

# Environmental and Social Management Framework for Tamil Nadu Rural Transformation Project

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## Report



Rural Development & Panchayat Raj Department  
Government of Tamil Nadu

**Volume II**  
**Environmental and Social Management**  
**Framework (ESMF)**

## Abbreviations and Acronyms

BIS	Bureau of Indian Standards
BOD	Biological Oxygen Demand
CBO	Community Based Organization
CEE	Centre for Environment Education
CLG	Common Livelihood Group
CO	Carbon Monoxide
CP	Community Professional
CSR	Corporate Social Responsibility
DIC	District Industries Centre
DDS	District Diagnostic Study
DPMU	District Project Management Unit
EA	Environmental Appraisal
ECP	Energy Conservation and Production
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EG	Environmental Guidelines
ESMF	Environmental and Social Management Framework
ETL	Economic Threshold Level
FAO	Food and Agriculture Organization
FSI	Forest Survey of India
FSSAI	Food Safety and Standards Authority of India
FYM	Farm Yard Manure
GHG	Green House Gas
GI	Green Index
GoTN	Government of Tamil Nadu
HM	Hazardous Material
ICT	Information and Communication Technology
IEC	Information, Education and Communication
ILO	International Labour Organization
IPM	Integrated Pest Management
LPG	Liquefied Petroleum Gas
MSME	Micro, Small and Medium Enterprises
MOEF	Ministry of Environment and Forest
MOP	Mureate of Pottash
NABL	National Accreditation Board for Testing and Calibration Laboratories
NH <sub>3</sub> -N	Ammonia nitrogen
NPL	National Physical Laboratory
NRM	Natural Resource Management
NTFP	Non Timber Forest Produce
NO	Nitrous Oxide

NP	National Parks
OP	Operational Policy
OSF	One Stop Facility
PCB	Pollution Control Board
PDO	Project Development Objective
PFT	Project Facilitation Team
PG	Producer Groups
PGP	Participatory Growth Plan
PI	Pollution Index
PM	Particulate Matter
PMP	Pest Management Plan
PPE	Personal Protective Equipment
R & D	Research and Development
SHG	Self Help Group
SO	Sulfur Oxide
SRI	System of Rice Intensification
SSFE	Small- Scale Forestry Enterprises
TNEPRP	Tamil Nadu Empowerment and Poverty Reduction Programme
TNRTP	Tamil Nadu Rural Transformation Project
TNRTM	Tamil Nadu Rural Transformation Marketplace
TSS	Total Suspended Solids
VCA	Value Chain Analysis
VISAKA	Vittiya Sakshrata Abhiyan
WHO	World Health Organisation

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## Executive Summary

Being an initiative supported by the World Bank, the Tamil Nadu Rural Transformation Project (TNRTP) is required to conduct an Environment Assessment study and develop a Management Framework. Based on the Environment Assessment study, an Environment and Social Management Framework is prepared for the project. The objective of the Environmental and Social Management Framework (ESMF) is to 'ensure environmental sustainability of enterprises and value chain interventions proposed under TNRTP'. The ESMF provides a strategy to manage negative environmental impacts of the enterprise and value chain activities, thereby sustaining the benefits of these interventions. It also provides the institutional mechanism to operationalise the ESMF, which contains guidelines, systems and procedures for ensuring environmental sustainability during project implementation. The project triggers the following Operational Safeguard policies of the World Bank - Environmental Assessment (OP 4.01); Forests (OP 4.36); Natural habitats (OP 4.04) and Pest Management (OP 4.09). The necessary measures to ensure compliance with these laws, regulations, and policies are included in the negative list, and environmental guidelines are developed as part of the ESMF.

The environmental safeguards are applicable to the following components of TNRTP.

<b>TNRTP Components</b>	<b>Environmental Implications</b>
<b>Component 1: Business Ecosystem Development and Enterprise Promotion</b>	
1.1: Inclusive Strategic investments, Analytics, and Planning	Integration of environmental aspects like status of natural resources, key environmental issues related to the value chains, opportunities for green enterprises etc. into the district diagnostic studies, value chain analysis etc. Environmental Appraisal of business plans and integration of mitigations.
1.2: Business Development Support Services.	One stop shop which will offer services to Enterprises provides necessary inputs to ensure compliance, Environmental Guidelines (EG) and Greening opportunities.
1.3: Enterprise promotion and Value chain strengthening	Convergence with Government Programs and Schemes; Private Sector Partnerships and Tie-ups with Technical and Financial institutions for greening interventions. Required consents on ESMF like from PCB and others will be availed.
<b>Component 2: Business Plans Financing and Innovations</b>	
2.2: Innovation Promotion	Thematic Innovation to promote Green Enterprises. This will increase the environmental benefit through the innovative solution.
<b>Component 3: Skills and Job Opportunities</b>	
3.3: Upgrading Skills in prioritized value chain	Skill up graduation measures to include green skills.

EA has identified the possible environmental implications of each income-generating activity proposed under the project, and ESMF suggests environment-friendly alternatives/guidelines or mitigation measures for each. It also encourages Green Enterprises on the critical environmental issues identified in the proposed activities through innovation promotion funds.

The ESMF implementation strategy is to conduct an Environmental Appraisal to all business plans/proposals and to integrate activity specific environment guidelines/mitigations into the value chain interventions and enterprises (production and processing). The system of Environment Appraisal will help to ensure compliance with applicable laws and regulations of the State and GoTN and the triggered safeguard policies of the World Bank and integration of environment guidelines. The ESMF also provides a strategy for measuring the greenness through a 'green index' in addition to the safeguards (which is discussed in a separate report).

The key implementation arrangements for ESMF include:

- Institutional arrangements: The institutional arrangements are the key to effective implementation of ESMF at the cluster, district and state levels. The roles and responsibilities of key staff at different levels are provided. However, the staffing costs are not included in the budget as it would be included as part of Project Management costs.
- Monitoring strategy: The focus of monitoring is to ensure the implementation of ESMF and Green Index. Internal and external audit mechanisms are planned for the same which are detailed in the ESMF.
- Capacity Building Plan: Capacity building plan for staff at various levels is designed in order to strengthen the capacities of the staff and community at different levels.
- Implementation timeline: The implementation timeline is provided with tasks spread across 6 years.

# Chapter 1

## 1.1 Background:

Being an initiative supported by the World Bank, TNRTP is required to conduct an Environmental Assessment study. The Centre for Environment Education (CEE) was contracted to undertake an Environmental Assessment (EA) of the project and develop a management framework with an objective of understanding environmental implications of project activities, and to define remedial measures to mitigate any negative impacts, and to understand the compliance requirements with the national and state legal and regulatory framework and the World Bank Operational Policies. The Volume I documented the findings of EA. Based on the Environment Assessment an Environmental and Social Management Framework is prepared for the project. The objective of Environmental and Social Management Framework (ESMF) is to 'ensure environmental sustainability of enterprises and value chain interventions proposed under TNRTP'. The ESMF provides a strategy to manage negative environmental impacts of the enterprise and value chain activities (production interventions) thereby sustaining the benefits of these interventions. It also provides the institutional mechanism to operationalise the ESMF which contains guidelines, systems and procedures for ensuring environmental sustainability during project implementation. EA/ESMF has also covered relevant social aspects like labor aspects, worker safety, equity, etc. Besides relevant mitigation measures from the Social Assessment are also included to make this more comprehensive.

## 1.2. Background of the project

The proposed Project Development Objective (PDO) is to 'promote rural enterprises, access to finance and employment opportunities in 120 blocks of Tamil Nadu'.

The project would achieve the project PDO by: i) Creating an enabling environment to promote and strengthen enterprises and creating jobs in targeted areas through identifying market and value-chain strengthening opportunities; ii) mobilizing and aggregating rural producers' (from SHG households) into producer collectives; iii) enhancing access to finance through development of appropriate financial products and linkages with formal financial institutions; iv) financing of business plans of producer collectives and enterprises linked to value chain opportunities; v) developing an institutional architecture for efficient delivery of business development and financial services; vi) upgrading skills in selected self-employment occupations and enhancing access to wage-employment jobs in growth clusters; and vii) forging partnerships with key stakeholders (public/private/research/academia) and leverage expertise of partners to engage in specific win-win opportunities to ensure sustainability of project initiatives.

TNRTP will be operational in 26 districts<sup>1</sup> specifically focusing on 120 blocks, and 3994 village panchayats of Tamil Nadu. The project will work with a total of 660,000 targeted households that are mobilized into Self-Help Groups, out of which 6000 households will be organized into Producer Collectives and 1000 Enterprise Groups. The project will support around 7,000 individual entrepreneurs; and 87,000 youth for skills enhancement through convergence with existing government skilling programs. The project implementation will be rolled out in a phased manner, in the first 8 months 26 blocks will be taken up for implementation in all project districts, followed by

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<sup>1</sup>*Districts Names:* Coimbatore, Cuddalore, Dindugul, Erode, Kancheepuram, Karur, Krishnagiri, Madurai, Nagapattinam, Namakkal, Nilgiris, Pudukottai, Ramanathapuram, Salem, Sivagangai, Theni, Thiruvallur, Thiruvannamalai, Thiruvarur, Thoothukudi, Tirunelveli, Tiruppur, Trichy, Vellore, Villupuram, and Virudhnagar.

52 blocks by end of 12 months and the remaining 42 blocks by the end of 18 months from initiation of project implementation.

The key results indicators are:

- Percentage of enterprises supported by the project (individual and collective) with ongoing operations (after 2 years of project support);
- Percentage of enterprises supported by the project receiving funds from financial institutions (individual and collective);
- Beneficiaries engaged in self or wage employment following training facilitated by the project (Number); and
- Project direct beneficiaries (Number) of which female beneficiaries (Percentage).

### **1.3. Project Components:**

The project has the 4 following components.

#### **1.3.1. Component 1: Business Ecosystem Development and Enterprise Promotion:**

The main objective of this component is to create an enabling environment for promotion and strengthening of enterprises and job creation. The overall focus of this component is to identify market and value chain development opportunities, support business conditions development in the project areas, and provide informed pathways to effectively and efficiently develop business enterprises. The sub components are:

##### 1.1. Inclusive Strategic investments, Analytics, and Planning.

Analytics and Planning will support a comprehensive and deeper understanding of the business ecosystem including agro-climatic and socio-economic aspects in the project areas to contextualize project investments. The subcomponent will identify and prioritize sectors/subsectors/commodities for project interventions and investments through an inclusive strategy and value chain analytical approach, following sequential steps that includes (i) District Diagnostic Study (DDS) - robust analysis at the district level to identify the major commodity/sub-sectors (ii) Value-Chain Analysis (VCA) studies at the State level for selected prioritized commodities and subsectors; (iii) Participatory Growth Plans (PGP).

##### 1.2: Business Development Support Services.

The objective of this sub-component is “to develop appropriate institutions and mechanism for business development support services to the enterprises in initiating, managing and successfully running the businesses”. This will support the producer collectives and enterprises under the project to (i) scope enterprise promotion including business plan development, and (ii) bridge critical gaps in accessing business development services, technology and skills; acquiring required legal licenses and formalities; and securing finance.

##### 1.3: Enterprise promotion and Value chain strengthening.

This component will promote individual and collective enterprises (including producer collectives) for prioritized sub - sectoral value chain activities and enhance their capacity to engage with markets and other stakeholders effectively. Each of these enterprises will be supported to enhance production efficiency; establish a predictable inputs infrastructure; mobilize credit from financial institutions and converge with government schemes; and integrate with markets on profitable terms.

### **1.3.2. Component 2: Enterprise Business Plan Financing and Innovations:**

The main objective of this component is to promote producer collectives and individual enterprises for taking up economic activities linked to the value-chain opportunities. The component has sub components.

#### **2.1: Facilitating Business Plan Financing**

This sub-component will promote their linkages with the formal financial sector. The sub-component will cover both: financial instruments, as well as capacity building, training and technical assistance to the participating financial institutions. The financial instruments under the project (such as grants and credit guarantees) will leverage existing resources of the financial sector.

#### **2.2: Innovation Promotion**

This sub-component will contribute to the design, promotion, and implementation of transformational ideas that use technology, innovation, and partnerships to tackle development challenges in Tamil Nadu. The sub-component will consist of the following interventions: a) *Tamil Nadu Rural Transformation Marketplace (TNRTM)*, which will create a platform to identify, showcase and celebrate innovations related to themes that have the potential to impact rural economic growth in Tamil Nadu, b) *Pilot Projects – Induced Thematic Innovations*, which will focus on the piloting of three concepts that are independent, yet consciously induced by the project, and are guided by global and national knowledge, experiences, and best practices. The sub-component will consist of three major pilots, which are: i) Agri Food Hub, with the objective to promote the agri-food sector in Tamil Nadu around an economically viable and scalable food system model that promotes economic empowerment and preserves the environment; (ii) Green enterprise, with the objective to support the development of a locally owned franchise to manufacture eco-friendly and affordable sanitary napkins; and (iii) Tribal Handicrafts in Nilgiris, with the objective to identify potential enterprises that can be taken up, demonstrated as pilots, through focused technical assistance support.

### **1.3.3. Component 3 - Skills and Job Opportunities:**

The objective is to create sustainable job opportunities through skilling, and enhance job placement through convergence and private sector interface, with specific strategies to include female youth. The sub components are

#### **3.1: Pre & Post training services to enhance employment outcomes.**

The objective of this subcomponent is to enhance access to and outcomes for youth from poor target households from training provision through existing flagship government skills training programs.

#### **3.2: Community Based Training and Skilling provision**

The objective of this sub-component is to enhance access of target households to skills training in locally relevant sub-sectors.

#### **3.3: Upgrading skills in prioritized value chains.**

This objective of this subcomponent is to enhance skills of three sets of actors – service providers, entrepreneurs and producer households - in focus value chains such as horticulture, leading to enhanced income and employment outcomes in these value chains.

### 1.3.4. Component 4: Project Management, Results Monitoring and Implementation Support Systems

The objective of this component is to provide support services (Knowledge Management, Monitoring & Evaluation, Financial Management, Procurement, Social and Environmental Safeguards Management, Human Resource Management and Information, Communication Technology- ICT and Safeguard Management) to the project staff to achieve the objective of the project. The sub-components are

4.1: Implementation Support Systems: Human Resource, Financial Management, Procurement, Safeguards and ICT

4.2: Monitoring, Evaluation and Grievance Redressal

This sub component represents a core component in the implementation of TNRTP.

4.3: Knowledge, Communication and Learning Systems

The aim of this sub-component is create a knowledge management and learning system which will ensure gathering, codifying and disseminating knowledge.

### 1.4. Applicability of Environmental Safeguards to TNRTP Components

This section discusses applicability of Environmental safeguards to the components of TNRTP. Environmental safeguards are applicable to 4 components of TNRTP.

