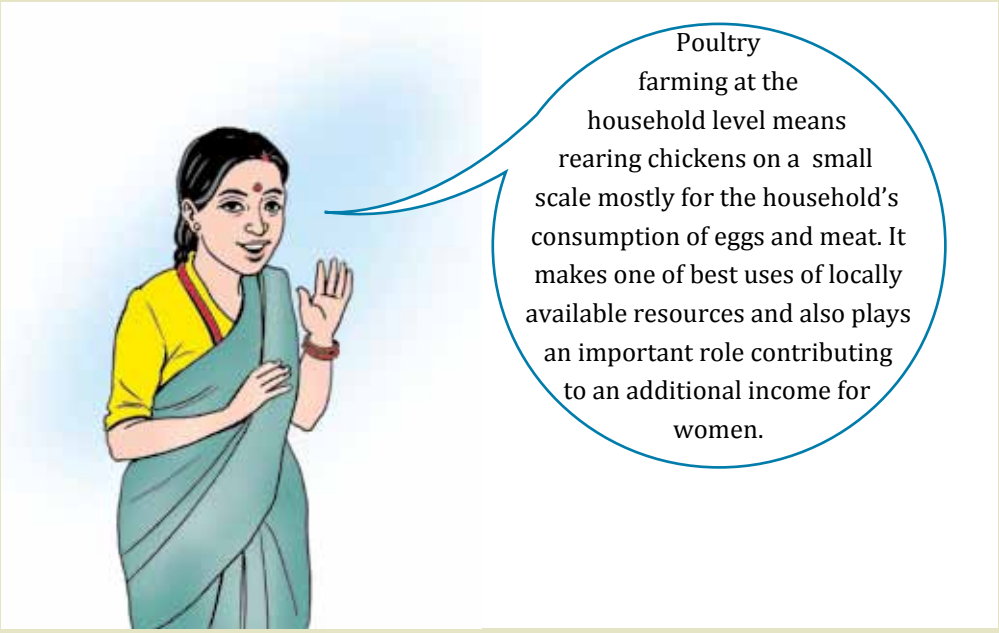
By the end of the session, participants will be able to:

- Identify important traits of improved breeds of poultry.
- Distinguish between different breeds of poultry (the ones that produce more eggs and meat versus those that produce less) and explain the importance of such breeds.

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Visual material: Flip chart.



Read the conversation below

Gita : Namaste Miss!

JT Miss : Namaskar Gita didi! You came early in the morning, how can I help you?

Gita : Yes, I am here to get few suggestions about poultry farming as you are talking about it last time, I am interested on it.

JT Miss : Oh sounds great! You made a good decision to integrate poultry because eggs are a wholesome nutritious food for children. Chicken meat and liver are good sources of protein for your family members, particularly for the health of your grandchildren and your pregnant daughter in law.

Gita : But I am afraid of whether or not I will succeed in poultry farming.

JT Miss : Don't worry, traditionally , we already have a practices on open grazing and using kitchen waste for rearing 5-6 local chicken breeds. . . But we should consider what breed types are most profitable in terms of egg and meat production. Moreover, we

should not forget about the management aspect of poultry production. Poultry management includes thinking about what type of feed you should provide, what type of coop should be built and how you will prevent poultry diseases etc., this crucial for successful implementation.

Gita : I have heard that Broiler chicken breeds are good for meat and Layer breeds are good for egg production.

JT Miss : Yes that is true. But it is good for large scale production in areas where the market and transportation are not limiting factors. However, for small scale famers in remote hills and plains we wouldn't recommend those breeds. For small scale farms we should think about how households can yield more benefits in a sustainable way.

Gita : I have few local breeds.

JT Miss : Oh that is excellent. For a reproduction strategy you should have some local chickens along with an improved/cross breed. For dual purpose (meat and egg) New Hampshire, Giriraj and Black Austrolorp are the recommended breeds for the hilly and plain regions. In Nepal, these breeds have benefitted many families who have reared them on a small scale. The local breeds can provide more meat and egg if they are reared with care, like the improved breeds. Therefore, our priority should be on proper management (feed, coop, vaccination, reproduction management) irrespective of the breed we rear. In order to increase production with low investment we need to make the most out of our local resources to ensure better management.

Gita : Where can I get these breeds of chickens?

JT miss : Normally transporting parent stocks or improved poultry breed day-old chicks from the breeding center to a remote village takes two to four days, sometimes more. Due to the changes in climate and long travel distance, the mortality rate is very high among the transported poultry. Therefore our focus should be to establish a local resource center in the village area to produce chicks.

Gita : Can you provide me with more information on the recommended breeds of chicken.

JT miss : I will briefly inform you on those breeds and then will focus on how to prepare feed and manage your poultry. You can identify different breeds through these pictures.

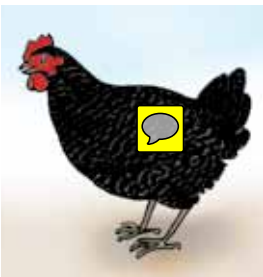
Useful breeds of chicken to contribute to family nutrition

1. New Hampshire

- Reared for both meat and egg.
- Red plumage which is brighter in males and darker in females.
- Under recommended management conditions it lays approximately 180-200 eggs per year.
- A red comb near to red ears and ear lobes.
- After laying eggs, can sell for the meat.

2. Giriraj

- It has high immune system making it resistant to many diseases and can it easily adapt to local situation.
- It is a fast growing breed.
- Lays approximately 140-180 light brown eggs per year.
- Reared for both egg and meat.
- After laying eggs, can sell for meat.



3. Black Australorp

- It is a large, soft feathered bird with glossy black feathers and black feet.
- Reared for both meat and egg.
- Lays good quality eggs, approximately 180-200 eggs per year in well managed condition.
- Have a red comb, ears, ear lobes and wattle.
- After laying eggs, can sell for meat.

4. Saakini

- Available almost everywhere in Nepal.it High immunity level to fight disease.
- Fully grown in 5 to 8 months.
- Can be reared in open space.
- Can be reared for both egg and meat, also hold religious significance in different societies.
- Weighs 1.5 to 2.5 kg on an average.
- Depending on the climate the female can hatch eggs 2 to 3 times a year and capable to hatch almost 60 to 80 % at one times.

5. Ghati Khuile (Naked- neck)

- Easy to rear in local environment. This breed isn't available in plenty to cater to the demand and the numbers of this breed is decreasing.
- High immunity level to fight diseases.
- Fully grown in 5 to 8 months.
- Useful to rear it in natural conditions and let it go about freely in the open space.
- High demand in the local market. Hold religious significance in some societies. Reared for both eggs and meat.
- Weighs 1.5 to 2.5 kg on an average.
- Depending on the climate the females can lay eggs 2 to 3 times a year and capable to hatch almost 60 to 80 % at one times.

6. Pwankh Ulte (Frizzled Feather)

- Easy to rear in the local environment. Only available in some of the Terai districts of Nepal. The numbers of this breed is decreasing.
- High immunity level to fight diseases.
- Fully grown in 5 to 8 months.
- Useful to rear it in natural conditions and let it roam about freely in the open space.
- High demand in the local market. Holds religious significance in some societies. Reared for both eggs and meat.
- Weighs 1.5 to 2.5 kg on an average.
- Depending on the climate the females can lay eggs 2 to 3 times a year and capable to hatch almost 60 to 80 % at one times.

Group Exercise

Participants are asked to discuss existing practice of poultry rearing at the household level and analyze its pros and cons.

SESSION 7
ESSENTIAL ACTIVITIES TO REAR BETTER BREED OF CHICKENS AT HOUSEHOLD LEVEL
SESSION 7.1 - FEED PREPARATION AT LOCAL LEVEL

Learning objectives:

By the end of the session, participants will be able to:

- Prepare nutritious poultry feed using locally available materials

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Locally available materials for preparing feed such as maize/ rice/ wheat/ barley, roasted soybean/ sesame/ pinna (mustard residue after extract oils)/ red gram/ pigeon pea (Bengal gram), lime stone or soft stone, egg shell, salt, sugar/molasses/edible gum (khudo) and other locally available materials.
- Grasses like Clover, Kigyu, Kaksphut and other plants for grazing.
- Visual material: Flip chart.

The following conversation discusses the importance of feed for poultry production and how to prepare poultry feed at the local level.

Gita : Namaste Miss.

JT Miss : Namaste Gita!! Have a seat.

Gita : Thanks Miss! I took your advice and reared five chickens (Black Australorp and New Hampshire) with my local hens. But my egg and meat production isn't as much as you mentioned earlier. They don't produce more eggs than the local ones like Saakini. So, I didn't really find much difference between local and improved breeds.

JT Miss : if so, I think you might have ignored some the aspects that I had emphasized, like the type of feed, temperature, water, diseases, vaccination, feed, coop etc. Nutritious and quality feed for chicken are among the most important factors for better egg and meat production. What feed do you provide to your chickens?

Gita : I use rice bran, maize and mostly leftovers at home. They are also very active searching food for themselves like insects, worms and other waste.

JT miss : If you rear improved and local breeds in the same way how will you get different results? Like human beings, poultry birds also need nutritious food for better performance. I would suggest you to change the type of feed you are currently providing. If you provide better feed to the local ones even they will produce more eggs.

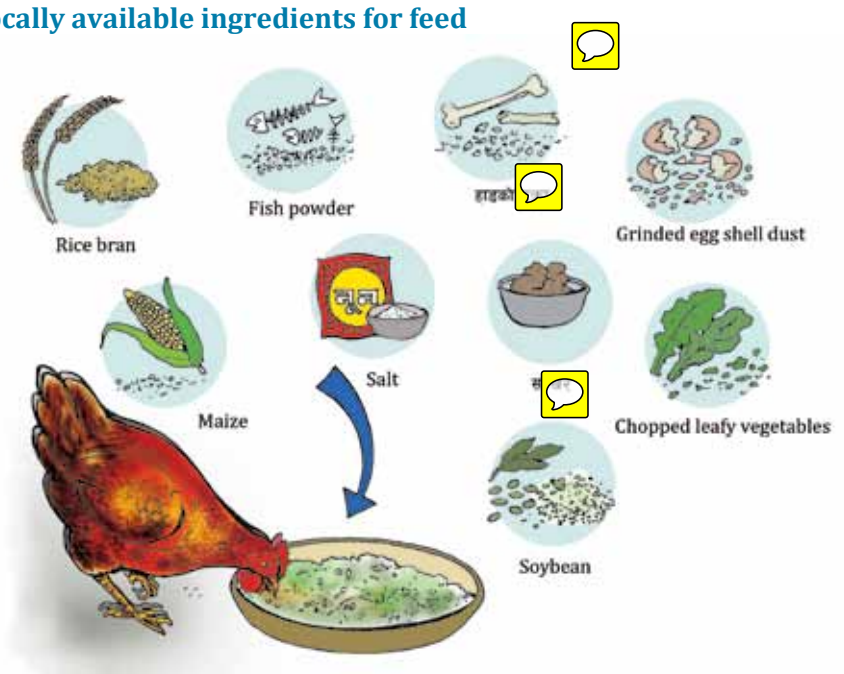
Gita : But you know about my financial condition, I don't have the capacity to buy poultry feed from the market which is expensive and not easily accessible.

JT Miss : I know that, and I am not talking about purchasing additional readymade feed from market. I am taking about how to prepare nutritious and good quality feed for chickens at home.

Gita : Really! Sound great; please let me know how to make nutritious feed at home.

JT Miss : Okay, listen carefully then I will teach right now, how to prepare nutritious and good quality feed for chickens at home.

1. Preparation of locally available ingredients for feed



Poultry feed ingredients

Method to prepare nutritious poultry feed using locally available ingredients

Necessary materials:

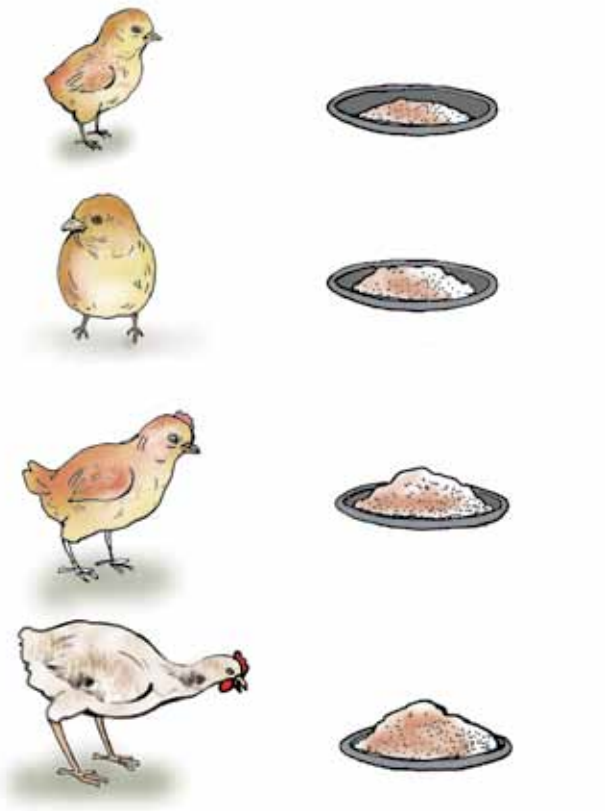
Maize/rice/wheat/ Barley	30 fistfuls
Roasted soybean/ sesame/Pinna (mustard residue after extract oil)/ Red gram/Pigeon pea	8 fistfuls
Egg shells/ soft stone/lime stone	6 fistfuls
Salt	3 light 2 finger's pinch
Sugar/molasses/ edible gum (khudo)	1 fistful

Things to remember

The above mentioned ingredients need to be arranged first. If they are not available locally, alternatives can be used. For example, if peanuts aren't available, soybeans can be used or soya been is not available other available materials like red gram, pea, Bengal gram (chick pea) can be used. Egg shells should be grinded and fed to chickens for their calcium intake. The ingredients used in the feed should have a verity of nutrients, not just carbohydrates (rice, maize). Locally available source of protein like mustard, soybean should be used in the feed.

