ICAR-NRC on Litchi, Muzaffarpur, Bihar

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

Crop / Activity	Open Field Cultivation of Litchi fruit

Year: 2019-2020

Become Entrepreneur	
	Lead Change and Innovation
Be creative	
	Lead Profits

ICAR-NRC on Litchi, Musahari, Muzaffarpur 842002(Bihar)

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Training Programme Name	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 06 days 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 are capital 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, timebound 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 06 days training programme at one of the NHB recognized /approved institution, with a goal of zero rejection of a project for which IPA is issued.

Litchi:

India is the second largest producer of litchi in the world.Litchi is a popular fruit crop of India, and contributes about 93,400 ha with annual production of 600000 MT. There has been sharp increase in area from 11,410 ha in 1961-62 to 93,000 ha in 2018-19. Bihar, West Bengal, Jharkhand, Assam and Chhattisgarh accounted for 80% of total country`s production during 2015-16. In this areas, litchi is being cultivated since long and most of the existing litchi orchards in Bihar are old and unproductive due to which the production and

productivity of litchi has stagnated in recent years. ICAR-NRCL has developed and refined production protocol to rejuvenate old senile litchi orchards, which provides various advantages and benefits over new plantation. In contrast to new plantation which takes atleast 15 years to reach peak production, the rejuvenated plants take only four years.

China and Shahi are leading commercial varieties of litchi. The cultivar China has a tendency of alternate bearing, whereby a year of bumper harvest is followed by one with little or no crop. Even in cultivar Shahi, which is supposed to be regular in nature, bears heavy and less in alternate years. As a result the income generation fluctuates from year to year for growers. ICAR-NRCL has developed and refined protocol of girdling in primary branches to regulate bearing and ensure regular flowering every year.

Major problems in litchi growing include infestation with fruit borer, sunburn, and fruit cracking. Various synthetic chemicals are used in the production system to overcome these maladies. However, ICAR-NRCL has developed and refined the protocol of fruit bagging about 30-40 days before harvest (at Large cardamom stage). Bagged fruits are free from borer infestation, blemishes, sunburn and fruit cracking.

Despite the availability of these improved technologies, there is slow pace of adoption at farmer level. Hence, the need has been felt to demonstrate these production technologies among farmers with the objective of up-scaling technological intervention to increase production and productivity of quality of fruits. The proposed project is also in line with the Govt. of India`s target to double farmer`s income by 2022.

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

1. Open Field Cultivation of litchi fruit √	

The project envisages capacity building, demonstration, and up-scaling of improved production technologies developed by ICAR-NRCL to increase production and productivity of litchi in selected litchi clusters in India. Under the proposed project production protocols including Rejuvenation of old senile orchards, Girdling to regulate bearing and ensure flowering, and Fruit Bagging to improve fruit quality will be demonstrated and up-scaled in the farmers` field in cluster approach. The cluster will be further sensitized to develop FPO and sustain the income of group through litchi production and marketing.

Profile of the Institute:

ICAR-NRC on Lithci, Muzaffarpur established in 2001 by Govt. of India has well developed facilities for providing leadership and hand holding to the stakeholders for implementation of activities. NRC on Litchi acts as a nodal institute for research and development of litchi and provides leadership at national level. It also acts as a national repository of information on litchi production, processing, value addition and provides consultancy services to end users. The Centre is located at Mushahari, on Muzaffarpur-Pusa Road at $26^0$5'87"N latitude, $85^0$25'64"E longitude at an elevation of 60 m from mean see level. It is about eight km from Muzaffarpur railway station. The area has typically subtropical climate with an average annual rainfall of 1000-1100 mm. The soil conditions of the area are alluvial with sandy loam texture and are calcareous having pH 7.5-8.0. The research farm of the centre is spread over an area of 40 ha.

VISION

To Develop ICAR-NRC on Litchi as Centre of Excellence in the field of Litchi Research, Extension, and Skill Development for Providing Livelihood Security and Economic Prosperity to Litchi Growers and Traders.

MISSION

Harnessing science and technology by interfacing research and extension activities for enhanced productivity, improved quality and diversified use of litchi for different stake holder.

