Name of the Institutes

I. **ICAR-Central Institute of Agricultural Engineering, Bhopal (MP)**
II. **ICAR-Central Institute of Post Harvest Engineering and Technology, Ludhiana (Punjab)**

Model

Entrepreneurship and Leadership Development Programme for Horticulture Entrepreneurs desirous of applying to Schemes of National Horticulture Board

Crop / Activity	**PHM –** • **Pre-cooling** • **Cold Room** • **Ripening Chamber& ReeferVan** **for the applicants of Pre-cooling units/Cold Room/ Ripening Chamber/ Reefer Van**

2019-20

Become Entrepreneur	
	Lead Change and Innovation
Be creative	
	Lead Profits

Address of Horticulture Training Institutes:

- **ICAR-Central Institute of Agricultural Engineering, NabiBagh, Berasia Road, Bhopal- 462038, Madhya Pradesh.** Ph. (0755)-2521110, Email: nachiket.kotwaliwale@icar.gov.in, Website: www.ciae.nic.in
- **ICAR-Central Institute of Post-harvest Engineering and Technology, PAU Campus, Ludhiana, Punjab**

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Training Programme Name	**Entrepreneurship and Leadership Development Programme on PHM-Cold Room and Ripening Chamber and Refer-van for Horticulture Entrepreneurs desirous of applying to Schemes of National Horticulture Board**	**Entrepreneurship and Leadership Development Programme for Horticulture Entrepreneurs desirous of applying to Schemes of National Horticulture Board**

Introduction: India is the second largest producer of Fruits and Vegetables globally. During 2017-18 the production of Fruits is 97 Million MT and that of Vegetables is 184 million MT and that of flowers is 2.4 Million MT. The salient features of commercial Horticulture are Perishability, intense Technology, High Profitability accompanied with high investment and High Risks including vulnerability to post-harvest losses. Overall it demands very good entrepreneurship and leadership.

National Horticulture Board, an autonomous organisation under the Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India has been promoting and developing commercial horticulture in the country since 1984.Appreciating both the challenges and prospects of commercial horticulture, so as to mitigate constraints and risks and maximise benefits and net income, NHB has taken a number of initiatives viz., Model Detail Project Reports, conducting both awareness and technical workshops and simplification of scheme implementation process. One another measure taken up is encouraging farmers, entrepreneurs and applicants desirous of availing benefit under its schemes to have requisite entrepreneurship and leadership by undergoing a 6 day training programme at one of the best training institutes recognised by it.

Rationale for the Training: NHB projects are credit linked and back ended and arecapital intensive running from several lakhs to several crores. In addition these involve good documentation and time bound activities on the part of promoter, banker and other stakeholders. So endeavour should be to ensure that the project is successful by all means be addressing all possible risks. Over the years it has been observed by NHB that most of the promoters of NHB projects are not having the required understanding of scheme documentation, time bound activities and lack knowledge and skills of handling the project themselves and thus become subjected to vagaries of others ignorance and omissions and commissions. The result is a number of projects have failed or became ineligible for subsidy consideration. Thus so as to rule out any these omissions and commissions and risks, NHB has made it mandatory for every applicant to undergo a 6 day training programme at one of the NHB recognised /approved institution, with a goal of zero rejection of a project for which IPA is issued.

Importance of Project: Crop / Activity: Global/National/State and role in horticulture development

	√
1. PHM-Cold Room	√
2. PHM-Ripening Chamber	√
3. PHM-Reefer-vans	
4. PHM – Pre-cooling unit	√

Profile of the Institute:

1. **ICAR-Central Institute of Agricultural Engineering, Bhopal**

Central Institute of Agricultural Engineering at Bhopal came into existence on 15th February 1976. The Institute has five Divisions (Agricultural Mechanization, Agricultural Energy and Power, Irrigation & Drainage Engineering, Agro Produce Processing and Technology Transfer), Coordinating Cells of four AICRPs (Farm Implements and Machinery, Utilization of Animal Energy, Renewable Energy Sources and Ergonomics & Safety in Agriculture) and two centres (Farm Science Centre and an outreach Industrial Extension Project at Coimbatore). The Institute has a sanctioned strength of 423 personnel with 90 scientists belonging to the disciplines of agricultural engineering, mechanical engineering, electronics and instrumentation, computer application, agronomy, biochemistry, microbiology, food technology, statistics and economics. The Institute is rich in infrastructure. The research workshop provides the facilities for fabrication of research prototypes, the prototype production centre carries out batch production of prototypes for pilot introduction; Agricultural Knowledge Management Unit and Computer Aided Design cells help in computer application in database, communication, presentation, design drafting and modelling; instrumentation cell gives support in various research projects and Audio-Visual Unit supports research and extension. The Institute has the richest library in the field of agricultural engineering in India, having around 25000 books and bound journals. The library has computerized cataloguing facility. It also has a large collection of CD ROMs on journals in agricultural engineering and related disciplines. The library subscribes to more than 125 Indian and foreign journals and provides e-subscription of some journals to the users.

