



Food and Agriculture
Organization of the
United Nations



CLIMATE SMART AGRICULTURE Curriculum/Module

for

In-service and Extension Agents Training

in

Myanmar

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**Sustainable Cropland and Forest Management in Priority Agro-
ecosystems of Myanmar Project (GCP/MYA/017/GFF)**

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ACRONYMS

AESA	Agro-ecosystem Analysis
AVSI	Association of Volunteers in International Service
CA	Conservation Agriculture
CARTC	Central Agricultural Research and Training Center
CSA	Climate Smart Agriculture
DAR	Department of Agricultural Research
DoA	Department of Agriculture
FAO	Food and Agriculture Organization
FFS	Farmer Field School
GAP	Good Agricultural Practices
GEF	Global Environment Facility
GHG	Greenhouse Gas
IPM	Integrated Pest Management
MoALI	Ministry of Agriculture, Livestock and Irrigation
MoNREC	Ministry of Natural Resources and Environmental Conservation
NGO	Non-government Organization
SAI	State Agricultural Institute
SALT	Sloping Agricultural Land Technology
SFM	Sustainable Forest Management
SLM	Sustainable Land Management
YAU	Yezin Agricultural University

Climate Smart Agriculture Course Curriculum

1. Background

The Food and Agriculture Organization of the United Nations (FAO) is implementing a project entitled “**Sustainable Cropland and forest management in priority agro-ecosystems of Myanmar (SLM-GEF)**” in coordination with the Ministry of Natural Resources and Environmental Conservation (MoNREC) and the Ministry of Agriculture, Livestock and Irrigation (MoALI) with funding from the Global Environment Facility (GEF).

The project aims to facilitate and strengthen sustainable land management (SLM), sustainable forest management (SFM), and climate-smart agriculture (CSA). The project facilitates the adoption of climate smart agriculture (CSA) policies and practices that will help to sustainably increase productivity, enhance resilience (adaptation), reduce/remove GHGs (mitigation) and enhance achievement of national food security and development goals.

The project intends to establish a national CSA/SLM training program mainstreaming CSA/SLM in the agriculture related training conducted by Department of Agriculture (DoA), State Agricultural Institutes (SAI), Department of Agriculture Research (DAR) and Yezin Agricultural University (YAU). The project will work with DoA, SAIs, DAR and YAU to integrate CSA within their research, training and development programs. The training program will vary with the need and nature of the institutions, for example;(1) one month training together with other subjects for the in-service or refresher course at Central Agriculture Research and Training Centre (CARTC), (2) one week intensive training of trainers (ToT) aiming for the senior extension agents of DoA, DAR and YAU, (3) CSA component integrated into the course for diploma students at SAIs, and (4) CSA component integrated into the course for bachelor and master's level at YAU.

AVSI Foundation has been contracted to develop the Climate Smart Agriculture Curriculum and Handbook to be introduced and incorporated as a course (subject) into the existing education systems at different levels as mentioned above. This document will serve as the main resource/reference book for the trainers to include the related topics on CSA into their courses for teaching.

2. Initial step before developing training curriculum

(a) Yezin Agricultural University

As a first step, the National Consultant accompanied by some responsible persons from AVSI Foundation visited YAU to explore the nature of courses being offered and explore the possibility of integrating CSA component in the existing curricula for undergraduate as well as postgraduate level at YAU. At the beginning, YAU presented a long list of 28 courses altogether aimed at CSA curriculum. However, some of the subjects are existing ones but many of them are just presented as the title and the details are yet to be developed. On the other hand, it is not well organized involving too many subjects, which is almost impossible to be incorporated into the existing courses. After discussion with the Rectors and Professors, it was learned that there was no CSA course as a separate subject offered for graduate or undergraduate levels although some topics related to CSA were included in some courses offered by different departments such as Agronomy, Soil Science, Agricultural Botany, Entomology and Horticulture. However, the courses were fragmented and focusing their own subject matter, not the climate smart agriculture. That means a curriculum needs to be developed for CSA.

(b) State Agricultural Institutes

The meeting with the responsible Director for training and the Principals of SAIs also revealed that CSA course is yet to be incorporated into their diploma courses although some topics such as soil conservation and conservation agriculture were touched very lightly but not with the concept of climate smart agriculture.