MANDATE

- Applied and strategic research on genetic resources and production technologies for enhanced, sustained and safe production of litchi.
- Transfer of technology and capacity building of stakeholders for enhancing and sustaining productivity of litchi**.**

SIGNIFICANT ACHIEVEMENTS

- Experimental farm spread over 35 ha has been developed
- Fifty six accessions of litchi and allied species were collected from indigenous sources.
- Molecular characterization of 20 litchi cultivars has been completed using RAPD and ISSR markers.
- Hybrid progeny involving Shahi, China, Bedana and perents have been Kasbaparents have been developed.
- Rejuvenation technique for old senile orchard has been standardized.
- Application of 75:50:100 g NPK/plant/year in cv. Shahi and 100:50:100 g NPK/plant/year in *cv.* China has been found most effective for vegetative growth of plants.
- Foliar application of planofix @ 2.5 ml/10 L or NAA 20 mg/ L one week after fruit set, significantly checked the fruit drop.
- Two spray of KNO_3 (2%) after 20 and 30 days of fruit set delayed colour-break by 5 days in litchi cv. Shahi.
- About 50000 quality litchi saplings is produced every year and supplied to stakeholders.
- Bagging of individual litchi bunches in cv. Shahi with perforated pp non oven bags was found the best for production more class-I category fruits with reduced sun-burn and cracked fruits.
- Biodiversity of arbuscularmycorrhiza in litchi rhizosphere revealed three predominate Three species of *Glomus*.
- *Alternariaalternata* is a major pathogen that afflicts litchi at multiple phenophases.
- *Trichodermaviride* strain NRCL T 01 is effective against wilt caused by *Fusariumsolani*. Mass production technique of the strain has been standardized.
- Management schedule for litchi fruit borer has been developed.
- Based on physic-biochemical studies, 3rd week of May is the best time for harvesting litchi cv. Shahi.
- A wine from litchi fruits having high nutritional value was produced by fermentation using wine yeast, *Saccharmoycescerevisiae var.*bayamus.
- Research potential has been strengthened through procurement of high-end equipments such as GCMS, HPLC, AAS, UV-VIS Spectrophotometer, Ultra Centrifuge, trinocularpase contrast microscope, Microwave digestion system, etc.
- A resourceful library, with more than 1700 books including recent reference books and encyclopedias, have been developed.

Technology Developed by ICAR-NRC on Litchi, Muzaffarpur

1. Rejuvenation of Unproductive Litchi Trees
2. Off Season Propagation in Litchi
3. Potting Media for Raising Healthy Plants
4. Post cut dip solution to enhance nursery survival
5. Litchi base cropping system model
6. Bagging Litchi bunches for quality fruits.
7. Bio-intensive management for fruit borer complex in Litchi
8. IPM of Litchi Mite
9. Production of wine from Litchi fruits
10. Production of Nut from Litchi fruits.
11. Girdling of branches for bearing regulation.

ICAR-NRC Litchi has sufficient managerial, scientific, and technical manpower, to undertake the requirements of the project. However, for implementation of the project at field level, a Young Professional-I is needed. Also, skilled and semi-skilled personnel will be engaged based on contingent needs for effective implementation of the project.

Basic infrastructure and collaboration to be in place: The ICAR-NRC on Litchi has

1. Competent Faculty.: **Available (**Scientific: 13, Technical : 07,Supporting : 02 and Qualified contractual staff)
2. Research expertise and farm / Demonstration experience.**Available (**Well develop Research Farm: 100 Acre,Nursery with a production 40000 sapling annually**)**
3. Excellent classrooms with all Audio-visual equipment and aids including PPT facility.**Available (**Training facilities, Lecturer Hall, Exhibition museum, Training Hall, Litchi Treatment facilities, Honey Processing Unit,Fruit Processing Unit etc.)
4. Excellent living/ residential accommodation with Computers and internet.**Available**
5. Has good networking with experts across India, to invite best of the faculty in a particular area of expertise.**Yes (**Guest House with all facilities)
6. Has collaboration with entrepreneurs and Industry.**Yes**
7. Willing to provide internships with FPOs/ FPCs/entrepreneurs.**Yes**

Previous experience:

The Institute has excellent past record for conducting such types of activates with ATMA, MIDH and NHB. However, the individual applicant has to explain their status.

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. Selection of cultivar, Technology to be adopted and Production practices for crop intensification and high productivity and ecological sustainability.
    a. How to select suitable **litchi** cultivar and source quality planting materialon market demand and sustainability.

b. Technology: Protection cultivation Technology-various kinds, customisation based on Agro-climatic condition, crop and pest and diseases profile; familiarisation of components and Mechanisation and Automation.
c. To know scientific production, harvesting and post-harvesting practices, technology and management and Analyse gap analysis with that of the current practices, technology and management of trainees.