- Mix the feed with small pieces of green leafy vegetables and peeled potato skin will help enhance the nutrition..
- For a day old chick, start feeding with 1 part of 1 fistful divided in 10 part then the quantity of feed should increase steadily from one part to two fistful once the chicken states laying eggs.
- The feed should be prepared keeping in mind the number of chickens. Up to 3 kg of feed can be prepared at once.

2. **Mix the ingredients as per recommended proportion**
3. **Provide amount of feed as per the age of chicken**



Chicks of different age group and the recommended amount of feed

Note: Prepared feed can be used for up to a month, if feed is stored for longer than a month, the quality may degrade. The amount of feed should be prepared depending on the number of chickens.

Food for thought:

When poultry feed is prepared with the recommended nutritious ingredients it might be compared with human beings food and community people might reluctant to prepare such feedings though the ingredients are very simple and doable. In these situations, we can convince the community people, to graze in the open space for 2 to 3 hours a day; this will reduce cost of the feed by approximately 20% to 25%. For grazing in the open space, different types of grasses like clover, kigyu, kaksphut and other plants need be grown in homestead area at home. Rotational grazing plot will help supply the grasses regularly. While grazing, the animals will also get their share of animal protein through worms and other insects.

Group Exercise

Divide the students in groups and ask them to discuss ways of preparing feed using locally available ingredients. Additionally ask them to discuss how nutritious feed for poultry is prepared with limited local ingredients and what are the alternative locally available resources which can substitute the above recommended ingredients?

SESSION 7.2 - WAYS TO BUILD COOP AND CONTROL DISEASE

Learning objectives:

By the end of the session, participants will be able to:

- Recognize value of management practices for poultry farming.
- Adopt the minimum required management practices such as: improved coop preparation
- Outline plan for disease control and management

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Visual materials: Pictures of locally available materials used to prepare chicken coops.
- Flip chart.

If you really want to maximize benefits from family poultry production then you should focus on improved existing management aspects of poultry production at the village level. In most cases, we found that there is little attention paid by households on care and management aspects in rural poultry production. So, efforts to improve management aspects of poultry farming could bring about significant changes.

JT Miss : Gita *didi*, yesterday I talked about preparation of nutritious poultry feed at the local level. But don't forget about the importance of poultry production management in small scale in villages.

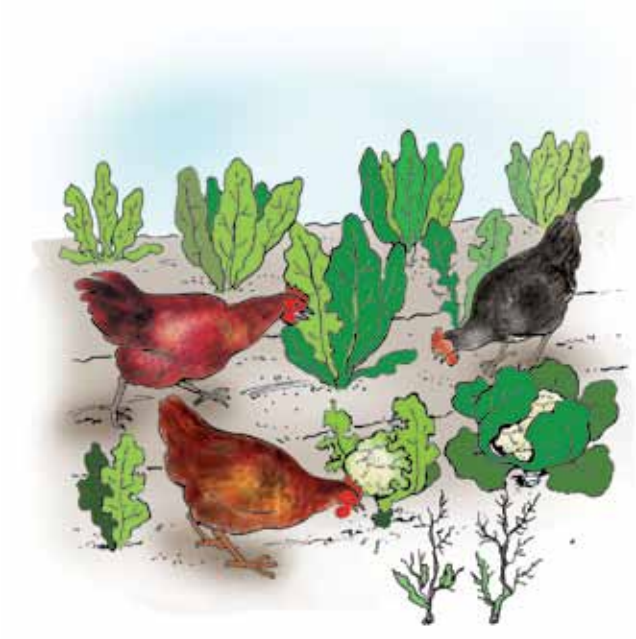
Gita : What are those management aspects? Please let me know. Is it about a type of coop?

JT Miss : You are right. Beside the type of coop, proper management also includes prevention and control of diseases, protecting chickens from predators like domestic cat, dog, wild fox, and other animals. I will also briefly tell you about the poultry rearing system in Nepal.

Poultry rearing system

1. Open System

This is the most popular and traditional practice in rural Nepal. In this system chickens are confined during the night in the poultry shed and left in the open field to graze during the day. They are provided with less feed as they graze for their food and water themselves.



In an open system, chickens may often damage vegetables while searching for food in the garden

Advantages

- Low production cost.
- No need for large coop.
- Saves time and labor.

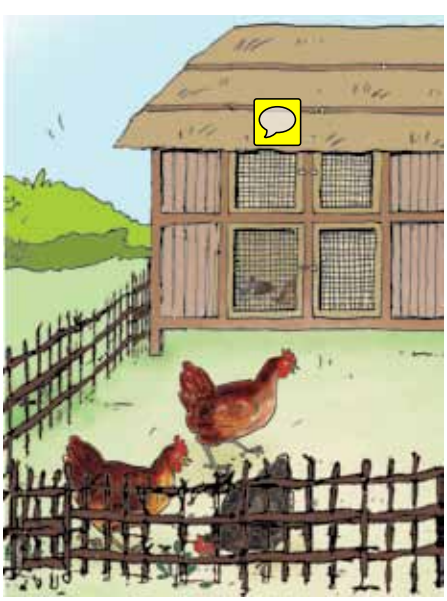
Disadvantages

- Due to low dietary supplement, production is very low and negligible (does not impact on nutrition status and health of family).
- In this system, farmers cannot rear large number of chicken.
- It damages vegetables and other crops grown in homestead gardens.
- Disease may spread among chickens leading to a significant amount of death.
- Danger of being attacked by wild animals and prone to harsh weather conditions in the absence of coop.
- They may lay eggs anywhere which increases the risk of damage.

Note: Open system disadvantages outnumber its advantages, so think twice before deciding to opt for this system.

2. Semi-open system

In this system the poultry are semi-confined, but the area is comparatively larger than the closed system. The chickens are confined during the night, and they are allowed to graze outside during the day for 2-3 hours. The coop and small open area outside are surrounded by wire or fence. If the area is large enough then it can be divided into two sections, with one section set aside for planting nutritional grasses such as Clover, Kikyu, and Cocksfoot.



Chickens grazing in a semi-open system

Advantages

- Reduces cost of feed by 20 - 25%
- Useful for poor households, who don't have enough space.

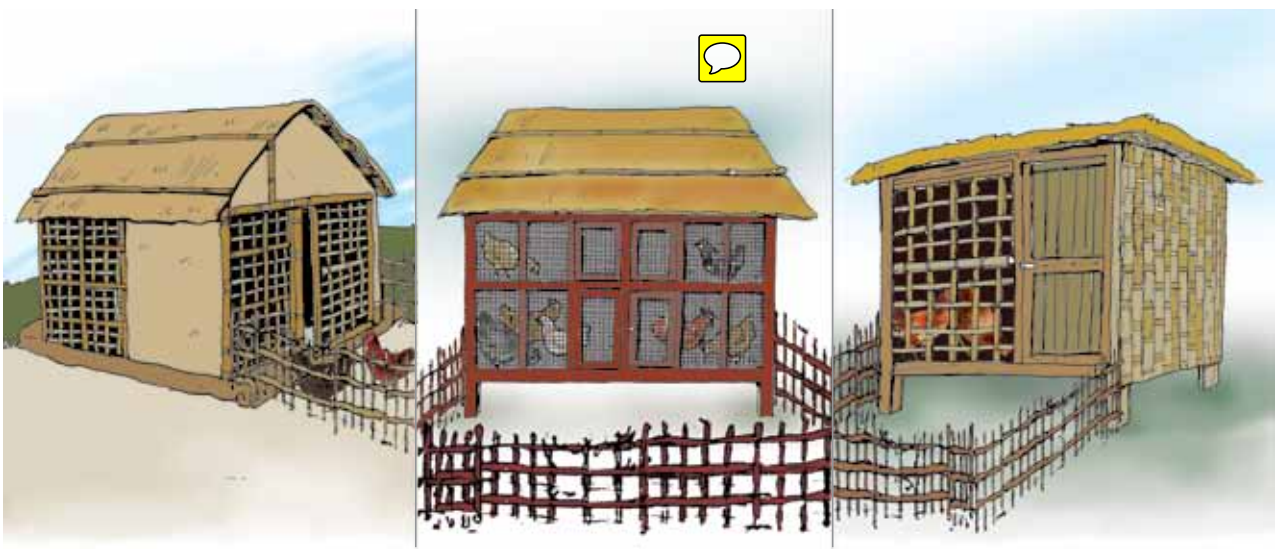
Disadvantages

- Grass plantation required
- Need space for grazing

Note: Semi-open system is recommended for households in villages.

How to make poultry coop for semi open system

1. First you have to assess what local materials are available to build the coop. For example in Udaypur district in eastern Nepal bamboos are widely available. So the bamboos could be a good choice for building material whereas in Baitadi and Kailali districts stones, wire and wood are more widely available.
2. Where to make the coop? You should select an area that receives plenty of sunlight and is close to home, so that the family members can look after it.
3. During the preparation of coop, proper ventilation should be built and its size should depend on the number of chicks being reared.
4. The coop should be made in such a way that it protects poultry from the direct effects of extreme hot weather, dew, cold weather, rainfall, other natural disasters and predators.



Different models of coop

Things to remember

Do	Don't
Use a locally made carrier/cage such as: doko, peurongo, or a wooden/ paper box during chick transportation from the breeding centre to the village.	Don't se carrier which is not ventilated during transportation of chicks.
Keep a limited number of chicks in each carrier to avoid overcrowding during transportation.	Don't keep a large number of chicks in a crowded carrier despite the available space.
Provide water to chicks during transportation.	Don't feed the chicks during transportation.
Provide good bedding materials with rice husks or rice bran until chicks are 7-8 weeks old. If there is no bedding material available, protect the chicks from cold.	Don't put 7-8 weeks old chicks in damp conditions.
Protect poultry from rain, intense sun, wind, and wild animals.	Don't expose chicks to adverse climatic and physical conditions like dew, cold temperature and strong wind.
Keep the chicken coop clean and hygienic.	Don't allow chicks, hens and cocks to eat human excreta, and other unhygienic waste, which is the general practice in rural areas.
Keep a limited number of chickens in cage to avoid overcrowding.	Don't keep a numbers of chickens in the same cage.
Use of appropriate feeding utensils and water trays as per the age and number of chickens. Use jute sacks to supply water for one week old chicks.	Don't use bamboo feeding utensils and water trays because there is high chance of dirt and filth contamination.

Prevention and control of poultry diseases

Prevention and control of diseases are integral to poultry production management. For poultry farmers it is crucial to learn how to prevent simple diseases, this will help to minimize loss and increase productivity. The following aspects need to be examined in order to prevent and control diseases during poultry farming.

Identifying disease

- Do not buy infected chickens even if they are sold at cheap prices. In villages, large flocks of chickens are often sold at the time of a disease outbreak. Buying chickens should be avoided during such situation, however if they have been bought, they must be kept in a separate shed and should be separated according to their age.
- Follow regular disinfecting procedures by spraying insecticides. Sunlight kills germs so the coops/shed should receive plenty of sunlight.
- The bedding materials and straw in the poultry coop/ shed should be dry.
- Prevent the chickens from eating dirt and filth such as feces, urine, spits, etc.
- Get regular vaccination against New Castles diseases and feed regular dose of deworming.
- The coop should be cleaned regularly and a large number of chickens shouldn't be kept in a small area.
- Separate the infected – chickens from the rest.

1. Newcastle or Ranikhet Disease:

Newcastle is one of the most contagious and economically fatal diseases that affect poultry. It is viral disease and the symptoms vary depending on the health of the birds, their age, breed and the type of virus causing the disease.

Symptoms:

- Respiratory problems (gasping, sneezing, coughing, watery discharge from mouth and nose).
- Swelling of the area tissues around eyes and in the neck.
- Greenish watery diarrhea with very bad odor. Eggs are misshapen, rough or thin shelled and contain watery albumen.
- Nervous sign like depression, drooping wings, restless, dragging legs, twisting of the head and neck, circling, inappetence, complete paralysis.
- Egg production severely decreases resulting in badly shaped fragile eggs.
- Sudden death may also occur without showing any symptom or morbidity and mortality depend on virulence of the virus strain, degree of vicinal immunity, environmental conditions, and condition of the flock.
- Stared twisting of the head and neck within seven days.

Methods of disease control

- If showing symptoms of New Castle disease, they should be immediately separated from others.
- New chicken should be vaccinated before they are taken to the coop with other chickens.
- To prevent this disease, vaccination is highly effective and considered one of the most reliable and safe methods.
- Regularly feed the medicine against deworming before one week of vaccination against of New castle disease.
- Consult with livestock service providers, veterinary doctors and farmers who know about this disease.

2. Fowl pox

Fowl pox is also a communicable viral disease and it attacks poultry birds of all age groups. It is particularly fatal to turkeys and chickens. This disease is transmitted from infected to healthy birds and can also be transmitted by mosquitoes and pests.

Symptoms

There are 2 types of symptoms seen in the chickens.