After discussion, it is agreed that CSA curriculum should be introduced in the third year. Initially it was agreed that half of the lecturing hours for both subjects will be replaced with CSA curriculum without affecting the essence of all subjects as usual. The director and responsible personnel for curriculum development of SAIs prefer to assign only one department (Agronomy) for teaching CSA. When the existing curriculum is observed, it may be more appropriate to share within two departments, Agronomy and Agricultural Chemistry. Some other departments such as Horticulture, Agricultural Botany and Plant Protection may teach the remaining portions as a complementary manner.

(c) Central Agricultural Research and Training Centre

The intention of introducing CSA training into existing regular training program at CARTC was reported to the Director General of DoA and obtained his permission to do so. The training schedule at CARTC was designed in advance in the early months of a year, so the permission was taken for one-week intensive training course for ToT at CARTC. A detailed discussion was made with the Principal of CARTC to offer one-week intensive training and the incorporation of CSA course into the one-month regular in-service training. In fact, CARTC has been giving CSA training for sometimes but the courses were not well organized. Some of the topics given by some specialists are presented in Table 1. Subject specialists were lecturing in their own way emphasizing their own subject matter. For example, someone who knows about soil science talked about soil conservation in detail. Similarly, conservation specialist talked about conservation agriculture only but nothing else. The agronomist, plant breeder, irrigation specialist, plant protectionist, horticulturist and climatologist do the same thing. So far, a well organized course on CSA has never been offered at CARTC. This means CARTC needs a new CSA curriculum to address the problems of climate change using comprehensive approaches.

The Director General and some officials from the Department of Agricultural Research (DAR) were also consulted with at their head office to get some idea about what DAR has been contributing to CSA by their research and breeding program to produce some crop varieties as well as certain cropping patterns to be able to adapt and also to mitigate the problem of climate change.

Table 1. Some topics related to CSA taught at CARTC

Sr No.	Topic	Lecturer	Date	
1	Organic farming in Doekwin Coffee Farm		March 2011	
2	Climate change and agriculture	Dr Sein Hla Bo		DAR
3	Climate change, organic agriculture and good agriculture practices (GAPs)	Dr Wunna Htoon	24-2-2016	VFRDC
4	Vanishing treasures of Myanmar – the lost of monsoon	Dr Tun Lwin	21-9-2016	Meteorology & Hydrology

Sr No.	Topic	Lecturer	Date	
5	The Role of Bio-pesticide in Plant Protection Management	Daw Seng Raw	1-2-2017	PPD
6	Climate change and strategies for implementing Climate Smart Agriculture	U Than Kyaing,	1-2-2017	Planning Section
7	Cultural practices to mitigate the problem of climate change	Daw Thin Thin Kyi	1-2-2017	
8	Climate Smart Villages: Implications for Agriculture Sector Transformation in Myanmar	Dr Mie Mie Aung	2-2-2017	Yezin Agricultural University
9	Soil and water management to mitigate problem of climate change		2-2-2017	Land Utilization Dept
10	Agriculture and Soil Conservation	U Hope San	2-2-2017	

Training and seminars held at CARTC before 2018

CARTC has a very tight schedule to train the staffs from different departments under MOALI. In each and every month, there are at least two- three training courses and up to as many as six sometimes overlapping with one another. The number of training courses is more than 50 times a year and trained more than 3000 staff every year (Annex 1). The duration of a training ranged from a few days to a month depending on the type of courses. The topics cover many areas from organization structure to crop production system, management, account and finance. Some topics such as GAP and organic farming are observed in the existing system (Annex 2).

The CSA module is intended to incorporate into the one-month training course for in-service and extension agents at CARTC.

(d) Follow-up meetings

After the preparation of the first drafts of training curriculum on CSA, follow up visits were made to all respective institutions again and presented the draft and received feedback. For this trip, a Professor of Agricultural Economics from the University of Milan, Italy, accompanied the team. All the feedbacks were taken into account and the curriculum was revised to incorporate their specific needs.