4. Harvesting, Post-Harvest Management practices, technologies and Infrastructure
    a. Maturity standards, Time of Harvesting, Physical condition of the produce, post-harvest practices, cleaning, sorting, grading, packing, labelling, pre-cooling, storage and transportation.
    b. To be aware of Post-harvest and storage practices, protocols and technologies.
    c. To know required infrastructure- Pack house/ Supply Chain/ Cold Chain and Marketing infrastructure and Gap analysis to the context of trainees.
5. Processing and value addition
6. 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; 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.
7. Supply/ Cold-chain development both for fresh and processed produce
8. 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.
9. 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.

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

Pedagogy: Training methods / styles are:

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

Outputs expected: (As on the last date of 06 days training)

1. 100% attendance of all Classes prescribed**: Will be ensured**
2. Daily studying of reading material provided **: Will be ensured**
3. Successful and timely completion of assignments **: Will be ensured**
4. A score a minimum of 75 % in final assessment by each trainee **: Will be ensured**
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 Production, harvesting, post-harvest, Marketing, Exportsetc. 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 Cultivation, harvesting, post-harvest, food safety, traceability certification and standards.
    c. Project: PHM&CC: 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 production & productivity 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.

Outcomes expected(in 18 months)

1. Successful completion of the project with right technology and processes complying with all NHB Scheme requirements.
2. Reduced cost of production; improved crop health, productivity &Reduced losses.
3. Improved food safety, certification, standards compliance- at least process is initiated.
4. Improved infrastructure.
5. Improved profits/ net income.

Programme in Brief

<table>
<tr><td>Training Programme Name</td><td colspan="4">Entrepreneurship and Leadership Development Programme for Horticulture Entrepreneurs</td></tr>
<tr><td>Qualification of trainee</td><td colspan="4">Minimum 10th Class pass with knowledge of English and Hindi writing & reading</td></tr>
<tr><td>Course fee</td><td colspan="4">Borne by NHB</td></tr>
<tr><td>Duration</td><td colspan="4">06 working days:01 Week</td></tr>
<tr><td>Participant Target Group</td><td colspan="4">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 open field production of litchi fruits.</td></tr>
<tr><td>Training Coordinator with Designation and Address Tel, Mobile and email id</td><td colspan="4">Dr.S.D. Pandey
Principal Scientist,
ICAR-NRC on Litchi, Muzaffarpur, Bihar
Mob.: 9835274641
Email: nrclitchi@yahoo.co.in</td></tr>
<tr><td>Languages</td><td colspan="4">Hindi/English</td></tr>
<tr><td rowspan="5">Training calendar for 2019-20</td><td>Month</td><td>Last date for Registration</td><td>Training reporting dates</td><td>Training Dates</td></tr>
<tr><td>Quarter- I</td><td>16th January, 2020</td><td>17th Feb., 2020</td><td>18-27 Feb., 2020</td></tr>
<tr><td>Quarter- II</td><td>11th April, 2020</td><td>11th May, 2020</td><td>12-21 May, 2020</td></tr>
<tr><td>Quarter- III</td><td>15th June, 2020</td><td>14th July, 2020</td><td>15-24 July, 2020</td></tr>
<tr><td>Quarter- VI</td><td>14th October, 2020</td><td>15th Nov., 2020</td><td>16-25 Nov., 2020</td></tr>
<tr><td>How to Apply</td><td colspan="4">Through email source institutions (ICAR-NRC on Litchi), Mushahari, Muzaffarpurnrclitchi@yahoo.co.in</td></tr>
<tr><td>Next review/ revision of Training Design</td><td colspan="4">December, 2020</td></tr>
<tr><td rowspan="6">Batch size and cost and Payment system</td><td>Batch size (No of trainees)</td><td>Course Fees</td><td>Hostel: Accommodation, Boarding: BF+L+D + Morning Tea + Afternoon Snacks</td><td>Total cost</td></tr>
<tr><td>15 -20</td><td>75,000</td><td>2,25,000</td><td>3,00,000</td></tr>
<tr><td>10-15</td><td>50,000</td><td>2,00,000</td><td>2,50,000</td></tr>
<tr><td>5-10</td><td>50,000</td><td>1,50,000</td><td>2,00,000</td></tr>
<tr><td><5</td><td>5,000/ person</td><td>20,000/ person</td><td>will be worked out based on no. of trainees.</td></tr>
<tr><td colspan="4">Payment system and address: online transfer
ICAR Unit-NRCL on Litchi,
AC No. 30043154027
SBIMushari Branch
Muzaffarpur,</td></tr>
</table>