- Visible symptoms include wounds and pimple like swelling on the head, face, and underside of the wings, which dry out later on. It may also cause swelling of the eyes and the body, and sometimes result in blindness. But the chickens that show such symptoms are cured within some weeks.
- This disease reduces the egg laying productivity drastically even though it has lower mortality rate.

Ways to control the disease

- To prevent infection, it is essential to vaccinate the chicks when they are seven to eight weeks old.
- Vitamins and antibiotics can be provided by mixing them in the drinking water.
- Consult livestock service providers, veterinary doctors and farmers who know about this disease.
- There is a higher probability of infection in the plain regions of Nepal, so the poultry birds there should be vaccinated against Fowl pox.

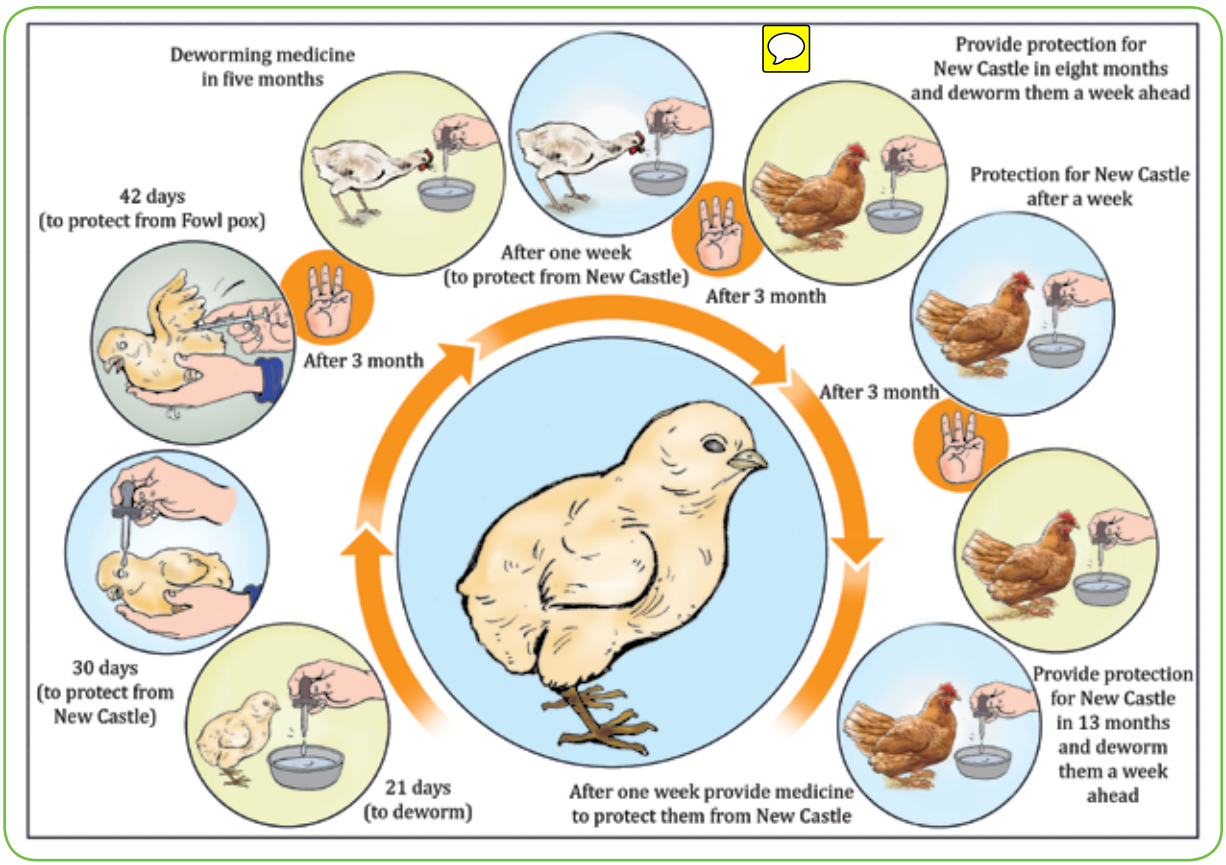
Vaccinations for poultry:

Remember this vaccination schedule and coordinate with the appropriate veterinary service providers in order to prevent disease.

Age	Disease	Type of vaccine	Method of vaccination
1st month (deworm them a week before the vaccination)	New Castle	I.V. La Sota	Mix the vaccine in 2-3 liters of water for every 100 chicks. Mix the vaccine in 4-6 liters of water for every 200 chicks. Keep in mind that they should not be given any water 3-4 hours before given this medicine.
Three months after the first vaccination (deworm them a week ahead)	New Castle	I.V. La Sota	Mix the vaccine in 2-3 liters of water for every 100 chicks. Mix the vaccine in 4-6 liters of water for every 200 chicks. Keep in mind that they should not be given any water 3-4 hours before this medicine is given.
Vaccination required every three months for two years, need to deworm them a week before the vaccination	New Castle	I.V. La Sota	Mix the vaccine in 2-3 liters of water for every 100 chicks. Mix the vaccine in 4-6 liters of water for every 200 chicks. Keep in mind that they should not be given any water 3-4 hours before this medicine is given.

Provide deworming medicine every three months	Worm	Piperazine hydrate	Six drops of Piperazine hydrate mixed with two tablespoons of water. Feed to the chicks up to seven weeks old. 10 drops of Piperazine hydrate mixed with five tablespoon of water and fed to chickens up to 3-5 months old. 14 drops of Piperazine hydrate mixed with seven tablespoon water and fed to hens above five months old.

Source: Heifer Project Nepal 2010



Remarks: The frequency and time of vaccination may be changed as needed. For example in Nepal's plain areas, the chickens are given a vaccination against Foul pox in their wings after they are 42 days old.

Group Exercise

For this group exercise, divide participants into groups, the objective is to help them understand the importance of poultry coops.

- Divide the participants in eight pairs and ask them to sit in a circle.
- Give five small stones to each participant, these stones will represent the chickens. Keep the remaining stones in the center.
- Among the eight pairs divide them into two groups of four. The pairs will be arranged such a way that one will belong to the group that will build a coop, while the other four will belong to the group that will not build the coop.
- Now the facilitator will ask each pair to pull a card. The ones who belong to the team with coop will select a white card and the ones on the team without the coop will select a blue card.
- After draw the card let them do what they see in the card or write in the card. For example if the picture on the card they have seen 'weasel attaching chicken's or with the sentence like 'weasel killed 2 chicken', then the participants will hand over the two stones in the center and keep the remaining three with them.
- In this way the participants will continue the game until the count of all the chickens/chicks are over.
- After the game is over ask the participants what they understood from the game, what the result was and why. Ask them to analyze and discuss all these aspects of the game and present their findings.

SESSION 7.3 - REPRODUCTION STRATEGY

Learning objectives:

By the end of the session, participants will be able to:

- Workout a reproduction plan for a second generation of improved poultry breeds

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape
- Visual material: Flip chart

The following conversation discusses the importance of reproduction strategy in poultry production and technical know-how about the second generation of poultry farming.

JT Miss : Namaste Gita didi, I came here today to see your poultry farm.

Gita : Namaste miss, please come and sit. I don't know whether I am doing it the right way. Let's go to the farm now and see.

JT Miss : Okay, how many chickens do you have now? I mean, have you been able to increase number of chickens compared to my last visit? Have your chickens have started laying eggs or not?

Gita : No, the number hasn't changed. There are five improved breeds and few local chickens. But they have started laying eggs.

JT Miss : Good start. Now you should have a plan on how to increase the number of chickens. Only then you can sustainably produce meat and eggs. You know that you will only get improved breed chicks one time as part of the project support. So the first thing is you have to think is, how do I increase the number?

Gita : You are right Miss. If so then we are late because we have already consumed the eggs.

JT Miss : No worries. You can start from today. I will tell you how.

The breeds of chicken reared in the hilly area start laying eggs after six months. With good management and under well fed conditions, they can give eggs for 18 months. The total cycle of egg production determines the number of eggs laid by a chicken, without any interruption. This is called clutch. Local breeds of chicken give up to 20 eggs per clutch.

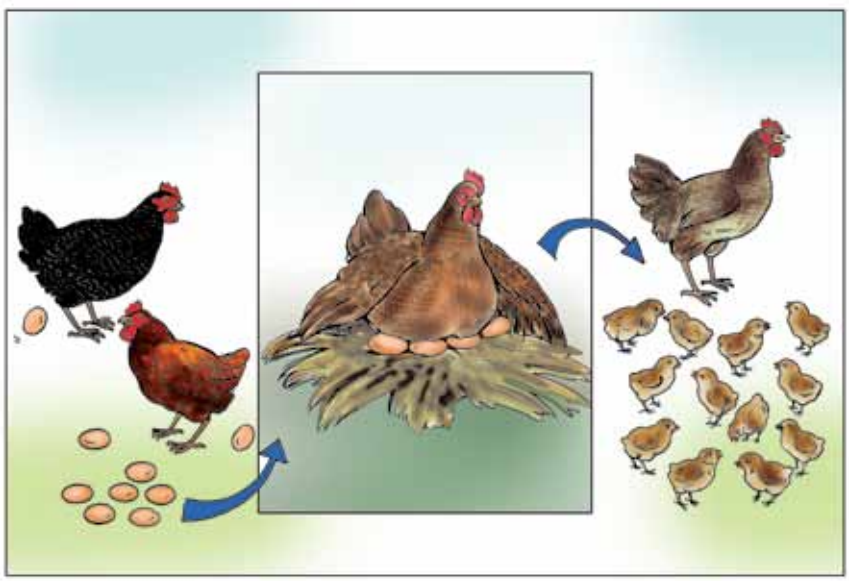
The interval between one clutch and another varies from one to several days. For a good layer the shape of the clutch is large and the clutch interval is also short. It is economically viable to sell the hens 20-21 months after they have laid eggs. Farmers should be able to produce new chicks six month before the old ones are sold.

Normally a hen can lay eggs for two to three years for this reason some farmers have keep their hens for three years, however is not advisable to do so. It is not profitable to rear a hen for too long since its egg production capacity reduces by 20%. That's why it is good to rear at least two to three improved breeds along with the local breeds. The hen that will incubate the eggs to hatch needs to be healthy, calm, fully grown and have feathers developed all over the body. Before the incubation begins, the hen needs to be treated for all internal and external infections.

Reproduction plan

1. Hatching plan

- You should have local breeds of chickens to hatch the eggs of improved breeds (New Hampshire, Black Australorp, Giriraj) since they cannot do it themselves.
- Eggs are ready for hatching 3-4 weeks after the first egg was laid. So do not use first month's egg for hatching. The first year's eggs are the ones that hatch the most.
- A hen can hatch chicks 2-3 times a year. Each time, they can incubate up to 10-15 eggs. So the number of local breeds of hen to be reared depends on the number of chicks to be produced. It also depends on feed availability, demand of eggs and market opportunity.



Reproduction process

2. Things to watch out during hatching

The hatching process in rural areas are often in poor, some of the commercial farmers hatch duck eggs with the hens incubating together whereas Duck eggs hatch in 28 days which is different than the hens' cycle. Therefore it is important for the hens to hatch eggs of same size and color.

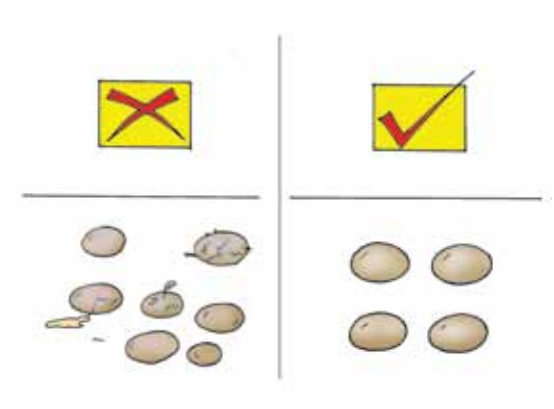
Generally, in the first month the chicken laying the eggs are smaller in size, but it gradually increases the size. Hatching normally takes place during the evening, and the eggs hatch in 21 days.

Nest for hatching

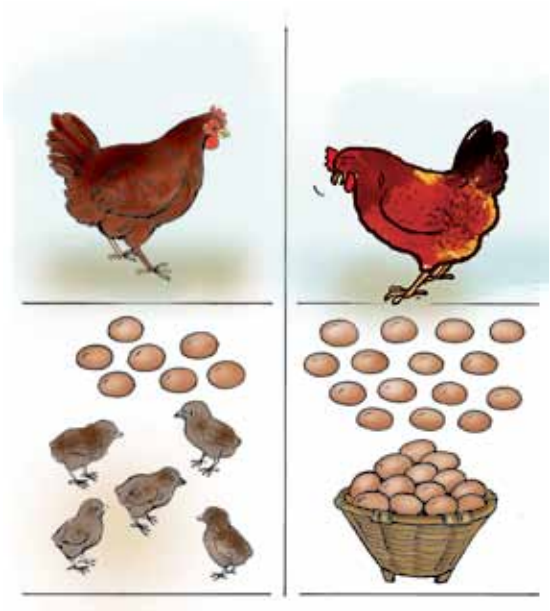
The nest should be built few inches above the ground using soft straw, leaves and pieces of paper so that the hens can easily enter inside. A vessel that is few inches deep and a few inches wide should be filled with straw; this is where the hen will sit. The nest should be well ventilated, dark, dry, easily accessible and easy to clean. At the same time the nest should be placed where the hen is safe from predators like dogs and cats. Adding Basil and Azadirachta indica leaves in the nest will keep it safe from bacteria and other germs.