Table 1.1 Applicability of Environmental Safeguards to TNRTP Components

S. No	TNRTP Components	Applicability of ESMF	Impact	Promotion Action
Component 1: Business Ecosystem Development and Enterprise Promotion				
1	1.1: Inclusive Strategic investments, Analytics, and Planning	Environmental aspects will be integrated into the district diagnostic studies, value chain analysis, investment plans etc. necessary guidance tools/notes are provided. The business plans to be appraised for identification of issues and integration of mitigations	Environmental aspects analyzed and integrated into the plans/studies	Capacity building of the project teams on integration. EA to be crucial step in sanctioning the proposals/business plans.
2	1.2: Business Development Support Services.	One stop facility is an offering service to all Enterprises which will be emerged from the project. Steps and necessary inputs to ensure compliance, Environmental Guidelines (EG) will be provided through OSF.	Compliance and integration of guidelines is ensured individual and group enterprises	OSF will deliver the provisioning services to CLGs and PGs. Training and Guidelines to OSF and CPs.
3	1.3:Enterprise promotion and Value chain strengthening	Convergence with Government Programs and Schemes; Private Sector Partnerships and Tie-ups with Technical and Financial	More green interventions in the enterprises	Trainings to project teams and OSF will facilitate this

		institutions for greening interventions	and value chains	with the guidance of State Environment Specialist
Component 2: Enterprise Business Plans Financing and Innovations				
4	2.2: Innovation Promotion	Thematic Innovation to promote Green Enterprises. This will increase the environmental benefit through innovative solution.	Innovative Green Enterprises which is replicable	Technical Support Agency to support project teams.
Component 3: Skills and Job Opportunities				
5	3.3: Skilling for prioritized value chain	Sustainable job opportunities through skilling, and enhance job placement through convergence and private sector interface, with specific strategies to include female youth.	Promotion of green jobs	Greening the value chains and enterprises creates Green jobs which will be incorporated in to Skill opportunities

### 1.5. ESMF for TNRTTP:

The objective of ESMF for TNRTTP is “to ensure environmental sustainability of enterprises and value chain interventions proposed under TNRTTP”. The TNRTTP is in the environmental screening category ‘B’ as per Bank’s Operational Policy (OP) 4.01, which requires an Environmental Assessment (EA) and based on that Environmental and Social Management Framework (ESMF) is developed. A stakeholder consultation workshop to share the ESMF and invite inputs for its’ strengthening was organized on 30 March 2017. The minutes of this workshop are provided in Annexure 12.

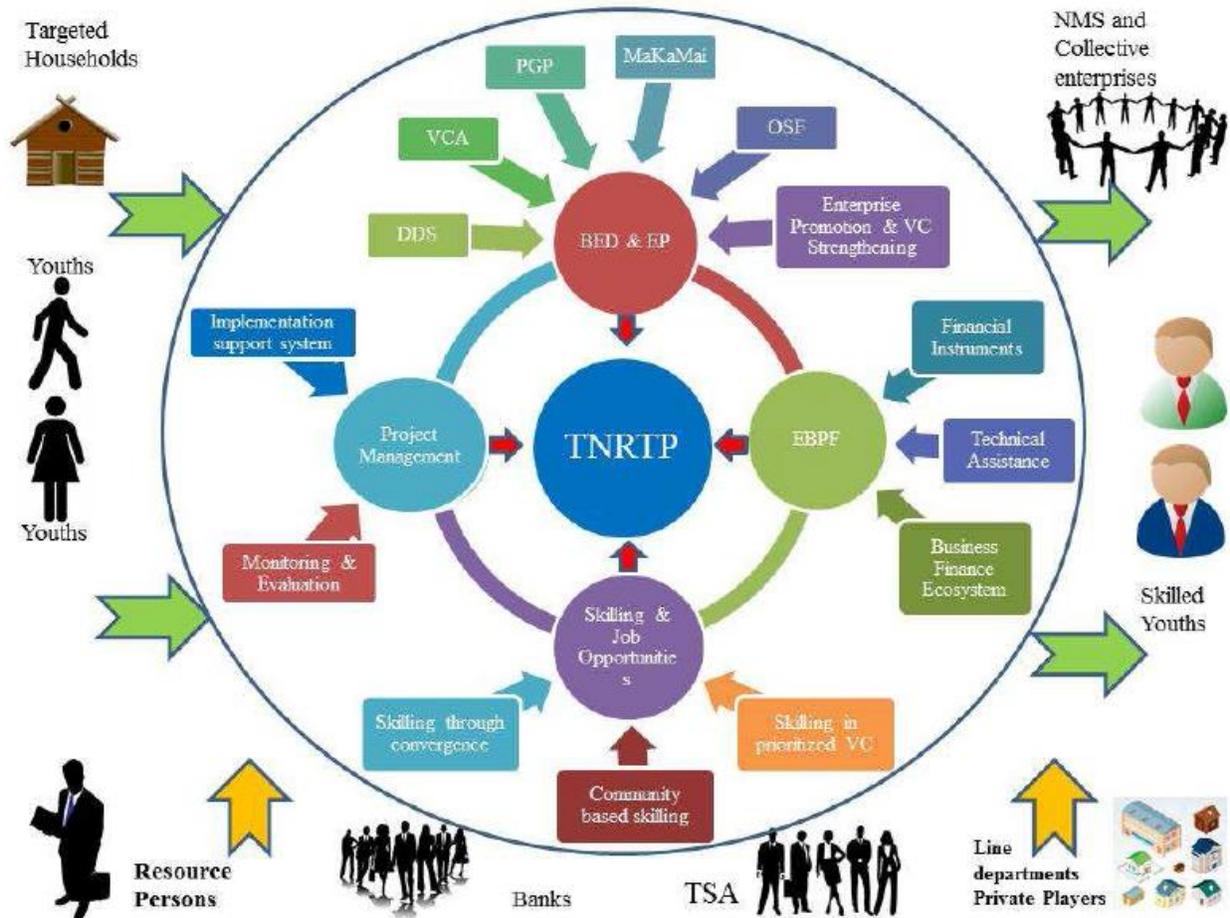
The TNRTTP triggers the following safeguard policies of the World Bank:

- Environmental Assessment (OP 4.01);
- Forests (OP 4.36);
- Natural Habitats (OP 4.04); and
- Pest Management (OP 4.09).

Integration of ESMF into Project Cycle:

The objective of the project is to “to promote rural enterprise, access to finance and job opportunities” in selected blocks of the state of Tamil Nadu. He project will work with households’ across farm and non-farm sectors; producer and their organizations; Entrepreneurs and enterprises; Staff of facilitating agencies; Government line departments; and Market players.

Fig 1.1 Overall TNRTP conceptualization:



Ref: TNRTP – Project Implementation Plan

BED & EP: Business Ecosystem Development & Enterprises Promotion

EBPF- Enterprises Business Plan Financing

NMS – Nano, Medium and Small Enterprises

TSA – Technical Support Agency

The purpose of the ESMF is to ensure that the project interventions are environmentally sustainable and are in compliance with applicable legal and regulatory framework.

The ESMF ensures that environmental aspects are integrated into the BED & EP - District Diagnostic Studies, Value chain analysis and Business plans taken up by the individual and group entrepreneurs under the project. It provides compliance requirements, mitigations/guidelines to ensure environmental sustainability during project implementation and provides the institutional mechanism to operationalise. The table below depicts the integration of ESMF aspects at different stages in the project cycle.

Table 1.2 Project Stage and ESMF integration

Project stage		ESMF aspects
District Diagnostic study	→	Integration of Environmental Aspects and identification of potential Green Opportunities
↓		↓
Value Chain Analysis	→	Identification of key issues and integration of environment friendly practices
↓		↓
Village Level Investment Plan	→	Integrating the present status of Natural Resources and issues
↓		↓
Investment Plans	→	Integrating Environmental Safeguards, identifying the risks and integrating the mitigation measures
↓		↓
Business plans	→	EA and integration of mitigations/guidelines, ensuring compliance.

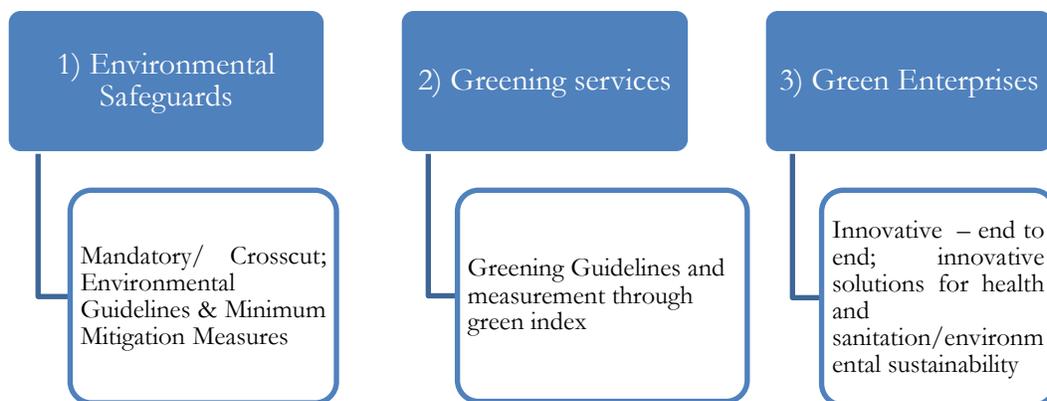
Format for integration of ESMF into District Diagnostic Studies and Village Investment Plans are enclosed as Annexure 8 and Annexure 9.

## 1.6 Approach of ESMF

Apart from integration into the Inclusive Strategic investments, Analytics, and Planning, the ESMF suggests a three pronged approach for environmental management and to enhance the environmental benefits from income generation activities (value chain interventions, enterprises, jobs etc.):

1. Environmental Safeguards
2. Greening of Enterprises and Value chains
3. Promotion of Green Enterprises

Fig 1.2: ESMF for TNRTP – Approaches



## 1.7 ESMF components:

Based on the approaches discussed, ESMF will have three components

- ESMF component 1: Environmental Appraisal (EA)
- ESMF component 2: Greening of Enterprises & Value chains – Application of ‘green index’
- ESMF component 3: Promotion of Green Enterprise

### 1.7.1 ESMF Component 1: Environmental Appraisal:

All Business Plans prepared by the Enterprises, Producer Groups and Producer Collectives with the help of Community Professionals and Project Facilitation Team (PFT)/Block team will go through the process of Environment Appraisal in order to identify compliance requirements if any and to integrate environment guidelines to mitigate any possible negative impacts and environment friendly alternatives. Environmental Appraisal will have three steps.

1. Screening
2. Categorization and
3. Appraisal

#### **Screening:**

All enterprises and business plans by producer collectives/groups, enterprise groups/entrepreneurs should be compliant with the laws and regulations of the country and the state i.e. the legal and regulatory frameworks developed (ref Volume I) based on Government of India and Government of Tamil Nadu and Safeguard policies of World Bank. Compliance with these rules and regulations ensure alignment of these investments with sustainable management of concerned natural resources. Ensuring compliance is important for all Enterprises (Individual and Group) and Producer Groups/Collectives that are promoted by TNRTIP. Details of compliance requirements were presented in Chapter Volume I. Based on the framework a 'Negative list of activities' is developed which will be used during appraisal. The list is enclosed in Annexure 11.

In essence 'Screening' verifies the business plan for compliance requirements and lists down the permission needed. It also checks for any activities that are not permitted as per the legal and regulatory framework. The legal and regulatory framework and negative list are referred for screening.

#### **Categorization:**

Followed by screening the activities are categorized into different categories based on the nature of their impact on the environment.

#### Categorization of enterprises:

The categorization of the enterprises is largely based on the classification by Pollution Control Board. The categorization is made on the basis of Quality of emissions (air pollutants) generated; Quality of effluents (water pollutants) generated; Types of hazardous wastes generated and Consumption of resources. The Pollution Index PI of any industrial sector is a number from 0 to 100. And based on the PI industrial sectors are classified into four categories (Red, Orange, Green and White). Criteria for PCB categorization are discussed in Annexure 9 of Volume 1.

In ESMF the 'orange' and 'red' categories are termed as '**high impact**' activities and 'green' and 'white' are termed as '**low impact**' activities. All potential TNRTIP activities are not part of PCB categorization and hence a criterion is developed to help the project teams to categorize the activities into the respective categories which is discussed later in this chapter. The 'Red' categorized activities are required to have an EIA by an external agency, whereas the 'white', 'green' and 'orange' activities need an Environmental Appraisal.

Table 1.3 Potential enterprises under TNRTTP and their categorization (as per PCB categorization)

<b>Red Category (High Impact)</b>	
1	Milk processes and dairy products (integrated project)
2	Pulp & Paper (waste paper based without bleaching process to manufacture Kraft paper)
3	Dyes and Dye- Intermediates
4	Slaughter house (as per notification S.0.270 (E) dated 26.03.2001)and meat processing industries, bone mill, processing of animal horn, hoofs and other body parts
5	Tanneries
<b>Orange Category (High Impact)</b>	
1	Food and food processing including fruits and vegetable processing
2	Jute processing without dyeing
3	Dairy and dairy products (small scale)
4	Coffee seed processing
<b>Green Category (Low Impact)</b>	
1	Biomass briquettes (sun drying) without using toxic hazardous wastes
2	Dal Mills
3	Flour mills (dry process)
4	Leather foot wear and leather products (excluding tanning and hide processing except cottage scale)
5	Poultry, Hatchery and piggery
6	Rice mill (Rice hullers only)
<b>White Category (Low Impact)</b>	
1	Bio fertilizer and bio-pesticides without using inorganic chemicals
2	Organic and inorganic nutrients ( by physical mixing)
3	Organic manure (manual mixing)
4	Manufacturing of coir items from coconut husks

Apart from the activities listed in the Table 1.3, any new activities will be categorized into respective categories based on their potential impacts on the environment as presented in the table below as well as by considering the criteria followed by PCB. Additional help may be taken from PCB as and when the need arises.

Table 1.4 Criteria for categorization of the enterprises (that are not covered under PCB categorization)

<b>Possible Impacts</b>	<b>Category</b>
Adverse long term environmental impacts, scope for air pollution (emissions from the activity), exploitation of local natural resources, release of harmful wastes, potential harm to the communities and workers.	Red
Short term environmental impacts, scope air pollution (emissions from the activity), use of local natural resource, possibility of waste release that could be managed, possible impacts on local communities, workers	Orange
Minimal impacts on environment, use of natural resources, no harmful wastes, scope for betterment	Green
No impact on environment, scope for integrating best practices	White

Categorization of the production interventions (Agriculture, Animal husbandry etc.) by Producer Groups:

The production interventions in the value chains are also categorized as ‘Low risk (White and Green)’ and ‘High risk (Orange)’ activities based on the nature of impacts. The table below lists the activities under different categories.

Table 1.5 Categorization of the production interventions

Type of activity	Category
Agriculture/Horticulture crop production with use of chemicals – fertilizers, pesticides etc. Intensive cropping with use of ground water	High Risk (Orange)
Organic farming/farming under Participatory guarantee System (PGS)	Low Risk (White)
Livestock rearing as an enterprise (keeping animals collectively or number of animals in a unit exceeding 10 in case of dairy, 20 in case of small ruminants and 500 in case of poultry birds)	High Risk (Orange)
Livestock rearing (dairy, goat, sheep) at household level	Low Risk (Green)
Intensive aquaculture	High Risk (Orange)
Fish culture in farm ponds, pond in the villages	Low Risk (Green)
NTFP collection and sale	Low Risk (Green)
NTFP collection and processing	High Risk (Orange)

List of all categorized activities are given in Annexure 2.