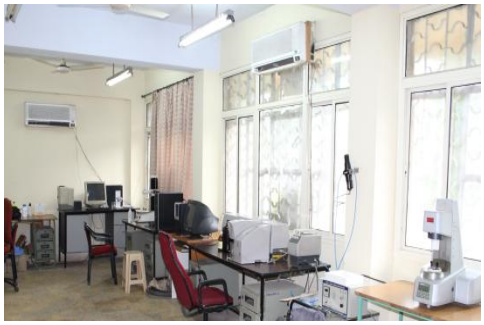
Infrastructure/facilities available at CIAE, Bhopal

1. Competent Faculty.
2. Research expertise and laboratory/pilot plant / Demonstration experience.
3. Excellent classrooms with all Audio-visual equipment and aids including PPT facility.
4. Excellent living/ residential accommodation with Computers and internet.
5. Has liaison with esteem industries and institutions.

CIAE-Ripening chamber

Food Processing Laboratory

Solar PV operated cold storage



Engineering property laboratory

Microbiology Laboratory

CIAE Guest house

Conference hall

2. **ICAR-Central Institute of Post-harvest Engineering and Technology, Ludhiana**

The ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET) was established on 3rd October 1989 at the PAU Campus, Ludhiana, Punjab, India as a nodal institute to undertake lead researches in the area of the Post-Harvest Engineering and Technology appropriate to agricultural production catchment and agro-industries. The institute's second campus was established on 19th March 1993 at Abohar, Punjab, India which is primarily responsible for conducting research and development activities on fruits and vegetables, and commercial horticultural crops. ICAR-CIPHET is also headquarters for two All India Coordinated Research Projects (AICRPs) viz. AICRP on Post-Harvest Engineering and Technology (PHET) at 31 Centre's and AICRP on Plasticulture Engineering & Technology (PET) at 14 Centre's. The institute has a mandate for carrying out research for solving problems and identifying technologies related to post-harvest loss assessment and prevention, processing, value addition and storage of agricultural, horticultural, livestock, and aquaculture produce targeted to achieve food safety and quality assurance. The other major mandate of the institute is to create human resource and entrepreneurship development in post-harvest engineering and technology.

Basic infrastructure and collaboration to be in place

1. Competent Faculty.
2. Research expertise and laboratory/pilot plant / Demonstration experience.
3. Excellent classrooms with all Audio-visual equipment and aids including PPT facility.
4. Excellent living/ residential accommodation with Computers and internet.
5. Has good networking with experts across India, to invite best of the faculty in a particular area of expertise.
6. Has collaboration with entrepreneurs and Industry.
7. Willing to provide internships with FPOs/ FPCs/entrepreneurs.

Previous experience:

1. **ICAR-Central Institute of Agricultural Engineering, Bhopal**

The Institute also has well-furnished hostel and guest house facilities to accommodate 80 guests. The International Training Centre of the Institute has facilities for conducting International meetings and training programmes with excellent ambience. More details of the institute are available at www.ciae.nic.in. The institute has conducted several professional training programmes including entrepreneurship development programmes in the areas of 'soybean processing', 'agro processing', 'custom hiring of agricultural machines', 'protected cultivation technologies', etc. Besides the institute regularly conducts international training programmes on different aspects of agricultural mechanization, post-harvest processing, etc.

2. ICAR-Central Institute of Post-harvest Engineering and Technology, Ludhiana

The Institute also has well-furnished guest house facilities. More details of the institute are available at www.ciphet.in. The institute conducts regular professional trainings. During last year, total of 648 participants were trained for post-harvest management of agricultural and livestock produce through three ICAR sponsored summer/winter schools, one model training course, seventeen EDP, eleven farmers' training, and two workshops. A total of 182 students were also trained during this period. The institute has assessed the losses during storage in godowns, funded by food Corporation of India (FCI). The institute has also established a fumigation chamber and norms for treatment of grapes for export to New Zealand and Australia. Besides, ICAR-CIPHET has a Food testing Laboratory for testing commercial samples. It also conducts professional training programmes.

Objectives of Training Programme :

1. Knowledge: Ensure every trainee acquires adequate knowledge and understanding of NHB Scheme Operational guidelines, Annual design and procedure viz.
    a. Eligibility of applicant including definition of family, and project, the process and steps involved in the scheme implementation, timelines, Scheme cost norms, pattern of assistance etc. Calculation of Eligible Project cost, Eligible components for subsidy, NHB standards, Basic Data Sheet & Protocols to be complied for availing subsidy,; Crop / Project specific Model DPR Template, Terms and conditions of IPA, Do's and Don'ts for Applicants /Banks/NHB officials for IPA ,
    b. List of documents to be submitted.
    c. To acquaint with NHB website including registration and modes of online application, operation of online account and contact persons, helpdesk and grievance redressal.
    d. Subsidy claim process through Bank/FI and list of documents to be submitted along with claim, JIT process, JIT Format, Documentation, Circumstances to request for and consider Re-JIT& Post-JIT process.
    e. Formats of Agenda and check list used for processing subsidy claim.
    f. How to expand understanding based on the minutes of meetings of previous IC and PAC available on website. It helps the applicant to understand how decision on subsidy is being made.
    g. To know and appreciate specific Horticultural commodity / crop economic importance and potential of fresh commodity and processed / value addition commodity; Country and Global scenario and State/UT Scenario.
    h. To learn / visit success stories / best practices including cluster development / FPOs; interact with successful entrepreneurs; and recognise key factors responsible for success and failure.
2. Personal leadership and skills development

a. To explore leadership roles required in horticulture business and realign and recalibrate self with new knowledge, concepts and tools.
b. Managing change and innovation and Taking charge and leading strategy.
c. To learn/ improve IT/ social media and know how to benefit from Internet and newspapers/media.
d. To improve leadership / social skills especially common informed vision, communication, team work, negotiation skills; with an exercise and success story.