By doing so, these training curricula will be very useful tools and sound foundation in paving a way to fight back the problems of climate changes in Myanmar complementing the government program like NAPA for achieving three main goals of CSA practices such as sustainably increased productivity, enhancing resilience (adaptation), reducing/removing GHGs (mitigation) where possible, and enhances achievement of national food security and development goals.

3. Urgent need to develop training curriculum of CSA

Introduction

The Government of Myanmar has initiated economic reforms to achieve a higher per capita income for the rural populace, whose major source of livelihood is agriculture, and Myanmar's economy was growing at 7.3% in 2012 to 2013. However, these economic gains are being threatened by climate change. Myanmar is annually affected by climate extremes, particularly floods, droughts, and tropical cyclones, threatening the livelihoods of poor people living in rural areas, as well as food security in the country.

Examples of observed changes in climate related hazards in Myanmar and their consequences include:

- An increase in the prevalence of drought events
- An increase in intensity and frequency of cyclones/strong winds
- Rainfall variability including erratic and record-breaking intense rainfall events
- An increase in the occurrence of flooding and storm surge
- An increase in extreme high temperatures

According to the *2016 Climate Risk Index*, Myanmar is the second most vulnerable country in the world to the effects of climate change. The intensity and regularity with which cyclones make landfall have increased with every year, with the delta region affected by tropical storms and the dry zone impacted by debilitating droughts.

Impact of climate change

The long-term effects of climatic change will seriously impact agricultural production and food security, requiring substantive adaptation of agricultural systems over time. Moreover, agriculture

significantly contributes to greenhouse gas (GHG) emissions. Therefore, the vulnerability of agriculture to climate change and food security is an issue of major importance that needs the attention of the national authority as well as local community. For achieving food security to offset the impacts of climate change, the implementation of climate smart agriculture through the sustainable crop production, adaptation and mitigation measures will be the solution.

Efforts of Government to tackle the problems

Government of Myanmar is trying its best to cope with the adverse effects of climate change with a National Adaptation Program of Action (NAPA) covering eight sectors, namely: 1) agriculture, 2) early warning systems, 3) forests, 4) public health; 5) water resources, 6) coastal zones, 7) energy and industry, and 8) biodiversity. Agriculture, early warning systems and forests have the highest priority. However, it is critical to get awareness of the climate change impact among the farmers who are the main stakeholder for food crop production. On the other hand, the extension staffs as well as the policy makers need to be educated to help tackle the problems of climate change. The final solution is the knowledge and adoption of CSA practices.

In this case, all the stakeholders from the agricultural sectors need to be trained to get familiar with climate smart agriculture. The duration of the training course and the content involved in the training will vary with the level of target group and type of organization as the training course is designed to address the need of individual institution and target groups. For in-service training, only basic concept will be introduced but it will be extended for TOT, diploma level, bachelor level and master's level one step after another.

Firstly, the awareness on climate change and its impact should be raised among the farmers using different media. On the other hand, a course on CSA should be introduced to the institutions for the students and extension staff working with Department of Agriculture. CSA has never been introduced as a subject at the university or training centers in Myanmar. Therefore, it is timely to develop curricula for different levels of agricultural institute and university.

The CSA training curriculum will provide students with the skills and tools for developing agricultural practices, policies and measures addressing the challenge that global warming poses for agriculture and food security worldwide.

4. Brief outlines of the training curriculum

The curriculum is divided into (4) parts based on the nature of the content:

- I. Basics
- II. Practices
- III. System approaches
- IV. Enabling environment

I. The basics

Climate-smart agriculture (CSA) is an integrative approach to address these interlinked challenges of food security and climate change that explicitly aims for three objectives:

- A. Sustainably increasing agricultural productivity, to support equitable increases in farm incomes, food security and development;
- B. Adapting and building resilience of agricultural and food security systems to climate change at multiple levels; and
- C. Reducing greenhouse gas emissions from agriculture (including crops, livestock and fisheries).