**Environmental Appraisal (EA) for different categories of activities:**

Followed by ‘screening’ and ‘categorization’ Environmental Appraisal will be conducted to the activities/business plans.

EA will be conducted for all business plans, however for low risk activities (‘white’ and ‘green’) the compliance requirements will be applied and minimum mitigation measures will be integrated. For high risk activities greening measures will be integrated apart from the mitigation measures and the greenness will be measured through ‘green index’. For the ‘red’ category activities under high risk activities, an environmental impact assessment will be conducted by hiring an external agency.

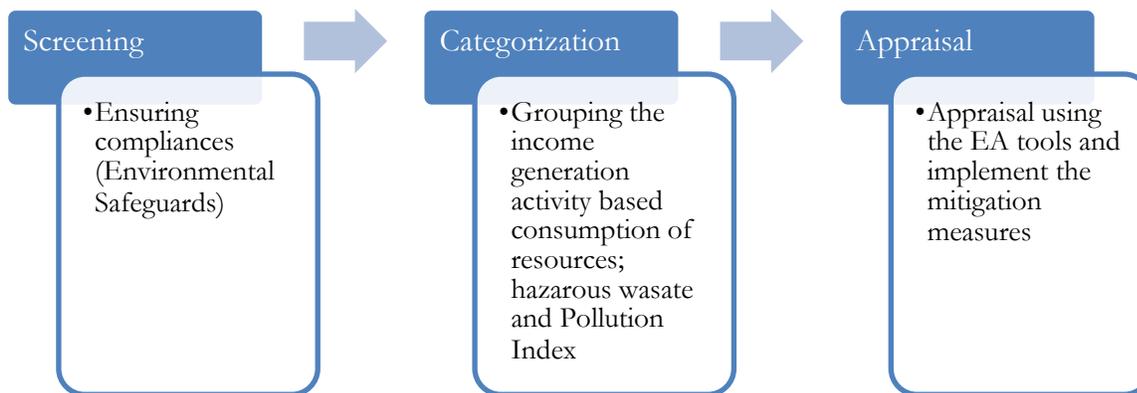
<p><b>Low risk:</b> For low risk category activity EA will happen and mitigations/ Environmental Guidelines will be integrated into the business plans.</p> <p><b>High risk:</b> EA will be done for high risk activities and mitigations will be integrated. For the activities under ‘Red’ category an Environment Impact Assessment will be conducted with support of an external agency.</p> <p>In case of enterprises - for green, orange and red category activities Greening measures will be integrated and Greenness will be measured through Green Index.</p>
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Environmental Appraisal will be done by Community Professional CPs and Block Team with the facilitation of OSF and DPMU. Environmental Guidelines will help in identifying the key issues and mitigations/guidelines. The identified mitigation measures and environment-friendly alternatives are integrated into the respective plans and proposals along with additional costs (for training, adoption a technology etc.) if any. All the relevant guidelines to aid in this exercise (list of negative activities, guidelines,) are provided in Annexure 5 and Annexure 11. An appraisal format is provided to aid in this. The format is attached as Annexure 7. Any technical support for the implementation of

mitigation measures (training, convergence with mainstream programmes etc.) will be provided by the Project through technical agency/knowledge partners.

Environment Appraisal process serves as one of the triggers for the release of the fund for Enterprises and Producer Groups/Collectives.

Fig 1.2 Steps in Environmental Appraisal



Responsibility of conducting EA

Low risk/White/Green category – EA by Enterprises CP → Vetted by OSF → Approved by DPMU

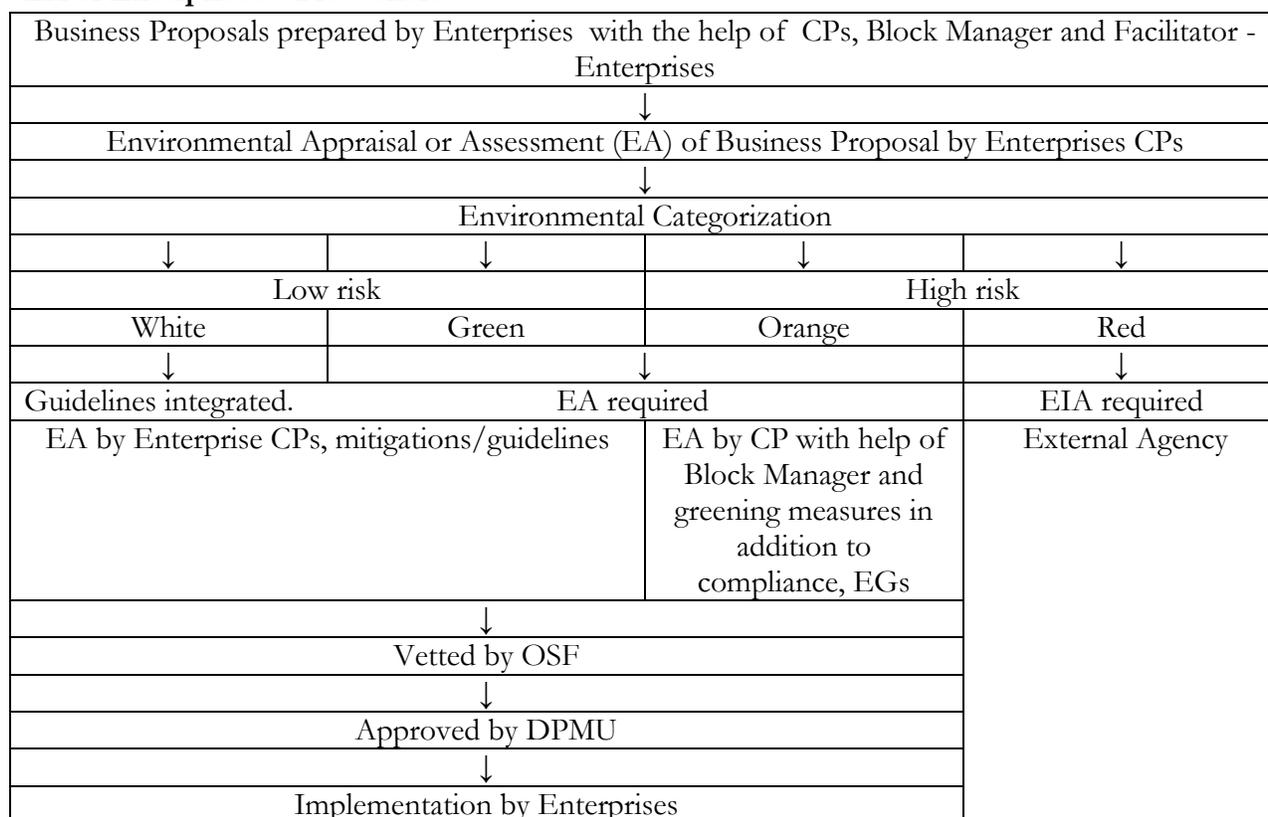
High risk/Orange – Enterprises CPs with the help of Block Manager → Vetted by OSF → Approved by DPMU

High risk/ Red – EIA by external Agency

**EA of Production interventions (agriculture, livestock, forest based) - Flow chart**

Business Proposals prepared by Producer Groups/ Collectives with the help of CPs, Block Manager and Facilitator – Producer Collectives	
↓	
Environmental Appraisal (EA) of Business Proposal by CPs – Producer Collectives	
↓	
Environmental Categorization	
Low risk	High risk
↓	↓
EA by CP, compliance and EGs will be integrated	EA by CP with help of Block Manager and greening measures in addition to compliance and EGs
↓	
Vetted by OSF	
↓	
Approved by DPMU	
↓	
Implementation by Producer Collectives	

### EA of Enterprises – Flow chart



### 1.7.2 ESMF component 2: Greening of Enterprises, Value chains and Skills

#### ***Greening the Value chains:***

Apart from compliance and mitigations, the production interventions in the value chain can adopt greening measures (best practices, improved environment technologies etc.) which will contribute to the environmental benefits. These activities will be measured through a tool called ‘green index’ discussed in a separate report.

#### ***Greening the Enterprise:***

The enterprises will also be encouraged to adopt greening measures. Greening interventions will provide alternatives/suggestions steps to make the activity eco friendly – like alternative energy, recycling of wastes etc. and positive impact on social well-being. Greening of the enterprises includes; Proactive interventions in water and energy efficiency and waste management. Greening is measured through ‘Green Index’. Greening services will include the optimal use of water and energy and minimization or waste generation, safe disposal waste and worker safety etc.

#### ***Green Skills and Green Jobs***

The objective of Skills and Job Opportunities is “to create (a) sustainable wage and self-employment opportunities (b) promote relevant skills for higher value agriculture; and (c) enable entrepreneurship through market responsive skills and entrepreneurship development”. The targets are i) Youth (unemployed) from project targeted households, with a special focus on women; ii) Community Service Providers / Trainers, Entrepreneurs in focus value chains; iii. Farm households with available basic assets to increase both quantity as well as quality of their produce. Existing gaps in the

prioritized value chains will be focused and relevant skills in identified sectors will be provided. Greening the value chains and enterprises creates Green jobs which will be incorporated in to Skill opportunities. Examples are given in the table below.

Table 1.6 Possible Green skills and Green jobs in TNRTP

Sector	Possible Green Skills and Green Jobs
Organic Agriculture	Preparation of Organic Fertilizers and Pesticides
	Pest Management Practices (PMP)
Livestock/ Agriculture/ Food Production	Waste Management (Waste Minimization, Waste recycle and reuse) through biogas plants
Energy	Solar Technicians
Masonry	Green Construction
Forestry	Sustainable Collection, Processing and Marketing of NTFPs
	Eco Tourism
Garments with dyeing	Organic dye preparation

Also focus will be given for exclusive new Green skills and Jobs. Project will develop innovative approaches for untapped segments through special projects. Examples:

- Green Energy promotion: in Agriculture, Appliances like Solar Television sets, Solar Cooker
- Permaculture Design Service (the development of agricultural ecosystems intended to be sustainable and self-sufficient)
- Recycled paper products
- Organic Farming
- Eco Tourism

Environment Resource Agency will develop a curriculum for Green Skills and identified beneficiaries will be trained on this.

**Greening of agriculture and allied interventions in value chains:**

Business Proposals prepared by Producer Groups/ Collectives with the help of CPs, Block Manager and Facilitator – Producer Collectives			
↓			
Environmental Appraisal (EA) of Business Proposal by CPs – Producer Collectives			
↓			
Environmental Categorization			
Low risk		High risk	
White	Green	Orange	Red
↓		↓	
EA by CPs and EGs will be integrated		EA by CP with help of Block Manager, mitigation measures.	EIA is required (external agencies)
↓			
Scope for greening and integration of greening measures			
↓			
Facilitated by State Consultants through DPMU and OSF			

↓	
Implementation by Producer Collectives	
↓	
Measuring Greenness by CPs with help of State consultant using green index	

### Greening of Enterprises

Business Proposals prepared by Enterprises with the help of Block Manager and Facilitator - Enterprises			
↓			
Environmental Appraisal or Assessment (EA) of Business Proposal by Enterprises CPs			
↓			
Environmental Categorization			
↓	↓	↓	↓
White	Green	Orange	Red
↓	↓		↓
EA and minimum compliance and mitigations	EA		EIA required
	EA by Enterprise CPs	EA by CP with help of Block Manager	External Agency
	↓		
	Scope for Greening and integration of greening measures		
	↓		
	Facilitated by State Consultant through OSF and DPMU		
	↓		
	Implementation by Enterprises		
↓			
Measuring Greenness by CPs with help of State consultant using green index			

All green, orange and red category activities will be forwarded to the consultants (GI) for Greening. They will check the means for the adoption of green measures to the particular enterprises/ value chains. And facilitate the implementation of green measures through DPMU and OSF.

### 1.7.3 ESMF component 3: Green Enterprises

The objective of this component will be to enhance the environment benefits by organizing an innovative solution to address the critical issues identified through environment assessment. The theme of the innovation promotion under ESMF will be “Green Enterprises”. ESMF encourages Green Enterprises on the critical environmental issues identified in the proposed activities through innovation. Green enterprise development results in greener, environmentally friendly, safer and more productive workplaces. Dissemination of good environmental management in livelihoods is best achieved through demonstration of green enterprises initially through pilots followed by scaled-up interventions.

The green interventions under the project will be promoted as part of the sub-component ‘Innovation Promotion’. There are three major interventions under this Subcomponent (2.C) viz., Tamil Nadu Transformation market place, Project implementation Innovation and Pilots (Induced

Thematic innovation). Green enterprise is one amongst the pilots, with the objective to support the development of a locally owned franchise to manufacture eco-friendly and affordable sanitary napkins (further discussed in chapter 2). ESMF will suggest the implementation strategies, Green justification (environment and social sustainability and economic viability), policy support available, technical support etc. Potential Green Business ideas are given in Annexure 10.

## 1.8 Institutional Arrangements for the implementation of ESMF

The ESMF for the TNRTP is an integral part of the implementation arrangements related to activities concerned with environmental implication. This section talks about steps in EA and Greening and institutional arrangements, Monitoring strategy, Capacity Building and Budget.

Table 1.7 Institutional Arrangements for ESMF implementation

Level	Key persons and roles	
State	SPMU - Environmental Specialist (ES)	Facilitation for the overall implementation of ESMF
	Capacity Building Agency	Capacity Building of Project Officials and Field Functionaries on ESMF
	Two consultants for Greening: One for Farm based activities one for and Non Farm activities	Water, energy audits for the enterprises; Measuring Greenness
	ES and the Agency will be closely working with Enterprises and Value Chain team in the State	
District	District Project Manager (DPM), One DPMU member (APM- Value Chain and Enterprises) anchors safeguards	Implementation of ESMF at district level; Coordination with State Team
	Assistant Project Manager (APM – Value Chain and Enterprises)	Support for ESMF implementation Support Block Management Team for EA
Block	OSF/MaKaMai	Service provider for Compliance; Integrating NRM based convergence in the Enterprises and value chains. Vetting EA, support for mitigations.
	CPs, Block Manager; Executive-Value chain, Facilitator - Enterprises	Support for the EA of Orange class activities; Support and Cross check the EA of Green class Enterprises
Village	Enterprises CPs	Conducting EA with support of Block teams

The overall responsibility for implementation of the ESMF will lie with Environment Specialist of SPMU. She/ He will closely with State Enterprises and Value Chain team, and ensure that all the provisions of the ESMF are adequately met. It will also take on the responsibility of recruiting a Capacity Building agency to capacity build the Project Officials and Field Functionaries on ESMF. Also two consultants will be recruited to facilitate and monitor Greening aspects and Measuring

Greenness. The overall responsibility of implementing ESMF at district level will lie with the DPMU and OSF. And grass root level ESMF implementers are the Block Team and Enterprises CPs.

## 1.9 Monitoring Strategy

Monitoring of ESMF implementation will be done at two levels, internal and external.