3. Develop expertise on installation, maintenance and operation of cold rooms and ripening chambers for fruits/vegetablesin order to reduce losses, maintain and optimize product quality, assure its safety and ensure efficiency in the supply chain.
    a. To make aware of cold storage and ripening practices, protocols and technologies.
    b. How to select suitable environmental conditions for storage and ripening of different fruits and vegetables.
    c. Technology: Time of harvesting (maturity level), pre-cooling, washing and sanitization, ripening, packaging, storage and transportation technology.
    d. To know required infrastructure- Supply Chain/ Cold Chain and Marketing infrastructure and Gap analysis with that of the current practices to the context of trainees, and management of trainees.
4. Processing and value addition
5. Marketing and value chain development
    a. To know value chain and document current value chain of trainees context.
    b. To know how to source inputs from reliable and quality sources economically and explore best way / place to sell.
    c. To know market based production concept; crop planning and preparing crop calendar.
    d. Analyse market prices of various markets and causes of instability. Document market efficiency and share of grower in consumer price realisation and possible way to minimise price spread.
    e. To know importance of branding and promotion.
    f. How to become an Exporter and know the roles of APEDA.
6. Supply/ Cold-chain development both for fresh and processed produce
7. Producing quality produce: Healthy, Food Safety / Traceability and Standards
    a. To know Global /National norms of Food Safety & traceability- Good Agricultural Practices, and standards, MRL, IPM, logistics, GMP, Organic certification, etc. Encourage trainees to document a roadmap for availing certification in 1 year time.
8. DPR and Project Management including Finance & Credit.
    a. To empower selection of crop based project based on Agro-climatic/soil/ water suitability, Market, Finance and Technical viability.

b. To empower the trainees to prepare Detail Project Report of his/her project. In case it is already prepared with the help of external expert, the trainee is made to understand and critically analyse the same.
c. To know about Banks/ Financial Institutions; Loan procedure-how to avail finance/ credit- challenges and prospects. Document difficulties in trainees context and facilitate in possible solutions on expeditious and easy access to credit.
d. To know risks viz., including natural calamities in production and business and their management strategies including insurance schemes.
e. To learn about Farm record book keeping.

9. Cluster development / Collaborative farming: What is cluster? Essential elements? To know importance of cluster approach,
10. Government organisations and Schemes related to Horticulture and laws to be complied.
11. Horticulture Statistics sources including DAC&FW website and State Horticulture Dept. website.
12. Technology and Entrepreneurship

Pedagogy: Training methods / styles are:

a. Lectures- with two way communication using Audio-visual aids, videos etc.
b. Group discussion
c. Panel discussion
d. Skill practice
e. Interactive field visits etc

Outputs expected: (As on the last date of 6 days training)

1. 100% attendance of all Classes prescribed.
2. Daily studying of reading material provided.
3. Successful and timely completion of assignments.
4. A score a minimum of 75 % in final assessment by each trainee.
5. Knowledge: by each of the trainee
    a. Essential elements of NHB Scheme guidelines, documentation & processes and Do's and Don'ts, understanding DPR, Bank Appraisal and Sanction, identification of risks and vulnerabilities and measures to address the same, Processes and documentation of NHB scheme implementation for successful subsidy release.
    b. Essential elements of scientific and commercial post-harvest processing, packaging, transportation and Marketing, Exports etc. in English/Hindi/trainees' language.
    c. Food safety (Good Agricultural Practices), traceability, standards etc.

    d. Documentation of analysis of current scenario of trainees context- production, harvest, post-harvest, supply chain, marketing and gap analysis and possible road map.
6. Skills: by each of the trainee
    a. Curiosity and continuous learning.
    b. Crop: Modern scientific harvesting, post-harvest, packaging, storage, food safety, traceability certification and standards.
    c. Project: PHM-Primary Processing & Packaging: Modern scientific operations, technology, safety etc.
    d. Familiarisation of Technology, Standards, Protocols and hands on experience.
    e. Good understanding of DPR and Project Management:
    f. A 3 year Strategic action plan: A Year to Year strategy for 3 years to achieve set goal in 3 years- for improved Post-harvest management with economy, modern harvest, post-harvest practices, infrastructure, marketing and organisational systems for improved incomes.
    g. Problem solving- to solve existing problem being faced by the trainees.
7. Attitude: developing confidence and leadership to successfully complete NHB project timely as per NHB norms, specifications/standards, protocols etc.
8. Networking with various Government and Non-Government Agencies and mentors.
9. To know various schemes and future useful training programmes across the country.