II. Practices

Although there are many aspects of CSA practices under this section, only certain areas will be introduced as follows:

(a) Soil management

Conservation agriculture, biomass recycling and soil health, integrated farming –nutrient management

(b) Crop management,

Use of diverse and appropriate varieties, crop and livelihood diversification, organic farming for sustainable agriculture, participatory seed production and seed saving, seed System

(c) System of Rice Intensification

- Introduction
- Operations
- Contributions to CSA
- Lessons learned

(d) Crop and livelihood diversification

- Crop diversification to reduce risk in adversely affected areas
- Integrated farming system (fish-rice, duck – rice, cow, goat, pig raising)
- Mixed, Inter, Relay cropping & Cropping System

(e) Water management

Water harvesting and saving techniques, Improved Micro irrigation for vegetables
Alternate Wetting and Drying (AWD) techniques for rice cultivation

(f) Agroforestry

Agroforestry, Sloping Agricultural Land Technology (SALT), community forestry

III. System approaches

To achieve the multiple objectives of productivity and food security, enhanced farmer resilience and reduced greenhouse gas emissions, CSA must adopt various systems perspectives. These include:

- (a) Landscapes and ecosystems - The landscape approach is categorized into three components for operationalization, viz.: i) landscape goals embracing multiple objectives at different

scales, ii) adaptive planning, management, and collaboration, and iii) comprehensive sector involvement.

(b) Value chain analysis

A value chain is simply a useful way of understanding how the world of producing, buying and selling things works. The conceptual framework of agricultural value chains includes a sequence of value adding activities, from production to consumption, through processing and marketing. Each segment of a chain has one or more backward and forward linkages. A value chain in agriculture identifies the set of actors and activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product.

Increasing rice production and upgrading the rice value chain will enhance the export volume, increase food security, reduce urban migration and give more of the regions' youth valuable employment opportunities.

From the systems perspective, it is important to pursue synergies between the different elements of the system, analyze and address trade-offs, and perform cost and benefits analysis. By doing so, it can be determined the actions to achieve the desired outcomes.

IV. Enabling environment

Enabling environments for CSA are the framework conditions that facilitate and support the adoption of climate-smart technologies and practices. They include:

- (a) crop insurance
- (b) integrated pest management
- (c) climate information services
- (d) infrastructure
- (e) policy engagement
- (f) institutional arrangements
- (g) gender and social inclusion

5. The design for teaching

The course will be offered by subject specialists: retired personnel or someone who is currently working with DoA, PPD, VFRDC, CARTC, Land Utilization Department, DAR, YAU or any other departments such as Irrigation Department and Agricultural Mechanization Department under MoALI or Forestry Department, Department of Meteorology and Hydrology from some other ministries. In this case, many experts from different departments will take part to share their own expertise and discipline to the course. For example, soil conservation will be lectured by soil scientist from Land Utilization Department or from YAU, and Agroforestry by foresters from Forestry Department or agronomists from YAU, DoA or DAR. Other disciplines will be taught in the same way. Ownership will be given to all departments that are relevant to the course. Only short lecture will be given, followed by short questions and answers, group discussion to be able to digest and grab the basic concept leading to practical application so that the concepts and tools of CSA can be practically applied by extension agents or to disseminate as a trainer to some other extension agents.

As the practical work may not be easy to incorporate for every topic, group discussion or assignment will be given individually or as a group depending on the time limit. Excursion to the area severely affected by climate change will be organized to witness the impact of climate change on agriculture and the livelihood of rural community. At the same time, trips will be organized to the places where people are trying to fight back the problems of climate change to learn lessons from the farmers who have firsthand experience.

6. Consultation workshop with relevant stakeholders

A consultation workshop with relevant stakeholders was held in Nay Pyi Taw on 24th July 2018 to get feedback and for the validation of CSA curricula for different levels for various organizations. The workshop was very successful with the active participation of all relevant stakeholders including responsible FAO Experts and team, Resident Advisor of Advanced Centre for Agricultural Research and Extension (ACARE), Professors from YAU, Deputy Director General and Directors from DoA, Directors and Principals of SAIs, Principal and Vice-principal from CARTC, Staff Officers from the project areas and responsible officer from DAR. CARTC

and SAIs requested to include their staff for the ToT programme so that they can give cascade training for their own departments in the future.