### Internal Monitoring

During the implementation, the activities will be monitored for compliance, integration of mitigation (sustainability) measures or environment guidelines into business plans, business proposals. The monitoring will also focus on the systems and the capacities at all levels in TNRTIP for ESMF implementation. Monitoring of ESMF will be done by Enterprises CPs at the village level, cluster teams at Cluster level and District teams at District level and at State Level and State Environment Expert and Consultants for Green Index at State level. CPs will monitor during each production cycle. Also the monitoring will be done once every year by the Project Team. The internal monitoring will involve desk review of plans, field visits to producer groups and use of green rating tools for the activities visited. This will be done as part of regular visits by village, cluster and district teams.

### External Monitoring

For ESMF: External audit will be conducted by hiring a third party external agency during years 3<sup>rd</sup> or 4<sup>th</sup>. The methodology can be a combination of desk reviews (to check the management aspects) and extensive field visits (to check on technical aspects) and stakeholder interactions.

For Greening an audit will be conducted by an external agency on 3<sup>rd</sup> or 4<sup>th</sup> year.

Table 1.8 Monitoring Indicators

Key aspects to be monitored	Monitoring indicators
Compliance of project activities with Legal and Regulatory Framework	Percentage of activities in compliance with legal and regulatory framework
Implementation of Environment Guidelines	Percentage of enterprises, value chains implementing mitigation measures/guidelines.
Green rating of the enterprises	Percentage of enterprises qualifies under green rating as per green index.
Internal Monitoring	System and frequency of internal monitoring
Capacity Building of CPs, Field Functionaries and Project Officials at different levels	The percentage of CPs, Field Functionaries and Project Officials at different levels (with ESMF roles) underwent Capacity Building programmes.

### Capacity Building:

The EA of business plans will also identify the capacity building needs based on which MaKaMai will develop a capacity building plan for the CLGs/entrepreneurs in the respective blocks. The block level capacity building plans are consolidated at district level and district anchor person will organize the training programmes with help of resource agencies. The state level ES and the consultants will provide necessary guidance and support.

Capacity building is required for the Project Officials (DPMs, APMs) and Field Functionaries (Block Team and CPs). The capacity building programmes will be conducted on regular basis both through integrating into the general induction training programmes (for all the staff under the project) as well as through focused training for relevant staff and project functionaries on the ESMF. Resource Agency will be hired at the State level for conducting the capacity building programmes for Project Officials and Field Functionaries. The responsibility of the Resource Agency includes: Designing the Capacity Building modules and conducting the training programmes. Support organizations or Technical Agencies or Knowledge Partners will also be part of district level training and Development of IEC materials for the Field Functionaries.

### **1.10 Environmental Risks and Mitigations/Guidelines**

EA has identified the potential negative impacts/risks and the mitigations which are discussed in the section. This information will be used by the CPs while conducting the appraisal. The guidelines are given for potential activities, however as the project rolls out the guidelines need to be developed any new emerging activities by the Environment Specialist. Environmental Guidelines are enclosed in Annexure 3. Environmental Guidelines of Producer Collectives were given in Annexure 5. Pest Management Plan is given in Annexure 4 since it is a mandate according to OP 4.09. Different methods in PMP and different crops which have potential to be supported by TNRTP were covered.

**Budget Estimate (tentative):**

A tentative budget is proposed for the implementation of environmental safeguards.

Table 1.9 The overall budget for ESMF implementation is estimated as below:

	Unit								Cost (INR) lakhs						
		2017	2018	2019	2020	2021	2022	Total	2017	2018	2019	2020	2021	2022	Total
<b>Investment Costs</b>															
State Environment Specialist	1	1	1	1	1	1	1	6	10	10	10	10	10	10	60
Consultants	2		2	2	2	2	2	8			20	20	20	20	80
<b>Capacity Building cost</b> Main Training for Project Officials and Field Functionaries (year 1) Over all State level orientation for TNRTP staff and yearly refresher programmes	1 training	1	1	1				3	0.8	0.8	0.8				2.4
One State level orientation Logistics by TNRTP (module development, material costs and resources by the agency) Main training programme for 2 days (year 1) and refresher training for 1 day (year 2 & 3.	1 training	1	1	1				3	9	9	9				27
Regional level training for APMS and OSF	1 training	1	1	1				3	7	7	7				21
<b>Material Development</b> Reference Materials for Project Officials and IECs for Field functionaries															
	Training Materials								25						25

Training Agency									50						50
<b>Monitoring cost</b>															
<b>Internal Monitoring</b>															
Monthly Monitoring by CPs ( Rs100000 x 6 years)									1	1	1	1	1		6
<b>External Monitoring</b>															
Costs of External Monitoring by third party agency - ESMF				1		1					30		30		60
Monitoring for green index				1		1					45		45		90
Administration, reporting, documentation and other miscellaneous charges lump sum															10
Software development for Green rating tools and traceability mechanism, purchase of tablets etc		1							15						15
Other cost															
<b>Total</b>		4	2						57.9	12.9					446.4

## ESMF Roll out plan

### Time frame for implementation of ESMF activities

Table 1.10 ESMF for TNRTP – Rollout plan

Activities	2017	2018	2019	2020	2021	2022
<b>1) Project Team</b>						
State level Environment Specialist in Place						
Consultants for Measuring Greenness – Farm and Non Farm sector in place						
<b>2) Training Agency</b>						
Identification of state capacity building support agency (for training Project Officials and Field Functionaries). Development of training modules						
<b>2)Capacity Building</b> For Project Officials and Field Functionaries (Year 1 Main training ; Year 2 & 3 Refresher training)						
State level orientation for TNRTP staff; DPMs						
Regional level training for APMs						
<b>3) Material Development</b> Reference Materials for Project Officials and IECs for Field functionaries						
<b>4) Monitoring cost</b>						
Internal Monitoring by GCPs						
External Monitoring by third party agency						
Monitoring for green index						
Software development for Green rating tools and traceability mechanism.						

## Chapter 2

### 2.1 Green Enterprise on Personal Health and Menstrual Hygiene Product - Pilot Project

The Green Enterprise on the theme of Personal Health and Menstrual Hygiene seeks to innovate, design and manufacture bio-degradable and affordable sanitary napkins and demonstrate a cradle to cradle green enterprise venture. The detailed proposal is developed by team involved in the Project implementation Innovation and Pilots (Induced Thematic innovation). This present chapter focuses on the environmental safeguards, mitigation and greening scope with respect to the proposed innovative green enterprise.

The overall objective of the project is to support the development of a locally owned franchise to manufacture eco-friendly and affordable sanitary napkins. It will expect that the pilot initiatives will contribute to the product design, capacity building to the producers, entrepreneurs, Hygienic and environmental education to women and adolescent girls, promotion, and implementation of transformational ideas that use technology, innovation, and partnerships to tackle the challenges in ecofriendly affordable sanitary napkin usage, safe disposal and degradable in Tamil Nadu.

The project will work with producers who have entrepreneurial ability and skill, women/ men entrepreneurs, service providers to start eco friendly affordable sanitary napkin production. The project will work with existing sanitary napkin producers to support them through aggregation, input supply and marketing.

The implementation phases of the pilot project would be

1. An impact evaluation of the existing provision of sanitary napkins under the GoTN's free supply in terms of improved knowledge of feminine hygiene requirements, access and availability of sanitary products and their disposal mechanisms
2. A pilot product testing of the new eco-friendly product line of the sanitary product to be introduced in the market.
3. Market research and Product design development and marketing strategy with government departments to support women and girls (Preparatory phase) – 1 to 6 months. Market research to look at what prompts the decision pattern apart from the economic angle on the choice of hygiene product
4. Establishing producer groups, Production and Manufacturing, developing Franchise (Project Implementation and piloting phase) 7<sup>th</sup> month to 24<sup>th</sup> Month. During this phase, the already existing groups would also be aggregated and the potential of shifting to clean green raw materials will be tested.
5. Consolidation and Product scaling up (25<sup>th</sup> month to 36<sup>th</sup> month). In this phase, there will be two sets of product lines – one that uses green technology and one that uses the already existing production line.
6. Conduct an intensive marketing campaign with targeted outcomes to develop product distribution network on an economically sustainable model up to the village level.
7. Stabilise the products and product line for expansion and growth (37<sup>th</sup> to 48 months). In this phase, it would be possible to look at cross - fertilisation of production technology and improving the product's market share

The project will establish pilots for each skill set that has a potential for scaling up.

- The project will be implemented in the TNPVP identified districts i.e., Virudhunagar (Sattur Block), Kanchipuram district.

## 2.2 Environmental Guidelines and Greening for sanitary napkins:

It would be important to state the reasons for categorizing bio-degradable sanitary napkins as a Green Enterprise in-order to brand the process and product as a ‘sustainability’ intervention under TNRTTP. The brand value can thus be created in terms of:

- Environment friendliness
- Social impact
- Greening of economy / products
- Customer/Citizen engagement for transforming rural economies

The above enterprise can build an innovative and truly social green enterprise by extending its value chain services to the end user in terms of ‘extended consumer responsibility’. This would include benefits to the end user and the environment in terms of *safe disposal of menstrual waste*.

Currently the disposals of used sanitary pads are governed by the Plastic Waste (Management and Handling) Rules, 2011. It is considered as Municipal Solid Waste. However, a true assessment of the menstrual waste should actually categorize it similar to Hospital Waste and treat it as per Hospital Waste Management Rules. The logic here is that, menstrual waste / used sanitary pads which have blood drops always carry the risk of getting contaminated by pathogens like Hepatitis B and C and other infectious microorganisms like E.coli, Salmonella, Staphylococcus etc. Hence, menstrual waste needs to be handled with care and disposed with the same importance as that of hospital waste.

Even though the product may be manufactured using bio-degradable materials like banana fibre etc.; it is the responsibility of the enterprise / manufacturer to handle the used product or empower the consumer on safe disposal / handling of the menstrual waste. This may be considered as extended enterprise responsibility towards the consumer and would be truly innovative social green enterprise.

As part of this green innovation enterprise of TNRTTP; a component on manufacture and establishment of low cost machinery and processes for “Safe disposal of Menstrual Waste” may be included to make the product line truly Green. Similarly, other than the sanitary napkin/pad form; other design forms may also be explored in order to be sensitive to cultural aspects; local customs. Usually, landfill disposal of the menstrual waste may be avoided as much as possible as this has risk of the contamination by pathogens/bio-hazard in used sanitary pads. Hence, innovation in disposal may be pursued such that it meets safe disposal guidelines as in hospital waste. The above aspects can be part of greening or menstrual hygiene education.

Table 2.1 Environmental Guidelines for sanitary napkins:

S. No.	Interventions	Environmental Impacts	Measures
1	Legal requirements	License has to be obtained for legal compliance and maintenance of quality	Licence has to be applied from Bureau of Indian Standards (BIS) for sanitary napkins as per IS: 5405:1980 norms. Licence should cover and certify the requirements for:

		standards. Safety of product for public use.	<ul style="list-style-type: none"> <li>• Absorbency and ability to withstand pressure after absorption, disposability, pH value</li> <li>• Quality in manufacture, workmanship and finish.</li> <li>• Sanitary napkins packing should be in polyethylene lined carton or polyethylene bag.</li> <li>• The carton shall contain an instruction leaflet or shall have the instruction printed on the outside of the polyethylene bag or carton about safe handling, safe disposal and precautions.</li> <li>• Mark of Certification (ISI) should be prominently displayed in working premise and packaged product.</li> </ul>
2	Quality testing through laboratory	Ensuring safety of the product; consumer health; safety to environment against contamination; and compliance of legal norms.	<ul style="list-style-type: none"> <li>• Suitable laboratory and staffing may be provided for calibration and testing of the equipments used in the manufacture of the sanitary napkins e.g. <ul style="list-style-type: none"> <li>○ Mechanical shaker: Once in a year.</li> <li>○ pH meter: Once in a year.</li> <li>○ Weighing Balance: once in a year.</li> </ul> </li> <li>• For all other instruments, if any: once in a year.</li> <li>• Calibration shall be done from NABL accredited laboratories wherever they are available in the same city. In case, where such laboratories are not available, traceability to a National Physical Laboratory (NPL) to be ensured.</li> <li>• Control Unit should be maintained to test and certify each control unit-batch. All napkins produced in one day from the same consignment of raw material shall constitute one control unit.</li> <li>• Those napkins which fail to confirm to the specification, shall not be stamped with the standard mark.</li> <li>• All records regarding the testing results must be maintained in register</li> </ul>

			<p>as per BIS format and available for inspection of Public Health Safety and Quality Control inspectors.</p> <ul style="list-style-type: none"> <li>• Details of the standard mark/certified product supplied to the customers must be maintained as per Suppliers List format prescribed by BIS.</li> <li>• The licensee (enterprise) shall send to the Bureau as per the prescribed proforma, a statement of the quantity produced, marked and exported by the enterprise and the trade value thereof for every quarter of the operating period of the licence. The statement is required to be forwarded to BIS at the end of every quarter of operative period.</li> <li>• The licensee (enterprise) shall supply, free of charge to the Bureau of Indian Standards and to its authorized representatives, the sample required in accordance with the Bureau of Indian Standard (Certification) Regulations, from the enterprise factory or godown as and when required by the Bureau. Bureau may also obtain and test samples of the enterprise that are sold in the market as and when desired.</li> </ul>
3	Raw material quality and permissibility	Non-standard and poor quality raw material can affect product quality; safety and endanger public health.	<ul style="list-style-type: none"> <li>• A suppliers list has to be maintained. Each consignment of raw materials used in manufacture of sanitary napkin have to comply as per standards of IS 5405: 1980. Records of the same to be maintained and each consignment accompanied with test certificate. Following materials are important: <ul style="list-style-type: none"> <li>• Absorbent Filler - (as per clause 2.1 of IS 5405: 1980)</li> <li>• Covering – (as per clause 2.2 of IS 5405: 1980)</li> <li>• Sizes – (as per clause 3 of 5405: 1980)</li> <li>• Preference may be given to source organic Cotton for use in raw material. This would avoid promotion</li> </ul> </li> </ul>

			<p>of procurement of pesticide based cotton /raw material products and add brand value to the green sanitary napkin product.</p> <ul style="list-style-type: none"> <li>• Water used in the enterprise during production stage should be free from chlorine and other harmful chemicals-bleaching agents.</li> </ul>
4	Manufacture, Workmanship and Finish		<p>Each sanitary napkin shall be manufactured and inspected as per clause 4 of IS 5405: 1980 and records maintained as per prescribed format.</p> <p>Requirements:</p> <ul style="list-style-type: none"> <li>• Absorbency and Ability to Withstand Pressure after Absorption- The sanitary napkin shall be tested as per clause 5.1 of IS 5405: 1980 and records maintained.</li> <li>• Disposability – The sanitary napkins shall be tested as per clause 5.2 of IS 5405: 1980 and records maintained</li> <li>• pH value – the sanitary napkin shall be tested as per clause 5.3 of IS 5405: 1980 and records maintained.</li> </ul>
5	Skilling of workers in enterprise	Skilled workers reduce risks of bad quality of product; ensure proper working conditions and quality assurance.	<ul style="list-style-type: none"> <li>• Staff of the enterprise may be exposed to trainings and given awareness about quality control measures.</li> <li>• Quality Management Systems in accordance with IS/ISO 9001 may be implemented (not mandatory though) in the enterprise.</li> </ul>
6	Extended consumer responsibility	To reduce impact of the product after use on the environment and public health.	<ul style="list-style-type: none"> <li>• Enterprise may design an extended consumer responsibility plan in order to educate end users on menstrual hygiene and safe disposal of sanitary napkins. Enterprise may explore manufacturing, sales of equipment for safe disposal treatment of used sanitary napkins (e.g. low cost permissible incinerator/disposal bins as per Bio Medical Waste Handling Rules 1998). This may be considered as part of greening or feature of the green enterprise and completion of green value chain.</li> </ul> <p>Such intervention would prevent disposal of pads by end user in public places; drains etc.</p>