Training Outcome

After completing this programme, participants will be able to:

- Develop/Install and maintain fruit ripening chamber
- Ripen banana in a ripening chamber
- Document and maintain records related to banana ripening
- Know the benefits, necessities, basic operations, limitations and precautions of operating Cold room and Refer-vans.
- Follow and maintain food safety and hygiene in the work environment

Outcomes expected (in 18 months)

1. Successful completion of the project with right technology and processes complying with all NHB Scheme requirements.
2. Reduced post-harvest losses in fruits & vegetables; improved product quality&higher shelf-life of products.
3. Improved food safety, certification, standards compliance- at least process is initiated.
4. Improved infrastructure.
5. Improved profits/ net income to farmers and rural entrepreneurs.
6. Creation of job opportunities for all types of rural youth.

Programme in Brief

Training Programme Name	**Entrepreneurship and Leadership Development Programme for Horticulture Entrepreneurs- PHM –** • **Pre-cooling** • **Cold Room** • **Ripening Chamber& ReeferVan** **for the applicants of Pre-cooling units/Cold Room/ Ripening Chamber/ Reefer Van**
Duration	6 working days
Participant Target Group	Individuals desirous of availing NHB benefit under Scheme No.1 or 2 and also for those who want to improve their knowledge and leadership in protected commercial horticulture.

Institute	CIAE, Bhopal	CIPHET, Ludhiana	NIPHT (HTC), Pune	NIFTEM, Kundli, Sonipat (Haryana)
Training Coordinator	Dr .NachiketKotwaliwale Head, Agro Produce Processing Division ICAR-CIAE, Bhopal 462038 075502521110, nachiket.kotwaliwale@icar.gov.in	Dr. K. Narsaiah, I/c Head, Agri. Structures and Environmental Control, CIPHET, Ludhiana-141004 9417143925 k.narsaiah@icar.gov.in	Shri VishwasJadhav 9422030775 htc_td@yahoo.com	Dr. Sunil Pareek 7056721483 Sunilpareek.niftem@gmail.com

Training calendar for 2019-20	Month	Last date for Registration	Training reporting dates	Training Dates	Institute Name
	Needs to be worked out again				ICAR-CIAE, Bhopal
	Needs to be worked out again				ICAR-CIAE, Bhopal
	Needs to be worked out again				ICAR_CIPHET Ludhiana
How to Apply	Desirous candidates should send an application in a format provided at the end of this document along with application fee. Copy of the same should also be submitted to National Horticulture Board.				
Next review/ revision of Training Design	February 2020				

<table>
<tr><td rowspan="4">Batch size and cost and Payment system</td><td colspan="4">ICAR-CIAE, Bhopal& ICAR-CIPHET, Ludhiana</td></tr>
<tr><td>Batch size</td><td>Course Fees Rs. per candidate</td><td>Hostel: Accommodation, Boarding: BF+L+D + Morning Tea + Afternoon Snacks Rs. per candidate</td><td>Total cost Rs. per candidate</td></tr>
<tr><td>5-10</td><td>14000 (Inclusive of GST)</td><td>3000</td><td>17000</td></tr>
<tr><td>Payment system and address:</td><td colspan="3">100% To be paid in advance, along with application, through DD in the name ICAR-Unit CIAE, Bhopal or ICAR-Unit CIPHET, Ludhiana</td></tr>
<tr><td>Enrolment</td><td colspan="4">Is voluntary on the part of trainee and on his/her submission of willingness in writing to undergo training.</td></tr>
<tr><td>Certificate</td><td colspan="4">Upon successful completion of training with 75% marks in final assessment, the candidates are awarded completion certificate with marks.</td></tr>
<tr><td>NHB & HTI Role</td><td colspan="4">1. The training programme is voluntary for any individual or trainee.
2. The cost of training is to be borne by trainee him/herself.
3. The training is not sponsored by NHB nor by any Government.
4. Upon 100% attendance and upon scoring 95% marks is considered as successful completion and then are eligible for training completion certificate.
5. Successful completion of training programme by the applicant and submission of completion certificate is one of the requirement for obtaining In-Principle Approval (IPA).
6. It is compulsory to reside in the hostel/accommodation provided by the institute in the interest of training.
7. The training institute has no say in NHB decision making either in approval or rejection of IPA or sanction or not sanction of Subsidy.
8. Trainees are responsible for their conduct and wellbeing issues
9. NHB has no liability towards IPA and Subsidy release or non-release
10. HTI has no liability towards IPA and Subsidy release or non-release.</td></tr>
</table>

Expectations from trainee before the arrival to the Training institute:

1. Study NHB scheme guidelines of all schemes with emphasis on specific component for which application is being/ is made including General conditions, Basic structure, Applicant eligibility, Technical standards, Basic Data sheet and Protocols, Budgetary allocation for his/her state/UT, Guidelines for submitting application, cost of application, various prescribed formats, FAQs, Dos and Don'ts, Agenda and Checklist, List of documents to be

submitted both for Pre-IPA and IPA available in NHB website and as received in their online account.

2. Study one's own Detail Project Report along with Model DPR available in NHB website.
3. Visit NHB website and study various services available- especially Scheme guidelines, Model DPRs, Technical Standards, Statistics, NHB interactive, Minutes of meetings (past), Public circulars to the extent possible.
4. Should see him/her self whether he/she is satisfying NHB Scheme requirements.
5. To cooperate with Horticulture Training Institute.
6. To share specific problems/ gaps / barriers in horticulture growth and profits in his area.