Egg that should not be used for hatching

- Eggs that are more than 10 days old.
- Dirty eggs mixed with hen's excreta.
- Cracked eggs.
- Eggs with very soft shell.
- Air filled eggs.
- Eggs with blood stain.



Eggs suitable for hatching and not suitable



Local breed (for hatch), improved breed (for eggs)

The types of eggs listed above do not hatch normally and can be easily detected by looking through the shell with a light inside of a dark room. Air filled eggs normally float in water.

3. Parent selection for second generation

The offspring is considered better if it is derived from distant breeds since they are robust, less prone to diseases and more productive. In order to get such hybrids, it is always recommended performing fertilization on distant breeds. Therefore, fertilization should not be carried out by those chickens coming from the same gene pool or those called full sib (mother and son, father and daughter, offspring, siblings) because the offspring from this kind of fertilization are weaker, have lower immunity and productivity level.

4. Care and maintenance for adult hatchers

During hatching, the hens incubating eggs become very weak and require more care. Hens should be given clean drinking water twice a day and be fed sufficiently with crushed lime stone and pebbles mixed in the feed. However, feed with high fat content should be avoided. Normally, they should be allowed to graze outside twice a day so that both the hens and the eggs get fresh air, which is very useful for them. If a hen doesn't come out then it should be forcibly brought out. They shouldn't stay outside for longer than 20 minutes. During the hatching, eggs can be checked after seven days through the candling method under bright light to scan fertile and infertile eggs. Fertile eggs have a black tinge and blood vessels looking like spider webs which can be seen under a candle light. In case of infertile eggs, such imprints of blood vessels cannot be seen and the dead embryo forms a small shape or thick red boundary.

Group Exercise

Divide the participants into several groups and ask them to discuss whether or not it is necessary to promote long-term poultry reproduction strategy for sustainable promotion of improved chicken breeds at the village level or not.

SESSION 8
GARDEN LAYOUT

Learning objectives:

By the end of the session, participants will be able to:

- Recommend context specific garden layouts to community members.
- Layout a garden for improved homestead production.

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Spade, tape and locally built bamboo pegs.
- Visual materials: Pictures depicting different size of gardens and model of season appropriate cropping which can be implemented at the local level.

The following conversation discusses factors to be considered during establishment of homestead garden.

Hari Maya : Namaste Miss! Welcome.

Krishna Miss : Thank you! May I see your garden and what crops are planted there?

Hari Maya : The garden has broadleaf mustard and radish only. I have very limited space for a homestead garden, nothing much can be done.

Krishna Miss : You should not think negatively. With good planning and a proper garden layout you could diversify crops and increase their production, even with limited land. There are no fixed size criteria to establish a garden. However, the size of your homestead garden will affect the volume of production and demand of your family's food requirements. If you only have a small patch of land available then you cannot completely rely just on the garden for domestic consumption. Generally the size of home gardens varies from 17-5,000 square meters.

Hari Maya : I think my garden size is about 50 square meters.

Krishna Miss : No worries. You could increase productivity of your garden if you follow a few improved management practices. Effective planning of the available space and resources will help you increase production.

Hari Maya : That means I could plant more vegetable crops as well?

Krishna Miss : Of course, why not! For optimum space utilization of home garden you must have good knowledge of synergy and compatibility of different variety of crops. Proper layout/ design of homestead gardens is important to reap maximum benefits. Utilizing a multi-layer design will make the best use of the vertical space in your garden.

Hari Maya : Is the cost high for layout and design?

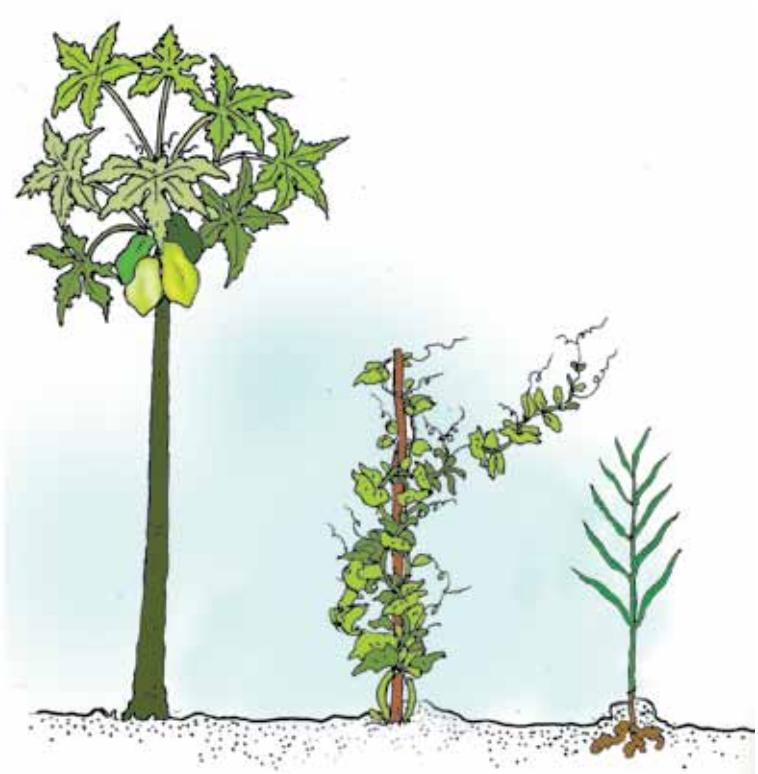
Krishna Miss : Not at all. Layout doesn't mean professional garden landscape. You can very easily do it yourself. The most important thing

is to figure out which crop should be planted where and which crops mix well with others in order to maximize production based on the resources available to you. Today I will provide you with some examples.

1. Vertical and horizontal layer management

For better space and light utilization in your home garden it is important to not only increases plant species diversity, but also increase productivity.

- Top layer can be made by planting fruit trees (such as mango, jackfruit, guava, pear, peach etc), fodder trees and other multi-purpose trees.
- Mid layer can be made by planting fruits (papaya, banana, citrus), vegetables (tree tomato, drumstick, and cassava) and climbers (gourds, yam, chayote, cucumber, and beans).
- Lower layer can be made by planting mostly of vegetables like okra, chilies, cauliflower, spices (ginger, turmeric) and herbs.
- Ground layer can be made by planting creepers (sweet potato), root crops (radish, turnip, carrot) and spices.



Layer management System

2. Incorporate at least one climber/creeper plant per homestead

Such crops don't require horizontal space. They can be grown on fences, roof, terrace and tall trees. Climbers are mostly grown around a manure collecting center because the fence surrounding the manure gives support to the climbers and additional manure is not needed. There is plenty of moisture around this area, no need extra care and watering to increase productivity.

3. Strategic selection of homestead area

Spices like ginger, turmeric are to be placed a little farther from the home as they do not require regular care and irrigation. Citrus and dwarf fruits are to be placed closer to the home as they don't require shade and other crops can be introduced in between them to optimize utilization of land. Tall fruits are placed farther since they occupy large space and provide shade to other crops. Fodder trees are placed further away from home because they have big crown and shade the surroundings affecting cultivable lands.

4. Removal of unproductive and unwanted crops

It is very essential to remove unproductive old fruit and fodder trees. Doing so will vacate space for the planting of other useful crops in garden. If the garden size is limited then fast growing crops should be planted to yield more benefit in shorter period of time.

Group Exercise

Divide participants into 2-3 groups and visit nearby home gardens. Instruct the to first evaluate whether or not the space in those gardens is properly utilized. Their second task is to design an improved home garden for maximum production.

SESSION 9
SELECTION OF APPROPRIATE CROPS AND VEGETABLE DIVERSIFICATION

Learning objectives:

By the end of the session, participants will be able to:

- Select the correct crops for the homestead garden in order to increase access and availability of nutritious foods

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Visual materials: crop calendar and table comprising of vegetables as per their nutritional value.

The following conversation discusses crop selection strategy for choosing creating diverse sources of nutrition.

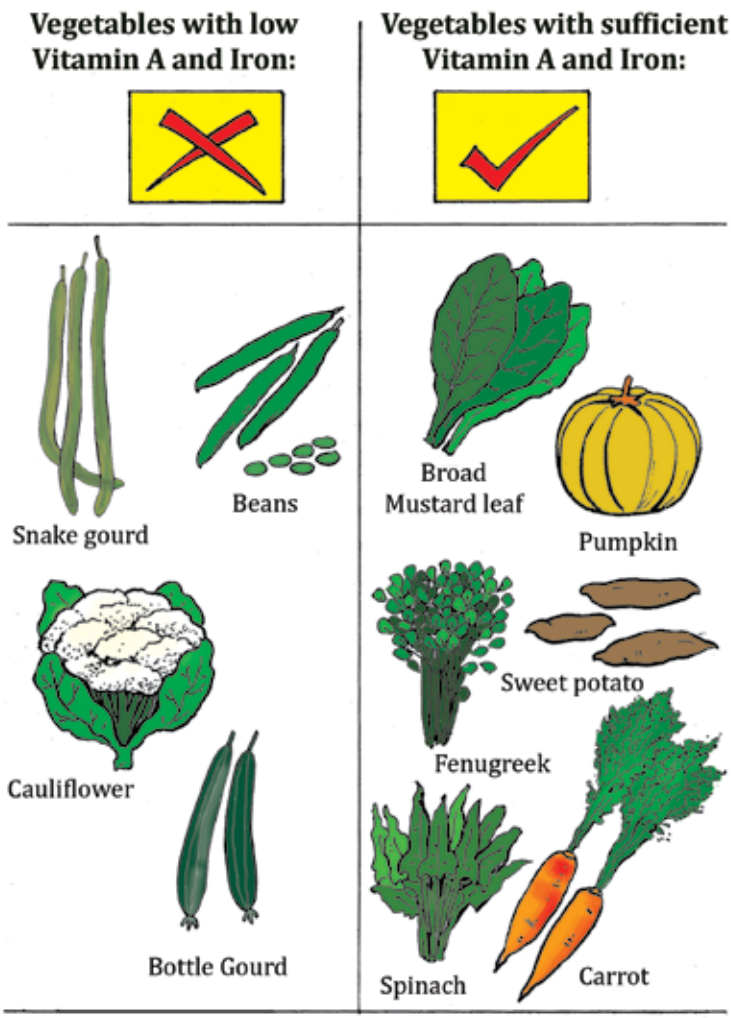
Rama Nepali : JT Miss, I also want to cultivate different crops in my homestead garden, but I am a bit confused about what to plant.

JT Miss : We should be aware about crop selection rather than planting them haphazardly. I will tell you the factors to be considered while selecting crops for your homestead garden.

1. Vegetables with high nutrient value contents (vitamins and minerals especially vitamin A andiron available in pumpkin, carrot, lettuce, spinach) required for better health of children and women.
2. Easy to grow and manageable crops with low cost input and technologies, such as (hybrids require more chemical and high input cost) Amaranths, Sweet potato, Kangkung (Water spinach), Bitter gourd and other types of gourd.
3. Though vegetables with highly nutrients should be prioritized, vegetables with cultural value, economic value and preference of family members are also important. For example, if you have limited space and options of one crop with high nutritional content and one with cultural value then you should go for vegetable with high nutritional value.
4. Multipurpose crops that can be grown around the year should be prioritized. It is beneficial if farmers can produce vegetable seeds themselves.

Name of the nutrients	Source	Deficiency symptoms
Carbohydrate	Sweet potato, Potato, Beans, Carrot, Amaranths, Coriander	• Weakness • Fatigue and tiredness • Inactiveness
Proteins	Beans, Fenugreek, Amaranths, Mustard	• Effect on growth and development • Weight loss and wasting • Wrinkling and swelling of the skin • Frequent illness
Vitamin A	Green leafy vegetables, Lettuce, Chenopodium, carrot, Amaranths, Pumpkin, kangkung, Colocasia	• Night blindness • Weakness in respiratory tract • Stone formation in gall or urinary bladder

Vitamin B	Chilies, Yam, Okra, snake gourd, Tomatoes	• Loss of appetite • Sterility • Wounds in the mouth • Fatigue in legs and hands
Vitamin C	Chilies, Broccoli, Coriander, Cabbage, Amaranths	• Tooth decay and bleeding • Cough
Iron	Coriander, Mustard, Amaranths, Fenugreek, Lettuce, Yam	• Anemia • Dirty blood
Calcium	Fenugreek, Amaranths, Radish, Yam, Coriander	• Weakness of bone/teeth • Profuse bleeding
Phosphorus	Buckwheat, Carrot, Garlic, Snake gourd, Pumpkin, Beans	• Weak bones • Low semen production
Fat	Yam leaf, leaf of fenugreek, Lettuce, Coriander leaf	• Weakness



Caption 16: Relationship between vegetables and nutrition

Planting Season:

- **Winter season vegetables**

  Vegetables like cauliflower, cabbage, broccoli, radish, carrot, garlic, onion, tomato, beans, broad leafy mustard, lettuce are winter season vegetables. Typically, the seeds of these vegetables are sown from August to October and harvested from November through February.

- **Spring season vegetables**
  Vegetables like cucumber, pumpkin, bottle gourd, bitter gourd, bottle gourd and snake gourd are spring season crops. The seeds of these vegetables are typically sown from mid-December through mid-March, and harvested from mid-March through mid-June.

- **Rainy season vegetables**
  Vegetables like okra, cowpea, beans, eggplant, chili, amaranths, and corn are rainy season crops. The seeds are typically sown from April through July and harvested during July through August.

