



FEED THE FUTURE INDIA TRIANGULAR TRAINING (FTF ITT)

International Training Programme Post-Harvest Technology in Horticultural Crops for Executives of African and Asian Countries November 6-20, 2017, ICAR - IIHR, Bengaluru



ICAR- Indian Institute of Horticultural Research, Hesaraghatta, Bengaluru, India
Tel: 91-80-23086100, Fax: 91-80-28466291, Email: director@ihr.res.in; pht@ihr.res.in,
website: www.ihr.res.in



FEED THE FUTURE INDIA TRIANGULAR TRAINING (FTF ITT)

**International Training Programme
Post Harvest Technology in Horticultural Crops
for Executives of African and Asian Countries
November 6-20, 2017, ICAR- Indian Institute of Horticultural Research
(IIHR), Bengaluru**

REPORT BY

**Dr Harinder Singh Oberoi, Course Director
Dr R Venkattakumar, Co-Course Director
Dr DV Sudhakar Rao, Co-Course Director
Dr RB Tiwari, Co-Course Director
Mr GA Atheequlla, Co-Course Director**



From the Desk of Director, ICAR-IIHR, Bengaluru

Horticultural produce is highly perishable, because of its high moisture and nutritional content. Compared to developed countries, where the supply chain management of the horticultural produce is well established Post-Harvest (PH) losses in horticultural crops in developing countries are substantially high. In India, the PH losses in fruits and vegetables range from 0.8 -16% (approx) resulting in a monetary loss of about Rs 31, 4860 million (Approx 4630 million USD) every year. As horticultural crops are a rich source of phytochemicals, essentially, nutrients, many developing countries are losing a lot of nutrients, due to high PH losses. Various ways to reduce the PH losses in horticultural crops are by introducing the concept of on-farm storage and processing, strengthening the supply chain management and improving the processing levels. Improved processing resulting in production of diversified products also plays a key role in reducing the PH losses. However, increase in processing levels also results in generation of a substantial amount of residues, which though nutritionally rich are discarded/dumped in many developing countries due to unavailability of the infrastructure to handle such a huge quantity of biomass and/or an established commercial use.



The training programme on "*Post-Harvest Technology in Horticultural Crops*" was organized with the major objective of acquainting the participants with the simple and affordable technologies/ protocols and the prototypes which help in reducing the Post-Harvest losses, increase processing levels, by-product utilization and mechanization in Pre and Post-Harvest operations in Horticultural crops. The participants (26 in all) from 12 different countries from Asia and Africa participated in the training programme which comprised of the theory classes, practicals, exposure visits and interactions with different experts from various facets of Horticulture. The major emphasis of the training was on Supply Chain Management of fresh fruits ,vegetables and flowers which included harvesting, sorting, grading, pre-cooling, storage, packaging and transportation, losses at different stages and cost-effective techniques developed by ICAR-IIHR and other research organizations in India to mitigate such losses; value-addition through processing and development of novel products; by-product utilization through development of value added products; mechanization in pre- and post-harvest operations in horticultural crops in order to reduce drudgery, improve productivity and create employment generation opportunities and extension and marketing strategies to disseminate the technologies developed by ICAR-IIHR, Bengaluru.

The goal of the training programme was to see how the simple, affordable and cost effective technologies developed by ICAR-IIHR could be adopted by the trainees in their home countries. Course Directors of the training programme are in constant touch with the participants and apparently some of the trainees have initiated work based on the knowledge and skill acquired by them during the 15 days training programme. ICAR-IIHR will extend all the possible technical support in implementation of Back to Work plan by the executives.

MR Dinesh
Director

CONTENTS		Page No.
1.	Introduction	
1.1	Background	5
1.2	Objectives	9
1.3	Key Focus Areas of the Training Module	9
1.4	Selection of Executives	10
1.5	Profile of Executives	12
2.	Methodology	
2.1	Training Methodology	16
2.2	Study Materials	18
2.3	Resource Persons	23
2.4	Field Visit	23
2.5	Visit to places of Historical and Cultural Importance	30
2.6	Cultural Evening-Culture for Global Harmony	30
2.7	Life Membership to Professional Bodies and Journals	30
2.8	Back – At – Work Plans	32
3.	Training	
3.1	Evaluation of Technical Sessions	33
3.2	Pre and Post Training Evaluation	33
3.3	Evaluation	33
3.4	Post – Training Monitoring	33
4	Valedictory, Media Coverage & Feed Back	
4.1	Valedictory	34
4.2	Feed Back from Executives	36
5	Annexures	
	Annexure-I: Back at Work Plan	37
	Annexure-II: Feed Back Evaluation Report	56
	Annexure-III: Pre and Post Test Evaluation Report	63

1. INTRODUCTION

1.1. Background

A new Agriculture Partnership between US and India to achieve Ever Green Revolution to address Global Food Security was announced during the State visit of US President Mr. Barak Obama to India in November 2010. The effort included Triangular Cooperation adapting technological advances and innovative solutions to address Food Security Challenges in Africa. This pilot stage focused on three African Countries i.e., Kenya, Liberia and Malawi with potential to expand throughout the African Continent in future.

Consequently, National Institute of Agricultural Extension Management (MANAGE), Hyderabad and National Institute of Agricultural Marketing (NIAM), Jaipur conducted 7 training programs covering 219 executives from Kenya, Liberia & Malawi. Participant's surveys were conducted in Kenya, Liberia & Malawi to assess the impact of training programs. Results were beyond expectations. Due to the success of first seven training programs, there has been considerable enthusiasm from the prospective Executives from Africa and Asia to participate in such training programmes.

As a result, USAID and Ministry of External Affairs (MEA), Govt. of India identified 17 Additional countries and designated the programme as Feed the Future; India Triangular Training Program which was launched on 25th July, 2016 at New Delhi. During the program period until 2020, around 1400 Agricultural professionals will be trained in Africa and Asia in phased manner. The program will conduct 32, fifteen days training courses (excluding travel period) at select Indian institutions for 25 participants in each programme. MANAGE, Hyderabad, India, an autonomous organization under Ministry of Agriculture and Farmers Welfare, Government of India has been designated as lead Institution for implementation of the program. Due to increasing Post Harvest losses, especially in perishable commodities, such as horticultural crops and more so in developing countries, the need for organizing a training in Post-Harvest Technology in Horticultural Crops was felt by MANAGE. Accordingly, ICAR-IIHR, a lead Institute for research and education in horticultural crops in the country was selected to organize the above training programme.

ICAR-Indian Institute of Horticultural Research (IIHR) is a premier institute for undertaking research, education and extension programmes in horticulture. The Institute has developed many high yielding varieties in vegetable, fruit, ornamental, medicinal crops; and farmer-friendly technologies for soil and plant health management, Post-Harvest management and value addition, which are widely accepted and adopted by the farmers, FPOs, entrepreneurs, start-ups across the country. The Institute undertakes concerted efforts regularly to disseminate the knowledge and the technologies among the National and International stakeholders, so that the benefits of the technologies are realized by the society.

The training programme on "Post-Harvest Technology in Horticultural Crops" was announced in the month of **August, 2017** and was scheduled during **November 6-20, 2017** at **ICAR- Indian Institute of Horticultural Research (ICAR-IIHR), Bengaluru**. The announcement / call received huge response from partner countries and MANAGE finally selected 26 executives from 12 countries viz., Afghanistan, Botswana, Cambodia, Ghana, Kenya, Liberia, Malawi, Mongolia, Mozambique, Myanmar, Sudan and Uganda to participate in the training Program. The executives selected were drawn from diverse fields, most of whom were working with the Agriculture/ Horticulture Departments in their home

countries, while few of them were Agri Business Managers, Entrepreneurs and few were involved in teaching and research in their home countries.

The programme was inaugurated by Dr MR Dinesh, Director, ICAR-IIHR, Bengaluru and was attended by all the Executives, Course Directors, Heads of Divisions from different divisions of ICAR-IIHR, resource faculty and Mr. Ravi Nandi, Programme Manager, MANAGE, Hyderabad. Dr. M.R. Dinesh, Director, ICAR-IIHR, inaugurated the program on November 7, 2017. In his presidential address, Dr. Dinesh emphasized the importance of post-harvest technology, especially in horticultural crops whose production is increasing year on year, but lack of adequate infrastructure for storage, packaging and distribution and low levels of processing lead to huge post-harvest losses. Dr. Dinesh also suggested to have horti-business incubators for entrepreneurship and skill development in the production hubs and also wished that the participants gain some knowledge and skills through this training programme, which could be adopted in their home countries in reducing post-harvest losses there.

Dr Harinder Singh Oberoi, Principal Scientist and Head, Division of Post-Harvest Technology and Agricultural Engineering, Course Director for the course emphasized on the need to have low cost on-farm storage and processing facilities and urged the participants to adopt such strategies to curtail the post-harvest losses. Dr. R. Venkattakumar, Principal Scientist and Head, Division of Social Sciences and Training, one of the co-Course Directors advised the participants to replicate the Agro Business Incubator model of ICAR-IIHR in their respective countries for capacity building purpose. Dr. D. V. Sudhakar Rao, Dr. G. Senthil Kumaran, Dr. R. B. Tiwari, and Mr. G. A. Atheequlla were the other Co-Course Directors from ICAR-IIHR for this program.

Inaugural function

FEED THE FUTURE INDIA TRIANGULAR TRAINING (FTF ITT)

**International Training Programme on
Post-Harvest Technology in Horticultural Crops
for Executives of African and Asian Countries
November 6-20, 2017, ICAR- IHR, Bengaluru**





1.2. Objectives of the training programme

Horticultural produce is highly perishable, because of its high moisture and nutritional content. Compared to developed countries, where the supply chain management of the horticultural produce is well established, Post-Harvest (PH) losses in horticultural crops in developing countries are substantially high. As horticultural crops are a rich source of phytochemicals, essentially, nutrients, many developing countries are losing a lot of nutrients, due to high PH losses. Various ways to reduce the PH losses in horticultural crops are by introducing the concept of on-farm storage and processing, strengthening the supply chain management and improving the processing levels. Improved processing, resulting in production of diversified products also plays a key role in reducing the PH losses. Increase in processing levels also results in generation of a substantial amount of residues, which though nutritionally rich are discarded/dumped in many developing countries due to unavailability of the infrastructure to handle such a huge quantity of biomass and/or an established commercial use. The present course therefore was designed with the following objectives keeping in mind the need of human resource development and capacity building in Post-Harvest management, value addition and processing of horticultural crops:

To acquaint the participants with the different supply chain management operations in important horticultural crops grown in Afro-Asian countries.

To demonstrate appropriate technologies for processing and value-addition in important horticultural crops

To expose the participants to different technologies for waste valorization/ by-product/residue management in horticultural crops.

To organize field visits to the companies dealing with the supply of fresh horticultural crops, processing units, especially developed using the ICAR-IIHR technologies and also the vegetable and ornamental nurseries.