All the feedback, suggestions and comments were taken into consideration and CSA curricula were modified to meet the needs of respective training programmes for different organizations. However, certain topics could not be accounted for as they are outside the scope of the CSA definition by FAO. It has been agreed that all CSA curricula to be incorporated into the existing system of the respective organizations except ToT programme where it will stand alone.

Climate Smart Agriculture Curriculum for In-service and Extension Agents Training Programme at CARTC (Module 3)

Course Objective	To understand the holistic nature of agriculture production and the main principles and techniques of Climate Smart Agriculture
Teaching	2 Lectures + Assignment/discussion
Module distribution	2hr x 2 d/wk x 4wk = 16- hr lecture + 8hr practical (Practical may be field visit to specific sites or seminar or group discussion)
Duration	1 months (incorporating with other subjects)
Source of instructors	Instructors from different departments of DoA, DAR, YAU or other
Type of delivery	Short lecture
Type of content	Theory (basic concept and field experiences)

Unit		Lectures
	I Basics	
1	<p>Agro-ecological zones of Myanmar</p> <p>Types of Agro-ecological Zones in Myanmar</p> <p>Topography and weather conditions</p> <p>Cultivated crops and cropping patterns</p> <p>Climate change and its impact on agriculture (disaster prone areas and the extent of damage)</p>	1
2	<p>What is CSA</p> <p>Definition</p> <p>Principles of Climate Smart Agriculture</p> <p>The three pillars of climate smart agriculture</p> <p>(a)Sustainably maintain and increase productivity</p> <p>(b) Adaptation and resilience and</p> <p>(c) Mitigation – reducing and/or removing greenhouse gas emission</p> <p>Key characteristics of CSA</p> <p>CSA addresses climate change</p>	1

Unit		Lectures
	<p>CSA integrates multiple goals and manages trade-offs</p> <p>CSA maintains ecosystems services</p> <p>CSA has multiple entry points at different levels</p> <p>CSA is context specific</p> <p>CSA engages women and marginalized groups</p>	
	<p>Climate Change Impact to Crops/Farmers</p> <p>High temperature,</p> <p>Irregular/erratic rainfall,</p> <p>Sea level rise,</p> <p>Drought and flood,</p> <p>Salt intrusion,</p> <p>Crop damage and failure</p> <p>Climate Change Impact to Crops/Farmers</p> <p>Why CSA?</p> <ol style="list-style-type: none"> 1. Food security, misdistribution and malnutrition 2. The relationship between agriculture and poverty 3. The relation between climate change and agriculture 	1
3	<p>II Practices</p> <p>Integrated Knowledge to manage CSA approach</p> <p>Soil management</p> <p>Key aspects of healthy soil / Soil as a living organism</p> <p>The impacts of climate change on soil and land resources - the need for sustainable management</p> <p>Sustainable soil and land management for climate-smart agriculture in practice - Afforestation</p> <ul style="list-style-type: none"> Preventing and mitigating land degradation Controlling soil erosion Managing Soil Organic Matter for soil carbon sequestration Improving water use and management in agriculture 	1

Unit		Lectures
	Pest and disease tolerant varieties and their application to the relevant area (Improving the conservation and use of plant genetic resources, Developing improved and adapted varieties, Improving seed production and distribution)	
	Crop and Livelihood diversification Crop diversification to reduce risk in adversely affected areas Integrated farming system (fish-rice, duck – rice, cow , goat, pig raising) Mixed, Inter, Relay cropping & Cropping System	1
	Organic farming for sustainable agriculture Principles of organic farming 1. The cyclical principle, 2. The precautionary principle and 3. The nearness principle, Organic agriculture nurtures soil biodiversity, Energy use, The potential of organic farming	1
5	Water management Alternate Wetting and Drying (AWD) techniques for rice cultivation Background Procedure Contribution to CSA	1
6	Water harvesting and saving techniques – Rain-fed cropping systems (Rainwater harvesting), Groundnut cultivation with green manure crop and wind break trees in dry zone, afforestation, Sterculia (shawbyu) growing, replacement fuel for firewood	1