Material to be brought by each of trainee:

1. Hardcopy of application already submitted to NHB if any.
2. Hardcopy of DPR already submitted to NHB or prepared if any.
3. Hardcopy of Model NHB DPR if possible.
4. Hardcopy of copy of Dos' and Don't's, Agenda and Checklist, List of documents to be submitted.
5. Hardcopy of applicants' eligibility and General conditions

Day wise schedule

Session	Module	Learning	Expert
	Registration	Registration Prior-Assessment of knowledge, attitude and skills	
Day1 Session 1	Orientation / Inauguration	• General discipline in class room (Do's and Don'ts) • Every trainee to share their introduction with expectations. • Motivational Talk	
Day1 S2	Economic / Marketing Potential and Specific State/ UTs context: Scope and opportunities and Success stories.	1. Banana& other fruits : Area, Production, Productivity, Prices & value in India and Global scenario 2. State/UT : Area, Production, Productivity, 3. Prices & value, variation across markets. 4. Domestic market : Supply and Demand; 5. Export and Import scenario; 6. Case study of success stories-2 7. Concerns for growers / entrepreneurs!	NHB experts
Day1 S3	Personal skills development	1. Improve listening, reading, writing and communication skills, team work; reading of signs etc. 2. To learn/ improve IT/ social media and know how to benefit from Internet and newspapers/media. 3. To improve leadership / social skills common informed vision, communication, team work, negotiation skills; with an exercise and success story. 4. To explore leadership roles required in horticulture business and realign and recalibrate self with new knowledge, concepts and tools. 5. Managing change and innovation and Taking charge and leading strategy.	
Day1 S4	NHB Scheme Guidelines, Annual Design and Processes of successful implementation and DPR, Bank Appraisal and Sanction of own Project	Group Discussion and Presentation by each group: 1.Scheme guidelines 2.Flow chart 3.Dos and Donts, List of documents to be submitted and Agenda and Checklist. 4.Technology standards/ Specifications etc. 5.Issues with Banks. 6.Common reasons for rejection of Projects at NHB. 7.Q & A on Queries.	DD NHB
	Quiz	Today's learning	

	Reading material for next day*	1. Study of NHB Scheme guidelines and come up with queries. 2. Reading material on Fruits and vegetable production and processing in India 3. Reading material on Cold storage and fruit ripening practices.	
	Evening/Nigh Home work/ Assignment #	• Creation of Whats' app group of all trainees. • Joining of NHB crop specific/Project specific Whats' app group.	

Day2 S1	General properties and physiology of fruits and vegetables	1. Fruits and vegetables: Structure, Composition, nutritional value 2. Post-harvest Physiology of fruits and vegetables 3. Climacteric and non-climacteric fruits 4. Maturity indices and determination techniques 5. Respiration and biochemical changes during ripening and transportation. 6. Factors responsible for the respiration 7. Ethylene sensitivity and fruit ripening	Horticulturist & Post-Harvest Technologist
Day2 S2	Post-harvest deterioration factors and their controls	1. Pre and post-harvest factors affecting the quality of fruits and vegetables 2. Major post-harvest defects 3. Factors responsible for deterioration 4. Environmental factors 5. Procedures for reducing post-harvest deteriorations during storage and transportation 6. Storage requirements for different fruits/vegetables 7. Cold storage: temperature sensitivity of fruits/vegetables	Agri. Process Engineer & Horticulturist

Day2 S3 & 4	Field visit	Visit to farmers field, mandis/cold stores for observations/demonstration of
		• Traditional methods for determination of Maturity of fruits/vegetables for harvesting
		• Methods of harvesting
		• Handling and storage practices
		• Methods of transportation
		• Familiarise technology and components of primary processing of fruits and vegetables
		  • Scenario of PHM- Ripening chamber and refer van
		  • NCCD & other study reports on the project activity
			Agri. Process Engineer & Horticulturist

	Discussion	Evaluation of Assignment and observations	
	Quiz	Learning on yesterday and today	
	Reading for next day	Post-harvest management practices for banana /NHB project	
	Assignment for next day	Difference between Applicants DPR and NHB's Model DPR- What are the learnings.	

Day 3 **S.1**	Harvesting and post-harvest handling of fruits and vegetables prior to cold storage/ripening	1. Factors affecting harvesting- maturity, moisture, size, colour, time etc 2. Harvesting methods-Manual & Mechanical methods 3. Necessary care during Harvesting 4. Tips for transportation and handling of fruits and vegetables 5. Pre-cooling methods for fruits and vegetables	**PH Technologist/ Engineers expert**
Day 3 **S. 2**	Cleaning/washing And disinfestations technologies	1. Methods of cleaning/washing 2. Machinery for cleaning/washing 3. Post-harvest diseases and control methods 4. Chemicals used to control spoilage 5. Heat treatment methods for disinfestation 6. Technology and equipment for hot water treatment of fruits/vegetables	
S.3 & 4	Practical on washing, pre-cooling of fruits and vegetables	6. Practical sessions including pre-cooling, cleaning, washing, hot water treatment of fruits/vegetables	
	Discussion	Evaluation of Assignment and observations	
	Quiz	Learning on 3 days	
	Reading for next day	• Quality analysis of fruits and vegetables	
	Assignment	Quality requirements of banana fruits for ripening	