1.3. Key focus areas of the training module

The training course emphasized on the different protocols used in the supply chain management of fresh horticultural crops, viz., harvesting, pre-cooling, sorting, grading, washing and disinfection, storage and packaging. An exposure was provided to the participants in the area of Modified Atmosphere Packaging (MAP) of a few selected fresh horticultural crops. Protocol standardization for extension of shelf life of the fresh-cut vegetables was also be demonstrated to the participants. In addition, participants were acquainted with the low cost ripening system of climacteric fruits. The participants were also exposed to different techniques used for processing of fruits and vegetables, such as preparation of fruit bars, osmotic dehydration of selected fruits, crushed tomatoes and preparation of fruit beverages. Participants were acquainted with the physico-chemical, biochemical, nutritional and microbiological analysis conducted for fresh as well as processed products.

The participants were also exposed to the operations involved in dehydration of flowers, by-product utilization and value-addition through the use of extracts from the horticultural residues. Mechanization in PH operations for selected horticultural crops was also be demonstrated to the participants in the Agricultural Engineering section.

In addition to the field visits outside the ICAR-IIHR campus, the participants were also taken around the ICAR-IIHR fields and various infrastructural facilities, such as Referral Food Testing Laboratory, polyhouses and other laboratories connected with Post-Harvest technology, directly or indirectly.

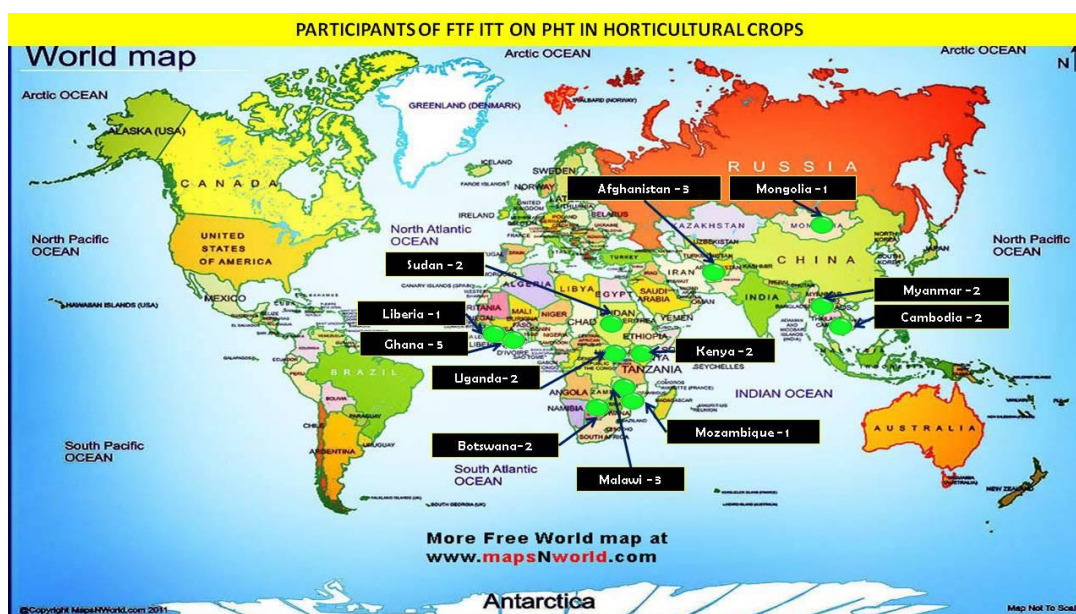
1.4. Selection of Executives

Due to the success of Pilot programs in Kenya, Malawi and Liberia during 2013 -15, there has been considerable enthusiasm from the prospective executives from partner countries to participate in the training program. In order to select right candidates, good publicity was given in partner countries through Point of Contact (POC) in respective countries, through Indian Embassies, USAID Missions of respective countries, National Governments and previously trained Executives. The following parameters received due weightage at the time of nomination/selection of Executives:







- At least 3 years of uninterrupted service in Public or Private sector in the training theme area.
- Executives may be nominated representing diverse working areas viz., Planning, Administration, Teaching, Research, Extension, Agri Industry, NGO, Farmers Organizations/cooperatives, Agripreneurs in Agriculture and allied fields namely Horticulture, Sericulture, Forestry, Livestock, Fisheries, Natural Resources Management, Nutrition, Agribusiness, Post-Harvest and Value Addition, Marketing etc.
- Currently involved in Feed the Future [FTF] Programs. Exceptions must be demonstrated by evidence that the participant will actively be involved in the above Program.
- At-least 50 per cent of the nominations were reserved for female professionals in selected and waitlisted category.
- Applicant shall possess physical and mental skills and abilities for successfully Completing the program.
- Working knowledge of English







A brief profile of the 26 executives selected for this training is included in the form of a Table under section 1.5






Country	Gender representatio		Sectoral representation – No. of executives			
	Female	Male	Agriculture	Horticulture	Agricultural Engineering	Education
Afghanistan	-	3	3	-	-	-
Botswana	1	1	2	-	-	-
Cambodia	-	2	2	-	-	-
Ghana	2	3	5	-	-	-
Kenya	1	1	2	-	-	-
Liberia	1	-	1	-	-	-
Malawi	2	1	3	-	-	-
Mongolia	-	1	-	-	-	1
Mozambique	-	1	1	-	-	-
Myanmar	-	2	1	1	-	-
Sudan	2	-	-	-	2	-
Uganda	1	1	2	-	-	-
Total	10	16	22	1	2	1












1.5. Profile of Executives

SI No.	Executive name and Address	Photo
Afghanistan		
1)	Mr. Fazal Rahim Ayoubi Cooperative General Manager Kandahar Department of Agriculture and Livestock District # 5, Kandahar City Afghanistan Ph: 0706064725 Email: fazalrahim.agri@gmail.com	
2)	Mr. Abdul Kabir Agha Hashmi Executive Manager Kandahar Department of Agriculture and Livestock District # 5, Kandahar City Afghanistan Ph: 0700722909/ 0702979543 Email: abdukkabiragha7@gmail.com/ pacha.agri@yahoo.com	
3)	Mr. Murtaza Aslampoor General Manager of Development Studies Ministry of Agriculture, Irrigation, and Livestock, Horticulture Directorate, vegetable and Greenhouse development department Jamal mina Kart-e-sakhi, Kabul Afghanistan Ph: 07443221999/ 0700818253	
Botswana		
4)	Ms. Mpho Christine Mogoro sakgomo Agricultural Scientific Officer Ministry of Agricultural Development and Food security P.O.Box # 83, Botswana Ph: +267 71910653 Email: mmogorosakgomo@gov.bw, mpmorupisi@gmail.com	
5)	Mr. Joel Olebile Segobaetso Agricultural Principal Scientific Officer Ministry of Agricultural Development and Food security PO. Box. 31, Molepolole, Botswana Ph: +267 71480738 Email: jsegobaetso@gov.bw, jsegoba@yahoo.com,	
Cambodia		
6)	Mr. Montha Chey Head of Department of Agro-Industry Prek Leap National College of Agriculture Highway 6A, Sangkat Prek Leap, Khan Chrocyhangva, Phnom Penh, Cambodia Tel: +855 236910595, +85512735758 Email: cheymontha@yahoo.com, info@pnsa.edu.kh	

7)	<p>Mr. Samrit Pauv Official staff Department of Agro-Industry Prek Leap National College of Agriculture Highway 6A, Sangkat Prek Leap, Khan Chrocychangva , Phnom Penh, Cambodia Tel: +855 236910595, +855 99267247 Email: pauvsamrit@gmail.com, info@pnsa.edu.kh</p>	
Ghana		
8)	<p>Ms. Esther Agyekum Senior Agricultural Officer Ministry of Food and Agriculture Directorate of Crop Services P.O Box. M37 Accra , Ghana Ph: +233 245629758 Email: estheragyekum@yahoo.com,</p>	
9)	<p>Mr. Robert Selassie Setorwofia Assistant Agricultural Officer, Ministry of Food and Agriculture Agribusiness Unit P.O Box. M37 Accra , Ghana Ph:+233 249 239244 Email: selassierobert@gmail.com</p>	
10)	<p>Mr. Emmanuel Amanor Yirenyki Assistant Agricultural Officer Ministry of food and Agriculture/Agribusiness Unit P.O.Box # M37, Ministries, Accra, Ghana Ph: 0303965094/0242844563/0209529179 Email: Kojo.amanoryirenyki@gmail.com, agribusiness- unitmofa@googlegroups.com"</p>	
11)	<p>Mr. Joseph Tommy Tommie Senior Agriculture Economist Ministry of Food and Agriculture MOFA/PPMED, Box M37, Accra, Ghana Ph: 0507281334/0249748287 Email: tommie2326@gmail.com</p>	
12)	<p>Ms. Elizabeth Edem Gididlo Agricultural Extension Officer Ministry of Food and Agriculture Directorate of Agriculture Extension Services P.O.Box M37, Ministries, Accra, Ghana Ph: 0244966294/0244966294 Email: egidiglo@yahoo.ca</p>	

Kenya		
13)	<p>Mr. Dominic Munywoki Principal Agricultural Officer Ministry of Agriculture, Livestock and Fisheries State Department of Agriculture P.O.Box. 30028 - 00100 Nairobi, Kenya Ph: +254 713273393 Email: graceagili@gmail.com dominickitaka@yahoo.com</p>	
14)	<p>Ms. Margaret Wanjiku Karuku Lecturer Kenya School of Agriculture Ministry of Agriculture, Livestock and Fisheries P.O.Box. 1909-10100, Kenya Ph:+254 722888990 Email: embumission@gmail.com, kenyaschoolofagriculture@yahoo.com</p>	
Liberia		
15)	<p>Mrs. Weedor Akoi Cegbe County Agriculture Coordinator Department of Regional Development Research & Extension, Ministry of Agriculture, Monrovia, Liberia Tel: +231 886708784 Email: weecgbe@yahoo.com, leorycegbe@ymail.com, ediboep@yahoo.com</p>	
Malawi		
16)	<p>Mr. Kafunda David Burton Agricultural Extension Development Officer, Salima District Office, P.O.Box.491, Salima, Malawi Tel: +265 993205903 Fax: +265 (1) 262663 Email: kafunda.alice38@gmail.com</p>	
17)	<p>Ms. Nyirenda Babra Malikebu Agricultural Extension Development Officer, MVERA EPA, P.O.Box. 42 Ministry of Agriculture, Mvera, Malawi Tel: +265 0999276164, 0991743066 Email: nyirendababs@gmail.com, lnyirenda2000@yahoo.com</p>	

18)	<p>Ms. Tamara Tembo Agricultural Development Officer Ministry of Agriculture Private Bag 30131, Lilongwe, Malawi Ph: +265999161065/ +265992518851 (Emergency) Email: tammzy@yahoo.com, xrisimike@yahoo.co.uk</p>	
Mongolia		
19)	<p>Mr. Jambal Tumurkhuyag Senior Officer, Crop Policy Implementation and Coordination Department Ministry of Food, Agriculture and Light Industry, Government Building #9, Exktaivan Avenue, 16 A, Ulaanbaatar-210349, Mongolia Tel: 51 263408, 99007368 Email: saruultuyadd@gmail.com, j_tumur@yahoo.com,</p>	
Myanmar		
20)	<p>Mr. Khaing Aye Min Assistant Staff Officer, Myanadi Horticultural Farm, Department of Agriculture, Ministry of Agriculture, Livestock and Irrigation Myittha Township, Mnadale Region, Myanmar Tel: +95-9-783644151, +95-9-5300591 Fax: +9567 410067 Email: thannaingmoe.tmn@gmail.com, hortioffice@gmail.com,</p>	
21)	<p>Mr. Than Naing Moe Deputy Staff Officer Department of Agriculture, Ministry of Agriculture, Livestock and Irrigation Office Number (43), Department of Agriculture Nay Pyi Taw, Myanmar Ph: +95 9-780025641, +95-9-5300591 Email: thannaingmoe.tmn@gmail.com, hortioffice@gmail.com,</p>	
Mozambique		
22)	<p>Mr. Elton Amadeus Francisco Rural Extension monitoring and evaluation officer Inhambane Directorate of Agriculture and Food security Inhambane city, between Eduardo Mondlane and Revolucao Avenue Mozambique Ph: +258 29320929/+258822834116/+258840358666 Email: dea.dpainhambane@gmail.com, aelton.francisco@gmail.com</p>	