Unit		Lectures
	<p>Irrigated cropping systems (Deficit irrigation for high yield and maximum net profits), Knowledge-based precision irrigation)</p> <p>Mulching, cover crops for moisture conservation</p> <p>Improved Micro Irrigation for Vegetables - drip irrigation / sprinkler/sub-irrigation</p> <p>Background</p> <p>Relationship to CSA</p> <p>Impacts and lessons learned</p>	1
7	<p>Agroforestry</p> <p>Agroforestry and Sloping Agricultural Land Technology (SALT)</p> <p>History of agroforestry,</p> <p>Agroforestry and ecosystem,</p> <p>Myanmar Agenda 21,</p> <p>Greening activities,</p> <p>Shifting cultivation to Agroforestry (for hilly region),</p> <p>SALT for Upland/Hills zone such as Mindat, Chin State,</p> <p>Appropriate Land-use policy</p> <p>Mangrove to offset deforestation for Irrawaddy Delta leading to production of aquatic food, policy to change firewood system</p>	2
8	<p>III System approaches</p> <p>Value chains</p> <p>Introduction to sustainable and inclusive food (value) chains</p> <p>Three elements –</p> <p>Diversification,</p> <p>Climate-proofing,</p> <p>Supply chain efficiencies</p> <p>Sustainable and inclusive food value chains in practice: the case of food losses and waste</p>	1

Unit		Lectures
	<p>Step-by-step approach for chain actors to improve their performance along the sustainable and inclusive food value chain</p> <p>Conclusions</p> <p>Rice / Green gram value chain analysis</p> <p>The key player in the value chain</p> <p>Value Chain Analysis of Rice</p> <p>End Markets Opportunities</p> <p>Major Constraints and Bottleneck along the Value Chain</p> <p>How to make it more profitable</p> <p>Harvesting & Post-harvest management</p> <p>Small farm implements for moisture saving</p> <p>Mechanization for timely harvest,</p> <p>Drying for quality improvement,</p> <p>Post-harvest systems,</p> <p>Food security and post-harvest Agriculture,</p> <p>Factors influencing the adaptive capacity of post-harvest systems</p> <p>Suitable seed/Grain storage techniques</p>	<p>1</p> <p>1</p>
9	<p>IV Enabling environments</p> <p>Introduction</p> <p>Integrated Pest Management</p> <p>Crop varietal resistance,</p> <p>Timing and spatial management,</p> <p>Ecosystem based strategy –</p> <p>Use an ecosystem approach,</p> <p>Undertake contingency planning,</p> <p>Analyse the nature of pest outbreaks,</p> <p>Determine how much production is at risk,</p> <p>Undertake to tract pest pattern in real time,</p> <p>Reduce insecticide use / Alternatives to pesticides</p>	<p>1</p>

Unit		Lectures
	Use or encourage natural enemies	
	Extension approach Challenges and perspectives, Demonstration plots, Farmer field School/Participatory approach Farmer to farmer, Observe local situation, Mitigation risks, Reducing steps in value chain, Food security, food safety, market and target Research and extension design (not upstream but downstream)	1

Field trips to the areas severely affected by climate change will be arranged to see the impact of climate change and how farmers are tackling the problems, and also to witness if they do have success stories.

At the end of each section, assignment relevant to each topic will be given to the students individually or as a group. In some cases, a video clip related to some particular topics will be shown and group discussion will be followed to assess the understanding of the students and also to get some idea how to apply the idea or technology and tools to benefit Myanmar farmers taking examples and lessons from the global context.

Annex - 1 Training /Seminar Programmes at CARTC in 2017-18

Sr no	Training/Seminar	Duration		
		from	to	No.
	April			
1	Refresher course for strengthening capacity of staffs from CARTC and SAIs	24.4.2017	5.5.2017	20
	May			