Day 4 S 1	Ripening of fruits	1. Fundamentals of banana ripening 2. Traditional methods used for ripening: Merits & demerits 3. Scientific method for banana ripening using ethylene	**PHE Expert**
Day 4 S 2	Ripening chambers for fruits	4. Requirements and specifications for ripening chamber 5. Design and development of ripening chambers: case study 6. Operation and maintenance of ripening chambers 7. Safety issues & management	**PHE Expert**
Day 4 S 3	Pre-cooling of fruits and vegetables	1. Function and benefits of the Pre-cooling 2. Requirement for an cooling room 3. Cold rooms: types, design guidelines, installation and operation, maintenance etc. 4. Cooling & ventilation techniques in the package 5. Management of temperature and RH inside cold rooms 6. Evaporative cooling, zero energy cool chambers 7. Effect due to cushioning materials and wrapping	
Day 4 S 4	Cold chain for fruits and vegetables & Storage of fruits and vegetables	1. Cold chain concept and constituents 2. Cold storage and transportation of fruits and vegetables 3. Refer-vans – major specifications, operation, maintenance, Dos & Don'ts 4. Principles of storage 5. Traditional/Low cost storage technology 6. Low temperature storage (Refrigeration and cold storage) 7. Low temperature disorders in fruits and vegetables 8. Improved storage practices (Hypobaric, MA/CA storage) 9. Demonstration of cold storage at Institute 10. Maintenance & after sale service risks, insurance etc. 11. Safety issues & management.	

Day 5 **S.1**	Hands on practices of banana ripening	1. Preparation of samples for ripening 2. Maintenance of desired conditions in ripening chamber 3. Arrangement of fruits in crates inside ripening chamber 4. Monitoring temperature, R.H and ethylene concentration inside chamber	PH Technologist/ Engineers
S.2	Analysis of quality parameters of fruits and vegetables	1. Determination of physical parameters (colour, texture, shape, sizes, density etc.) 2. Determination of chemical and microbial parameters 3. Tests to assess progress of ripening	PH Technologist/ Engineers
	Discussion	Evaluation of Assignment and observations	
	Quiz	Learning on 5 days	
	Reading for next day	• Packaging and storage of fruits	
	Assignment	Components of a ripening chamber and how to maintain desired conditions in a chamber	
Day 5 **S3 &4**	Marketing and value chain development	Marketing Basics: 1. Value Chain Analysis of product / commodity in State / UT- Current scenario and the best possible solutions 2. Identification of markets- Export, Distant Market, Local markets- Mandis/ Traders, Processing units. 3. Demand – seasons / days etc. 4. Market differentiation- Organic, chemical free, Taste etc. 5. Market Driven Production- Concept: What? How? Challenges? Solutions 6. Promotion strategy: Branding; Differentiation of product 7. e-marketing	Marketing Expert, APMC Secretary, Exporter
		Market Intelligence / Transparency in Market prices/ Assimilation of Market Information / 1. Knowing end market prices- Local market and distance market; from reliable sources, Mandis, competitors through Media-print, AIR, TV, internet, commission agents etc. 2. Analyse market information season wise. 3. Use market information to decide on crop, area to be sown, appropriate post -harvest decision of drying, grading, bagging, processing, storage etc., and to decide where	

		to sell, when to sell, to whom to sell, and what quantity to sell etc to be profitable. 4. Arranging cost effective transportation. 5. Also use market information for growing next crop, area and release of produce into market etc.	
		Demand assessment and management: 1. Need to consolidate demand from all sources- retail outlets, chain, hawkers etc. 2. Assured quantum can be vertically integrated with producers. 3. Variable demand is linked with indirect or Mandi based procurement. 4. To know a balance sheet: demand and supply of commodity if possible.	
		Causes of market instability and measures to address 1. Causes: Low cost supplies from new production areas, Fluctuating demand in Transport availability, Market manipulation, weather vagaries, local disruptions (Bandhs etc.) etc. 2. Measures: Building brand loyalty, Efficient supply chain with dedicated transport on pre-determined schedules, Complementary storage option for buffers for 2 weeks; For perishables- back end sources and reefer transport, modern pack houses; Food processing capacity, Export markets. 3. Measures to check gluts.	
		Marketing models / Measures to minimise price spread / enhance price realisation. 1.Direct- 1.Bulk sale- fast tracked without any pre-cooling with daily dispatches. 2.Bulk or retail outlets- owned/ franchisee. 3.Through wholesale trader / Retail chain/ Exporter/Importer/ Street vendors/ vegetable sellers. 2.Marketing with /without legal contract with buyers, supply chain agents etc. 3. Models: • NDDB-Mother Dairy/ SAFAL Model- Front end distribution hub and retail outlets.	