Uganda		
23)	Mr. Lukurwe Ham Wilson Technical Officer-Sector Skills Councils, Skilling Uganda Reform Task Force (RTF) Secretariat Ministry of Education and Sports Kampala, Uganda Tel: +256 772962503, +256 702264145 Email: lukurweham@gmail.com, shinecaresuganda@gmail.com	
24)	Ms. Rose Lukwago Nassali Judicial Service Commission, Farmers House, Plot 6/8 Parliament Avenue P.O.Box 7679, Kampala Uganda Tel: +256772673217 Email: permasec@jsc.go.ug, nassalirose60@gmail.com	
Sudan		
25)	Ms. Abeer Elamin Mohanedahamed Elhaj Engineering Agriculture Sud kh Alnil Street, Ministry of Agriculture, Almogran Khartoum, Sudan Mob: 002466737609, 00966537473303 Email: abeeralmin1985@gmail.com, bitelgozouli@yahoo.com	
26)	Ms. Kautyher Altom Algzoly Alnor Engineering Agriculture Sud kh Alnil Street, Ministry of Agriculture, Almogran Khartoum, Sudan Mob: 002498278418, 0024993986632 Email: kwseraltom@gmail.com, bitelgozouli@yahoo.com	

METHODOLOGY

2.1 Training Methodology

The training program was participatory in nature, which included lectures, panel discussions, group discussions, case studies, practical classes and field visits. Each participant was expected to contribute ideas and take part in group activities thereon forming small groups to undertake various tasks allotted under the training. The participants were also provided hands-on-training by the scientists on artificial ripening of fruits, shrink wrapping, processing into value added products like beverages, dehydrated fruits, crushed tomatoes, and dry flowers. The trainees were also exposed to the basic machinery used for field, harvesting and Post-Harvest operations in horticultural crops. Although, experiential learning methodology was effectively incorporated in the program, the participants were expected to emulate learning through group interaction, field visits and interactions with domain experts. A Back at Work Plan was in-built to ensure the transformation of learning into action at their workplace, once they return back to their home countries. The effectiveness of the training

was monitored after conducting Pre & Post Tests to evaluate the impact of the training on the increase in the knowledge of the participants.

Methodology adopted for the program was as follows:

Participatory approach

Participants expected to contribute ideas and work in groups

Experiential learning methodology (Cross learning, field experiences)

Lectures, group discussions, panel discussions and field visits to Krishi Mela, commercial Packhouse for fresh fruits and vegetables, processing unit for dehydrated fruits, polyhouses, vegetable nursery and farmer's fields in and around Bengaluru

Interactions with innovative farmers and Agri-entrepreneurs

Special lectures/interactions with eminent scientists in Process Engineering, Processing and value addition and Food Safety

Participants were made to present “Back-at-Work-Plans” based on the knowledge gained and skills acquired during the training programme.

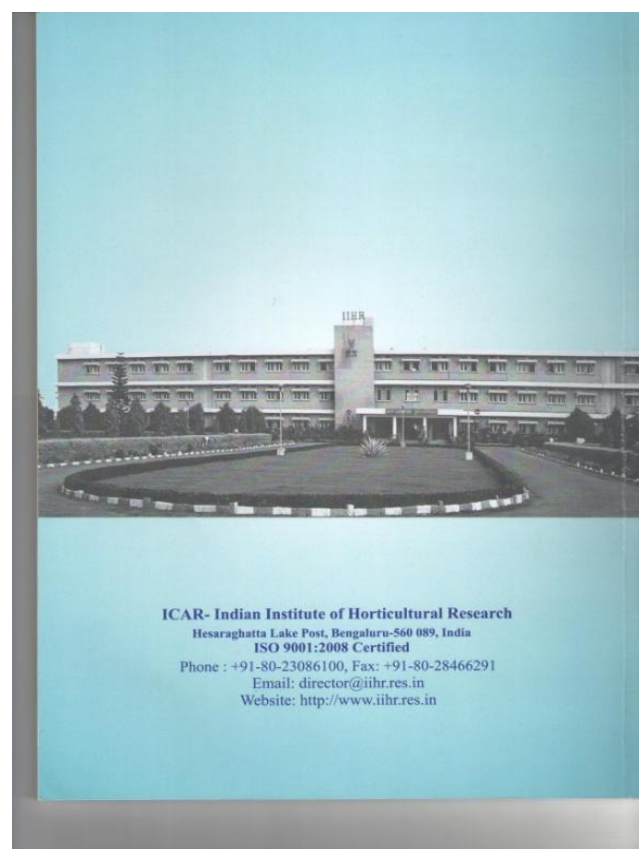
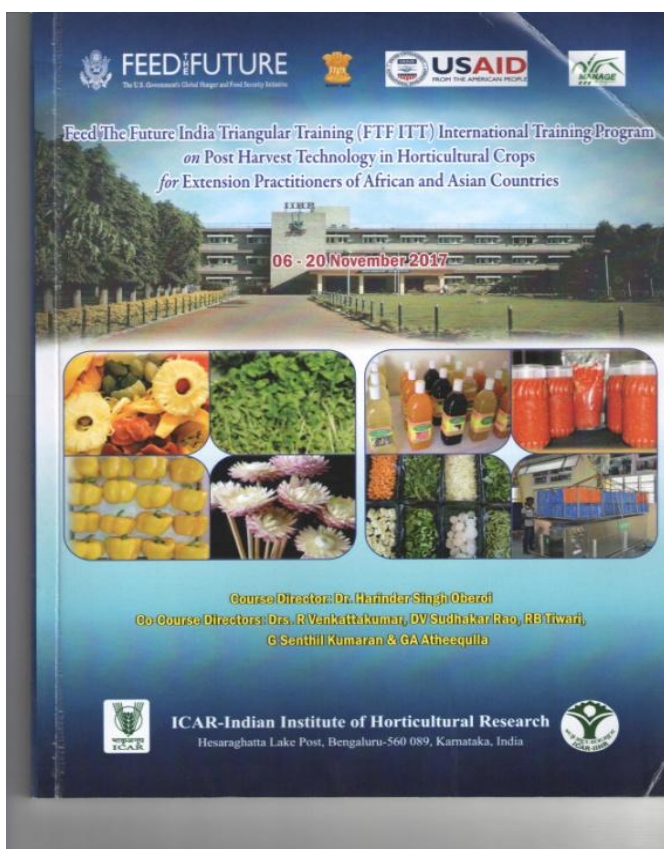
Regular feedback on the progress as per the Back-at-Work-Plan is being collected.



Executives attending the practical demonstrations on packaging, value addition and processing of fruits and vegetables.

2.2 Study Material

Study materials, prepared by Course Director and Co-Course Directors from ICAR-IIHR, Bengaluru on all the major themes were provided to the executives. The soft copies of all the presentations made during the sessions were also provided to the executives at the end of the course. More than 100 photographs of lectures, field visits and other important activities of program were also given to the Executives. The executives had full access to the net facility and library facility of ICAR-IIHR, Bengaluru



Technologies Commercialized by Division of Post Harvest Technology and Agricultural Engineering



Crop Nursery Machinery
Mushroom Cultivation and Spawn Production Machinery
Onion Cultivation and On-farm Processing Machinery
Harvesting Tools for Mango, Sapota and Lemon
Shrink Wrapping Technology
Fruit Squash and RTS Beverages
Crushed Tomato Technology
Osmotically Dehydrated Fruits
Dry Flower Technology
Hot Water Treatment Unit for Mango
Arka High Humidity Storage Box
Fresh Cut Vegetables Technology
Raw Mango Processing Machinery
Raw Mango Slices Preservation





USAID
FROM THE AMERICAN PEOPLE



सत्यमेव जयते



**Training Schedule of Feed The Future India Triangular Training Program (FTF ITT)
on
Post-Harvest Technology in Horticultural Crops (6th November to 20th November 2017)**

	Morning Sessions		Afternoon Sessions
Date/Day	9.30 am to 11.00 am	11.30 am to 12.30 pm	2.00 to 4 pm
Day 1 6/11/17 (Monday)	Registration, Pre-screening test and Campus visit (All Course Directors)		
Day 2 7/11/17 (Tuesday)	Bill settlements, orientation (All Course Directors) and a short lecture on "An overview of Post Harvest Technologies developed by ICAR-IIHR and future trends" by Dr HS Oberoi		Inauguration (1.30 pm-3 pm) and lecture on Technologies for reduction of Post-Harvest losses in fruits and vegetables–Indian perspective (Dr. MR Dinesh)
Day 3 8/11/17 (Wednesday)	Post Harvest Management of fresh fruits and vegetables in India (Dr DV Sudhakar Rao)	Post- Harvest disease management in horticultural crops (Dr AK Saxena)	Practical on safe ripening methods and protocols and Harvesting and post harvest operations in horticultural crops (sorting, grading, pre-treatments, etc) (Dr DV Sudhakar Rao)
		Panel discussion: Dr CK Narayana, Dr. Sudhakar Rao and Dr AK Saxena	
Day 4 9/11/17 (Thursday)	Value addition to mushrooms for health and nutrition	Strategies for value addition to flowers	Practical on storage of green leafy vegetables and fresh flowers and different packaging methods for

	(Dr. Meera Pandey)	(Dr. Sangama)	fresh fruits and vegetables (Drs DV Sudhakar Rao and Dr. Bhuvaneshwari)
Day 5 10/11/17 (Friday)	Visit to Namdhari pack-house and Poly houses (Dr RB Tiwari, Dr B. Balakrishna and Mr. Dyanand)		
Day 6 11/11/17 (Saturday)	Visit to Mysuru (Mr. Paramashivaiah and Mr. Anandamurthy)		
Day 7 12/11/17 (Sunday)	Assignment work to be completed at Hotel		
Day 8 13/11/17 (Monday)	An overview of drying and dehydration methods for fruits and vegetables (Dr RB Tiwari)	Mechanization of Post Harvest Operations in Horticultural Crops (Dr. RP Kachru)	Practical on Dehydration and Osmotic Dehydration of fruits and vegetables (Dr RB Tiwari)
		Panel discussion: Dr RP Kachru, Dr. HS Oberoi, Dr RB Tiwari, Dr. Senthilkumaran and Dr. Carolin Rathinakumari	
Day 9 14/11/17 (Tuesday)	Packaging interventions for intermediate moisture foods and processed foods (Dr. S Bhuvaneshwari)	Fresh-Cut fruits and vegetables- Microbiological, biochemical and physiological aspects (Dr. Ranjitha K)	Practicals on preparation of Fresh-cut vegetables and microbiological protocols (Dr. Ranjitha K)
	Panel discussion : Dr Debi Sharma, Dr S Bhuvaneshwari and Dr. Ranjitha K		
Day 11 15/11/17 (Wednesday)	Visit to Namdhari Fresh, Bidadi, Ramanagara		Panel Discussion on strategies for extension and marketing of Post Harvest technologies : Dr R