Sr no	Training/Seminar	Duration		
		from	to	No.
2	Basic course for in-service training	2.5.2017	31.5.2017	110
3	GAP and Organic farming	2.5.2017	12.5.2017	50
4	Training course for Pesticide and fertilizer inspectors	15.5.2017	26.5.2017	50
	June			
5	Management, finance and account	5.6.2017	16.6.2017	50
6	Basic course for in-service training	5.6.2017	30.6.2017	110
7	Training for GAP Inspector	19.6.2017	23.6.2017	60
8	Development of Pulses Seed Bank	26.6.2017	30.6.2017	50
9	GIZ-SAFT GAP Inspection Training (Project funded)	26.6.2017	30.6.2017	50
	July			
10	Basic course for in-service training	3.7.2017	28.7.2017	110
11	GIZ-SAFT Monitoring & Evaluation for GAP & Organic (Project funded)	3.7.2017	4.7.2017	30
12	Adaptive Research Management and communication skills development training	3.7.2017	7.7.2017	30
13	Training for rice quality improvement and yield increase	10.7.2017	14.7.2017	50
14	TOT for rodent and weed control	10.7.2017	14.7.2017	25
15	Project Cycle Management & Evaluation	17.7.2017	28.7.2017	50
	August			
16	Basic course for in-service training	7.8.2017	1.9.2017	100
17	Crop production technology (coffee and seasonal)	7.8.2017	11.8.2017	25
18	Training on management, account and finance	7.8.2017	18.8.2017	50

Sr no	Training/Seminar	Duration		
		from	to	No.
19	Refresher course for horticulturist	14.8.2017	18.8.2017	32
20	Training course for Pesticide and fertilizer inspectors	21.8.2017	1.9.2017	50
21	Training for district/township officers	21.8.2017	25.8.2017	50
	September			
22	Basic course for in-service training	4.9.2017	29.9.2017	110
23	Training on In-service skill	4.9.2017	15.9.2017	50
24	Development of pulses seed bank	25.9.2017	29.9.2017	50
25	Training for district/township officers	4.9.2017	8.9.2017	50
	October			
26	Basic course for in-service training	9.10.2017	2.11.2017	110
27	Advanced management training	9.10.2017	20.10.2017	30
28	Yield improvement of cotton fiber and silk	9.10.2017	13.10.2017	50
29	Extension training for evaluation of participatory rural areas	26.10.2017	20.10.2017	40
30	Production, seed production, marketing and pest management for vegetables and horticultural crops	23.10.2017	2.11.2017	30
31	Refresher course on quarantine	23.10.2017	2.11.2017	20
32	Training for district/township officers	23.10.2017	27.10.2017	50
	November			
33	Basic course for in-service training	6.11.2017	1.12.2017	110

Sr no	Training/Seminar	Duration		
		from	to	No.
34	Training on in-service skills	6.11.2017	27.11.2017	50
35	Training course for Pesticide and fertilizer inspectors	20.11.2017	1.12.2017	50
36	GIZ-SAFT Organic Inspection Training (Project funded)	27.11.2017	30.11.2017	50
37	Training for district/township officers	6.11.2017	10.11.2017	50
	December			
38	Basic course for in-service training	4.12.2017	29.12.2017	110
39	Advanced management, account and agricultural technology	4.12.2017	22.12.2017	50
40	Basic course on technology of food production	4.12.2017	8.12.2017	30
41	Training for rice quality improvement and yield increase	11.12.2017	15.12.2017	50
	January			
42	Basic course for in-service training	1.1.2018	26.1.2018	110
43	Technology for yield improvement of cotton fiber and silk	8.1.2018	12.1.2018	50
44	Training on applied issue culture technique	8.1.2018	12.1.2018	30
45	Basic course on English, computer and information reporting systems for agricultural staff	15.1.2018	26.1.2018	30
46	Workshop on integrated production technology for farmers	29.1.2018	30.1.2018	50
47	Training for district/township officers	15.1.2018	19.1.2018	50
	February			

Sr no	Training/Seminar	Duration		
		from	to	No.
48	Basic course for in-service training	5.2.108	1.3.2018	110
49	Training on in-service skill	5.2.108	16.2.2018	50
50	Advanced course on management, account and agricultural technology	5.2.108	23.2.2018	50
51	Training on small scale domestic industry to generate farmer's income	26.2.2018	2.3.2018	20
52	Advanced Biotechnology	26.2.2018	2.3.2018	30
53	Training for district/township officers	26.2.2018	2.3.2018	50
	March			
54	Advanced training course on management, account and agricultural technology	5.3.2018	23.3.2018	50
55	Advanced level of English, computer and reporting and reporting system	5.3.2018	16.3.2018	30
56	Training for district/township officers	12.3.2018	16.3.2018	60
	Total	56 times		3062 persons