		• HOCOMS model: Both back end ownership of collection centres and transport and front end distribution, outlets. • Big Basket Model. • Study of pricing / price realisation across the models Supply to Distribution hub by Buyer like HOPCOMs or by FPO as in case of Mothers; dairy SAFAL.	
		Private partnership- Success stories	
		Potential niche Export markets 1. Global Scenario- product wise; Success story, 2. State/UT s potential, Challenges for Export markets- sea based; 3. Interaction with Exporters and Importers. 4. Linkage with Distribution hubs (Netherland)	
		Potential niche Domestic markets: 1. Indian Scenario- product wise; Challenges for Domestic – road based 2. List of processors, value added companies.	
		Exposure / Networking visits/Trade Fairs/ Exhibitions_ India & Abroad- CDB support	

Day 6 S3	Government organisations and Schemes and applicable laws and standards.	• List of Institutions for promotion of Horticulture: State/ UT Govt., DAC&FW- CDB, NHB, CPCRI, UT Government, • Central Schemes –NCDC, MoFPI, APEDA, NABARD etc. • Applicable laws / clearances etc. for Horti-business- As may be applicable- • Crops: IPR, PPVFR, • Technology: TM, Patent, licensing. • BIS, FSSAI, NCCD & NHB standards, specifications, protocols of project components • Ripening chamber: Fire Safety, Pollution, Agriculture Marketing, Conversion of Land use etc.	State Dept. of Horticulture/ NHB State/UT official SFAC APEDA NCDC NABARD
Day 6 S4	• Evaluation and Valediction		

Trainers' Material: to be used for preparing Participants Handbook first in English and then in local language as far as possible.

The following web links are illustrative. Training Institute is requested to explore more and the best fit material for the trainees socio-economic condition, crop and enterprise.

S.No	Module	Reading Material	
		For the Trainer	For the trainee
1.	Economic Potential and Specific State/ UTs context and Success stories.	Horticulture Statistics at a glance: http://agricoop.gov.in/statistics/publication-reports World fruit and vegetable map: 2018: Robo Bank https://research.rabobank.com/far/en/sectors/regional-food-agri/world_fruit_map_2018.html APEDA AGRIEXCHANGE: http://agriexchange.apeda.gov.in/ ICAR institutions publications on specific crop CII / FICCI/ASSOCHAM/ PHDCC reports http://www.fao.org/docs/eims/upload/210971/global_issues_paper.pdf Success stories: http://agritech.tnau.ac.in/success_stories/sstories_horti_2015.html	
2.	Personal skills development	Internet and youtbue	
3.	Harvesting, Post-Harvest Management / Infrastructure	Text Books on Post-harvest of Horticultural Crops; FAO documents and reports; Analysis of FPO model for Vegetables https://nccd.gov.in/PDF/Analysis_FPO_model.pdf Doubling of Farmers Income Report: Vol.III and IV http://agricoop.gov.in/doubling-farmers	
4.	Packaging/ Processing / Value Addition	ICAR / Any reputed R&D Institution publications; Text books on Post Harvest; e-learning: videos from authentic sources- ICAR/ SAU/SHU/Global Institutions.	
5.	Supply/ Cold-chain development both for fresh and processed produce	Cold Chain Awareness program https://nccd.gov.in/PDF/Cold-chain%20Awareness%20Booklet.pdf Analysis of NDDB Model for Vegetables https://nccd.gov.in/PDF/Analysis_NDDB_veg_model.pdf All India Cold Chain Infrastructure Capacity : Gap Analysis https://nccd.gov.in/PDF/CCSG_Final%20Report_Web.pdf	
6.	Marketing and value chain development	Directorate of Marketing and Inspection website: http://agmarknet.gov.in/ Crop specific market information sources	
7.	Maintain quality of produce: Health & Food Safety /	TNAU AgriTech portal on Food Safety: http://agritech.tnau.ac.in/gap_gmp_glp/gap_fresh%20_%20fruits%20&%20veg.html http://agritech.tnau.ac.in/food_safetyindex.html	

	Traceability and Standards	Global Gap: https://www.globalgap.org/uk_en/ INDGAP: http://www.qcin.org/CAS/INDGAP/ Global gap India facilities: http://agriexchange.apeda.gov.in/Market%20Profile/Market_Inteligence/Annexure_III.pdf Food Traceability in Inda: http://face-cii.in/sites/default/files/final_report-version_2.pdf FAO International Code of Conduct on Pesticide Management http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/code/en/ TRACEABILITY IN FOOD AND AGRICULTURAL PRODUCTS: ITC, Switzerland publication at http://www.intracen.org/ GRASP: Global GAP Risk Assessment on Social Practice The Global Social Compliance Programme GSCP https://www.gscpequivalenceprocess.com/	
8.	Finance, Credit & Farm/ Project & Risk Management	Model DPR Templates for NHB Schemes ww.nhb.gov.in	
9.	Cluster development : Collaborative farming/ FPOs/ FPC	NHB Website: Proposed scheme: Horticulture Business Cluster and Supply chain development Programme FAO (2010) Agro-based clusters in developing countries: staying competitive in a globalized economy http://www.fao.org/docrep/012/i1560e/i1560e.pdf World Bank: Agriculture Clusters https://www.innovationpolicyplatform.org/sites/default/files/rdf_imported_documents/Agricultural_Clusters.pdf How Can the Poor Benefit from the Growing Markets for High Value Agricultural Products? FAO / UN Paper https://papers.ssrn.com/sol3/papers.cfm?abstract_id=944027 Crop specific Producers Society and company online authentic sources	
10.	Government organisations and Schemes	http://agricoop.gov.in/ http://mofpi.nic.in/ http://apeda.gov.in/ http://nhb.gov.in/ http://coconutboard.nic.in/Scheme.aspx	
11.	Knowledge and Statistics	ICAR Indian Horticulture Magazine: https://icar.org.in/node/9420 IIHR: https://iihr.res.in/documentary-video-clips-for-farmers FAO: http://www.fao.org/e-agriculture/stub-28	
12.	Technology and Entrepreneurship	Visit ICAR – Institutions / Directorates/ Bureaux/ NRCs: https://icar.org.in/ Innovation in Agriculture: http://www.fao.org/3/CA2460EN/ca2460en.PDF Specific technologies: https://icar.org.in/content/agricultural-technologies e-learning: https://ecourses.icar.gov.in/	