Crop-calendar informs appropriate time for planting and harvesting vegetables

Produce green, yellow and orange colored vegetables year-round for everyone in the family to enjoy, including your child

Seasonal crop-calendar

How do you cultivate different vegetables in the garden?

- Please refer details about cultivation practices oninfo sheet 1 regarding vegetable cultivation practices.
- For specific information required for you to cultivate crops in your garden, you can approach the local agriculture service center, District Agriculture Development Office or other organizations working on vegetable production..

Group Exercise

Instruct participants to make an inventory of vegetables in their own garden and prepare a crop-calendar based on the size of their homestead garden, geographical condition, and climate and resource availability.

SESSION 10
SUSTAINABLE SOIL MANAGEMENT

Learning objectives:

By the end of the session, participants will be able to:

- Prioritize sustainable organic fertilizers for soil management Prepare organic fertilizers for low cost soil nutrient management to increase homestead food production

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Grass hook, Hoe, Spade, tape, plastic.
- Chemical fertilizers like DAP, urea, potash and agricultural lime.
- Farm manure and different types of organic manures.
- Effective microorganisms or Jiggery.
- Plastic, drum and old vessels to collect animal urine.
- Samples of soil that have both plenty of organic manure content and samples with low organic manure content.
- Visual materials: Pictures depicting traditional and improved shed and materials used in farm manure management.

The following conversation discusses low cost soil nutrient management practices for increased home garden produce.

Goma : Namaste JT Miss.

JT Miss : Namaste. How are you? Sound worrying!

Goma : I am fine but the soil is very bad in my garden. .

JT Miss : What happened? Did you use chemical fertilizer?

Goma : Yes, we have been applying chemical fertilizers for the last 2-3 years since we got it through subsidy. In the beginning, the productivity was quite high, but the soil has become harder and vegetable production is getting lower every year. Furthermore in the absence of the fertilizer subsidy program, it is being difficult for us to afford it now.

JT Miss : You should know that soil fertility and crop productivity are closely related. If you intend to get a good crop yield then you should learn how to maintain the required amount of nutrient contents in soil. If we harvest different crops regularly without application of fertilizers then soil nutrients required by plants cannot be replenished. Generally leafy vegetables need more nitrogen content, root vegetables need more potassium and flower and fruit vegetables need more phosphorus.

Goma : Yes, that's why I also used nitrogen rich chemical fertilizer. I forget the name but I think it might be urea.

JT Miss : Additional nutrients should be supplemented to soil through fertilizers, Organic fertilizers like compost and farm yard manure is best. You need to have a sustainable soil nutrient management plan rather than short term solution and profit. Chemical fertilizers

should only be added if organic matter and other sources are insufficient and in severe condition as a last resort but it should be applied very judiciously following safety measures.

Goma : We also apply cow dung, but because we have limited livestock it is not sufficient for the garden.

JT Miss : Yes, that's why I am talking about compost and other organic fertilizers. There are also incorrect-practices of cow dung, in villages to use it as fertilizer which is less effective. So simply improving the application practice will be far better for your soil.

Goma : Interesting! Can you please teach me how to prepare those organic fertilizers and their correct application?

Drawbacks of chemical fertilizers

- It doesn't add organic elements to the soil; instead it makes the soil harder and drier over time.
- A single fertilizer cannot provide all the essential nutrients required by the plants.
- Reduces the soil's organic activities.
- Excessive use of urea and ammonium sulfate causes changes in the soil composition and increase acidic soil that made the plant unable to absorb nutrients from the soil despite their availability.
- Comparatively expensive than homemade compost.
- Not always accessible easily.

How to prepare organic fertilizers?

A. Compost:

It is a low cost organic fertilizer can be produced easily from materials such as household wastes, straw, dead plants, dry grass, animal manure, ash, wood ash, urine, water hyacinth, crop residues, green leaves and weeds, maize or rice husks fruit peels, poultry litter and fish wastes. It is very easy process. This manure can be made with two methods a) Dumped into pit, b) Composting pile heaps but it depends on situation and available place at home. The following bullet points describe the details of the suitable procedure:

Compost manure

Compost preparation method:

1. Dig two pits that are 3 meter wide and 1.5 meter deep. The pit can be made according to the size of available land and organic wastes of your home.
2. Collect materials whatever you have around home, like dry grass, green grass weeds, crop residue, dead plants, waste plants, cattle's dung, animal's urine, urea, biogas slurry, effective micro-organism (EM), ash, agriculture lime, forest soil, plant leaves, crop scraps, animal manure, wood ash, rice or maize husks and other scraps and gather them near the compost heap or pit.
3. For the first layer, fill the compost pile / heap or pit with straw, dry leaves, crop and other plant scraps. Then in middle part, one-foot thick layer should be of animal manure or poultry litter and animal's urine with some prepared compost fertilizer.
4. Then in the next layer can be added Ash or wood ash and agricultural lime.
5. Repeatedly fill the pit or heap with first layer and second layer as above until it's filled.
6. Top the heap with a layer consisting of a mixture of good soil and animal manure. This layer should be approximately half a foot high.
7. To ensure aeration, fix a long pipe from the center of the heap or pit.
8. After a few days, the center of the heap will become very hot, this means that the materials are decomposing.
9. Check the heap every two to three days, ensuring that it is neither too dry nor too wet. Add some water if it is too dry. Turn over the pile every week until all of the materials are completely rotten.
10. After approximately one and a half months, turn the materials and transfer them to another pit. The compost will be ready in four to six weeks after transferring into the second pit. It should have a rich black color.
11. Cover it with thatch in order to protect it from the sun and rain.
12. The decomposition process may be enhanced by adding EM with 10 gm Jiggery, 10 ml EM mixed with 10 liters of water. Mix them throughout and apply it all of the layers.

How to know whether compost is ready?

- It is odorless and soft.
- Earthworms and moulds are present at the bottom.
- Materials used in it are not recognizable anymore.
- Absorbs more water.
- It is light with a non-sticky texture.

Checking the compost: Is it ready or not?

Points to remember

- Compost manure is highly useful in the areas where cattle cannot be reared or farmyard manure isn't available.
- Choose a site in the homestead that is protected from the rain. If this is not possible, the whole compost heap or pit should be covered by a roof, which can be made with thatch or straw.

- It is also important to know that well-decomposed animal manure takes less time to decay. Plants can absorb nutrients only from well decomposed compost.
- The proportion of animal manure is 1 portion and other materials are 10 portions should be mixed for making compost. .
- There is a chance of nutrients being lost due to faulty preparation, such as leakage and evaporation.

B. Farmyard manure

Manure prepared through the collection of stable litter, animal urine and dead plants after decomposition is known as farmyard manure.

Steps for preparation

- Select a site for preparation near cattle shed.
- Compile and mix cattle dung, urine and leftover feeding material and leave it for decomposition.
- Protect from direct sun exposure by making a thatch roof.
- Properly mix the cattle dung and bedding materials in the pit. Protect the pits from rainwater by making a separate trench around the pit
- Cover the pit with poly sheet, tree leaves or soil to fasten the rotting process.
- Check the manure regularly, it is ready when it becomes black and odorless, it shouldn't turn solid or feel sticky.
- The quality of the manure can be checked in the laboratories by sending a sample to the District Agriculture Development Office.

Appropriate methods of farmyard manure preparation

- **Pit method**

  This method is used during the dry and winter season, when there is less moisture in soil. This is a permanent method because once the pits are dug; they can be used again and again. The ideal pit size for preparing farmyard manure is 3 meters high, 2 meters wide and 1 meter deep. However, this measurement can be changed according to the amount of manure to be prepared, which is largely determined by the number of cattle and amount of bedding materials. For a home garden, the appropriate pit size is 1 m3 (1 m in length, 1 m in breadth and 1 m in depth), in which one ton of manure can be produced.

- **Semi-pit method**

  This method is normally practiced in an area where the water level in the field is high. Therefore, instead of preparing a full sized pit, a half sized pit is dug and bedding materials are kept inside it. In Nepal's hilly area, this method is normally practiced in the terrace farms, slightly below the cattle sheds. Such pits are prepared and then protected by covering it with stones and wooden materials.

- **Heap method**

  This method is mainly practiced during the rainy season, where water logging is problematic. It is done to avoid unnecessary extra moisture and leakage of nutrients caused by the higher water level in the field.

Incorrect practices found in the use of farmyard manure

- Farmyard manure prepared without using cattle urine is very common in rural communities, but urine is an essential component while preparing such manure.
- Generally farmers prepare cow dung under direct sun light before its use. This causes evaporation of nutrients and also dries out the manure. Such severely exposed manure becomes less effective.

Factors affecting the quality of farmyard manure:

- The quality of animal's feed: There is comparatively higher nitrogen content in the animal urine if the animal fed more protein rich and leguminous plant sourced fodder.
- Animals' age: Younger animals produce better quality manure than the older ones.
- The quality of bedding materials: When leguminous plants or materials are used, the quality of the manure is better.
- Materials for decomposing : For better decomposition, use fresh dung and urine, wood ashes, biogas slurry, forest soil, pond soil, and lime.

Wrong practice in the use of farmyard manure

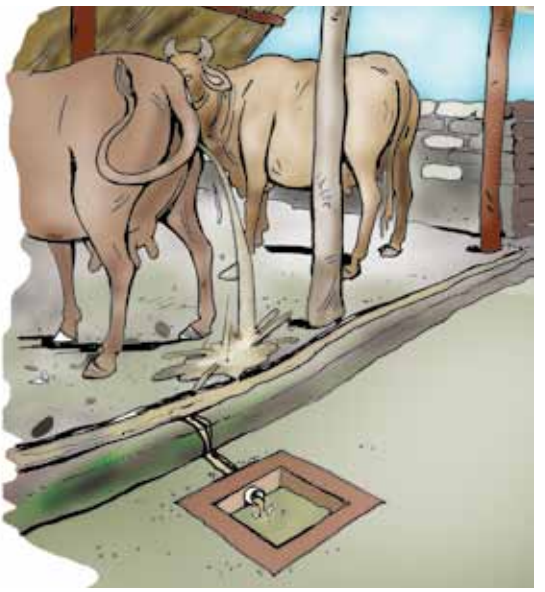
Points to be considered during application:

- Use only properly decomposed manure.
- Do not leave a heap of manure in the field before mixing it with soil.
- Incorporate the manure into soil immediately after taking it to the field,
- If the manure cannot be incorporated into soil immediately, then make a heap on one side of the plot and cover it with weeds and other green materials to protect from the sun.
- If chemical fertilizer has to be used in the soil, then use it in a balanced and integrated way.

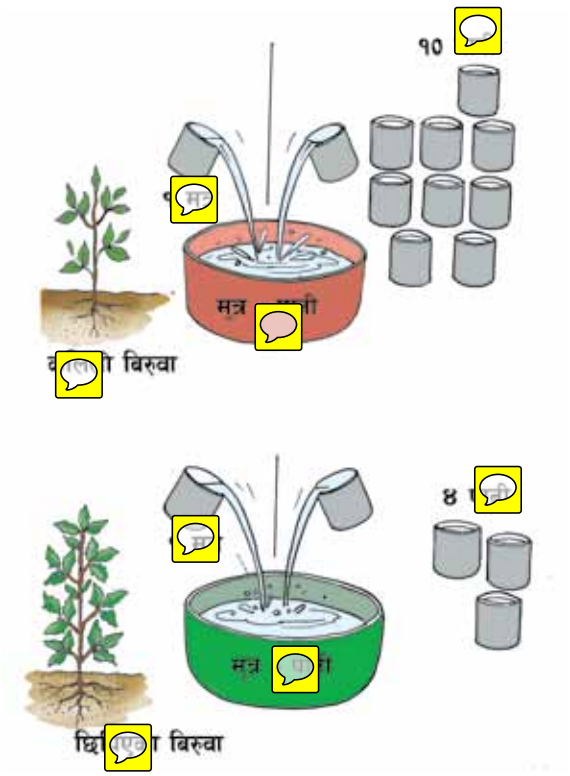
Correct way to use farmyard manure

C. Cattle urine collection and use

Cattle urine is an easily available source of nitrogen and can be easily sprayed directly on the plants. One study showed that if a cow is fed 100 kg of food, only 20% of the nitrogen is used, while the rest is lost through its urine and dung. Of that 80%, about 52% of the nitrogen is lost through urine; while28% is lost through dung. For this reason it is best to utilize cattle urine as much as possible as its nitrogen content is greater compared that of dung. The urine can be collected in a drum for direct spraying or be used when making compost. When using cattle urine to make compost, spread grass and leftover fodder in the cattle shed to absorb the urine, this can then be used in layering the compost pile.



Animal urine collection



Mixing urine and water according to the age of the plants

How to prepare cattle urine for direct spraying?

Collect the cattle urine and decompose it in a black plastic drum or in a pit for about 15 days. Once it begins to give out a rotten smell, it is ready to be sprayed on plants. For one mature plant, mix one part of urine with four parts of water, for growing plant, mix one parts of urine with six part of water and for naive plant one part urine mix with eight part of water and spraying on it.

D. Liquid Manure

Fermentation of fresh animal manure or the leaves of leguminous plants in to the water is called Liquid manure. The process of make this manure is to immersing a bag of fresh animal manure into a drum of water and allowing it to ferment. Nutrients from the soil are easily absorbed when liquid manure is applied. Depending on the materials available, animal manure can be substituted with the leaves of nitrogen-fixing trees, such as *Ipil ipil* (Leucaena leuccephala) or *Gliricidia*.