Annex - 2 Time table for one month in-service training course at CARTC in 2018

First Week

Date <hr style="border: none; border-top: 1px solid black; width: 80%; margin: 0 auto;"/>	Time	09:00–09:55hr	10:00–10:55hr	11:00–11:55hr		13:30–14:25hr	14:30–15:25hr	15:30–16:15hr		
Monday 4-6-2018	06:00–07:00hr Field practical	Opening ceremony	Organization structure and duties of DoA		12:00–13:00hr Lunch	Demand for Good Agricultural Practices (GAP)		(GAP) Implementation		
Tuesday 5-6-2018		Activities of Seed Division	Seed physiology			Seed quality test (laboratory)	Seed production			
Wednesday 6-6-2018		Seed law and Procedures		Vegetable production		Vegetable production	Vegetable seed production			
Thursday 7-6-2018		Pre- and post-harvest GAP for vegetable and fruit		Organic agriculture		Organic agriculture	Post-harvest technology	Post-harvest technology		
Friday 8-6-2018		Financial Principles	Accounting	Budget planning		Auditing	Office letter writing			

Time table for one month in-service training course at CARTC in 2018
Second Week

Date /	Time	09:00–09:55hr	10:00–10:55hr	11:00–11:55hr	12:00–13:00hr Lunch	13:30–14:25hr	14:30–15:25hr	15:30–16:15hr
		Monday 11-6-2018	06:00–07:00hr Field practical	Office procedure			Public servant's disciplines, Departmental enquiry and conduct	
Tuesday 12-6-2018	Principles of soil and soil conservation	Soil fertility improvement and making compost		Soil fertility improvement and making compost	Soil nutrient			
Wednesday 13-6-2018	Fertilizer experimental plots	Reaching Toward Optimum Productivity (RTOP) management		Reaching Toward Optimum Productivity (RTOP) management	Tea plantation as Alternative Crop			
Thursday 14-6-2018	Supply activities			Seed quality inspection in the field				
Friday 15-6-2018	The qualification and activities of extension agents			Cropping system, cropping pattern and paddy		post-harvest loss of		

Time table for one-month in-service training course at CARTC in 2018

Third Week

date <hr style="border: none; border-top: 1px solid black; width: 80%; margin: 0 auto;"/>	Time	09:00–09:55hr	10:00–10:55hr	11:00–11:55hr		13:30–14:25hr	14:30–15:25hr	15:30–16:15hr
Monday 18-6-2018	06:00–07:00hrField practical	Public servant affairs			12:00–13:00hrLunch	Objectives of rice growing,, Good Agricultural Practices (GAP) and sustainable agriculture		
Tuesday 19-6-2018		Plant quarantine				Seed corn production technology	Pulses production	
Wednesday 20-6-2018		Pesticide Law				Procedure relating to Pesticide Law		
Thursday 21-6-2018		Pesticide label and calibration of sprayers	Pesticide residue problems			Pesticide formulation and quality		
Friday 22-6-2018		Local and international projects		Principles of research experiment		Principles of research experiment	Production technology for oil crops	

Time table for one-month in-service training course at CARTC in 2018

Fourth Week

Date <hr style="border: none; border-top: 1px solid black; width: 80%; margin: 0 auto;"/>	Time	09:00–09:55hr	10:00–10:55hr	11:00–11:55hr		13:30–14:25hr	14:30–15:25hr	15:30–16:15hr	
Monday 25-6-2018	06:00–07:00hr Field practical	Perennial crops		Rubber production	12:00–13:00hr Lunch	Rubber production	Palm oil production		
Tuesday 26-6-2018		Coffee production				Sugarcane production			
Wednesday 27-6-2018		Cotton morphology and growth	Cotton production			Cotton nutrients	Scouting method for cotton pests		
Thursday 28-6-2018		Production of jute and sunn hemp				Mulberry growing and silkworm rearing			
Friday 29-6-2018		Commercial orchid growing		Capacity building		Auditing Capacity building	Concluding ceremony		

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