	IFS code: SBIN00014283
Enrolment	Is voluntary on the part of trainee and on his/her submission of willingness in writing to undergo training.
Certificate	Upon successful completion of training with 75% marks in final assessment, the candidates are awarded completion certificate with marks.
NHB&HTIRole	1. The training programme is voluntary for any individual or trainee. 2. The cost of training is to be borne by trainee him/herself or group. 3. The training is not sponsored by NHBnor 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.

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 NHBDPR 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 Session1 1.30 hrs	**Orientation / Inauguration**	• Ice- breaking General discipline in class room (Do's and Don'ts) • Introduction and expectations of trainees • Motivational Talk	Successful entrepreneur
Day1 Session2 1.30 hrs	Economic / Marketing Potential and Specific State/ UTs context: Scope and opportunities and Success stories.	1. Crop Origin, Botany and economic products 2. Fresh Value added products potential and scope 3. Area, Production, Productivity, Prices & value in Indian Context 4. State/UT wise Area, Production, Productivity, 5. Prices & value, variation across markets. 6. Global status of Area, Production, Productivity, Prices; 7. Domestic market : Supply and Demand; 8. Export and Import scenario; 9. Case study of success stories-2 **10.** Concerns for growers / entrepreneurs!	Horticulturist
Day1 Session3 1.30 hrs	Personal skills development	1. Improve listening, reading, writing and communication skills, team work; reading of signs for fruits & litchi 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.	Social Scientist
Day1 Session4 1.30 hrs	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 (Local)
	Quiz	Today's learning	
	Reading material for next day*	1. Study of NHB Scheme guidelines and come up with queries. 2. Reading material on Litchi production post	NHB

		harvest management. 3. Preventive practise and curative measures.	
	Evening/Night Home work/ Assignment#	• Creation of Whats' app group of all trainees. • Joining of NHB crop specific Litchi Project specific Whats' app group.	Technical cell of NRCL

*: TO be read in the night before attending next day class.

#: Are evaluated/tested the following day.

Day 2 Session1 1.30 hrs	Selection of cultivar/ site plant availability like planting system etc.	1. Agro-climate, soil health, and water quality., 2. Varieties and cultivars with their features- High yielding, Pest/Disease resistance 3. Ascertaining market/consumer preference -choice characteristics of commodity. 4. Understanding ecological challenges of project land and village (Project site) 5. How to select economically profitable and sustainable cultivar / variety/hybrid. 6. Quality Planting Material-How to confirm/variety sapling. 7. Nursery Management/ production, appropriate time of planting system space of planting. 8. Sources of Quality Planting material. 9. Knowledge of vegetative propagation methods.	**Horticulturist & Marketing Expert**
Day2 Session2 1.30 hrs	Orchard planning and planting	Layout,Pit preparation, Planting,After care, Canopy architecture, plant health management in young plants.	**Horticulturist**
Session3 & 4 1.30 hrs each session	Visit to field and technology park	Visit to various Experimental blocks of farm	**Technical person**
		• Hands on Agronomic practise in field and nursery. Soil & Water testing- PH & EC Concept,	
		• Standard potting media for litchi plants in nursery and Idea about soil less potting media. • Coco peat , Rock wool, Perlite, Vermiculite • Media Bag Selection, microbial treatment	
	Discussion	Evaluation of Assignment and observations	**Technical person**
	Quiz	Learning on yesterday and today	
	Reading for next day	Plant canopy management in fruit crops.	
	Assignment for next day	Difference between Applicants DPR and NHB's Model DPR- What are the learnings.	