How to prepare liquid manure?

1. Take an empty jute bag and fill three quarters of the bag with fresh leaves or fresh manure.
2. Bind the opening of the bag and place in to drum with water.
3. Tie a large stone on the bag to ensure it stays at the bottom of the drum.
4. Fill the drum with water, and then cover it.
5. After three weeks, remove the bag from the drum.
6. To use the liquid manure in the garden, mix one part of the liquid manure with four parts water.
7. Apply the liquid fertilizer around the base of the plant (avoid any contact with the plant).

E. Green Manure

Green manure is produced through crops, leaves and branches that are decomposed in the soil. This is specially use for enhancing quality of the soli. There are many leguminous and other crops available in Nepal which are being used as green manure. Plants like gliricidia, sesbania grandiflora, sun hemp, pulses, soybean, beans, agola, artemisia, adhatoda, epium and lantana camera supply nutrients (especially nitrogen) to the soil. Leguminous plants obtain the atmospheric nitrogen available in the air through the nodules on their roots, thus making them a good source for green manure.

Green manure can be used in two ways. The first method is to grow leguminous crops in the field, cut them into pieces and mix them in the soil right before they are about to bloom. Another method is to

collect leaves and branches and mix them into the soil. . It decomposes within 15-20 days and provides rich nutrients to the soil. Beside this green manure is also increases fertility of the soil and improves the organic and chemical quality of the soil.

If it is not possible to gather the materials you need to prepare green manure, then it leguminous crops should be planted at least once a year to ensure that the soil quality is maintained.

Group Exercise

Divide participants into groups to discuss alternative ways to meet the demands of organic fertilizers.

SESSION 11
LOW COST AND EASY IRRIGATION MANAGEMENT

Learning objectives:

By the end of the session, participants will be able to:

- Figure-out suitable low cost irrigation techniques based on the feasibility of available resources.

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape.
- Family nutrition kit and collection of waste water in a small pool dug nearby.

The following conversation discusses low cost irrigation management practices for increased home garden production.

Goma : JT Miss, does this organization provide support for irrigation?

JT Miss : You could apply for it, but it is very difficult to get since there are so many applications.

Goma : So then what can I do? I really need it, but don't have the resources to invest in it.

JT Miss : Don't worry, for your home garden you can manage your own irrigation.

Goma : Oh really! how does it work then?

JT Miss : You could begin by collecting waste water, harvesting rain water and practicing mulching. I will briefly tell you about some of these methods, if you need more information you can visit organizations working in irrigation.

Ways to manage water for household level production

Mulching

Mulching is the practice of adding different organic substance to the soil around the plants in order to retain soil moisture. Various mulching materials are available in the rural areas of Nepal, such as water hyacinth, straw, plant leaves and leftover of animal feeding grasses. In the dry season, it is very important to maintain soil moisture for vegetable production.

The advantages of mulching

- Retains soil moisture.
- Adds organic matter into the soil.
- Protects the seeds and seedlings from the splashing effects of rain.
- Makes soil more light.
- Control to grow other unnecessary weeds.

Family Nutrition Kit

This is one of the most affordable and simple drip irrigation technologies, costing approximately NRs 700 per kit. The family nutrition kit is very useful for small scale vegetable production in areas where water shortage is a key farming problem. It is simple to use, durable and lasts for two to three growing seasons. It has been successful in India where mostly women use it to produce vegetables for domestic consumption.

Key features of family nutrition kit are:

- It is a low cost 20 liter double layered plastic bag.
- It is comprised of a 20 liter water storage unit, screen filter valve and sub-main pipe.

Waste water collection

In many rural areas of Nepal, water scarcity affects daily lives and makes it all the more difficult to manage water to irrigate nurseries, home gardens and farms.. In such areas where water cannot be fetched from far away, collected waste water can be used for homestead food production. It is a low cost and simple and doable water management practice which minimizes irrigation problems. Waste water from washing dishes, hands, faces, clothes and bathing can be used to irrigate few crops in homestead gardens.

- Select a site to prepare the pit, this site should be an appropriate area to collect waste water.
- The pit should be 50-60 cm deep and 20-25 cm wide.
- Put plastic sheet on the bottom of the pit to prevent water leakage.
- Cover the pit with plastic to protect from insects, pests and other external materials, especially during the summer.
- Soap water should not be included in this pit to avoid its negative effect to the plants.

Group exercise

Divide the participants in various groups to discuss on possible low cost and doable irrigation practices at the local level.

SESSION 12
PEST AND DISEASE MANAGEMENT USING LOCALLY AVAILABLE RESOURCES

Learning objectives:

By the end of the session, participants will be able to:

- Prioritize pest management practices based on locally available resources.
- Prepare bio-pesticide for pest control through the use of local resources.

Time: 1 hour 30 minutes

Required materials:

- Newsprint, marker and masking tape.
- Locally available plants with pest fighting abilities.

The following conversation discusses integrated pest management.

Goma : JT Miss, I don't know why so many of the crops in my homestead garden are being affected by insects, pests and diseases these days.

JT Miss : I wouldn't recommend using chemical pesticides to control them. Chemical pesticides and insecticides are expensive and aren't always easily available in the villages. If you don't use them you risk reducing the plants productivity, however such chemically treated produce may have adverse impacts on human health.

Goma : So what can I do in such a situation?

JT Miss : I will tell you how to prepare bio-pesticides from locally available resources as well as some techniques to reduce pest and insect infection. Although applying chemicals should be the last resort, you should know the type of pesticides and how to apply them.

Bio-pesticide

Bio-pesticide is prepared from natural resources such as animals, plant leaves, roots, twigs, fruits and other natural ingredients available at home. Bio-pesticide can minimize attacks from harmful insects and pests on homestead garden crops. This simple process can change the quality of garden produce and reduce crop loss from insect and pest infection. For effective results, farmers must use this bio-pesticide very frequently, for example, in rainy season it should be used almost every day or at 1-2 day intervals, during winter season it should be used every 3-4 days.

Preparation method

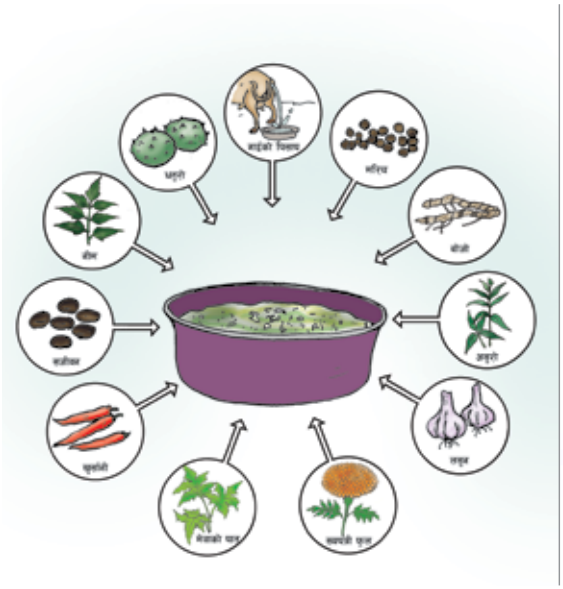
1. Collect ingredients for bio-pesticide like Mugwort, Neem (azadivacta indica) leave, Sting nettle, Papaya leaves, Asuro (justicia adhatodo), Bakaino (melia azadracht), Khiro (sapium insigne), Bojho (calamus), Timur (zanthoxylum alatum), chilli, lemon grass, Tulasi (ocimum sanctum), Kalo sirish (albezia sinensis) garlic, cattle urine, , kerosene oil, and other crops with high pungency (collect as many diverse ingredients as possible).
2. Collect the plants and cut them into small pieces.
3. Fill ⅔rd's of drum with this mix then fill the remainder of the drum with cow urine.
4. During the summer months let the mixture sit and decompose for 25 days and for 30-35 days during the winter.
5. Once the mixture is decomposed, it can be used in a ratio of 1 part pesticide to 4 parts water4 for bigger plants and a ratio of 1:10 for smaller plants.

Things to remember:

- Always use locally available bitter, nasty and unpleasant odor plants.
- Add Pina (oil free mustard residue) into the mixture for fast decompose.
- if not possible to add animal's urine, water can be used.

Other methods to manage insect and pest

1. **Plucking by hand:**
   In areas where plants have been inflected by pests, separate the infected pests from the rest of the plant by plucking them. Infected parts should be buried to avoid spreading the infection to other healthy plants.
2. **Physical intervention:**
   A physical intervention can be used to protect plants from certain pests and insects by covering them with a net or thin cloth. It is an effective measure to save flowers from the flies that rot them.
3. **Light trap:**
   Since many insects are attracted to light, a glowing object or light can be placed in the middle of the field, below the light a large bowl with water and kerosene mix. When insects are collide with light and fall in the water and kerosene mix and die.
4. **Making the area clean ,**
   Cleaning the area by removing unnecessary weeds helps to reduce infection from pests and insects. Many of these pests are also attracted to post harvest remains. Such post-harvest remains should either be buried or burnt in order to avoid pest infection.
5. **Crop rotation**
   Crop rotation is an effective method to discourage pest infection. By regularly changing crops pests won't be able to complete their life cycle with in one plant species, this helps to avoid further infection.
6. **Time of planting**
   Paying attention to the time of the year when vegetables are planted also helps to reduce insects, pest and diseases. For instance vegetables and other crops should only be planted during seasons when the disease infection levels among plants are the lowest; this will save the plants from various diseases.
7. **Fertilizer management**
   Using the appropriate quantity of manure during the time of plantation and topdressing helps to ensure that the plants are healthy, grow fast and have better immunity against future infections.
8. **Mixed crops**
   Planting various types of crops and plants at the same time, i on the same patch of land will prevent all crops from several infections at the same time.
9. **Proper irrigation**
   Properly irrigating the gardens will help to control the number of insects and pests already present in the soil.



Plants used to prepare bio-pesticide

Using bio-pesticides

Group Exercise

Divide the participants into several groups and ask them to discuss the challenges of using bio-pesticide in large scale home gardens and vegetable production.

SESSION 13
SEED PRODUCTION AT HOME GARDENS

Learning objectives:

By the end of the session, participants will be able to:

- Identify healthy and quality seeds and promote proper seed production strategies.
- Adopt basic requirements of seed production for producing healthy and good quality seed.

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape.

The following conversation describes the importance of village level seed production.

JT Miss : Namaste Maya , what are you doing?

Maya : Namaste Miss, I am just doing household chores.

JT Miss : I am on the way to visit one of my relatives and wanted to see your garden.

Maya : This season, I have had good vegetable production in my garden, but now I am worried about how I will get seeds for the next season. I heard that the program that supported us only provides seeds for three seasons, so I won't have seeds for next season.

JT Miss : Yes, most programs work that way since nobody can provide support forever. So we need to start planning ways to become self-reliant and continue farming sustainably. I suggest you start producing seeds from whatever crops are available. For example you can easily save seeds from gourds, beans etc.

Maya : Miss, can you please tell me more about it.

JT Miss : First of all, I have to know about your land size. If you have limited land, then I don't suggest you to produce seeds yourselves, instead you could support your community members who have more land to produce seeds. This will also help you to get seeds regularly and easily.

Maya : Land is not a problem for me.

JT Miss : That's good, so you can produce seeds, though the quality of seed production is very important. Seeds of improved varieties are not easily available in the market so farmers produce their own seeds without considering and maintaining their quality. These seeds have low performance quality resulting low yield. On the other hand, producing seeds of local varieties and indigenous crops will contribute to the conservation of such crops. In fact the seeds of such traditional varieties and indigenous crops aren't usually found in the market.

Maya : JT Miss, does that mean I can produce seeds from any crop in my garden?

JT Miss : No, it is difficult to produce seeds of every crop variety. It is relatively easy for gardeners to maintain the quality of seeds of self-pollinated

		vegetables in comparison to cross pollinated varieties. Cross pollinated varieties and crops tend to modify and diversify. You cannot produce seeds of hybrid varieties unless you have a specific technology and structures. All hybrid seeds are imported and expensive. So I mostly discourage to cultivate hybrid varieties of vegetables.
Maya	:	So then let's me know what types of seed can be produced in my garden and how?
JT Miss	:	Okay I will tell you about the basics of seed production. There is famous proverb that says "fruit depends on the plant and the plant depends on the seed", this demonstrates that healthy, quality seeds are the foundation for better yield.

Gardeners need to know different aspects of quality seed production such as:

- **Pollination :**

  For successful good quality seed production it is important to understand the pollinating behavior of the crops. They usually pollinate in one of the three following ways:

  - ***Self-pollination:*** The flowers of self-pollinated vegetables (such as bean, tomato and lettuce) are complete; this means they contain both male and female parts. Self-pollination occurs when the pollen of one flower fertilizes the same flower on the same plant.
  - ***Cross-pollination:*** This occurs when an insect or the wind transfers pollen from the flower of one plant to another (e.g. pumpkin and radish).
  - ***Incomplete/sometimes cross-pollination:*** Sometimes, a mixed pollination occurs when a single plant either self-pollinates or cross-pollinates, depending on the environmental conditions. Examples of mixed-pollinated plants are eggplant, okra and pigeon pea.

- **Sources of seeds :**

  It is important to know the source of the seeds being used. Seeds should either be produced by the gardener or acquired from a reliable seed source.