			Venkattakumar co-ordinator, Dr TM Gajanana, Dr. Sudha Mysore, Dr D Sreenivas Murthy, Dr Narayanswamy, Dr. Balakrishna and Dr GA Atheequlla) 2-4.30 pm
Day 10 16/11/17 (Thursday)	Techniques for waste valorization in horticultural crops (Dr CK Narayana)	Nutritional composition of important fresh and processed fruits and vegetables (Dr Shamina Azeez)	Practicals on utilization of horticultural waste (Dr CK Narayana and Mr. Ravinder Kumar)
Day 12 17/11/17 (Friday)	Food safety standards and role of regulatory bodies (Dr Suresh Khurana)	Post Harvest Management and value addition in temperate horticultural crops (Dr Deshbir Singh)	Preparation of fruit beverages and culinary pastes (Dr. IND Gowda) and Practicals on preparation of fruit beverages and nutritional analysis of fresh and processed fruits and vegetables (Mrs Pushpa Chethan Kumar and Mr. Redappa)
Day 13 18/11/17 (Saturday)	Visit to MCI Agro Industries (Dr. Carolin Rathinakumari and Mr. K Redappa)		
Day 14 19/11/17 (Sunday)	Visit to Bengaluru City (Dr. Shamina and Mr. Nagappa)		
Day 15 20/11/17 (Monday)	Feedback about different sessions and evaluation test for the participants		Valedictory function

2.3. Resource Personnel

In addition to the faculty members from ICAR-IIHR, Bengaluru belonging to different disciplines from different divisions, following experts were invited to deliver the special lectures:

- Dr RP Kachru, Former Assistant Director General, Indian Council of Agricultural Research (ICAR), New Delhi
- Dr DB Singh, Director, ICAR-Central Institute of Temperate Horticulture (CITH), Srinagar, Jammu and Kashmir
- Dr. Suresh Khurana, Consultant, Food Safety Standards Authority of India (FSSAI), New Delhi

2.4 Field Visits

The executives were taken around the demonstration plots in Block-3 of ICAR-IIHR, Bengaluru wherein they were apprised about the important features of the varieties/ hybrids developed by ICAR-IIHR, Bengaluru and important characteristics of such varieties/ hybrids. The executives were also taken around the research farms of ICAR-IIHR, Bengaluru where they were exposed to the breeding strategies being followed for improvement in fruit and vegetable production. The executives were also taken around the Agricultural Technology Information Centre (ATIC), Mushroom Research Laboratory and state-of-art Referral Food Testing Laboratory (RTL) at ICAR-IIHR, Bengaluru.



Executives interacting with Director, ICAR-IIHR about breeding and cultivation aspects of different fruit crops



Interaction of Executives with the Vegetable breeders and Course Director at ICAR-IIHR, Bengaluru



Executives interacting with Scientists- Incharge of RTL and ATIC at ICAR-IIHR, Bengaluru

The executives accompanied by the scientists from the Division of Social Sciences and Training and Post Harvest Technology and Agricultural Engineering were taken to the Mukkenahalli village, near Doddaballapura taluk, Bengaluru urban district in which green



capsicum was grown in a 1 ½ acre polyhouse. This project is supported by the National Horticulture Board (NHB), Government of India.



All the delegates were explained about the holistic package of capsicum cultivation including post harvest management for domestic and export market adopted by the farmers. The delegates had intensive discussion with the farmers on varieties, integrated crop production techniques, economics, marketing of capsicum with polyhouse farmers. The executives also visited other 3 farmers fields and discussed on integrated crop management and marketing of bottle brinjal, chrysanthemum and colour capsicum.



Executives interacting with the farmers practicing polyhouse cultivation of vegetables and the scientists from ICAR-IIHR at a Farmer's field at Dodaballapura taluka, Bengaluru
 The executives were also taken to Sri Sai Floritech Pvt. Ltd. Farm in which Rose, gerbera, Carnation and Gypsophilla flowers were grown with excellent integrated crop management and marketing system in an area of >25 acres. They also visited rain water harvesting, storage and utilization facility along with an exposure on grading, packaging, transportation and marketing of these flowers for both domestic and export market.



Visit of Executives at the Sri Sai Floritech Pvt Ltd (Hi-tech floriculture project), Dodaballapura taluk, Bengaluru

All the executives had learnt different fine tuned crop management practices, specifically bending in roses, water, nutrient and pest management in Carnation and Gerbera, wilt and nematode management in Gerbera using ICAR- IIHR technology and also had intensive discussion with the farmer, Mr. Srikanth, and the manager Mr. Kiran of Sri Sai Floritech Pvt. Ltd on various aspects of Hi-tech floriculture

As the pre-harvest practices in horticulture crop production have a drastic impact on the post-harvest quality attributes of the produce, the participants were acquainted with the polyhouses and Hi-tech horticulture. The executives were exposed to the cultivation practices being followed at a Hi-Tech vegetable nursery (Eklavya nursery), near Hesaraghatta, Bengaluru. Eklavya nursery employs mechanized protray dibblers cum seeder for production of vegetable seedlings. These seedlings are transplanted by the vegetable growers in their farms, thereby getting a uniform quality produce and good remuneration.



Visit of Executives to Eklavya Nursery, Hesaraghatta, Bengaluru

The executives of the international training accompanied by Course Director Dr H.S. Oberoi and Course Co-Director Dr D. V. Sudhakar Rao visited the pack-house facility of Namdhari Seeds Pvt Ltd located about 40 Km from Bangalore on 15th November 2017. The visit was arranged to get the executives exposed to different supply chain operations followed for fresh horticultural produce for both domestic as well as export markets. At the state-of-art pack-house facility, the executives had a learning exposure to various pack-house operations like sorting, washing, grading, pre-cooling, packaging, cold storage, quarantine inspection and hygiene practices for handling of fruits and vegetables that are being followed for both domestic and export markets. In addition to the pack-house facilities the executives were also taken around the state of the art poly house facilities put up in their premises used for producing quality vegetables that are meant for supply to their retail outlets and export markets. The executives keenly interacted with Mr Sunil G. Awari, the General Manager of pack house and Mr Upendra, Manager to know the pack-house operations and also production aspects of vegetables



Visit of Executives to Namdhari Fresh, Bidadi, Ramnagara district, Karnataka

The executives accompanied by Dr. Shamina Azeez and Mr. Nagappa, visited the University of Agricultural Sciences (UAS), GKVK, Bengaluru, where the Krishi Mela was organized. Executives were taken to the various stalls, including the ICAR-IIHR stalls and were familiarized with the various agricultural technologies, stalls of public and private enterprises including seed companies, homestead gardening, agricultural implements, and several other stalls. The officers found the entire fair interesting and educative. In addition, they also enjoyed the live folk music and dance performances during the Krishi Mela.



Executives visiting different stalls in the Krishi Mela organized at the University of Agricultural Sciences, GKVK, Bengaluru

The executives visited MCI Agro Industries, Krishnagiri (Tamilnadu) who have adopted the technology for osmotic dehydration of fruits and vegetables and for preparation of fruit bars from ICAR-IIHR, Bengaluru. The executives were taken around the solar tunnel dryers (STD, 7 Nos.), fabricated out of polycarbonate sheets, which prevent the UV rays directly hitting the products, thereby helping in better retention of texture and colour with very minimal loss of nutrients. The total production capacity of the plant was 920 kg/day Apart from this, the STD's were installed with high capacity lamps, which produces heat in order to dry the products during bad/unfavourable weather. The executives expressed that the technology which was adopted by the firm for development of various products is very good, technically viable and the products are highly acceptable and the solar tunnel dryers are very much useful for their respective countries where fruits and vegetables are grown in plenty.





Executives with CEO, MCI Agro Industries Krishangiri, Tamil Nadu

2.5. Visit to places of cultural and historical importance

The executives were taken around a few places in Bengaluru which included Lal Bagh, Cubbon Park, Handicrafts Emporium and a Mall. The executives were taken to Mysuru, a town known for its cultural and heritage importance. On the way they visited famous Toys and Handicrafts Emporium at Channapatna. At Mysuru City, the executives visited Chamundeswari Temple, Chamundi Hills, Mysuru Palace, St. Philomena's Church, Krishnaraja Sagar Garden and Music water fountain and cherished each and every moment.

Executives visiting the Mysuru Palace, Mysuru City



Visit to Handicraft facility, Bengaluru

2.6. Cultural Evening

A cultural evening was organized on 14th November, 2017 with the theme “Culture for Global Harmony “. The programme started with an awesome and mesmerizing performances of traditional Indian dances from North and South India, namely Kathak and Bharatnatyam, respectively. There was at least one cultural item performed by the executives of all twelve participating countries showcasing the culture and tradition of their respective countries. All the executives had come in their country's traditional attire and were totally involved in their

performances. All of them put in their best to give an idea about the culture and tradition of their countries as well as exhibit the innate talent each one of them had. Participants exhibited their talents through singing, dancing in solo or group by depicting their respective country's traditional cultural attire. It ended with the group song and dance number " We are the World" in which the some of the staff of the institute also joined with all the executives on the stage to prove the Global harmony. The audience was thrilled and mesmerized by the overall splendid performance of the executives.





2.7 Life Membership to Professional Bodies and Journals

All the executives were made Life Members of Society for Promotion of Horticulture (SPH). All the Executives shall be receiving copies of the Journal of Horticultural Sciences published by SPH, ICAR-IIHR, Bengaluru regularly.

2.8. Back -At-Work-Plans

The present programme aimed at hands-on-training on the protocols being used for different operations during the supply chain management of fresh fruits and vegetables; value addition and processing and mechanization in both field and Post-Harvest operations. Simple low-cost ripening chambers, design of evaporative cooling and zero energy cool chambers for extending the storability of the fresh horticultural produce can be easily adopted by the farmers in their fields. Low cost shrink wrapping technology or packing of fruits in CFB boxes can add value to the produce and improve its storage life. The executives were exposed to all these protocols and techniques. Processing of tomatoes into Crushed tomatoes or fruits and vegetables to beverages, osmotically dehydrated products or dehydrated products were also demonstrated to the executives who themselves were asked to carry out the process. The executives were also exposed to the machinery used for onion cultivation, Hot water

treatment of mangoes, onion grading and nursery mechanization. Details of individual Back-at-work plans are given at Annexure-I

3. TRAINING EVALUATION

3.1 Evaluation of training Sessions

Feedback of all Executives was collected on all training sessions including theory, panel discussion and practical sessions conducted by different resource persons and study visits on rating on the 1-10 scale (1 being the least and 10 being highest) i.e. '1 being the least and 10 being the highest. Their suggestions on other areas such as Food and accommodation, transport facilities provided and overall impression about the training were also collected for improvement in future programmes of similar kind. The executives gave average ratings of 8.5, 8.6 and 8.9 for theory classes, practicals and study visits respectively. Executives rated the overall training program with a score of 8.9 on 10 point scale. The feedback received from executives are tabulated and given at Annexure-II.