Day 3 **Session 1 & 2 1.30 hrs**	Crop husbandry including organic production technology	1. Water requirement, critical stages, Irrigation / fertigation& drainage/ soil & water conservation/ RWH; irrigation schedule; 2. Weed management & Mulching. 3. Nutrient Management (Macro & Micro) / Manuring including Bio-fertilizer: Vermi compost production- Identify correct species of earthworm, quality production technique, finances and market linkage, food safety issues etc. 4. Integrated Pest, Disease & Nematode Management- knowing of pests/diseases/ symptoms, stages of attack and measures & precautions; Bio-pesticides, promotion of natural enemies. 5. Litchi based Farming System, Inter/ Mixed cropping; 6. Farm mechanisation& Automation- Tools and equipment for nursery and production & harvesting, Annual Maintenance & Service centre etc. 7. Crop rotation / inter crop. 8. Care to be taken in procuring inputs. 9. Availing extension services at regular intervals with the visit of experts to fields. 10. Honey bees- supplementary income 11. What is cluster sprout? Cluster? Salient features of Cluster? 12. Monthly calendar of operation	Horticulturist/ Plant Protection Expert/ Soil Expert
Session 3 & 4 1.30 hrs	Visit to Farm- of Farmer	13. Practical sessions including training, pruning, and canopy management for different system and densities.	Training In-charge/Technical person
	Discussion	Evaluation of Assignment and observations	
	Quiz	Learning on 3 days	
	Reading for next day	• Factors that decide maturity and harvesting time. • Post-harvest management practices, technologies and infrastructure for litchi specific to each trainee.	Technical person
	Assignment	Technologies for Water, Nutrient and Integrated Pest and Disease management. Preparation of Calendarof Pest, disease & Nematode occurrence for developingmanagement	Training leader

Day 4 Session 1 & 2 1.30 hrs	Harvesting, Post-Harvest Management / Infrastructure to enhance holding life and to reduce post-harvest losses	1. Post-Harvest losses and Waste scenario of litchi in the country and measures to minimise the same. 2. Proper technique & do's and don'ts of Harvesting; 3. Factors affecting harvesting- maturity, colour, time etc. 4. Careful Post-harvest handling / practices including use of crates, reception area, washing/cleaning, sorting (parameters), grading (standards), pre cooling treatment Packaging, labelling, storage & Traceability	PHM Expert
	Processing / Value Addition	1. Fresh product: Minimal processing. 2. Processing / Preservation- & Value Addition • Waste utilization. • Use of renewable energy on roof tops for processing energy	PHM Expert/ Horticulturist
Session 3 1.30 hrs	Visit to Model farm	Skill /Hands on training on field operation techniques	Horticulturist
	Visit to Modern Pack house, cold storage etc.	Skill /Hands on training on Harvesting techniques +Post-harvest practices	
	Visit to processing unit/ Value addition plants	Discussion about special products and scale	
	Discussion	Evaluation of Assignment and observations	
	Quiz	Learning on 4 days	
Session 4 1.30 hrs	Reading for next day	Diseases and pest management in litchi	Training In-charge/Technical person
	Assignment	Technologies for Water, Nutrient and Integrated Pest and Disease management. Preparation of Crop calendar including Pest, disease management	

Day 5 Session 1 &2 1.30 hrs each	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, Alcohol 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.	Information technology/ Horticulturist
Day 5 Session 1 & 2 1.30 hrs each	Economics, Finance, Credit &DPR and Project Management and Risk Management	1. Estimate cost of production and required investment; 2. To know about Banks/ Financial Institutions; Loan procedure-how to avail finance/ credit- challenges and prospects. 3. Facilitate in possible solutions on expeditious and easy access to credit in trainees context. 4. To prepare a proposal for loan duly considering Agro-climatic/soil/ water suitability, Market, Finance and Technical viability. 5. Model DPR Templates of NHB.	Team of Chartered Accountant/ Horticulturist/ PHM Expert/ Bank Manager/ Insurance Agency/ FPO representative

		6. DPR preparation for various schemes 7. Farm record keeping. 8. Economics of enterprise & performance measurement using 2-3 Financial indicators. 9. Managing Natural calamities 10. Mitigation, Insurance- risks covered, not covered, claims, assessment, settlement etc. 11. Assessing requirement for rejuvenation of old orchard 12. Monitoring and Evaluation of project	