			<p>avoiding risk to public health, sanitation and contamination.</p> <p>Designs other than sanitary napkin format re-usable sanitary cloth pads, tampons, cups etc. may be explored as innovative design, conforming to quality standards and also being culturally sensitive-accepted.</p> <p>Currently, sanitary pad disposal is covered under Solid Waste Management Rules. Green enterprise may bring about policy perception shift to consider sanitary pad disposal equivalent to Biomedical waste handling, since scope for contamination post improper disposal is very high.</p>
7	Workers safety	Risk of health hazards will be minimized	<p>Provision of safety measures like nose masks, hand gloves, Provision of first aid box, fire safety, spacious and ventilated workspace, proper pest free storage areas.</p> <p>Workforce handling the production and packaging section should be healthy and handle product in hygienic manner to avoid contamination.</p>
8	Location of the unit	To avoid health hazards	<ul style="list-style-type: none"> <li>• 100m distance from the living area</li> </ul>
9	Workers safety	Lack of proper facilities to workers may result in health issues	<ul style="list-style-type: none"> <li>• Decent working condition should be provided</li> </ul>
10	Possibility of using child labour	There is a risk of hiring child labour	<ul style="list-style-type: none"> <li>• Engagement of children below 14 years will be avoided</li> </ul>
11	Fair and equal wages	Possibility of discrimination in the wages	<ul style="list-style-type: none"> <li>• Fair (not below minimum wages)/equal wages that will be paid to all workers</li> </ul>
12	Women Participation	Exclusion of women workers	<ul style="list-style-type: none"> <li>• Priority for women workers</li> </ul>
13	Including disabled beneficiaries	Exclusion of disabled beneficiaries	<ul style="list-style-type: none"> <li>• Inclusion of disabled beneficiaries where ever they can.</li> </ul>

## ***Annexure 1***

### **Criteria for categorization:**

All enterprises promoted under TNRTP will be categorized into four according to TNPCB scenarios.

The categorization is made on the basis of following:

- Quality of emissions (air pollutants) generated
- Quality of effluents (water pollutants) generated
- Types of hazardous wastes generated
- Consumption of resources

Reference is taken from the following:

- The Water (Prevention and Control of Pollution) Cess Act, 1977
- Standards so far prescribed for various pollutants under the Environment (Protection) Act, 1986
- Doon Valley Notification, 1989 issued by MoEF.

Categorization of industrial sectors based on the Pollution Index which is a function of the emissions (air pollutants), effluents (water pollutants), hazardous wastes generated and consumption of resources. The Pollution Index PI of any industrial sector is a number from 0 to 100 and the increasing value of PI denotes the increasing degree of pollution load from the industrial sector. The categorization will be done on the basis of composite score (0-100 marks) of Pollution.

Index given in accordance with the following weightage

Air Pollution Score based on parameters namely PM, CO, NO <sub>x</sub> , SO <sub>x</sub> , HMs, Benzene, Ammonia and other toxic parameters relevant to the industry.	40 Marks
Water Pollution Score based on parameters namely pH, TSS, NH <sub>3</sub> -N, BOD, Phenol and other toxic pollutants relevant to the industry.	40 Marks
Hazardous wastes (land fillable, incinerable, recyclable) as generated by the industry.	20 Marks

- Industrial Sectors having Pollution Index score of 60 and above - Red category
- Industrial Sectors having Pollution Index score of 41 to 59 - Orange category
- Industrial Sectors having Pollution Index score of 21 to 40 - Green category
- Industrial Sectors having Pollution Index score incl. & upto 20 - White category

There shall be no necessity of obtaining the Consent to Operate” for White category of industries. An intimation to concerned SPCB / PCC shall suffice. No Red category of industries shall normally be permitted in the ecologically fragile area / protected area.

SPCBs may issue consent to the industries

- Red category of industries for 5 years.
- Orange category of industries for 10 years.
- Green category of industries for 15 years.
- No necessity of consent for non-polluting industries.

## Annexure 2

### List of categorized activities

<b>I) List of Red, Orange, Green and White category Industries as per PCB Direction</b>	
<b>Red Category</b>	
<b>S. No</b>	<b>Industry Sector type</b>
2	Milk processes and dairy products (integrated project)
3	Organic Chemicals manufacturing
4	Yarn / Textile processing involving any effluent/ emission generating processes including bleaching, dyeing, printing and colouring
5	Tanneries
6	Slaughter house (as per notification S.0.270 (E) dated 26.03.2001)and meat processing industries
<b>Orange Category</b>	
<b>S. No</b>	<b>Industry sector-Types</b>
1	Bakery and confectionery units with production capacity > 1 Tons Per Day (TPD) (With ovens / furnaces)
2	Chanachur and laddoo from puffed and beaten rice(muri and shira) using husk fired oven
3	Food and food processing including fruits and vegetable processing
4	Jute processing without dyeing
5	Silk screen printing, sari printing by wooden blocks
6	Cotton spinning and weaving (medium and large scale)
7	Ayurvedic and homeopathic medicine (with Boiler)
8	Brickfields ( excluding fly ash brick manufacturing using lime process)
9	Dairy and dairy products (small scale)
10	Fish feed, poultry feed and cattle feed
11	Fish processing and packing (excluding chilling of fishes)
12	Lime manufacturing (using lime kiln)
13	Liquid floor cleaner, black phenyl, liquid soap, glycerol mono- stearate manufacturing
14	Manufacturing of iodized salt from crude/ raw salt
15	Cashew nut processing
16	Coffee seed processing
<b>Green Category</b>	
<b>S. No</b>	<b>Industry sector-Types</b>
1	Bakery /confectionery / sweets products (with production capacity <1tpd (with gas or electrical oven)
2	Biomass briquettes (sun drying) without using toxic hazardous wastes
3	Chilling plant, cold storage and ice making

4	Coke briquetting (sun drying)
5	Cotton spinning and weaving (small scale)
6	Dal Mills
7	Facility of handling, storage and transportation of food grains in bulk
8	Flour mills (dry process)
9	Oil mill Ghani and extraction ( no hydrogenation / refining)
10	Poultry, Hatchery and piggery
11	Power looms (without dye and bleaching)
12	Puffed rice (muri) (using gas or electrical heating system)
13	Rice mill (Rice hullers only)
14	Rolling mill (gas fired) and cold rolling mill
15	Soap manufacturing (hand made without steam boiling / boiler)
16	Spice grinding (20 HP motor)
17	Spice grinding (20 hp motor)
18	Mineralized water
19	Tamarind powder manufacturing
20	Cutting, sizing and polishing of marble stone

#### **White Category**

<b>S.No</b>	<b>Industry sector-Types</b>
1	Assembly of air coolers / conditioners, repairing and servicing
2	Assembly of bicycles, baby carriages and other small non motorizing vehicles
3	Bio fertilizer and bio-pesticides without using inorganic chemicals
4	Cotton and woolen hosiery making (Dry process only without any dyeing / washing operation)
5	Flavoured betel nuts production! grinding (completely dry mechanical operations)
6	Fly ash bricks/ block manufacturing
7	Fountain pen manufacturing by assembling only
8	Ground nut decorticating
9	Handloom/ carpet weaving (without dyeing and bleaching operation)
10	Leather cutting and stitching (more than 10 machine and using motor)
11	Manufacturing of coir items from coconut husks
12	Organic and inorganic nutrients ( by physical mixing)
13	Organic manure (manual mixing)
14	Rope (plastic and cotton)

#### **II) List of potential activities not included in the PCB**

##### **Green Category**

1	Banana Fibre products
2	Pickle making
3	Fruit Jam
4	Palm Products

5	Coir Products
6	Garments stitching
<b>Orange Category</b>	
1	Coconut oil extraction
2	Milk products and Sweet
3	Snacks and Bakery
4	Spice powders (Turmeric/ onion)
5	Bamboo products
6	Granite Quarry
7	Construction
<b>III) Production Interventions</b>	
<b>Green Category</b>	
1	Organic farming/farming under Participatory guarantee System (PGS)
2	Livestock rearing (dairy, goat, sheep) at household level
3	Fish culture in farm ponds, pond in the villages
4	NTFP collection and sale
<b>Orange Category</b>	
1	Agriculture/Horticulture crop production with use of chemicals – fertilizers, pesticides etc. Intensive cropping with use of ground water
2	Livestock rearing as an enterprise (keeping animals collectively or number of animals in a unit exceeding 10 in case of dairy, 20 in case of small ruminants and 500 in case of poultry birds)
3	Intensive aquaculture
4	NTFP collection and processing

## Annexure 3

### Environmental and Social Guidelines:

#### Annexure 3.1 Environmental/Social Guidelines for Agriculture Value Chains

Agriculture Commodity Value Chains: Environmental/ Social issues and best practices in Interventions for Productivity enhancement, Storage, Processing etc.

S. No	Interventions	Environmental Impacts	Measures
1	Productivity enhancement	<ul style="list-style-type: none"> <li>▪ Use of high yielding varieties, hybrids may impact local diversity</li> <li>▪ Excess use of ground water for intensive cropping depleting the ground water resource.</li> <li>▪ Increased use of pesticides in more quantities than desired leading to runoff into water bodies and polluting them and polluting environment, negative effects on health etc. Soil degradation due to fertilizer use in more quantities (without soil testing) and high uptake of nutrients due to high responding varieties.</li> <li>▪ Lack of information on weather updates may lead to untimely operations leading to crop loss due to unexpected dry spells or rains.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Use water efficient methods of irrigation like drip especially for horticultural crops.</li> <li>▪ Restrict to non chemical methods of Pest management. Avoid use of pesticides banned and restricted by World Health Organisation (WHO Annexure 11 of Section 1).</li> <li>▪ Adopt organic manuring practices as far as possible. Any chemical fertilizer application should be based on soil testing.</li> </ul>
2	Drying	<ul style="list-style-type: none"> <li>▪ Storage of grains and products like turmeric, red gram etc. needs drying to attain prescribed moisture level to avoid pest and disease infestation which may call for chemical use for management.</li> <li>▪ Drying on open grounds may contaminate the produce with dirt; microbes etc. which will</li> </ul>	<ul style="list-style-type: none"> <li>▪ Dry the product to attain prescribed moisture level.</li> <li>▪ Drying on cement platforms, mats etc. will protect the produce from contamination. Use solar dries wherever possible.</li> </ul>

		reduce the quality of produce will have an impact on health.	
3	Storage	<ul style="list-style-type: none"> <li>▪ Storage facilities when not properly ventilated will attract pest and moisture which will spoil the produce. And pest infestation may lead to pesticide use which may leave harmful residues on produce.</li> <li>▪ Storage pest infestation is a common problem during storage. Stored product pest control involves use of fumigants which leave residues on food products and are harmful for health.</li> <li>▪ Chemicals stored along with food commodities may contaminate the produce or give off flavors.</li> <li>▪ Organic produce stored along with non organic produce may lead to adulteration.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Storage facility should be well ventilated and free of moisture seepage. Care must be taken to ensure this during construction or renting of such facilities.</li> <li>▪ Follow natural methods of storage pest control such as impregnating gunny sacks in neem oil, using dried neem leaves, repairing all crevices cracks in the godown etc.</li> <li>▪ Chemicals/pesticides/weedicides / fertilizers should not be stored along with food commodities. It is advisable to store organic produce separately.</li> </ul>
4	Milling	<ul style="list-style-type: none"> <li>▪ Noise pollution to the workers and in the neighborhood due to milling.</li> <li>▪ Fine dust during milling will lead to health issues like allergy, asthma in long run.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Noise protective equipment should be provided to the operator of the machines.</li> <li>▪ Silencer should be attached to the equipment to reduce noise from the equipment to surrounding areas. Person using these machines must wear mask for preventing the problem related to inhalation.</li> </ul>
5	Processing and value addition	<ul style="list-style-type: none"> <li>▪ Processing and value addition may require high amount of energy and water depleting local fuel and water resources and increasing emissions due to energy use.</li> <li>▪ Accidents and health hazards are possible during</li> </ul>	<ul style="list-style-type: none"> <li>▪ Use energy efficient equipment for processing (such as steam boilers in turmeric, steam roaster in cashew or aqua pulper in coffee).</li> <li>▪ Take safety precautions and use safety gear during processing.</li> <li>▪ The processing environment</li> </ul>

		<p>processing involving machinery.</p> <ul style="list-style-type: none"> <li>Unhygienic environment or practices at processing will contaminate the food products.</li> </ul>	<p>should be kept clean and personal hygiene is must among the workers.</p>
6	Transport	<ul style="list-style-type: none"> <li>Organic produce may get contaminated when transported along with other non food commodities like fertilizers, pesticides etc.</li> </ul>	<ul style="list-style-type: none"> <li>Vehicles used for transport for chemicals should not be used for transport of edible produce.</li> <li>The vehicle should be cleaned and dried before transportation of food grains etc.</li> </ul>
7	Waste disposal	<ul style="list-style-type: none"> <li>Disposal of wastes openly after milling or waste (water, seed coats, peels, etc.) after processing may create unhygienic environment due to decomposition.</li> </ul>	<ul style="list-style-type: none"> <li>Explore the alternate uses for the wastes; in cases where they cannot be put to alternate use dispose the wastes as per the prescribed procedures.</li> </ul>
8	Workers safety	<ul style="list-style-type: none"> <li>Lack of proper facilities to workers may result in health issues</li> </ul>	<ul style="list-style-type: none"> <li>Decent working condition should be provided</li> </ul>
9	Possibility of using child labour	<ul style="list-style-type: none"> <li>There is a risk of hiring child labour</li> </ul>	<ul style="list-style-type: none"> <li>Engagement of children below 14 years will be avoided</li> </ul>
10	Fair and equal wages	<ul style="list-style-type: none"> <li>Possibility of discrimination in the wages</li> </ul>	<ul style="list-style-type: none"> <li>Fair (not below minimum wages)/ equal wages that will be paid to all workers</li> </ul>
11	Women Participation	<ul style="list-style-type: none"> <li>Exclusion of women workers</li> </ul>	<ul style="list-style-type: none"> <li>Increase the participation of women, especially those from the poor families; strengthen women in decision making</li> </ul>
12	Including disabled beneficiaries	<ul style="list-style-type: none"> <li>Exclusion of disabled beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>Enabling the possibility of involving disabled beneficiaries wherever they can</li> </ul>