3.2 Pre and Post-Training Test

Pre & Post training tests were conducted for the Executives at the beginning and at the end of the training, respectively. Twenty five objective questions on Post-Harvest Technology in Horticultural Crops with a maximum of 25 marks were administered for pre- and post-training tests and the responses obtained were evaluated to assess the change in knowledge levels and effectiveness of the training programme. The average score of executives in the pre-training test was 12.88 (51.5%) whereas the average score of post-training was 18.7 (74.8%). Thus, level of knowledge of executives increased by 23.23 per cent after the training programme. Details of pre and post-training test are given at Annexure-III.

3.3 Post-Training Monitoring

Post-training impact evaluation in respective countries by Program Coordinator/Course Director of Host Institute is an integral part of the programme. Course Director will be regularly in touch with executives through emails to monitor the progress of their "Back-at Work-Plans" and it will help in the effective monitoring and impact evaluation which is one of the important aspects of Program Monitoring & Evaluation (M & E).

4. Valedictory Programme and Feedback from executives



The training programme concluded with a valedictory function on 20th November, 2017 afternoon at committee room at ICAR-IIHR, Bengaluru. The programme was presided by Dr. M R Dinesh, Director, ICAR-IIHR, Bengaluru who also chaired the session. Dr. P. Chandra Shekara, Program Director, MANAGE attended the valedictory programme as the guest of honor. Dr Harinder Singh Oberoi, Principal Scientist and Head PHT and AE, Course director of the training programme welcomed the Director, guest of honor and other delegates. Co – course coordinators of the training programme Dr G Senthil Kumaran, Dr D.V Sudhakar Rao, Dr R B Tiwari and Mr G A Atheequilla were also present.



The programme began with the welcome address by Dr.G Senthil Kumaran who briefed about the various activities organized during the fifteen days training programme, including the field visits, cultural evening and visit to places of cultural heritage.



During the valedictory session, selected executives from Afghanistan, Kenya, Mozambique and Uganda briefly presented the back at work plan. Later on trainees expressed their overwhelming joy and happiness on successful completion of the 15 days training cum learning process and assured of prompt and fruitful execution of their back at work plan in their home countries.

Dr P Chandra Shekara congratulated ICAR-IIHR, Bengaluru for successfully completing the task of imparting 15 days training programme in Post-Harvest technology. He also briefed about the objectives and vision of the triangular training programmes. He stressed on the importance of such training programmes which pave the way for adopting



technological advances and innovative solutions to address food security challenges in Africa. He also narrated the success stories of similar training programmes, in which the trainee executives have done remarkable interventions during back at work programme which has helped the farming communities at large. He urged the executives to work effectively and implement the technologies or interventions learned here, in their respective countries.

Dr M R Dinesh, Director, ICAR-IIHR, thanked MANAGE for having chosen the Institute for imparting training in Post-Harvest Technology in Horticultural Crops. He briefed and complimented the Course Director, Co-Course Directors and the entire staff from the Divisions of Post-Harvest Technology and Agricultural Engineering and Social Sciences and

Training, ICAR-IIHR for successful coordination and execution of such an important training programme. He shared the glimpses of entire package of practices/technologies generated by IIHR and advised the executives to adopt them as per their local conditions and requirements which benefit the communities of respective countries in particular and the whole world in general. He distributed the certificates to all the executives and complimented them for successful completion of the training programme.



The valedictory programme ended with the vote of thanks by Mr. GA Atheequlla to the Chair, Course Directors, Chief Guest, Executives and all the staff.

Feedback from Executives

The feedback was received from all the executives on all training sessions conducted by the resources persons, and also about the study visits, general boarding and lodging arrangements, transportation facilities, etc. The executives expressed satisfaction and remarked that the programme was excellent and educative. The feedback scores received are tabulated and mentioned in Annexure-II.

Annexure- I



USAID
FROM THE AMERICAN PEOPLE



सत्यमेव जयते



Back at Work Plan

Mr.Fazal Rahim Ayoubi

Cooperative General Manager,
Kandahar Department of Agriculture and Livestock
District # 5, Kandahar City
Afghanistan
Ph:0706064725
Email:fazalrahim.agri@gmail.com



Name of the Activity	Introduce evaporation cooling storage for small scale farmers under extension plan
Problem in your service area	Farmer cannot store their production after harvest for a long time due to its perishable nature. Farmer cannot carry their produce on time to market Fruit and vegetable lose their weight during store in open place
Indian Experiences/Solutions/ Innovations	Learnt many techniques about post harvest section but our first priorities will be on setting up an evaporative cold storage facility on the farmer's field.
Place	Kandahar, Afghanistan
Target group	Small group of farmers
Duration	One year
Expected end results	Training of farmers about the advantages of establishing the Evaporative Cold structures for extended storage of fruits and vegetables
Any other information	

Mr. Abdul Kabir Agha Hashmi
 Executive Manager,
 Kandahar Department of Agriculture and Livestock
 District # 5, Kandahar City
 Afghanistan
 Ph: 0700722909/0702979543
 Email: abdulkabiragha7@gmail.com/pacha.agri@yahoo.com



Name of the Activity	Introduce evaporation cooling storage for small scale farmers under extension plan
Problem in your service area	Farmer cannot store their production after harvest for a long time due to its perishable nature. Farmer cannot carry their produce on time to market Fruit and vegetable lose their weight during store in open place
Indian Experiences/Solutions/Innovations	Learnt many techniques about post-harvest section but our first priorities will be on setting up an evaporative cold storage facility on the farmer's field.
Place	Kandahar, Afghanistan
Target group	Small group of farmers
Duration	One year
Expected end results	Training of farmers about the advantages of establishing the Evaporative Cold structures for extended storage of fruits and vegetables
Any other information	

Mr.Murtaza Aslampooor
 General Manager of Development Studies
 Ministry of Agriculture, Irrigation and Livestock,
 Horticulture Directorate, Vegetable and
 Greenhouse Development Department,
 Jamal Mina Kart-e-sakhi, Kabul Afghanistan
 Ph:07443221999/0700818253



Name of the Activity	Introduce evaporation cooling storage for small scale farmers under extension plan
Problem in your service area	Farmer cannot store their production after harvest for a long time due to its perishable nature. Farmer cannot carry their produce on time to market Fruit and vegetable lose their weight during store in open place
Indian Experiences/Solutions/Innovations	Learnt many techniques about post harvest section but our first priorities will be on setting up an evaporative cold storage facility on the farmer's field.
Place	Kabul, Afghanistan
Target group	Small group of farmers
Duration	One year
Expected end results	Training of farmers about the advantages of establishing the Evaporative Cold structures for extended storage of fruits and vegetables
Any other information	

Ms. Mpho Christine Mogoro Sakgomo
 Agricultural Scientific Officer
 Ministry of Agricultural Development and
 Food Security,
 P.O.Box # 83, Botswana
 Ph: +267 71910653
 Email: mmogorosakgomo@gov.bw



Name of the Activity	Construction of an on farm zero energy cool chamber
Problem in your service area	Most farmers in the country are experiencing greater loss of fruits, vegetables especially in the rural areas where there is no electricity supply and temperatures are as high as 40°C
Indian Experiences/Solutions/Innovations	Farmers and retailers in India have managed to reduce post-harvest losses of fruits and vegetables through using post-harvest technologies among them the zero energy cold chamber is a low cost and simple technology. Osmotic Dehydration, packaging methods such as shrink wrapping and low temperature storage are the other promising technologies which could be adopted in Botswana.
Place	Technologies will be implemented in the two districts – Southern Molepdole and Central part of the country which is Tonota
Target group	Horticulture cluster farmers especially those who are in the production of tomatoes
Duration	6 months
Expected end results	This technology will help to extend the storage life of tomatoes especially that field temperatures will be reduced and farmers can sell quality produce. This technology can further be adopted by other farmers from other districts including the extension officers
Any other information	After successful implementation of the technology we will start mushroom production and the post harvest technologies like drying and powder making.

Mr. Joel Olebile Segobaetso
 Agricultural Principal Scientific Officer
 Ministry of Agricultural Development and Food Security
 PO Box.31, Molepolole, Botswana
 Ph: +267 71480738
 Email: jsegobaetso@gov.bw, jsegoba@yahoo.com



Name of the Activity	Construction of on- farm zero energy cooling chamber
Problem in your service area	Farmers are experiencing great loss of fruits and vegetables more especially in rural areas where there is no supply of electricity
Indian Experiences/Solutions/ Innovations	Post harvest technologies like cold storage facilities, beverages making, puree making, osmotic dehydration, packaging technologies
Place	Molepolole (KWEMENE DISTRICT)
Target group	Horticultural Cluster farmers growing tomatoes
Duration	6 months
Expected end results	Reduced losses Adoption of technology by other farmers
Any other information	To also start mushroom production

Mr. Montha Chey,
 Head of Department of Agro-Industry
 Prek Leap National College of Agriculture,
 Highway 6A, Sangkat Prek Leap,
 Khan Chrocychangva,
 Phnom Penh, Cambodia
 Tel: +855 236910595, +85512735758
 Email: cheymontha@yahoo.com, info@pnsa.edu.kh



Name of the Activity	Pineapple Juice
Problem in your service area	The fruit cannot be stored for long period. Production and packing of juice
Indian Experiences/Solutions/Innovations	Different processing technologies
Place	Cambodia
Target group	Farmers and Entrepreneurs
Duration	2-3 months
Expected end results	Shelf life extension of Pineapple juice
Any other information	

Mr. Samrit Pauv
 Official Staff of Department of Agro-Industry
 Prek Leap National College of Agriculture,
 Highway 6A, Sangkat Prek Leap
 Khan Chrocychangva,
 Phnom Penh, Cambodia
 Tel: +855 236910595, +855 99267247
 Email: pauvsamrit@gmail.com, info@pnsa.edu.kh



Name of the Activity	Pineapple Juice
Problem in your service area	The fruit cannot be stored for long period. Production and packing of juice
Indian Experiences/Solutions/Innovations	Different processing technologies
Place	Cambodia
Target group	Farmers and Entrepreneurs
Duration	2-3 months
Expected end results	Shelf life extension of Pineapple juice
Any other information	

Ms.Esther Agyekum
 Senior Agricultural Officer,
 Ministry of Food and Agriculture
 Directorate of Crop Services
 P.O.Box. M37 Accra, Ghana
 Ph: +233 245629758
 Email: estheragyekum@yahoo.com



Name of the Activity	Safe ripening of fruits, Shrink wrapping, Fresh cut vegetable handling
Problem in your service area	High post-harvest losses (20-50%) recorded in horticultural crops Low income of farmers due to high perishability of the horticultural produce
Indian Experiences/Solutions/Innovations	1.Vegetable value addition through – Shrink wrapping (Fruits and Vegetables), treatment of fresh- cut cucumber and green pepper 2.Safe ripening chamber for banana using ethylene 3.Water (Hot) treatment of mango
Place	Greater Accra (3 locations)
Target group	Farmers/farmer groups, FSV Entrepreneurs/ processors, Agricultural Extension Officers
Duration	1 year (2018-2019)
Expected end results	Improved incomes of farm household through reduced post harvest losses
Any other information	