Day 6 **S1** **1.30 hrs**	Supply/ Cold-chain development both for fresh and processed produce Agri/Horti-Logistics	1. What is Supply Chain and Cold Chain? Advantages. 2. <u>For Local sale</u>: where product selling cycle is < 48 hrs- to have aggregation, staging platforms at village level for sorting and grading and to consolidate volume for viable truck loads. 3. <u>For Long distance</u>: where product selling cycle is > 48 hrs- require aggregation platforms, pre-conditioning supply & cold chain management- Modern pack house, integration with reefer transport. 4. Required infrastructure Gaps, 5. Strategy for phase wise Supply/ Cold Chain development in trainees context. 6. For domestic market- Local & Distant 7. For export market. 8. Annual Maintenance, Contract of Infrastructure.	Expert from APEDA/NCIPM / Sh. AlokKedia
Day6 **S2** **1.30 hrs**	One day internship at one of the successful entrepreneur:	Trainee specific Crop Production Technology, • Post-Harvest Practices, Technology and Infrastructure • Producing Quality produce • Finance, Credit & Farm/ Project & Risk Management	Mentored by Successful entrepreneur
S 3 **1.30 hrs**	Evaluation 1 Hour	Training evaluation /Test on 1. Knowledge 2. Skills 3. Attitude Marks in the test are	3-4 Successful entrepreneurs
	Total Marks Final Assessment	1. Class room participation — 25% 2. Timely submission of assignments — 25% 3. Final evaluation — 50% Total Marks (Are recorded in Completion Certificate)	Training Cell
	Feedback 30 Min		3-4 Successful entrepreneurs
	Discussion on Feedback		
S 4	Valedictory Function		

Technical topics to be covered during training are as follows.

S.N.	Theory classes (10.30 to 1PM)
1	Scenarios of litchi in India with special emphasis to Assam
2	Varietal choice of litchi in India and Assam
3	Importance and role of training and pruning of different types of orchards for quality litchi production
4	Establishment of litchi nursery and propagation of quality litchi planting materials
5	Role of different materials in litchi propagations and cost benefit ratio.
6	Canopy architecture management for litchi
7	Importance of nutrition in plants and calculations of quantity of manures and fertilizers
8	Role of microbes in organic litchi production
9	Importance of micro nutrient and PGR and their schedule of application
10	Water and environment management in litchi orchard
11	Occurrence severity of litchi pests Management schedule of insect pests in litchi
11	How to make a litchi plant to flower Bearing regulation in litchi

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

The following weblinks 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 APEDAAGRIEXCHANGE: 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.	Selection of cultivar and Production practices for high productivity	ICAR institutions publications on specific crop Package of practices of specific crop (s). e-learning: videos from authentic sources- ICAR/ SAU/SHU/Global Institutions. ICAR e-courses: https://ecourses.icar.gov.in/	
4.	Harvesting, Post-Harvest Management / Infrastructure	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	
5.	Processing / Value Addition	ICAR / Any reputed R&D Institution publications e-learning: videos from authentic sources- ICAR/ SAU/SHU/Global Institutions.	
6.	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	
7.	Marketing and value chain development	Directorate of Marketing and Inspection website: http://agmarknet.gov.in/ Crop specific market information sources	
8.	Maintain quality of produce: Health	TNAUAgriTech 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	

	&Food Safety / 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 FAOInternational 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/	
9.	Finance, Credit & Farm/ Project & Risk Management	Model DPR Templates for NHB Schemes ww.nhb.gov.in	
10.	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	
11.	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	
12.	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	
13.	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/ ICARPublications: https://krishi.icar.gov.in/jspui/ Local University publications Local University success stories	
14.	Protected (/Greenhouse /	National Committee on plasticulture Agriculture with the Horticulture https://www.ncpahindia.com/	

	Shade net / Walk in Tunnel) cultivation:	Agriculture Skill Council of India: Curriculum and Occupational / Qualification standards: http://asci-india.com/National%20Occupation%20Standards.php	
15.	Cold Storage / Cold Chain Development:		

Reading material for the trainee is to be prepared by the Training Institute based on trainers' reading material in local language either in brief or in detail based on the module and need. May share booklets or print out of detailed scientific package of practices recommended locally.