Potential Environmental/Social Guidelines and Environment friendly alternatives in the Paddy value chain:

Activity in the value chain	Possible issues	Interventions, Best practices
<b><i>Interventions for Productivity Enhancement</i></b>		
Varietal selection	<ul style="list-style-type: none"> <li>Varieties not suitable to local environmental conditions may not respond well and increase cost of pest and disease management.</li> </ul>	<ul style="list-style-type: none"> <li>Varieties suitable to the local climatic conditions and environment should be selected. The list of recommended varieties for Tamil Nadu is attached as</li> </ul>

		<i>Appendix 2 of Annexure 3.1.</i>
Method of cultivation (with respect to irrigation and water use)	<ul style="list-style-type: none"> <li>▪ Long periods of flooding rice fields' results in Methane emission which is green house gas playing key role in global warming.</li> <li>▪ Flood irrigation increases the use of precious water resources and in ground water irrigated areas it also increases the energy consumption for pumping ground water. This leads to over exploitation of ground water.</li> <li>▪ Application of urea under flood conditions leads to Nitrous oxide emissions.</li> </ul>	<ul style="list-style-type: none"> <li>▪ System of Rice Intensification (SRI) can be taken up under bore well irrigated areas – Most of the area under the proposed blocks falls under bore well irrigated areas.</li> <li>▪ Application of Azolla compost under SRI method to supply nitrogen in place of urea.</li> </ul>
Cropping pattern	<ul style="list-style-type: none"> <li>▪ Continuous mono cropping of paddy may lead to depletion of similar kind of nutrients from the soil which in turn would lead to decreased productivity in long term.</li> <li>▪ In irrigated areas of Tamil Nadu rice is grown in Rice-Rice rotation which is very detrimental to the soil health.</li> </ul>	<ul style="list-style-type: none"> <li>▪ It is advisable to follow a Rice-Legume rotation pattern of cropping so as to maintain the quality of soil for a long time.</li> <li>▪ Rice cropping system in <i>Appendix 3 of Annexure 3.1</i></li> </ul>
Managing soil fertility	<ul style="list-style-type: none"> <li>▪ Excessive use of chemical fertilizers without knowing the nutrient status of the soil can be detrimental for soil health. This also increases cost of cultivation.</li> <li>▪ Besides the chemical fertilizers leave residues in the soil which leads to salinity and alkalinity of the soil which in turn affects the soil structure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Integrated Nutrient management practices (listed below) are to be followed for supplying nutrients.</li> <li>▪ <b>Mineral Fertilizer:</b> Super granules, coated urea, direct use of locally available rock PO<sub>4</sub> in acid soils, Single Super Phosphate (SSP), MOP and micronutrient fertilizers.</li> <li>▪ <b>Organic Sources:</b> By products of farming and allied industries. FYM, droppings, crop waste, residues, sewage, sludge, industrial waste.</li> <li>▪ <b>Biological Sources:</b> Microbial inoculants substitute 15 - 40 Kg N/ha</li> </ul>
Weed management	<ul style="list-style-type: none"> <li>▪ Application of weedicides causes damage to Fish,</li> </ul>	Integrated Weed Management can be followed.

	<p>impeded propagation of Algae and other non targeted organisms. This will also lead to chemical residues in soil and water.</p>	<p><b>Critical period of weed control</b> - 20-30 DAT (Days After Treatment).  <b>Cultural method-</b>  1) Hand weeding  2) Hand pulling  3) Pudding  4) Flooding  <b>Mechanical method</b> - 1) Weeder (Float)  2) Conoweeder/Rotary weeder  <b>Chemical method –</b>  Use Butachlor 1.25 kg/ha or Anilophos 0.4 kg/ha, Thiobencarb @ 2 kg/ha (1 kg ai/ha), Pendimethalin @ 4.5 kg/ha (1.5 kg ai/ha)  <b>Biological method-</b>  1. <i>Hirsch – Manniella spinicaudata</i> is a rice root nematode which controls most upland rice weeds  2. <i>Azolla</i></p>
Pest control	<ul style="list-style-type: none"> <li>▪ Use of chemical pesticides cause damage to aquatic bio diversity in rice fields and surrounding water bodies and leaves chemical residues.</li> </ul>	<p>Non Pests and Disease Management Practices are to be followed. Annexure 4</p>
<b><i>Interventions for Storage, processing etc.</i></b>		
Storage	<ul style="list-style-type: none"> <li>▪ Fumigation of storage godowns and storage spaces with Methyl bromide and phosphine in order to control store product pests may cause damage to human health.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clean rice barn, warehouse or storehouse before storing the produce. The regular cleaning of the storage is recommended.</li> <li>▪ Spray plant extract, such as Bitter bush or Siam weed (<i>Eupatorium odoratum</i> L.) to kill insects on the floor, wall and vacant space in the storage.</li> <li>▪ Mix seeds with plant extracts such as Neem (<i>Azadirachta indica</i> A.), dried Long pepper flower (<i>Piper longum</i>) and Sweet flag (<i>Acorus calamus</i> L.)</li> <li>▪ Fumigate the storage structures with carbon dioxide gas.</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>▪ Contamination is possible during package and transport.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Containers and sacks used for packing, as well as vehicle for transporting organic rice, should be clean and free from</li> </ul>

		<p>any contamination of chemical substances and other rice. It is not recommended to use vehicle that has been loaded with soil, animals, manures, fertilizers or chemicals that may cause contamination of pathogenic and toxic substances, unless such vehicle has been properly cleaned before use.</p> <ul style="list-style-type: none"> <li>▪ Separate Carrier or vehicle should be allotted to handle organic rice. Organic rice shall not be comingled with nonorganic commodity and other prohibited materials or substances for organic agriculture during transportation from production site to distribution center.</li> </ul>
Milling	<ul style="list-style-type: none"> <li>▪ Water used for soaking the paddy, especially for parboiled rice production, if not properly treated could result in water pollution and odour nuisance to local community.</li> <li>▪ Air pollution both on site and in the surrounding locality due to release of dust to the atmosphere from handling or processing of the paddy or its by-products is a major environmental concern for rice mills.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Good and adequately maintained drainage to facilitate run-off and minimize the likelihood of flooding. Regular inspection of bulk storage tanks to minimize the risk of surface water pollution.</li> <li>▪ Installation of interceptor traps for solids, oil and fuel to reduce the control release of contaminated water via the surface drains. Separation of milling areas from all other areas of operation. Water proofing of mill floor and all other floors.</li> <li>▪ Adequate ventilation should be provided to prevent dust pollution and reduce heat. Prevention of dusts on machinery and in the building by timely cleaning operations. Design of chimney and vents of sufficient height and appropriate technology to avoid causing local nuisance of</li> </ul>

		dust and smoke emissions. Walls should be designed in away to prevent accumulation of dust and entry of rodents, birds, or pests.
Energy usage	<ul style="list-style-type: none"> <li>Different operations in paddy processing require considerable energy for parboiling, mechanical drying and milling.</li> </ul>	<ul style="list-style-type: none"> <li>Hulling of rice before parboiling process is also a possible option to reduce energy consumption for rice parboiling. It would save 40% of energy however this process is susceptible to contamination if the processing equipment is not as per food grade quality and it needs shade drying. Instead of open floor drying under sunshine as in traditional practices.</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>Disposal of solid wastes, particularly unused rice husk occupies space and creates inconvenience. Effluent produced during cleaning of equipment will pose a problem to surrounding environment.</li> </ul>	<ul style="list-style-type: none"> <li>Paddy husk can be reused as fuel for paddy drying, to run steam generator or gassifier. Charcoal briquetting units can be set up which use paddy husk as raw material.</li> </ul>
Workers safety	<ul style="list-style-type: none"> <li>Lack of proper facilities to workers may result in health issues.</li> <li>Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.</li> </ul>	<ul style="list-style-type: none"> <li>Decent working condition should be provided.</li> </ul>
Possibility of using child labour	<ul style="list-style-type: none"> <li>There is a risk of hiring child labour</li> </ul>	<ul style="list-style-type: none"> <li>Engagement of children below 14 years will be avoided</li> </ul>
Fair and equal wages	<ul style="list-style-type: none"> <li>Possibility of discrimination in the wages</li> </ul>	<ul style="list-style-type: none"> <li>Fair (not below minimum wages)/ equal wages that will be paid to all workers</li> </ul>
Women Participation	<ul style="list-style-type: none"> <li>Exclusion of women workers</li> </ul>	<ul style="list-style-type: none"> <li>Increase the participation of women, especially those from the poor families; strengthen women in decision making</li> </ul>
Including disabled beneficiaries	<ul style="list-style-type: none"> <li>Exclusion of disabled beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>Enabling the possibility of involving disabled beneficiaries wherever they can</li> </ul>

**Appendix 1 of Annexure 3.1**

**Suitable Paddy Varieties of Tamil Nadu**

Short duration varieties		
Duration (Days)	Suitable seasons	Suitable varieties
90 - 120 days	Navarai, Sornavari, Kar, Kuruvai, Late Thaladi	ADT 36, IR 50, IR 64, IR 36, MDU 3, CO 47, ASD 16, ASD 17, ADT 37, TPS 2, ADT 39, ASD 18, MDU 4, PMK 2, ADT 42, MDU 5, ASD 20, ADT 43, TKM 11, ADT (RH)1, ADT (R) 45, TKM (R) 12, TRY (R) 2, PMK (R) 3, ADT (R) 47, ADT (R) 48.
Medium duration varieties		
Duration (Days)	Suitable seasons	Suitable varieties
120-140 days	Early Samba, Samba, Late Samba, Thaladi/Pishanam, Late Thaladi, Late Pishanam.	IR 20, Bhavani, IR 50, CO 43, White Ponni, ADT 38, TPS 2, TKM 10, TPS 3, ASD 19, TRY 1, CO 46, CORH 2& ADT(R) 46.
Long duration varieties		
Duration (Days)	Suitable seasons	Suitable varieties
140-180 days	Early Samba, Samba, Late Samba, Thaladi/Pishanam, Late Pishanam.	Ponmani, PY 4(JAWAHAR), ADT(R) 44
Ruling varieties in Tamil Nadu		
Short duration varieties	IR-64, CO-47, ADT-36, ADT-37, ADT-43, ADT-45, ADT-47, ADT-48, ASD-16, ASD-17, ASD-20 and MDU-5	
Medium duration varieties	IR 20, IR 36, CO 43, CO 46, ADT 38, ADT 39, ADT 46, Bhavani, MDU 3, MDU 4, TRY 1, ASD 19, TPS 2, TPS 3 and white ponni	
Long duration varieties	Ponmani(CR 1009), BPT 5204, and ADT 44	
Hybrids	CORH 1, CORH 2, CORH 3, ADTRH 1	

## *Appendix 2 of Annexure 3.1*

### **Recommended Rice cropping system in Tamil Nadu**

**Sequential cropping system:** A form of multiple cropping in which paddy is grown in sequence on the same field, with the succeeding crop planted after the harvest of the preceding crop.

#### **Command areas:**

Rice (Aug.-Jan) – pulses/sesame/maize (Jan.-April)  
Rice (June-Sep.) - rice (Oct.-Jan.) - pulses / gingelly/green manure (Feb.-May)  
Rice (June-Sep.) - rice (Dec.-March)  
Rice (June-Sep.) - green manure (Oct.-Nov.) - rice (Dec.-March)  
Rice (Aug.-Jan.) - cotton (Feb.-June)  
Rice (Oct.-Jan.) - pearl millet/vegetables/sesame/ pulses/groundnut (Feb.-May)  
Rice (April-Aug.) - rice (Sep.-March) – fallow

#### **Well irrigated areas (Filter point well)**

Rice (Aug.-Jan.) - rice (Jan.-April.) - groundnut (April-June)  
Rice (Aug.-Nov.)-rice (Dec.-March) - rice(Mar-July)  
Rice/vegetables/marigold (June-Oct.) - maize (Oct.-Jan.) - pulses (Feb.-May)  
Rice (April-Aug.) - groundnut (Sep.-Dec.) - vegetables / gingelly (Jan.-March)  
Rice (Aug.-Jan.) - groundnut (Feb.-April) - sesame/ pulses/maize (April - June)  
Rice (Aug.-Jan.) - cotton (Feb.-June)/gingelly (Feb.- May)  
Rice (June-Oct.) - ragi / groundnut / gingelly (Nov.- Feb.)  
Rice (April-Aug.) - rice (Sep.-Jan.) - fodder sorghum (Jan.-March)  
Rice (Oct.-Feb.) - pulses (Feb.-May)

#### **Tankfed areas**

Rice (Aug.-Jan.) - rice (Jan.-April)  
Rice (Aug.-Jan) - maize (Jan.-April)  
Rice/Vegetables/watermelon (Aug.-Jan.)- groundnut/ gingelly /pulses(Feb.-May)  
Rice (June-Sep.)-ragi (Sep-Dec.)-pulses (Jan.-Apr)  
Rice (July-Nov.) - groundnut / ragi (Dec.-March) - fallow  
Rice (Sep.-Jan.) - cotton (Feb.-Aug.)  
Rice (Sep.-Jan.) - green manure (Feb.-April)  
Rice (Sep.-Dec.) - senna\* (Jan.-March)  
Rice (June-Sep.) - chillies (Oct.-Feb.)

#### **Rainfed areas**

Upland rice/millet / pulses / groundnut / cotton / chillies (Sep.-Feb.)  
Dry rice (June-Aug.) - pulses / vegetables / gingelly (Sept.-Jan.)  
Rice (July-Nov.)