Mr.Robert Selassie Setorwofia
 Assistant Agricultural Officer,
 Ministry of Food and Agriculture,
 Agribusiness Unit
 P.O.Box.M37 Accra, Ghana
 Ph: +233 249 239244
 Email: selassierobert@gmail.com



Name of the Activity	Dehydration technology introduced to agribusinesses, farmers and farm institutes
Problem in your service area	1.High post-harvest losses recorded in fruits and vegetables 2.Mostly Government interventions are production oriented with minimal emphasis on Post Harvest technologies 3.Farmers have limited knowledge in post-harvest management, resulting in low levels of income
Indian Experiences/Solutions/Innovations	1.Osmotic dehydration of fruits 2.Shrink wrapping technology for fruits and vegetables 3.Dehydration of fruits and vegetables
Place	Greater Accra and Volta regions
Target group	Farmers, Agribusinesses, Agricultural farm institutes and colleges
Duration	6 months – 1 year
Expected end results	Increased knowledge in post-harvest technology in horticulture Increased income earnings for farmers and agribusinesses
Any other information	

Mr.Emmanuel Amanor Yirenkyi
 Assistant Agricultural Officer,
 Ministry of Food and Agriculture/Agribusiness Unit
 P.O.Box # M37, Ministries, Accra, Ghana
 Ph: 0303965094/0242844563/0209529179
 Email:Kojo.amanoryirenkyi@gmail.com,
 Agribusiness-unitmofa@googlegroups.com



Name of the Activity	Dehydration technology introduced to agribusinesses, farmers and farm institutes (Training activity)
Problem in your service area	1.High post harvest losses recorded in fruits and vegetables 2.Mostly Government interventions are production oriented with minimal emphasis on technology Farmers have limited knowledge in post harvest management resulting in low levels of income
Indian Experiences/Solutions/Innovations	1.Osmotic dehydration of fruits 2.Shrink wrapping technology for fruits and vegetables 3.Dehydration of fruits and vegetables

	4.Low cost ripening technology
Place	Greater Accra and Volta Regions
Target group	Farmers, Agribusinesses, Agricultural Farm Institutes and colleges
Duration	6 months – 1 year
Expected end results	Increased knowledge in post harvest technology in horticulture Increased income earnings for farmers and agribusinesses
Any other information	

Mr. Joseph Tommy Tommie
Senior Agriculture Economist
Ministry of Food and Agriculture,
MOFA/PPMED, Box M37, Accra, Ghana
Ph: 0507281334/0249748287
Email: tommie2326@gmail.com



Name of the Activity	Safe ripening of fruit – shrink wrapping Fresh vegetable handling
Problem in your service area	- High post harvest losses (20 -50%) recorded in horticultural crop - Low incomes of farmers due to high perishability -
Indian Experiences/Solutions/Innovations	-Value addition through -Safe ripening chamber of banana using ethylene -Hot water treatment
Place	Greater Accra Region
Target group	-Farmers/Farmer groups -Agri.Extension Officers
Duration	1 year (2018-19)
Expected end results	Improved incomes of farmers through reduce post harvest losses
Any other information	

Ms.Elizabeth Edem Gididlo
 Agricultural Extension Officer,
 Ministry of Food and Agriculture
 Directorate of Agriculture Extension Services
 P.O.Box M37, Ministries, Accra, Ghana
 Ph:0244966294/0244966294
 Email: egidiglo@yahoo.ca



Name of the Activity	Tomato Puree Technology
Problem in your service area	High Post Harvest Losses in Tomato
Indian Experiences/Solutions/Innovations	Tomato technology in processing raw harvested tomato into puree
Place	Ghana, Greater Accra, Region
Target group	Farmers and women in Agriculture Development in Ghana – GA-South Municipal
Duration	One year
Expected end results	Reduction of post harvest losses in tomato
Any other information	Osmotic dehydration will be tackled latter in pineapple and other fruits after the first result of tomato puree have been achieved

Dominic Munywoki
 Principal Agricultural Officer,
 Ministry of Agriculture, Livestock and Fisheries
 State Department of Agriculture,
 P.O.Box 30028 -00100 Nairobi, Kenya
 Ph: +254 713273393
 Email: graceagili@gmail.com
dominickitaka@yahoo.com



Name of the Activity	Training on the use of low cost artificial ripening technology
Problem in your service area	Poor and unhygienic methods of ripening fruits posing health hazard to consumers
Indian Experiences/Solutions/Innovations	Use of low cost artificial ripening technology
Place	Central, Eastern and Nairobi regions
Target group	Extension officers, traders and farmers
Duration	December 2017 – June,2018
Expected end results	Reduced risk of consuming poisonous chemicals Reduced post harvest losses Improved income to the farmer and marketers
Any other information	Other technologies which will be considered for the ... 1.Osmotic dehydration 2. On farm cold storage

Ms. Margaret Wanjiku Karuku,
Lecturer,
Kenya School of Agriculture,
Ministry of Agriculture, Livestock and Fisheries
P.O.Box.1909-10100, Kenya
Ph:254 722888990
Email:embumission@gmail.com
kenyaschoolofagriculture@yahoo.com



Name of the Activity	Training on the use of low cost artificial ripening Technology
Problem in your service area	Poor and unhygienic methods of ripening fruits posing a health hazard to consumers
Indian Experiences/Solutions/Innovations	Use of low cost artificial ripening technology
Place	Central, Eastern and Nairobi Regions
Target group	Extension officers, traders and farmers
Duration	December,2017 – June,2018
Expected end results	1. Reduced risk of consuming poisonous chemicals 2. Reduced post harvest losses 3. Improved incomes to the farmers and marketers
Any other information	Other technologies to be considered for implementation 1.Osmotic dehydration 2.On farm cold storage

Mrs. Weedor Akoi Cegbe
Country Agriculture Coordinator
Department of Regional Development Research & Extension,
Ministry of Agriculture,
Monrovia, Liberia
[Tel:+231 886708784](tel:+231886708784)
Email: weecegbe@yahoo.com, leorycegbe@ymail.com
edibo@yahoo.com



Name of the Activity	Training on basic knowledge and skills in post harvest management and value addition along the chilly pepper value chain
Problem in your service area	Due to this farmers are complaining to sell the fresh chilly at very low price and those that are sold mostly go waste
Indian Experiences/Solutions/Innovations	Sorting and grading of chilly pepper for better market and price
Place	Liberia

Target group	This proposed activity mainly target fifty (50) women and youth in agriculture, who will be trainer for trainees on post harvest technologies for better management of chillies
Duration	Two (2) years
Expected end results	Reduced post-harvest losses in chilly
Any other information	The technologies and skills they will earn enough money from their produce

Mr. Kafunda David Burton
Agricultural Extension Development Officer,
Salima District Office,
P.O. Box.491,
Salima, Malawi
Tel: _265 993205903
Fax: _265(1) 262663
Email: kafunda.alice38@gmail.com



Name of the Activity	Osmotic dehydration in mangoes and papaya in Malawi
Problem in your service area	Poor market of mangoes and papaya Poor storage facilities Lack of knowledge of fruit processing
Indian Experiences/Solutions/Innovations	Drying of mangoes through osmotic dehydration Prolonged shelf life for fruits and vegetables
Place	Salima, Malawi
Target group	Misengo Lirigham Club
Duration	5 months
Expected end results	Reduced Post Harvest losses through value addition to mangoes and papaya
Any other information	

Ms. Nyirenda Babra Malikebu
 Agricultural Extension Development Officer,
 MVERA EPA, P.O. Box.42
 Ministry of Agriculture, Mvera, Malawi
 Tel: +265 0999276164, 0991743066
 Email: nyirendababs@gmail.com
Inyirenda2000@yahoo.com



Name of the Activity	Osmotic dehydration in mangoes and paw paws in Malawi
Problem in your service area	Lack of knowledge in mango and pawpaw processing. Lack of knowledge in proper harvesting of fruits
Indian Experiences/Solutions/Innovations	*Processing of mangoes through osmotic dehydration *Ripening of fruits using chambers
Place	Mvera EPA DOWA
Target group	Chikhutu/Kaliza Farmer Club Nankhala Irrigation Club
Duration	5 months
Expected end results	Reduction of post harvest losses in mango and pawpaw; Increase in income for small holder after selling processed fruit products
Any other information	The knowledge gained here will be shared with the fellow extension workers and also with the farmers

Ms. Tamara Tembo
 Agricultural Development Officer,
 Ministry of Agriculture,
 Private Bag 30131, Lilongwe, Malawi
 Ph: +265999161065/+265992518851
 Email: tammzy@yahoo.com, xrismike@yahoo.co.uk



Name of the Activity	Osmotic Dehydration in PawPaws and mangoes in Malawi
Problem in your service area	Poor marketing of mangoes and papaya Poor storage facilities Lack of knowledge of fruit processing
Indian Experiences/Solutions/Innovations	- Drying of mangoes and papayas through Osmotic dehydration - Prolonged shelf life for fruits and vegetables
Place	Chileka Extension Planning Area in Ulonawe

Target group	Mapuyu Association
Duration	5 months
Expected end results	Reduction of post harvest losses in papaya and mangoes Increased income of small farmers
Any other information	

Mr. Jambal Tumurkhuyag
Senior Officer,
Crop Policy Implementation and Coordination Department,
Ministry of Food, Agriculture and Light Industry,
Government Building #9, Exktaivan Avenue, 16 A,
Ulaanbaatar-210349, Mongolia
Tel: 51 263408, 99007368
Email:saruultuyadd@gmail.com



Name of the Activity	To establish plant seedling greenhouse To organise post harvest technology training
Problem in your service area	Lack of knowledge and experience Finance, Climatic condition
Indian Experiences/Solutions/Innovations	Good quality seedling (coca peat) Government support
Place	Ulaanbaatar
Target group	Fruit and Vegetable farmers
Duration	2018
Expected end results	Production of good quality of seed and planting material and Enhancement in farmer's knowledge
Any other information	

Mr.Khaing Aye Min
 Assistant Staff Officer,
 Myanadi Horticultural Farm,
 Department of Agriculture, Ministry of Agriculture,
 Livestock and Irrigation, Myittha Township,
 Mnadale Region, Myanmar
 Tel: +95-9-783644151, +95-9-5300591
 FAX: +9567410067
 Email: thannaingmoe.tmn@gmail.com,
hortioffice@gmail.com



Name of the Activity	Low cost ripening chamber and zero energy cool chamber to get quality fruit and vegetables
Problem in your service area	Small scale farmers have poor knowledge about the PHM system, and storage condition
Indian Experiences/Solutions/Innovations	How to apply ethylene to enhance the ripening process and uniform ripening by using low cost ripening chamber. How to construct the zero energy cool chamber
Place	May Pyi Daw Council Area, Central Myanmar
Target group	Small scale farmers, Extension workers
Duration	During 2017 November to 2018 May
Expected end results	Many farmers not only in the service area but also the whole of Myanmar growing area will know how to make low cost ripening chamber and zero energy cool chamber
Any other information	