Success Stories: Illustrative

IARI	http://iari.res.in/index.php?option=com_content&view=article&id=539&Itemid=1516 http://www.iari.res.in/files/Pusa_Hydrogel.pdf
IIHR	https://iihr.res.in/success-stories
CISH	http://www.cish.res.in/success_story.php
CCRI Nagpur	https://www.youtube.com/watch?v=QwE6oFkq3F8
NRC Banana	http://nrcb.res.in/success-stories.php
CITH Srinagar	http://www.cith.org.in/index.php?option=com_content&view=article&id=83&Itemid=11&lang=en
IIVR	https://iivr.org.in/success-stories
Grapes	https://rkvy.nic.in/Uploads/SucessStory/TAMILNADU/2018/20180440133.%20GRS%20Success%20story.pdf

https://www.innovationpolicyplatform.org/sites/default/files/rdf_imported_documents/Agricultural_Clusters.pdf

Activities prior to training by Horticulture Training Institute:

The training institute shall undertake

1. Desk Analysis:
    a. About specific commodity: State/ UT and District's Area, Production, Productivity, cost of cultivation, production, post-harvest and marketing 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 production, 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, practicals (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 are (Venue) :…….
    c. Safe hostel accommodation and healthy Boarding.
    d. Accommodation/Hostel is at:
    e. Hostel check in: One day before training
    f. Hostel check out: following day of completion of course.
    g. 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:**

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.

Photographs of Campus/ Class rooms / Hostel / Technology / Infrastructure

What is cluster ? When a group of individual growers or farms are called as Cluster? Essential elements / components of a cluster:

Cluster sprout: Large scale areas where a particular crop is under cultivation already, but lack all the characteristics of Cluster.

Cluster: A cluster is a geographic concentration of firms that work in a related value chain. (Professor C. Leigh Anderson 2015: Univ. Washington)

Principle (s):

1. Firms that operate close to related firms and supporting institutions are often more innovative and, therefore, more successful in raising productivity than firms that operate in isolation.
2. To counter increasing fragmentation in farm holding size, by promoting collaboration in land holders. This is expected to regain economy of scale- on inputs and on outputs.

The essential characteristics / elements of a horticulture cluster are :

1. Geography: Located within an identifiable & as far as practicable, contiguous area.

2. Specialisation: Similarity in the commodity (s) production and complementarity in the methods of production, Channels for communication among the members, quality control and testing,technology and marketing strategies/practices energy consumption, Common challenges and opportunities etc.
    i. In case of Fruits: Commodity specific
    ii. In case of Vegetables: 4-5 crops of similar nature capable of rotation.
    iii. In case of Floriculture: Commodity /Similar commodity specific

3. Intensive linkages viz., Horizontal, Vertical and Support relationships

    a. Horizontal relationships among producers:
        Cooperatives / FPOs/ Companies/Smallholder business consortia but for the NHB scheme it is within the FPC model.
    b. Vertical relationships -among
        i. Agricultural producers,
        ii. Production Input Suppliers,
        iii. Production, Harvest and Post-Harvest Service providers
        iv. Financial Institutions,
        v. Processors and exporters,
        vi. Logistics/ Supply Chain providers
        vii. Branded buyers and retailers;

        Colocation of actors at multiple parts of the value chain is one of the defining features of agribusiness clusters. In such contexts co-location through agribusiness clusters can reduce transaction costs, and increase productivity and innovation.

c. Support relationships between producers and facilitating organizations:- that reinforce the quality, efficiency and sustainability aspects of the chain
    i. Governments, business service providers,
    ii. Research institutes, universities and
    iii. non-government service organizations).
    iv. Cluster members may benefit from linkages from supporting institutions that provide specialized training, education, information, research and technical support (Porter, 1998). Clusters also often involve private sector financial firms who provide access to financial services and investment.

4. Critical mass of Actors: Number of growers and size: Critical mass of actors, resources and competencies necessary for a cluster to effectively lower transaction costs, facilitate information flows, provide access to specialized factor markets and interact effectively with local, regional and national consumers.Area of willing growers with produce volume capable of viable capacity use of the post-harvest infrastructure components while retaining priority to reach distant markets.

5. Producer ownership: Holds ownership of trading / marketing of produce: Removes intermediary traders/Bypass wholesale traders. Deals with buyers / retailers directly.

6. Shall serve identified Targetted Market (s).

7. Undertake promotion of produce with collective branding

8. Evolution and diversification of commodity trade with time and entrepreneurship- Fresh produce, processing and Export, new markets.

9. Inclusiveness : have provision for enrolling new members to enable prospective entrepreneurs and utilise facilities / services within set limits.

10. Generate innovation and promote evolution of the business model.

India’s Success Story: Sahyadri Farms: Farmers Producers Company