Environmental/Social issues and Greening points for Pepper – whole pepper; powdered pepper

Component	Possible Issue	Intervention, Best practice
<i>Interventions for Production Enhancement</i>		
Pepper nursery / plantation / cultivation	Non availability of steady cultivation and of pepper nursery plants.	<ul style="list-style-type: none"> <li>▪ SHGs may raise pepper nursery plants and use it as per climatic and soil suitability in their region. This paves way for more pepper production and harvesting engagement of SHGs members.</li> </ul>
Pepper cultivation and harvest	Absence of Good cultivation practices can worsen the plant yield and lead to losses	<ul style="list-style-type: none"> <li>▪ Black Pepper cultivation: Partially composted coir pith and vermicompost (75:25) enriched with Trichoderma (in talc formulation, 107 cfu/g at the rate of 10 g/kg) is an ideal potting medium for black pepper nursery for healthy planting material production using plug-trays compared to conventional multiplication.</li> <li>▪ Black Pepper: Cultural practices As the plants grow; shoots are tied to the standard as often as required. The young vines should be protected from hot sun during summer by providing artificial shade. Regulation of shade by lopping the branches of standards is necessary not only for providing optimum light to the vines but also for enabling the standards to grow straight.</li> <li>▪ Disease resistant pepper varieties with good horticultural characteristics are becoming available can be procured to fetch better market prices.</li> <li>▪ For commercial cultivation, Two year rotation away from tomato and pepper crops is recommended.</li> <li>▪ Pepper Seed should be certified and disease free. A seed treatment using bleach may help provide control.</li> <li>▪ Good field sanitation should be practiced to minimize the spread</li> </ul>

		<p>of the disease. Planting disease-free transplants is a key step in managing this disease in the field.</p> <ul style="list-style-type: none"> <li>▪ Drip irrigation to minimize the spread of several pepper diseases.</li> <li>▪ Harvest: Care should be taken when breaking the peppers from the plants, as the branches are often brittle. Hand clippers or pruners can be used to cut peppers from the plant to avoid excessive stem breakage. Pest management practices are mentioned in general note separately.</li> </ul>
Machinery and powdering premises	Poor Health and safety conditions that leads contamination and affect the safety of workers.	<ul style="list-style-type: none"> <li>▪ Cleaning, sorting and grinding, packaging procedures have to be skilled / trained to SHG members. Machinery: Blowers and gravity separators can be used to remove dust, dirt clods, bits of twigs and stalk, and other impurities from the peppercorns after they are imported from the field.</li> <li>▪ Sometimes, treatments are used to eliminate bacteria on the cleaned, dry peppercorns.</li> </ul>
Grading and Storing	Improper storing and grading will affect the Pepper market value additions. It may cause damage to product and be a hindrance to create premium products.	<ul style="list-style-type: none"> <li>▪ Grading and Storing: The fruit must be handled carefully to prevent skin breakage and puncturing that could lead to decay.</li> <li>▪ Cooling peppers, as soon as possible, after harvest, will extend their shelf life. Once the fruit is cooled, it can be stored for two to three weeks under the proper conditions.</li> <li>▪ Storing: store the pepper and powder products in no-humidity conditions; dust free and disease free conditions.</li> </ul>
Worker safety	Dust accumulation in working space may lead to allergic infections.	<ul style="list-style-type: none"> <li>▪ Workers in the pepper powder making should maintain cleanliness and allergic people kept away from the operations.</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Dust masks and water should be kept and worn during operations. Emergency preparedness in case of dust; powder spill; handling etc. should be available and training / skilling done for worker safety.</li> </ul>
Shelf life and market cost enhancement by value addition – measures.	<p>Lack of training and skilling for value addition of raw pepper and introduce appropriate machinery to make premium products.</p> <p>Non availability of information about pepper market prices; fluctuations and demand which will help SHGs to customize their production; suitable value addition and fetch better prices for their effort.</p>	<p>Following value addition to pepper raw material may be explored after skilling and machinery installation:</p> <p>Green Pepper Products</p> <ul style="list-style-type: none"> <li>○ 1.1 Dehydrated green pepper</li> <li>○ 1.2 Canned green pepper</li> <li>○ 1.3 Bottled green pepper</li> <li>○ 1.4 Dry packed green pepper</li> <li>○ 1.5 Freeze dried pepper</li> </ul> <p>2 White Pepper</p> <ul style="list-style-type: none"> <li>○ 2.1 Water steeping technique or retting process</li> <li>○ 2.2 Boiling technique</li> <li>○ 2.3 Chemical process</li> <li>○ 2.4 Decortication process</li> <li>○ 2.5 Economics of white pepper production</li> </ul> <p>3 Ground Pepper</p> <ul style="list-style-type: none"> <li>○ 3.1 Black and white pepper powder</li> <li>○ 3.2 Cryoground pepper</li> </ul> <p>4 Pepper Oil</p> <p>5 Products of Black Pepper: Oleoresin</p> <p>Pepper spirit is used in many medicinal and beauty products. Pepper oil is also used as</p> <p>Market prices of pepper and its products may be shared with the workers/ enterprises to give real time information about market prices and accordingly make suitable pepper based products / niche products to fetch better prices.</p>
Institutional support	Lack of Institutional support in capacity building; market linkages can help SHGs to produce and market their pepper products better.	Increased knowledge of soil fertility and mixed cropping leading to greater productivity and year round income (e.g., improved linkages with input suppliers, soil testing etc.) Increased knowledge of post-harvest storage techniques to reduce loss.
Workers safety	Lack of proper facilities to workers may result in health	Decent working condition should be provided

	issues. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.	
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

### Annexure 3.2 Environmental/Social Guidelines for Livestock Value Chains

**Dairy:** TNRTP targets with a target to produce of milk through best livestock management practices. The interventions will include induction of high yielding animals, capacity building, and fodder requirements etc.

Potential Environmental/ Social issues and Environment friendly alternatives in the Dairy value chain:

Component	Possible Issue	Intervention, Best practice
<b><i>Interventions for Resource management and Productivity Enhancement</i></b>		
Breed selection	<ul style="list-style-type: none"> <li>Selection of breeds that cannot adapt to the local climatic conditions will lead to loss of cattle or results in low productivity and health issues.</li> </ul>	<ul style="list-style-type: none"> <li>Selection of breeds suitable to local climatic conditions and up gradation with the improved breeds suitable or acclimatized to local climate should be done under technical guidance. The suggestions on local suitability of cattle, sheep and goat is given in Appendix 4 and 5 of Annexure 3.2</li> </ul>
Open grazing	<ul style="list-style-type: none"> <li>Even though open grazing is a traditional practice and recommended for better health conditions of the animals, over grazing will lead to loss of pasture lands due to reduced regeneration capacity as a result of continuous grazing.</li> <li>The local biodiversity is also affected and soil becomes susceptible to erosion as the green cover is removed.</li> <li>This will also increase the strain on the animal to walk longer distances in search of fodder affecting the productivity.</li> </ul>	<ul style="list-style-type: none"> <li>It is ideal to combine stall feeding with grazing for a limited time. The grazing should be done in rotational manner. Grazing lands can be improved by reseeded and manuring collectively by cooperatives and a system of rotational grazing can be designed.</li> <li>This can be done in convergence with programmes like NREGS.</li> </ul>
Fodder cultivation	<ul style="list-style-type: none"> <li>Exclusive dependence of fodder varieties like CO4 will not supply all vital nutrients to the cattle, besides it depletes soil nutrients and water</li> </ul>	<ul style="list-style-type: none"> <li>Green fodder should comprise of proper cereal grass and legume mix to provide complete nutrition. The fodder plots should also accommodate legume</li> </ul>

	resources as the water requirement for such crops is high.	<p>crops like cow pea, stylo and fodder trees like sesbania.</p> <ul style="list-style-type: none"> <li>▪ This provides proper ration to the animals as well as maintains soil fertility. Azolla cultivation can also supplement the protein requirement. Use of chemical should be avoided/ minimized.</li> </ul>
Chemical Fertilization  Tackling the fodder scarcity	<ul style="list-style-type: none"> <li>▪ Over use of chemical fertilizers or use of pesticides will lead to biomagnifications and affect the quality of milk.</li> <li>▪ Fodder scarcity in dry seasons or drought periods will create stress on available vegetation like trees and insufficient fodder affects animal health.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Individual /Community fodder banks are to be maintained by the groups by procuring crop residues and storage, and maintaining supplementary feed units.</li> </ul>
Stall feeding with unchopped green fodder	<ul style="list-style-type: none"> <li>▪ Stall feeding with unchopped green fodder will lead to wastage of fodder and feeding efficiency of animal is decreased.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Green fodder cut into small bits using chaff cutter or suitable tools will improve the feeding efficiency of the animal digestibility and reduce the wastage.</li> </ul>
Shed spacing, sanitation and waste management	<ul style="list-style-type: none"> <li>▪ Congested and unclean sheds (without proper facilities for draining the urine etc, lack ventilation etc.) will lead to outbreak and spread of diseases.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The sheds should be clean and should provide sufficient ventilation, enough space for the animal to move freely (recommended space is 4 sq mt per animals). There should be arrangements like slope and a pit for collection of urine which can be put to alternate uses like panchakavya preparation or can be added to manure pits). In general sheds are constructed outside the village required ventilation.</li> <li>▪ The daily sweepings of the</li> </ul>

	<ul style="list-style-type: none"> <li>Open disposal of the shed leanings - fodder wastage, manure, urine etc. will create unhygienic environment in the surroundings.</li> </ul>	<p>shed should be composted in a pit. However pit methods can be avoided in areas with high water table but the heap should be properly covered with palm leaves or gunny sacks to avoid leaching.</p> <ul style="list-style-type: none"> <li>The households having 2 cattle can plan for biogas plants. Composting the slurry provides enriched compost or vermicompost.</li> </ul>
Interventions for improving milk yield	<ul style="list-style-type: none"> <li>Injecting hormonal substances like oxytocin under misconception that it increases milk yield will have negative impact on animal health and will make the animal go dry early.</li> </ul>	<ul style="list-style-type: none"> <li>Practice of injecting hormones should be strictly avoided.</li> </ul>
Milking	<ul style="list-style-type: none"> <li>Unhygienic milking practices -milking without washing hands.</li> <li>Not addressing any injuries or disease of the animal will contaminate the milk</li> </ul>	<ul style="list-style-type: none"> <li>Beneficiaries should be trained on hygienic milking practices.</li> </ul>
Open disposal of carcasses	<ul style="list-style-type: none"> <li>The dead bodies of calves or small ruminants that are dead due to epidemics will further spread the infection when disposed openly.</li> </ul>	<ul style="list-style-type: none"> <li>The carcasses should be properly buried or burned, after bio security measures. Package of Common Management Practices Recommended for Dairy is enclosed as Appendix 6 of Annexure 3.2.</li> </ul>
<b><i>Environment Issues and Measures in Bulk Milk Cooling Units</i></b>		
Cleaning and maintenance of equipment in bulk milk cooling units	The chemical and acids used in cleaning the unit pollute the soil and water when discharged without being treated	Waste water after cleaning should not be released into the gutters leading to agriculture fields, or to the open area nearby. Drying ponds (with cement lining) can be constructed where water can be evaporated and residue can be collected and disposed of safely.
Workers safety	Lack of proper facilities to workers may result in health issues	Decent working condition should be provided
Possibility of using child	There is a risk of hiring child	Engagement of children below 14

labour	labour or sending children for grazing.	years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

#### Goat Rearing: Potential Environmental/Social Guidelines

Component	Possible Issue	Intervention, Best practice
<b><i>Interventions for Resource management and Productivity Enhancement</i></b>		
Breed selection	Selection of breeds those are not suitable to the local climatic conditions.	<ul style="list-style-type: none"> <li>Selection of breeds suitable to local climatic conditions. Usually the breed for meat purpose is raised. The suggested breed varieties are in Appendix 5 of Annexure 3.2.</li> </ul>
Disease management	Diseases and infections can create loss of productivity and damage to the whole goat stock.	<ul style="list-style-type: none"> <li>Disease management may be done through prevention activities and adequate treatment through linkages with veterinary services.</li> <li>Vaccinations and deworming services by SHGs. This can be a “Goat Health” service given by SHG – trained veterinary SHG members.</li> </ul>
Shed spacing	Congested and unclean sheds (without proper facilities for draining the urine etc, lack ventilation etc.) will lead to outbreak and spread of diseases.	Erecting shed with proper stocking density
Grazing	Open grazing increases the strain on the animal to walk longer distances in search of fodder affecting the productivity. Continuous grazing leads to loss of pasture land.	<ul style="list-style-type: none"> <li>It is ideal to combine stall feeding with grazing for a limited time. Pasture land to be developed. Also division of labour within SHGs to contribute to</li> </ul>

	Issues of using child labour for tending goats could be arised	<p>time spent for grazing. E.g. Group grazing (division of labour): Group pasturing means that goats are jointly grazed by a group of 3–5 households. Goats are taken to the fields in turn by someone from the group. Supported by such a system, some poor households managed to reduce their disadvantage in labour availability.</p> <ul style="list-style-type: none"> <li>▪ Avoid child labour. Goat rearing would require fragmented hours of work every day – especially for pasturing. Hence goat rearing may be taken up in combination with farming activities.</li> </ul>
Insurance and Financial services	Lack of insurance can lead to major loss during times of emergency and group assets	<ul style="list-style-type: none"> <li>▪ Group assets and insurance may be undertaken to avoid financial losses during emergencies. Take insurance of goats – equipments; insure the herd of goats.</li> </ul>
Training and capacity building and Market services	Training and capacity building of members can help in enhanced productivity and better management practices	<ul style="list-style-type: none"> <li>▪ Training on feed management: Free feed (leaves, grasses and fodder crops); concentrates (oil cakes and coarse grains) and crop residues. Crop residues include the straws and husks of various kinds of harvested crops.</li> <li>▪ Training and orientation about the provision of subsidies and technical knowledge on stall feeding and maintenance of goats. Goat scats for manure purpose. Reduce infection of diseases to goats due to</li> </ul>

		<p>non-sheltered conditions.</p> <ul style="list-style-type: none"> <li>▪ Social empowerment and people participation: Reduce conflicts arising out of any caste factor that prevents grazing on common ground by SC persons/households</li> <li>▪ Access to information about market prices of goat, goat meat - market information on price of live goats and goat meat in local and larger markets in the nearby towns.</li> <li>▪ Link with dedicated slaughter house – integrator – schemes</li> <li>▪ Explore side linkages and market demands for use of Goat Liver – etc. in Ayurvedic medicine preparation; soup – link breed to medicine making etc.</li> <li>▪ Use of Goat Milk – specialized applications – convert to value added product – e.g. Goat Milk good for treating Tuberculosis. Goat urine in heavy demand for Ayurvedic medicine formulations.</li> </ul>
Workers safety	Lack of proper facilities to workers may result in health issues	Decent working condition should be provided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

Slaughter House: Potential Environmental/Social issues and Greening points

Component	Possible Issue	Intervention, Best practice
<i>Interventions for Resource management and Productivity Enhancement</i>		
License and permissions	Waste water discharge, waste disposal and carcass disposal may not be adhered according to guidance without licence.	<ul style="list-style-type: none"> <li>▪ Permission of local municipality and Panchayat has to be taken for slaughter house establishment. The norms for waste water discharge; waste disposal; carcass disposal in slaughter house has to be adhered as per guidelines issued by the Pollution Control Board.</li> <li>▪ Follow rules of the Prevention of Cruelty to Animals (Slaughter House Rules) 2001; under the notification issued by the Ministry of Environment and Forests, Climate Change; Govt. of India.</li> <li>▪ Follow rules of the Prevention of Food Adulteration Act 1954 and Tamil Nadu shops and Establishment Act.</li> <li>▪ Follow rules of the Food Safety and Standards (FSSAI) Act, 2006. And licence taken for sale of meat / processed meat for public consumption. Licence has to be obtained from the Municipality as per Municipal Corporation Act and also from Panchayat.</li> <li>▪ Health Department of the Corporation is the regulatory body.</li> <li>▪ The design and facilities of the slaughter house has</li> </ul>