Mr.Than Naing Moe
 Deputy Staff Officer,
 Department of Agriculture, Ministry of Agriculture,
 Livestock and Irrigation,
 Office Number (43),Department of Agriculture,
 Nay Pyi Taw, Myanmar,
 Ph:+95-9-780025641, +95-9-5300591
 Email: thannaingmoe.tmn@gmail.com



Name of the Activity	Low cost ripening chamber and zero energy cool chamber to get quality fruit and vegetables
Problem in your service area	Small scale farmers have poor knowledge about the PHM system, and storage condition
Indian Experiences/Solutions/Innovations	How to apply ethylene to enhance the ripening process and uniform ripening by using low cost ripening chamber. How to construct the zero energy cool chamber

Place	May Pyi Daw Council Area, Central Myanmar
Target group	Small scale farmers, Extension workers
Duration	During 2017 November to 2018 May
Expected end results	Knowledge about setting up of ripening chambers and low cost Evaporative Cooled Structures
Any other information	

Mr. Elton Amadeus Francisco
Rural Extension Monitoring and Evaluation Officer
Inhambane Directorate of Agriculture and Food Security
Inhambane City, between Eduardo Mondlane and
Revolucao Avenue
Mosambique
Ph: +258 29320929, +258822834116, +258840358666
Email: dea.dpainhambane@gmail.com



Name of the Activity	Osmotic Dehydration of Mango
Problem in your service area	High level of post harvest losses in Mango due to lack of knowledge about alternative methods of processing and storage
Indian Experiences/Solutions/Innovations	Osmotic dehydration of mango
Place	Inhambane Province, Mozambique
Target group	Small farmers and Extension Agents
Duration	4 months
Expected end results	The reduction of post harvest losses of mango will help in increasing the income of small farmers, improve the availability of the processed mango because of its higher shelf life
Any other information	

Mr. Lukurwe Ham Wilson
 Technical Officer-Sector Skills Councils,
 Skilling Uganda,
 Reform Task Force (RTF), Secretariat
 Ministry of Education and Sports
 Kampala, Uganda
 Tel: +256 772962503, +256 702264145
 Email: lukurweham@gmail.com, shinecaresuganda@gmail.com



Name of the Activity	Waste Valorization of horticultural crops. A case of hibiscus, scientifically testing and making use of seed husks and discarded calyses
Problem in your service area	Ever increasing waste resulting from increase of processing of hibiscus juice
Indian Experiences/Solutions/Innovations	Availability of simple technologies that can turn waste into useful products
Place	Piloted in Mpigi district and later scaled up in the rest of the country
Target group	Processors Women farmer groups
Duration	One year
Expected end results	-Increased profitability -Improved environmental friendly practices
Any other information	Hibiscus waste valorisation will be implemented as a pilot project. The team shall explore use of other technologies to reduce loss through waste valorization of other crops

Ms. Rose Lukwago Nassali,
 Judicial Service Commission, Farmers House,
 Plot 6/8, Parliament Avenue
 P.O.Box 7679, Kampala
 Uganda
 Tel: +256772673217
 Email: permasec@jsc.go.ug, nassalirose60@gmail.com



Name of the Activity	Process waste valorisation of Hibiscus husks and discarded calyses
Problem in your service area	Take long to decompose and turn into manure. Production of hibiscus is increasing after bringing more out growers on

	board. Therefore, increase in this wastes
Indian Experiences/Solutions/Innovations	Turning the process waste into fuel or other value added products and/ or processing further the waste to turn into other products that can be consumed by humans/animal
Place	Agraric Mixed Model Farm, Buwana, Mpigi District Uganda
Target group	Jus Ben Ben Factory – where the hibiscus is processed into juice and soft drinks), leaving behind discarded calyses and seed husks
Duration	5 months
Expected end results	Use of Hibiscus husks and discarded calyses for fuel, or for animal/poultry feeds if the process waste is tested and found to contain nutritious salts/minerals
Any other information	The waste valorisation of hibiscus waste technology can be transferred to other industries, farmers groups and to especially horticultural crops as a measure towards environmental conservation

Ms.Abeer Elamin Mohanedahamed Elhaj
Engineering Agriculture
Sud Kh Alnil Street,
Ministry of Agriculture,
Almogran
Khartoum, Sudan
Mob: 002466737609, 00966537473303
Email: abeeralmin1985@gmail.com



Name of the Activity	Provide training to trainers, skill to staff of Ministry of Agriculture and stake holders
Problem in your service area	The horticultural value chain in dehydration and problems in processing. There are post harvest challenge in the horticultural industry due to unavailability of post harvest technologies and equipment. There are gluts during most seasons resulting into waste and loss
Indian Experiences/Solutions/Innovations	Have acquired adequate knowledge in dehydration of vegetables and osmotic dehydration for fruits and vegetables. The dehydration and osmotic technology will serve as a major solution and point to address the post harvest loss in Sudan.
Place	Khartoum, Sudan
Target group	College staff-farmers – women group
Duration	6 month to one year
Expected end results	Enhanced capacity of Ministry staff in dehydration of vegetables and osmotic dehydration technology for fruits
Any other information	Reduce post harvest losses during glut seasons

Ms.Kautyher Altom Algzoly Alnor
 Engineering Agriculture,
 Sud kh Alnil Street,
 Ministry of Agriculture,
 Almogran
 Khartoum, Sudan,
 Mob: 002498278418, 0024993986632
 Email: kwseraltom@gmail.com



Name of the Activity	Provide training to Trainers and skill to the staff of Ministry of Agriculture and Stakeholders/ along the horticultural value/chain in dehydration and osmotic dehydration technology
Problem in your service area	There are post harvest challenges in horticultural industry due to unavailability of post harvest technologies and equipment There are gluts during most seasons resulting into waste and loss
Indian Experiences/Solutions/ Innovations	Have acquired adequate knowledge in dehydration of vegetables and osmotic dehydration for fruits and vegetables The dehydration and osmotic technology will serve as major solution point to address the post harvest losses in Sudan
Place	The plan is to pilot the dehydration and osmotic technology at Khartoum/Sudan/Almogren/Alnil Street in Sudan
Target group	College staff, farmers, farmer group organization, women groups
Duration	6 month to 1 year
Expected end results	Enhanced capacity of Ministry staff in dehydration of vegetables and osmotic dehydration technology in fruits Reduced post harvest losses during glut seasons
Any other information	To give me second time to come in to IIHR for another program to get information

Annexure-II

FEEDBACK EVALUATION REPORT



FEEDBACK FORM

Feed The Future India Triangular Training (FTF ITT) Program on “Post-Harvest Technology in Horticultural Crops” held at ICAR-Indian Institute of Horticultural Research, Bengaluru, INDIA (6th November to 20th November 2017)

Date : 20/11/2017

Venue: ICAR-IIHR, Bangalore, India

EVALUATION FORM

Please give your rating on the 1-10 scale (1 being the least and 10 being highest)

S N	Topic	Faculty	Average Score
1.	An overview of Post Harvest Technologies developed by ICAR-IIHR and future trends	Harinder Singh Oberoi	9.38
2.	Technologies for reduction of Post Harvest losses in fruits and vegetables–Indian perspective	Harinder Singh Oberoi	9.23
3.	Post Harvest Management of fresh fruits and vegetables	DV Sudhakar Rao	8.56
4.	Integrated Post harvest disease management of horticultural crops	AK Saxena	8.31
5.	Value addition to mushrooms for health and nutrition	Meera Pandey	8.0
6.	Strategies for value addition of flowers	Sangama	8.08
7.	An overview of drying and dehydration methods for fruits and vegetables	RB Tiwari	9.04
8.	Mechanization of Post Harvest Operations in Horticultural Crops	RP Kachru	8.52
9.	Packaging interventions for intermediate moisture foods and processed foods	S Bhuvanewari	8.19

10.	Minimal processing and Fermentation technology of fruits and vegetables	Ranjitha K	7.88
11.	Strategies for reducing pesticide load in fresh and fresh-cut fruits and vegetables	Debi Sharma	7.96
12.	Techniques for waste valorization in horticultural crops	CK Narayana	8.65
13.	Nutritional composition of fresh and processed fruits and vegetables	Shamina Azeez	8.64
14.	International Food Safety Standards and Role of Regulatory Authorities	Suresh Khurana	8.73
15.	Post Harvest Management and value addition in temperate horticultural crops	Deshbir Singh	8.31
	Panel discussion		
16.	Extension strategies for promotion of Post Harvest technologies in horticultural crop	R Venkattakumar B Balakrishna	8.58
17.	Technology Commercialization and Business Planning & Development support @ ICAR- IHR	Sudha Mysore	8.32
18.	Assessment of Post Harvest Loss and Its Impact on Marketing Efficiency of Fruits and Vegetables in India	TM Gajanana	8.32
19.	Marketing of fruits and Vegetables in India	D Sreenivasa Murthy	8.48
20.	e-Horticulture – An initiative to solve real farm situations	Atheequlla G.A	8.27
	Average		8.47
	Practicals		
21.	Safe ripening methods of fruits	DV Sudhakar Rao	8.96
22.	Post harvest operations in fruits & vegetables (grading, pre-treatments)	DV Sudhakar Rao Senthilkumaran G	8.38
23.	Preparation of fruit beverages and culinary pastes	IND Gowda Pushpa C. Kumar	8.0
24.	Storage of green leafy vegetables and fresh flowers	S Bhuveswari	8.54
25.	Different packaging methods for fresh fruits and vegetables	DV Sudhakar Rao	8.76
26.	Dehydration and Osmotic Dehydration of fruits	RB Tiwari	9.12

	and vegetables		
27.	Preparation of Fresh-cut vegetables and microbiological protocols	Ranjitha K	8.65
28.	Nutritional analysis of fresh and processed fruits and vegetables	Pushpa C. Kumar and Redappa	8.12
29.	Practical demonstration of field and Post Harvest machinery	Senthilkumaran G Caroline R Dyanand	8.42
	Exposure visits		8.55
30.	Visit to the ICAR-IIHR demonstration plots, laboratories and facilities	HS Oberoi	8.81
31.	Visit to Mushroom laboratory of ICAR-IIHR	Senthilkumaran G	8.12
32.	Visit to polyhouses at Doddabalapur	RB Tiwari and B Balakrishna	9.0
33.	Visit to Pack-house at Namdhari Fresh Bidadi	HS Oberoi and DV Sudhakar Rao	9.23
34.	Visit to MCI Agro Industries, Krishnagiri, Tamilnadu	Carolin R.Kumari and K. Redappa	9.19
35.	Visit to Krishi Mela, GKVK and Bengaluru city visit	Shamina Azeez and Nagappa	8.68
36.	Visit to Mysore city	Paramashivaiah & HS Anandamurthy	8.96
37.	AVERAGE OF ALL SCORES		8.86
A	Food & Accommodation facility		8.85
B	Transport facility		8.35
C	Overall impression about Training Program		8.88

FEEDBACK FORM

**Feed The Future India Triangular Training (FTF ITT) Program on “Post-Harvest Technology in Horticultural Crops” held at
ICAR-Indian Institute of Horticultural Research, Bengaluru, INDIA
(6th November to 20th November 2017)**