  - **Plot or land selection :**

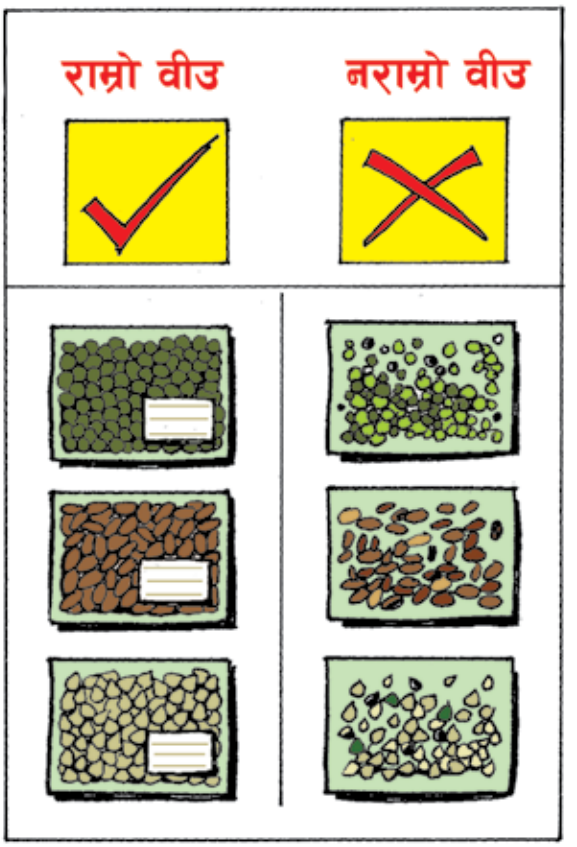
    The plot or land should not have been used to cultivate the same crop in the previous season or year. The land should also be free of weeds and seed-borne diseases for developing good and quality seed.
  - **Isolation Distance :**

    Isolation distance means a distance that is maintained to avoid cross-fertilization between two different varieties of the same crop. To prevent cross-fertilization of different varieties of the same vegetable, it is important to maintain the correct isolation distances. Isolation distance varies with different seed categories, such as foundation or certified seeds.

    Sometimes it is very difficult to maintain isolation distances between common vegetable's seed with many varieties in the same village. In such cases, contamination from the same crops that are too close in proximity can be prevented by providing the neighbors with the same varieties of seeds or by choosing a protected plot surrounded by trees or high fencing.

Properties of a good seed:

- It should be physically pure (it should not contain any germs of weeds and inert materials).
- It has a higher germination percentage (more than 70%).
- The seeds should have the same size, they should be shiny and free from disease and insects.
- If possible, it should be treated with the appropriate chemicals.



Good and bad seeds

Steps of seed production:

Step 1: Roughing and plant selection

Healthy crop means healthy seeds, so diseased plants should be removed from the field and destroyed. This not only prevents the contamination of other plants, but also protects next season's harvest from seed-borne diseases.

- Roughing - the action of removing and destroying plants in the field that do not have the desired varietal characteristics.
- Plant selection- Maintain the best plants with highest yield by carefully selecting them at the appropriate growing stage. To prevent household members from harvesting the plants/fruits that you wish to keep for seeds, mark the selected plants so that everyone can see that these plants or fruits are saved for seed production.

Step 2: Seed collection and extraction

Seed collection and extraction depends on the type of vegetables that will be harvested. Different types of vegetables have different methods of seed collection as described below:

- **Wet seeds from fleshy fruit**
  When the fruit flesh and seeds are wet, such as in tomato, eggplant, cucumber and bitter gourd, the flesh is usually attached firmly to the seeds. These types of seeds can be extracted by hand or by using a knife. A fermentation process is sometimes used to remove the seeds. After cutting, soak the fruit in water for 12-24 hours, then separate the seeds from the flesh and throw away any flesh and seeds that float in the water. The good seeds are those that have sunken to the bottom, they should be washed and dried.
- **Dry seeds**
  These are obtained or extracted from a dried pod or fruit. Seeds are extracted by hand or by beating the fruit or pod inside a bag. Beating the seeds inside a bag is necessary to prevent the seeds from scattering. Seeds from vegetables such as cauliflower, cabbage and beans are obtained this way.

- **Dry seeds from fresh fruit**
  The ripe fruit is dried before the seeds are extracted. Some of the vegetables where seeds are extracted this way are chilies and okras. Once the fruits are dried, the seeds can be extracted by threshing or by hand.

Grading seed

Step 3: Cleaning and grading of seeds

Cleaning is an important step in maintaining the quality of seeds. The cleaning and grading process is to physically separate undesirable materials. The unwanted materials are mainly:

- Inert materials
- Weed seeds
- Other crop seeds
- Lightly damaged or low quality seeds

Home gardeners perform this process mainly by winnowing and by gravity separation using locally available materials, bamboo baskets, and wind blowing.

Step 4: Drying seeds

It is necessary to dry seeds properly before processing; this helps to increase longevity while storing the seeds. Seeds with high moisture content are easily attacked by pests and diseases and often get damaged during processing. Seeds should be dried in the sun on a clean, uniform surface. Do not be dry directly on the ground surface. Various locally available materials can be used for drying seeds such as plastic sheets and jute mats. If it starts to rain the seeds can quickly be covered with these materials.

The following points should be kept in mind when drying seeds:

- Choose a spot that is always exposed to the sun during the day.
- Spread the seeds thinly over the drying mat.
- Seeds should be turned over gently four or five times a day to ensure that they dry evenly.
- Do not dry seeds in the sun when the heat is too intense (i.e. between 11am and 1pm during the dry season) as it can damage the germination capacity of the seeds.
- In the evening bring the seeds indoors.
- Continue this process until the seeds are properly dried.

How to determine the seeds are sufficiently dried?

There are several local methods that home gardeners use to determine whether seeds are dry enough for storage. All vegetable seeds are divided into the following three categories (depending on their size) for the purpose of the tests:

- Large, thin seeds will break with a snapping sound when twisted between the fingers. This method works with seeds from pumpkins, bottle gourd and wax gourd.
- Large, thick seeds, which cannot be broken between the fingers, must be tested in a different way. The seed will break with a cracking sound when bitten. This method works with seeds from beans, soybean and maize.
- Small seeds will break with a cracking sound when squeezed between the fingernails. This method works for amaranth, radish and mustard green.

Method to check whether or not the seeds have dried

Step 5: Storing seed

After cleaning and drying, seeds should be stored carefully so they remain dry and safe from insects. Seeds should be stored with the following principles in mind:

- Bottles, tins and glass jars with tight fitting lids or stoppers can be used.
- Make sure that the container is dry before putting seeds in it.
- Use rat and mouse proof containers.
- Different varieties of seeds can be put into separate plastic bags and then into large bags.
- Toasted rice or ash is kept inside the container to draw moisture out of the air and keep the seeds dry.
- Do not put a small amount of seeds in a large container.
- Remember that heat kills seeds, so store your seeds in a cool, shady and dry place.
- Do not place the seeds directly over a fire (cooking place) or under direct sunlight.

Step 6: Testing seed quality

Seeds can be stored for 6-8 months before use. Controlling a good storage environment is essential, especially after dry and rainy season. It is advisable to carry out a simple germination test before using, selling or giving the seeds to others.

The steps to test the quality of seeds:

- Fill an earthen or wooden pot with river sand and wet it.
- Sow 100 seeds and wait for about one week, maintaining a high level of moisture.
- After one week, count the seedlings that have come up. If the quality of the seeds is good, there should be at least 50 to 80 (depending on the type of vegetable) sprouts.

Step 7: Seed Treatment

Though selecting seeds from healthy plants is the basis for managing seed-borne diseases, seed treatment also helps to prevent plants from being infected by harmful organisms and diseases. There are several ways to treat seeds; some of them have been listed below:

- **Sun and hot water treatment**
  Sun drying protects the seeds from the germs of insects and diseases that are stuck on the outer layer of the seeds. In addition, treating vegetable seeds in hot water at 50º C for 30 minutes will kill all germs. It is important to ensure that the seeds are treated at the exact temperature and given time frame.
- **Seed treatment in salt water or brine solution:**
  In this method, the seeds are rinsed in 1% to 2% salt water (i.e. 10 to 20 gm salt/liter of water). The water should be heated very gently. Afterwards, the seeds are dried in a shady area and later under gentle sunshine. This practice kills the germs of diseases that stick on the outer layer of the seeds.

Group exercise

Based on the following conversation, discuss in groups under what situation should farmers/ households initiate seed production.

SESSION 14
FISHERY

Learning objectives:

By the end of the session, participants will be able to:

- Understand the importance of rearing various species of fish for the overall nutrition consumption of the family.
- Explain fundamental aspects of fisheries in home gardens.

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape.

For proper physical and mental growth, people need a balanced diet comprising of vitamins, minerals, and proteins. Due to an absence of the right amount of these essential nutrients malnutrition has become prevalent across the country. Beans, vegetables, fish, milk and meat are a good source of these vitamins, proteins and minerals. Fish is one of the main sources of protein that is affordable and can be used as easily accessible nutrients tablets.

Kalpana didi : Namaste everyone.

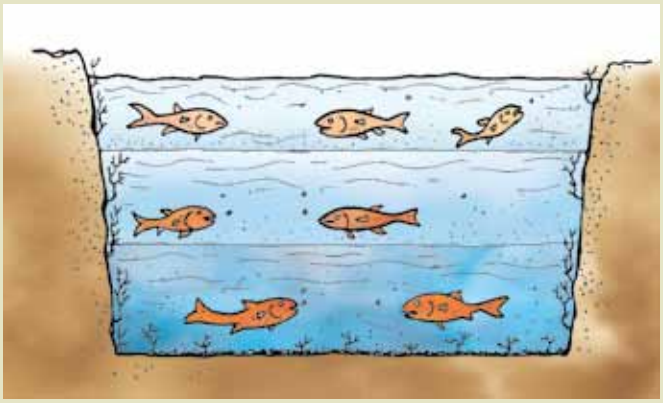
Participants : Namaste Kalpana didi.

Gaura : didi I heard about the fishery at the District Agriculture Development Office yesterday. It sounds very interesting. Is it possible for us to start fishery in our home gardens in the village?

Kalpana didi : I was just about telling you all about the importance of fisheries and how a fishery can be integrated into home gardens.

Maya : How is it important?

Kalpana didi : Fish is a great source of protein and helps improve the health of pregnant women and young children. Rearing various species of fish also helps generate extra revenue for the family.



There are three levels of water for rearing various species of fish.

Gaura : How can we integrate a fishery in our home gardens then, didi?

Kalpana didi : First of all, we need to properly manage our water source and find an appropriate area for the pond.

Maya : How much area is required for the pond?

Kalpana didi : It depends on the availability of the land, but the appropriate pond size would be about 50-100 square meters and pit should be 4 to 5 ft. deep. The pond shouldn't be too far from the house and should not be wet area.

Maya : So can we get the fish immediately after digging the pond?

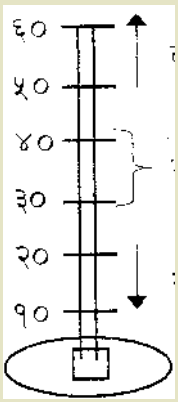
Kalpana didi : Not that fast. When the pit is ready, wet the pit with little water and now it needs to be covered properly with local paint chuna (lime powder) 2 to 4 kg and allowed to dry. The dry pit should be filled with organic manure (3 to 6 kg) and chemical fertilizer (300 to 600 gram urea and 1 to 2 kg DPA). After the pit is ready, the water needs to be filled before five days it will help to develop natural feeding like weeds and grass. Then the fishes are transferred in to the pond. The water softness in the pond needs to be checked regularly.

Gaura : How do we test water softness?

Kalpana didi : Cut out a circle from an iron sheet and paint it in four sections. The first and third should be painted black and the second and fourth should be painted white with enamel paint. The iron sheet has to be thicken that can be deep in to the water easily. Tie the centre of the circle with a thread or wire and dip it in the water at mid noon to gauge the softness. If the color of the circular iron sheet is visible below 20 centimeters then the pond is no fertile, if the color becomes invisible before the 20 cm mark then the pond is fertile. Therefore color of the pond should be slightly green. If the pond is not fertile then the fishes won't be able to grow properly, and in case of higher fertility the oxygen will be low which will again affect the production. The softness/ fertility of the pond can also be checked by placing one's hand inside the water.

cm

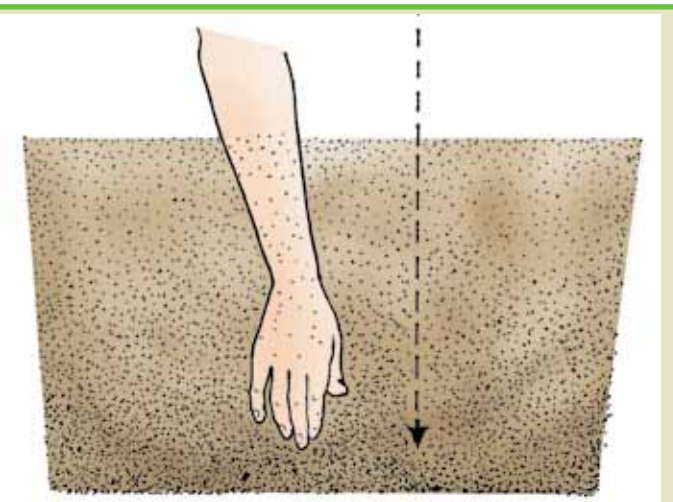
Sechi disk



Less fertile

Appropriate fertility

Highly fertile



Checking how fertile the pond by dipping hand in the water

Maya : What species of fish would be most appropriate for such pond?