		ICAR Publications: https://krishi.icar.gov.in/jspui/ Local University publications Local University success stories	

Activities prior to training by Horticulture Training Institute:

The training institute shall undertake

1. Desk Analysis:
    a. About specific crops and processing technologies: State/ UT and District's Area, Production, post-harvest and marketing practices, problems etc.
    b. Road map formulated by State/UT government to develop the area/ crop / farmers income of the area including State/UT Economic Survey, Annual Report of Agriculture/Horticulture Dept., District website etc.
    c. Explore various research articles on crop processing, marketing etc. of the State/ Area.
    d. Examine various study reports of Government agencies- State/ DAC& FW/ APEDA/ SFAC/MoFPI and private agencies- CII /FICCI/ASSOCHAM/ Others for the horticulture Development of the State, Specific location, India etc.
2. Preparation of training design and teaching-learning material.
    a. Preparation of training schedule with good mix of theory, practical (both in class room and field visits) and home work (After class hours) and also physical fitness and site seeing.
    b. Participants Handbook: A brief note on each of teaching module in local language for circulation to each trainee, with the help of local technical expert.
    c. Preparation of case studies/ exercises for class room discussion / brain storming / homework.
    d. Access to internet and computers to explore the potential of technology.
    e. Identification of the best experts for each of the session and invitation of successful FPOs/ entrepreneurs/ experts for interaction session with the trainees.
    f. Identification of FPOs/Entrepreneurs/Firms/ Organisations for internship with clear Do's and Don'ts.
    g. Every trainee to come with 2 problems with respect to each of the session.
    h. Use of Audio-visual aids for teaching-learning& Good logistics for field visits
3. Identification of fields, FPOs, enterprises and operations etc. for the visit of trainees.
4. Good preparation of trainees accommodation, food (of trainees cultural context as far as possible), primary health care etc.

Services by the Horticulture Training Institute

1. **Facilities to Participants during training**
    a. Safe and joyful learning environment.
    b. Classrooms (Venue): ICAR-CIAE Bhopal; ICAR-CIPHET, Ludhiana; Safe hostel accommodation and healthy Boarding.
    c. Accommodation/Hostel is at: ICAR-CIAE Bhopal; ICAR-CIPHET, Ludhiana;
    d. Hostel check in: One day before training
    e. Hostel check out: following day of completion of course.
    f. Internet and computer systems.
2. **Material to be made available to Participants by Horticulture Training Institute**
    a. Training Brochure before training
    b. Reading Material during training
3. **Faculty: Available**

4. **Post-training activities:**
    1. Take written feedback on each of session with respect to content, clarity and delivery style, opportunity for Q&A, accommodation, food, other facilities, suggestions for improvement etc. and share action proposed in future trainings, during valedictory session.
    2. Submission of training report to be submitted within 15 days of completion of EDP:
        a. Objectives, outputs and outcomes of training.
        b. Training schedule
        c. Trainee's / participant list with postal address and contact numbers.
        d. Photographs and Video (Also to be hosted by training institute and NHB)
        e. Analysis of feedback and action taken report.
        f. Action taken on networking with trainees local R&D Institution / experts for regular extension and entrepreneurship development activities.
        g. Utilisation Certificate.

APPLICATION FORM

Entrepreneurship and Leadership Development Programme for Horticulture Entrepreneurs desirous of applying to Schemes of National Horticulture Board

PHM- PRIMARY PROCESSING AND PACKAGING OF FRUITS AND VEGETABLES/
PHM- COLD ROOM, RIPENING CHAMBER & REFER-VAN

Name of the Institute (Select One):

- ICAR-Central Institute of Agricultural Engineering, Bhopal
- ICAR-Central Institute of Post Harvest Engineering and Technology, Ludhiana
- National Institute of Post Harvest Technology, Pune
- KrishiVigyan Kendra, Baramati

Name and address of applicant	:		
Father's/Husband's Name	:		
Permanent address	:		
Contact details	:	E-mail	Mobile
Date of Birth	:		
Educational Qualifications	:		
Present profession/activity	:		
Name of the training (Please select one)	:	PHM- PRIMARY PROCESSING AND PACKAGING OF FRUITS AND VEGETABLES/ PHM- COLD ROOM, RIPENING CHAMBER & REFER-VAN	
Month and date of training	:		
Training Fee, Draft details	:	Amount, Rs.: DD No. & date: Name of Bank:	
GST No. (optional)	:		
Whether application has been submitted to NHB for funding?	:	Yes/ No	

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Signature of the candidate