S No	Topic	Faculty	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Ave- rage
1.	An overview of Post Harvest Technologies developed by ICAR-IIHR and future trends	Harinder Singh Oberoi	8	9	10	10	8	10	8	10	9	9	10	10	9	8	10	9	10	10	10	10	10	9	9	10	9	10	9.38
2.	Technologies for reduction of Post Harvest losses in fruits and vegetables–Indian perspective	Harinder Singh Oberoi	9	10	9	9	8	9	9	9	10	8	8	9	9	8	10	10	10	10	10	10	9	9	10	10	8	10	9.23
3.	Post Harvest Management of fresh fruits and vegetables	DV Sudhakar Rao	8	7	10	10	8	8	9	9	8	8	9	8	8	7	10	8	9	8	10	10		8	9	8	8	9	8.56
4.	Integrated Post harvest disease management of horticultural crops	AK Saxena	7	6	10	7	8	8	7	8	8	8	9	9	9	9	9	8	10	8	9	10	8	8	9	8	7	9	8.31
5.	Value addition to mushrooms for health and nutrition	Meera Pandey	6	4	9	6	8	8	8	9	9	8	7	9	7	7	9	7	10	9	9	10	7	8	10	8	7	9	8.00
6.	Strategies for value addition of flowers	Sangama	8	5	10	7	7	8	7	8	10	7	8	8	7	7		9	10	9	9	10		8	9	8	7	8	8.08
7.	An overview of drying and dehydration methods for fruits and vegetables	RB Tiwari	7	9	10	10	8	10	7	9	9	9	8	9	8	8	10	10	10	9	10	10	9	9	10	9	8	10	9.04
8.	Mechanization of Post Harvest Operations in Horticultural Crops	RP Kachru	7	7	10	6	8	9	7	9	10	7	9	10	7	8	10	7	10	9	9	10		9	10	8	8	9	8.52
9.	Packaging interventions for intermediate moisture foods and processed foods	S Bhuvaneshwari	6	6	9	5	8	9	8	8	10	9	10	10	7	7	10	8	10	6	10	10	6	8	9	9	7	8	8.19

10.	Minimal processing and Fermentation technology of fruits and vegetables	Ranjitha K	5	5	10	6	7	8	7	8	8	8	8	7	7	8	10	9	9	7	10	10	8	8	9	8	7	8	7.88
11.	Strategies for reducing pesticide load in fresh and fresh-cut fruits and vegetables	Debi Sharma	6	5	10	6	7	10	8	8	7	7	9	6	7	7	9	9	10	8	9	10	8	8	9	8	8	8	7.96
12.	Techniques for waste valorization in horticultural crops	CK Narayana	7	7	9	8	8	9	9	9	8	8	10	6	9	9	9	10	10	10	10	10	8	8	8	9	8	9	8.65
13.	Nutritional composition of fresh and processed fruits and vegetables	Shamina Azeez	6	6	9	8	8	10	8	9	10	9	9	8	9	8	9	8	10	8	9	10		9	10	8	9	9	8.64
14.	International Food Safety Standards and Role of Regulatory Authorities	Suresh Khurana	7	5	10	7	7	10	9	10	9	7	10	9	10	7	9	10	10	9	9	10	9	9	10	7	8	10	8.73
15.	Post Harvest Management & value addition in temp. horticultural crops	Deshbir Singh	5	5	9	10	7	8	8	8	9	7	9	9	9	7	10	9	10	7	10	10	8	9	9	9	7	8	8.31
	Panel discussion																												
16.	Extension strategies for promotion of Post Harvest technologies in horticultural crop	RVenkattakumar B Balakrishna	7	6	10	10	8	8	8	9	8	7	9	6	10	7	10	10	10	10	10	10	9	7	10	9	7	8	8.58
17.	Technology Commercialization and Business Planning & Development support @ ICAR- IIHR	Sudha Mysore	5	5	8	9	8	9	8	9	10	9	10	7	7	7		10	10	9	9	10	6	8	9	10	7	9	8.32
18.	Assessment of Post Harvest Loss and Its Impact on Marketing Efficiency of Fruits and Vegetables in India	TM Gajanana	7	5	9	8	8	8	7	9	9	9	10	7	7	7		9	10	9	10	10	9	8	9	8	7	9	8.32
19.	Marketing of fruits and Vegetables in India	D Sreenivasa Murthy	6	6	10	7	8	9	7	8	10	9	10	7	8	8		10	10	9	10	10	9	8	9	8	7	9	8.48

20.	e-Horticulture – An initiative to solve real farm situations	Atheequlla G.A	6	6	10	10	7	8	7	9	8	7	9		7	7		9	10	9	10	10			8	9	8	8	8.27
	Practicals																												
21.	Safe ripening methods of fruits	DV Sudhakar Rao	7	7	10	9	8	10	7	9	9	9	8	9	10	8	10	10	10	10	9	10	10	7	10	9	9	9	8.96
22.	Post harvest operations in fruits & vegetables (grading, pre-treatments)	DV Sudhakar Rao G. Senthilkumaran	6	7	9	9	7	9	7	8	8	8	7	9	8	7	10	8	10	9	10	10	10	8	9	9	7	9	8.38
23.	Preparation of fruit beverages and culinary pastes	IND Gowda Pushpa C. Kumar	7	8	8	8	7	8	5	7	9	6	7	9	8	8	9	8	10	8	9	10	9	6	10	8	7	9	8.00
24.	Storage of green leafy vegetables and fresh flowers	S Bhuveneswari	7	7	10	8	8	9	6	8	10	8	9	7	7	8	10	9	10	8	9	10	10	8	10	8	8	10	8.54
25.	Different packaging methods for fresh fruits and vegetables	DV Sudhakar Rao	7	6	9	10	8	9	7	9	10	8	9	8	8	9	9	8	10	9	10	10		9	10	9	9	9	8.76
26.	Dehydration and Osmotic Dehydration of fruits and vegetables	RB Tiwari	9	9	7	10	8	10	7	9	10	9	8	9	9	8	9	10	10	9	10	10	9	10	10	9	9	10	9.12
27.	Preparation of Fresh-cut vegetables and microbiological protocols	Ranjitha K	7	6	10	9	8	10	7	8	9	8	9	10	8	8	9	8	10	8	10	10	10	9	10	7	8	9	8.65
28.	Nutritional analysis of fresh and processed fruits and vegetables	Pushpa C. Kumar and Redappa	7	6	10	9	7	8	6	8	10	6	8	8	7	7	9	8	10		9	10	10	6	10	7	8	9	8.12
29.	Practical demonstration of field and Post Harvest machinery	Senthilkumaran Caroline R and P Dyanand	6	6	10	9	8	9	7	8	7	9	9	8	6	9	9	9	9	8	10	10	9	8	10	10	7	9	8.42
	Exposure visits																												
30.	Visit to the ICAR-IIHR demonstration plots, laboratories and facilities	HS Oberoi	8	9	10	10	8	9	6	9	8	7	9	9	8	8	8	9	10	8	10	10	10	9	10	8	9	10	8.81
31.	Visit to Mushroom laboratory of ICAR-IIHR	Senthilkumaran G		6	10	9	7	10	7	8	7	5	8	9	9	7	7	7	10	7	10	10	6	9	10	8	8	9	8.12

32.	Visit to polyhouses at Doddabalapur	RB Tiwari and B Balakrishna	8	8	9	10	8	10	7	8	8	8	10		9	9	9	10	10	9	10	10	10	9	10	9	8	9	9.00
33.	Visit to Pack-house at Namdhari Fresh Bidadi	HS Oberoi DV Sudhakar Rao	8	9	10	10	8	10	7	10	8	9	9	9	10	8	10	10	10	8	10	10	10	9	10	10	9	9	9.23
34.	Visit to MCI Agro Industries, Krishnagiri, Tamilnadu	Carolin R.Kumari and K. Redappa	8	8	10	9	8	10	8	10	10	9	9	10	9	9	8	9	10	8	10	10	10	9	10	10	9	9	9.19
35.	Visit to Krishi Mela, GKVK and Bengaluru city visit	Shamina Azeez and Nagappa	6	8	9	8	8	8	7	9	9	8	10	9	10	7	9	10	10	7	10	10	10	9	10		8	8	8.68
36.	Visit to Mysore city	Paramashivaiah Anandamurthy	8	9	8	8	7	10	7	9	9	9	10	9	10	9	10	10	10	8	10	10	9	8	10	9	8	9	8.96
A	Food & Accommodation facility		6	8	10	8	9	9	8	10	7	10	10	9	9	7	9	10	10	8	10	10	5	9	10	10	9	10	8.85
B	Transport facility		10	9	10	9	5	8	7	9	7	7	10	7	10	9	8	10	10	8	10	10	6	7	10	5	7	9	8.35
C	Overall impression about Training Program		8	8	9	10	8	9	8	9	9	10	10	9	8	9	9	9	10	8	10	10	8	7	10	8	8	10	8.88

Annexure-III

PRE AND POST TEST EVALUATION REPORT



Evaluation and Analysis of Pre & Post Training Tests. To know the change in the knowledge level of International executives who undergone training

S. No	Executive Name -Country	Post Test Score (Max 25 Marks)	Pre-Test Score (Max 25 Marks)	Gain Score (Post - Pre scores)	Gain %
1.	Mr. Fazal Rahim Ayoubi Afghanistan	17	10	7	28
2.	Mr. Abdul Kabir Agha Hashami Afghanistan	12	6	6	24
3.	Mr. Murtaza Aslam poor Afghanistan	20	14	6	24
4.	Ms. Mpho Christine Morupisi Botswana	21	18	3	12
5.	Mr. Joel Olebile Segobaetso Botswana	21	14	7	28
6.	Mr. Chey Montha Cambodia	12	9	3	12
7.	Mr. Pauv Samrit Cambodia	15	9	6	24
8.	Ms. Esther Agyekum Ghana	20	15	5	20
9.	Mr. Robert Selassie Setorwofia Ghana	22	17	5	20
10.	Mr. Emmanuel Amanor Yirenkyi, Ghana	21	16	5	20
11.	Mr. Joseph Tommy Tommie Ghana	18	12	6	24
12.	Ms. Elizabeth Edem Gidiglo Ghana	19	17	2	8
13.	Mr. Dominic Munywoki Kitaka Kenya	20	15	5	20
14.	Ms. Margaret Wanjiku Karuku Kenya	23	18	5	20
15.	Mrs. Weedor Akoi Cegbe Liberia	15	9	6	24
16.	Mr. David Burton Kafunda Malawi	19	14	5	20
17.	Ms. Nyirenda Babra Malikebu	18	14	4	16

	Malawi				
18.	Ms. Tamara Tembo Malawi	21	15	6	24
19.	Mr. Tumur khuyag Jambal Mongolia	22	11	11	44
20.	Mr. Aye Min Khaing Myanmar	16	10	6	24
21.	Mr. Than Naing Moe Myanmar	18	14	4	16
22.	Mr. Elton Amadeus Francisco Mozambique	19	12	7	28
23.	Mr. Ham Wilson Lukurwe Uganda	18	10	8	32
24.	Ms. Rose Nassali Lukwago Uganda	23	10	13	52
25.	Ms. Abeer Elamin Mohanedahamed Elhaj Sudan	20	16	4	16
26.	Ms. Kautyher Altom Algzoly Alnor, Sudan	16	10	6	24
	AVERAGE GAIN				23.23