Kalpana didi : Carp would be the most appropriate species.

Gaura : And what should we feed the fish?

Kalpana didi : There are natural and artificial feeds available for fish. The natural feed mostly comprises of water plants, while artificial feed are those given from outside. The feed prepared for fish at home should consist of protein rich items like mustard, beans, nuts and maize, wheat among other grains.

Maya : How much do we feed them?

Kalpana didi : It depends on how big the fish is they should be fed just 3-5% of their total weight. The feed should be properly mixed, make like small ball and given six days in a week, at the same time and same place.

Gaura : We have learned so much about fisheries, can you also tell us about the diseases that can affect fish?

Kalpana didi : You have raised an excellent question. The primary causes leading to diseases are: lack of oxygen in the pond, polluted water, excessive use of manure, fishes getting hurt, and weakness caused by the lack of feed, and not removing dead or ill fishes from the pond.

The fish can be saved from such diseases by taking the following steps:

1. Daily inspection of the pond.
2. Maintaining the pond water level.
3. Providing the fish with sufficient feed.
4. Buying the fish from a reliable fish farm only.
5. If possible the pond should be dried once a year and should be repainted with the appropriate amount of local paint Chuna (lime powder).
6. Preventing dead and decomposed materials from entering the pond.
7. Check for broken fins, swollen eyes, gills turning yellow, and rashes on their bodies and consult with the help of concerned technicians for treatment.

Group work

Ask the participants to discuss ideas and prepare a plan about constructing a home garden fishery.

SESSION 15
CONCEPT OF VILLAGE MODEL FARM

Learning objectives:

By the end of the session, participants will be:

- Familiar with the concept of village model farm (VMF) to promote homestead food production in community for household nutrition security.
- Able to work out strategies for sustainability of village model farm for wider impact.

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape.

The following conversation explains why it is necessary to learn technicalities of how VMF supports sustainable HFP at household level.

JT Miss : Maya bahini, besides seed production, I would also like to share other strategies of sustainable HFP with you.

Maya : Yes please, I would love to learn more about it.

JT Miss : But first you need to promise me to share the concept of the village model farm with as many people in your village as possible.

Maya : Definitely Miss.

JT Miss : The village model farm is a resource farm/garden in a village which demonstrates good, innovative practices to increase homestead food production. It not only demonstrates good practices of production, but also increases community members' access to seeds, seedlings, poultry birds, diverse vegetables and other simple agricultural inputs.

Maya : It sounds great. Such model farms should be in each community and can help to motivate community members to develop model garden and make resources more accessible.

JT Miss : You are right. For sustainable HFP, there should be 4-5 village model farms in each community. Actually, this concept has been developed and promoted by HKI (Helen Keller International) globally. Based on last the10 years of HKI Nepal's experiences in the far western region of Nepal, the village model farm concept is gaining popularity and is quite useful to increase HFP. Under this concept, each village model farm owner provides services and resources to 40-50 households in the community. The owner acts as progressive farmer with leadership qualities to bring together community members. Okay now I will tell you how to select a model farmer.

Roles and responsibilities of village model farm (VMF)

- Inspire, motivate and build capacity of members for HFP.
- Provide technical assistance to community members.
- Provide inputs/materials as much as possible (in the beginning sell to community members the seedlings, poultry chicks, eggs, vegetables).
- Provide counseling to members on concerned issues.
- Monitoring and supervision from household level.
- Lead the community for sustainable development.
- Coordination and linkage with other stakeholders for community development.

Step1: Criteria for selecting a village model farm owner:

- Land holding size for demonstration of improved homestead food production- varies from 2 kattha in Terai (7290 sq. ft. in plains) to 1.5 ropani (8214 sq. ft.) in hills.
- Support from other family members for necessary garden activities.
- Should be active, innovative, committed, risk taking, pro-active leader female farmer.
- Interested in cost sharing to make poultry coop and other required investment for increased vegetable production.
- Location of VMF should be accessible to household beneficiaries so that she could easily provide technical services to community members as per the requirements.
- Availability of basic agricultural facilities like sources of irrigation.

Step2: Capacity building and material support to VMF owner

- Provide relevant training to increase vegetable production and improve poultry production.
- Also provide material support like seeds of diverse vegetables, chicks and other basic inputs as per norms of the organization.

Step 3: Institutionalize relationship between VMF and household beneficiaries

- Orient VMF owner to provide technical services to household beneficiaries through the demonstration of increased vegetable and poultry production and organizing monthly meeting.
- Supervision and monitoring of household beneficiaries' gardens and improved management practices.

Selling hen

Step 4: Entrepreneurship development

- Provide the necessary support to generate income through selling chicks, hens, eggs, vegetables and seeds.

Strategies for VMF sustainability are:

- **Formalize linkages with District Agriculture Development Office (DADO) or District Livestock service Office (DLSO) for VMF registration.**
  - To obtain regular technical advice from DADO or DLSO.
  - To promote VMF as a local level contact point for agriculture and livestock extension workers.
  - To procure vaccinations or be trained to vaccinate with supply from a commercial/ government source.

- **Create market linkages for income generation**
  - Link VMFs with local level farmers' groups and private sector groups, especially agro vets and brooding centers.
  - Establish/improve local markets to ensure income generation from surplus HFP produce.
  - Link saving and credit groups to VMFs to provide economic credits to women's groups.
  - Create demand for procurement of seeds and poultry by community members.
- **Improve local governance**
  - Build local level capacity and facilitate multi-sectoral planning & coordination.
  - Strengthen existing agriculture extension structure and brooding centers.
  - Explore small scale irrigation facilities with DADO, DDC (District Development Committee) and linking VMFs for subsidies.

Group Exercise:
Participants are asked to select potential VMF in their locality (VDC) and present reasons for selection and possible strategies for sustainability of the VMF in the community.

SESSION 16
COORDINATION AND LINKAGE WITH LOCAL SERVICE PROVIDERS AND TECHNICAL ORGANIZATIONS

Learning objectives:

By the end of session, participants will be able to:

- Understand importance of coordination and linkage with local service providers for sustainable production.
- Workout strategic partnerships for resource generation and synergy building activities.

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape.

The following conversation explains the basic knowledge about how to coordinate and link with local service providers.

Maya : Namaste JT Miss, I am here to ask you a favor. Could you please arrange vaccines for my new born improved breed chicks?

JT Miss : I am from the agriculture service centre and we don't have a special package for such vaccinations. Due to limited budget we cannot allocate funds for livestock. But I suggest you visit the livestock service center, since they work with livestock and poultry. It is important not to rely on only one organization for support and services. You should be pro-active and search service providers working at the community level. These days there are so many organizations working for community welfare, try to get information about those organizations as well as what kind of resources and support they offer. You have the right to approach those organizations as their goal is to help community members.

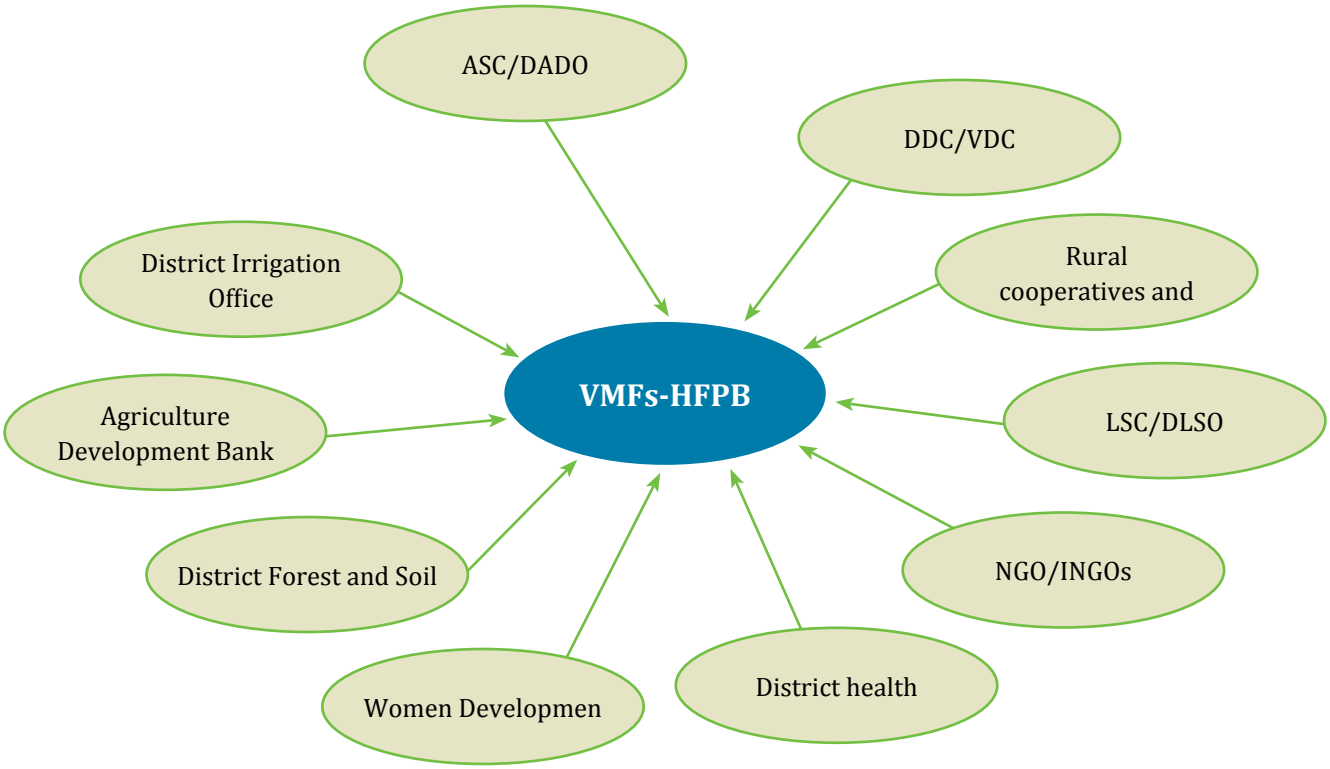
Maya : Oh! I have no idea on these thanks you miss. Could you please let' me know which organizations are working in our community who can help farmers like me?

JT Miss : oh that's fine I will tell you about some community based organizations that might be helpful to you, but you need to explore more about other similar organizations working at the community level in the same areas.

Maya : Will they support us if we just go there and ask them what we need?

JT Miss : No, they have their own policies and regulations, for example, if you are in group then you could approach the livestock service center and agriculture service center. You should know about their criteria and how to seek their support in terms of technical assistance, providing goods and support services. Then you should think about what group or cooperative needs to be registered in which organization as per your need. These days VDCs also have budget for community development, so you should also go to VDC with other members for possible support and resources.

Organizations for coordination and linkages



Group exercise

Instruct participants to make an inventory of organizations (GOs, NGOs, INGOs, civil society) working in their own community. Do they have any experience collaborating on community work with any one organization? If yes, then ask them to present their experience of how they made it possible, what came of their collaboration and what did they learn from the experience?

SESSION 17
COLLECTIVE MARKETING FOR ADDITIONAL INCOME

Learning objectives:

By the end of the session participants will be able to:

- Understand what collective marketing means and why it is necessary.
- Promote concept of collective marketing and its approaches for additional income generation.

Time: 1 hour 30 minutes

Required materials

- Newsprint, marker and masking tape.

The following conversation explains the essence of collective marketing and collective marketing approach as one of the ways to promote small scale homestead garden produce for household benefits.

Goma : Krishna Miss, Many people are talking about collective marketing, I would like to know about it.. What does it mean?

Krishna Miss : That is a good question. Collective marketing really helps to sustainably manage your HFP. I will tell you briefly about it, but first I want to know whether or not you have started selling your garden produce.

Goma : No, I haven't, my garden produce is very low and is only sufficient for family consumption. However last season due to improved management practices, we produced more than our family's requirement. Unfortunately the surplus vegetables were wasted because I couldn't take the extra two kg cucumber to the market. It is too much of a hassle given transportation costs and required time.

Krishna Miss : Don't worry; based on collective marketing your problem will get solution. . Collective marketing really helps small scale farmers like you to sell your surplus after consumption. Actually, home garden produce will get good market value because:

- The vegetables are fresh and diverse.
- The produce is organic, high quality, highly nutritious and healthy.
- Has unique value.
- Small quantity is easily saleable.

Challenges of HFP marketing

- Small production volume.
- Means of transportation (limited road access and only option is using animal for transportation).
- Not easily access to market (limited market).
- High cost of transportation.
- Time consuming.
- Competition with commercial vegetables (that has high use of chemicals, insecticide, pesticide).

Collective Marketing Process

- Collect surplus home garden produce from each household.
- One of the community members needs to take initiation to bring the collected surplus to the nearest market.
- Take turns among group members to collect and market the produce.
- Maintain transparency among group members.

Marketing strategy

- Collective marketing plan (informal) – turn wise.
- Agreement with households directly- One VMF/Group comprising of 15-20 households for regular supply of diverse vegetables and eggs.
- Focus on consumer preference- diversified vegetables, unique vegetables.
- Focus on quality and healthy production- harvest at proper stage, use of organic fertilizers.
- Unique promotion strategy- focus on local available management process for healthy productions from HFP.
- Group approach, cooperative approach (formal approach) for homestead production.
- Development of HFP networks to target district market, central market.

Group exercise

Do you think there is a scope to start collective marketing in your village/community?
If yes, how will you plan for collective marketing?

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