		<p>to be approved. Standard design as per FAO may be followed.</p> <ul style="list-style-type: none"><li>▪ The Panchayat or Municipality shall publish a notice in a daily newspaper in the chief language of the locality having wide circulation in the area and in the notice board of the Panchayat office and in the places specified by the Panchayat, and shall give publicity through pamphlet and loudspeakers and giving a period not being less than 30 days for filing objections and after considering the objections in detail received within the period and the Panchayat shall take decision on it.</li><li>▪ Animals shall be slaughtered only in places specially allotted for them in the slaughter house. Meat of animals slaughtered to be inspected and stamped. The Veterinary Surgeon of the Animal Husbandry Department of the village panchayat area specially authorised by that village panchayat in this behalf, shall inspect whether the meat of the slaughtered animal is fit for sale for human consumption, and if he finds it fit, stamp it accordingly. No one shall sell or keep for sale meat without such a stamp.</li></ul>
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		<ul style="list-style-type: none"> <li>▪ Slaughter house licence has to be renewed annually.</li> <li>▪ Meat stall shall be one covered with glass, inaccessible to insects like houseflies and also having abundant air circulation and meat shall be kept in a manner not visible to the lay public and the License of the stall shall exhibit a board in front of the stall visible to others, specifying his name number of the stall and price chart.</li> </ul>
License of Butchers	Butchers without licence may contain contagious diseases and corntain health problem which will further cause infections.	<ul style="list-style-type: none"> <li>▪ Licensing of butchers. No person shall be permitted for slaughtering animals in the slaughter houses except with a license in Form issued by the Secretary, Public Health.</li> <li>▪ Butcher should not be a person that he is not a person infected with any contagious diseases or having any health problems warranting refusal of license for slaughtering animals</li> </ul>
Site location	Slaughter houses near to residential and public places can create public nuisance and compromise public health safety issues.	<ul style="list-style-type: none"> <li>▪ A slaughter house shall not be within 90 metres of any dwelling house or within 150 metres from Hospitals with inpatients treatment or Public Educational institutions or places of worship.</li> <li>▪ No door of any slaughter house shall open directly into any street or lane or other public place and no such door shall be situated that the slaughtering of animals can be seen from</li> </ul>

		<p>any public place, public street or from any adjacent dwelling house or occupied place outside the slaughter house.</p> <ul style="list-style-type: none"> <li>▪ A sign board marked 'public slaughter house' or 'licensed slaughter house' shall be exhibited in front of the building used for slaughtering.</li> </ul>
<p>Stamping of animals for butchering</p>	<p>Meat from animals' without stamping and without examination may spread diseases.</p>	<ul style="list-style-type: none"> <li>▪ Stamping of animals. No animal shall be admitted into a slaughter house for slaughter unless it is examined, certified and stamped by the Examining Authority that the animal is free from contagious diseases and other diseases. Such certificate shall contain the time and date of the examination of the animal and it shall be valid for 48 hours only.</li> <li>▪ The person in charge of the slaughter house shall maintain register showing the particulars of animals thus examined and stamped.</li> <li>▪ The person who brings animals for slaughter shall keep the animals clean and shall see that they are kept in-charge of a keeper and secured by ropes to prevent them from injuring one another, and shall provide them with 12 hours rest and water prior to their being led to slaughter.</li> </ul>

Meat sales	Meat from slaughter houses cannot be directly sold to customers.	<ul style="list-style-type: none"> <li>▪ No meat to be sold in slaughter house. No person shall be permitted to sell meat in the slaughter house or in its premises, but the uneatable animal part, horn, skin etc. may be sold within the yard to the purchasers to whom permits have been issued.</li> <li>▪ However, after butchering and cleaning of meat; it may be sent to permit meat stalls.</li> </ul>
Waste management and health control in slaughter house; maintenance of machinery and premises.	Improper disposal of wastes from slaughter houses will lead to health issues due to animal disease.	<ul style="list-style-type: none"> <li>▪ Destruction of meat unfit for use.-The Inspecting Authority may at any time inspect the meat of a slaughtered animal and if find the same as diseased or unfit for human consumption, it shall not be allowed to be removed by the owner and shall be seized and destroyed. The expenses incurred for the same shall be realised from the owner.</li> <li>▪ The Panchayat shall have the right to cancel the licence of an owner who sells or stores such meat unfit for consumption.</li> <li>▪ Separate receptacles to be provided for putting refuse and allowing blood to flow. No person shall put refuse from the slaughter house in or allow the blood there from to flow into the receptacle other than those provided in this behalf and shall uncover the receptacles for a longer time than is</li> </ul>

		<p>absolutely necessary to put the refuse into it and to flow the blood.</p> <ul style="list-style-type: none"> <li>▪ The inflation or blowing of carcasses shall not be done in the slaughter houses.</li> <li>▪ Offal, skin, horn, entrails, etc. for which provision is made for sale in the slaughter house shall not be brought to the stall or kept in for sale.</li> <li>▪ The meat shall be suspended by means of hooks in such a way that they do not come into contact with the roofs, walls or pillars of the stalls.</li> <li>▪ The balance of meat taken for weighing shall be suspended and not placed on the table.</li> <li>▪ All article inside the slaughter house shall be kept clean, Provision shall be made for an abundant supply of water to keep the slaughter house clean.</li> <li>▪ Spittoons to be provided in the slaughter house. Necessary spittoons shall be provided in suitable places in the slaughter house and no person shall spit in the slaughter house</li> </ul>
Management of visitors		<ul style="list-style-type: none"> <li>▪ No person shall take or admit any child below ten years of age into the slaughter house.</li> <li>▪ No person shall be allowed to bring dogs in the slaughter house. Crows and other birds shall not be allowed to get into the slaughter house.</li> </ul>

		Any person who is found drunk, begging, loitering or misconducting himself should be removed from the premises.
Workers safety	Lack of proper facilities to workers may result in health issues. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.	Decent working condition should be provided
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can
<p>The Kerala Panchayat Raj (Slaughter Houses and Meat Stalls) Rules, 1996 may be adapted / followed for the slaughter house establishment and operations.</p> <p>STANDARD PLANS FOR A SMALL ABATTOIR as per FAO guidelines may be followed for design of slaughter house and energy efficiency.</p>		

## ***Appendix 1 of Annexure 3.2***

### **Selection of Cattle Breed**

#### **Indigenous Breed**

Indigenous Breeds are classified under three groups based on utility / purpose.

- a) Milch breeds / Milk breeds
- b) Dual Purpose breeds
- c) Draught breeds

#### **Milch Breeds / Milk Breeds:**

The cows of these breeds are high milk yields and the male animals are slow or poor work animals. The examples of Indian milch breeds are shahiwal, Red Sindhi, Gir and Deoni. The milk production of milk breeds is on the average more than 1600 kg per lactation.

#### **Dual Purpose Breeds:**

The cows in these breeds are average milk yielder and male animals are very useful for work. Their milk production per lactation is 500 kg to 1500 kg. The example of this group is Ongole, Hariana, Kankrej, Tharparker, Krishna valley, Rathi and Golo Mewathi.

#### **Draught Breeds:**

The male animals are good for work and Cows are poor milk yielder are their milk yield as an average is less than 500 kg per lactation. They are usually white in color. A pair of bullocks can haul 1000 kg. Net with an iron typed cart on a good road at walking speed of 5 to 7 km per hour and cover a distance of 30 - 40 km per day. Twice as much weight can be pulled on pneumatic rubber tube carts. The example of this group Kangayam, Umblacherry, Amritmahal, Hallikar.

### ***Milch Breed***

#### **Red Sindhi**

- Hailing from the Kohistan, Sindh province in present Pakistan, this breed is one of the most distinctive cattle breeds of India.
- Mainly available in Punjab, Haryana, Karnataka, Tamil Nadu, Kerala and Orissa.
- Under good management conditions the Red Sindhi averages over 1700 kg of milk after suckling their calves but under optimum conditions there have been milk yields of over 3400 kg per lactation.

#### **Sahiwal**

- Originally Belonging to the Montgomery district of Present Pakistan
- Mainly found in Punjab, Haryana, U.P, Delhi, Bihar and M.P.
- Milk yield – Under village condition :1350 kg
- Milk yield – Under commercial farms: 2100 kg
- Age at first calving -32-36 months
- Calving interval – 15 month

#### **Gir**

- Mainly found in Gir forest areas of South Kathiawar
- Gir Cows are good Milk – yielder

- Milk yield – Under village condition : 900 kg
- Milk yield – Under commercial farms: 1600 kg

### ***Milch and Draught breeds***

#### **Haryana**

- Mainly found in Karnal, Hisar and Gurgaon district of Haryana, Delhi and Western M.P Milk yield –1140 -4500 kgs
- Bullocks are powerful for road transport and rapid ploughing

#### **Tharparkar**

- Mainly found in Jodhpur, Kutch and Jaisalmer
- Milk yield – Under village condition :1660 kg
- Milk yield – Under commercial farms: 2500 kg

#### **Kankrej**

- Mainly found in Gujarat
- Milk yield – Under village condition :1300 kg
- Milk yield– Under commercial farms : 3600 kg
- Age at first calving -36 to 42 months
- Calving interval – 15 to 16 months
- Bullocks are fast, active and strong. Good for plough and cart purpose

### ***Draught Breeds***

#### **Kangayam**

- This breed, in its native area, is also known by other names of Kanganad and Kongu though the name Kangayam is well-known. These cattle are bred in the southern and southeastern area of the Erode district of Tamilnadu in India.
- Mainly found in Coimbatore, Erode, Namakkal, Karur and Dindigul districts of Tamil Nadu
- Best suited for ploughing and transport. Withstands hardy conditions

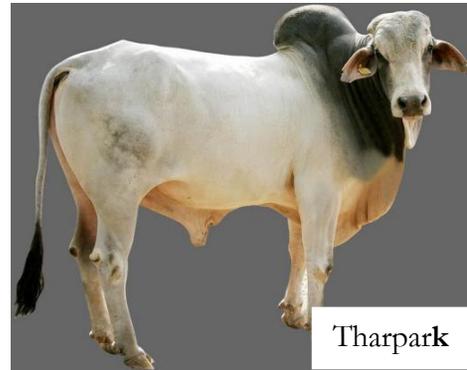
#### **Amritmahal**

- Mainly found in Karnataka.
- Best suitable for ploughing and transport.

#### **Umblacherry**

- Origin: Tanjore district in Tamilnadu.
- This breed has similar characters as kangayam.
- Bulls are fearely temperament. They are used for ploughing in Thanjore delta area.
- Calves are red in colour when born and become grey in colour after 6 months of age.
- Cows are poor milker with average milk yield of 300 kg/lactation
- Male animals are good for hard work.

## Cattle Breeds



## Cross-breed cattle in India

S. No	Name of the Breed	Native breed	Specific region	Assembling centre	Remarks
1	Brown Swiss	Switzerland		India, Pakistan & other Asian countries	Dairy breed
2	Holstein Friesian	Holland	Province of North Holland and West Friesland	Throughout the country (crossbreds)	Dairy breed
3	Jersey	British Isles	Island of Jersey	Crossbreds available in all states.	Dairy breed

### *Appendix 2 of Annexure 3.2*

## Goat and Sheep breeds

### *Sheep Breeds*

<b>Mecheri</b>	It is distributed in Salem, Erode, Karur, Namakkal, and fewer parts of Dharmapuri districts of Tamilnadu
<b>Chennai red</b>	This is distributed in Chennai, Kancheepuram, Villupuram, Thiruvannamalai districts of Tamilnadu.
<b>Ramanadhapuram white</b>	This is distributed in Ramanadhapuram, Sivagangai, and Virudhunagar districts of Tamilnadu
<b>Keezhakaraisal</b>	This is distributed in Ramanadhapuram, Sivagangai and Thirunelveli districts of Tamilnadu.
<b>Vembur</b>	It is distributed in Vembur, melakarandhai, keezha karandhai, nagalapuram regions, Tuticorin and Virudhunagar districts of Tamilnadu.
<b>Neelagiri</b>	These are distributed in Neelagiri district of Tamilnadu.
<b>Trichy black</b>	These are distributed in Trichy, Perambalur, Dharmapuri and Salem districts of Tamilnadu.
<b>Coimbatore</b>	It is distributed in Coimbatore district of Tamilnadu.

### *Goat Breeds*

#### **Jamunapari**

- Fairly tall animal
- Has a strongly arched Roman nose and long pendulous ears which are about 12 inches long in adult Jamunapari.
- Buck weighs about 65-85 kgs and does weighs about 45-60 kgs
- one kid per kidding
- six months kid weighs about 15 kg
- Milk production is about 2-2.5 lit/day.

## Tellichery

- Goats are in white, brown and black colors
- Kidding size is 2-3 kids
- Buck weighs about 40-50 kgs and does weighs about 30 kgs

## Boer

- Reared for meat all over the world
- Has a fast growth rate
- Buck weighs about 110-135 kgs and does weighs about 90-100 kgs
- Kids weighs about 20-30 kgs at 90 days of age

## Common Good practices of Goat and sheep

### Feed management

- Grazing along with concentrate feeding gives maximum growth rate
- Feeding protein rich green fodder such as acacia, leucerne and cassava and are important sources of dietary nitrogen.
- Farmers can cultivate agathi, subabul and glaricidia trees along the border of the farm and use as green fodder
- Fodders and trees cultivated in one acre of land is enough to feed 15-30 goats

Concentrate feed can be prepared as follows.

Ingredients	Kid ration	Growing Ration	Lactating Goat Ration	Pregnant goat Ration
Maize	37	15	52	35
Pulses	15	37	---	---
Oil Cakes	25	10	8	20
Wheat Bran	20	35	37	42
Mineral Mixture	2.5	2	2	2
Common salt	0.5	1	1	1
Total	100	100	100	100

- Kids should be provided with 50- 100 gms of concentrate for first 10 weeks.
- For growing ones concentrates should be provided 100 -150 gm daily for 3-10 months.
- For pregnant goat concentrates maybe given upto 200 gm daily.
- Milch goats producing 1 kg milk are provided 300 gms of concentrate daily
- Mineral blocks with rich copper (950-1250 ppm) should be provided in the goat stalls.
- Always Try to buy pregnant goats, which give kids in 40 to 60 Days.
- Suggested Green Fodders: CO3, CO4, Lucern, Barseem, Stylo, Dashrath, Hybrid Napier, African Tall, Sorghum, Molato, Gini Grass, Subabul. (As per soil requirement)
- Dry Fodder: Barley, Maize, Ground Nut etc.

Use animal manure (day manure) to make vermicompost. Use manure (night manure) to improve the soil of your farm for cultivation of green fodders.

### ***Appendix 3 of Annexure 3.2***

#### **Package of Common Management Practices Recommended for Dairy**

Modern and well established scientific principles, practices and skills should be used to obtain maximum economic benefits from dairy farming. Some of the major norms and recommended practices are as follows:

##### **I. Housing:**

1. Construct shed on dry, properly raised ground.
2. Avoid water-logging, marshy and heavy rainfall areas.
3. The walls of the sheds should be 1.5 to 2 meters high.
4. The walls should be plastered to make them damp proof.
5. The roof should be 3-4 metres high.
6. The cattle shed should be well ventilated.
7. The floor should be pucca/hard, even non-slippery impervious, well sloped (3 cm per metre) and properly drained to remain dry and clean.
8. Provide 0.25 metre broad, pucca drain at the rear of the standing space.
9. A standing space of 2 x 1.05 metre for each animal is needed.
10. The manger space should be 1.05 metre with front height of 0.5 metre and depth of 0.25 metre.
11. The corners in mangers, troughs, drains and walls should be rounded for easy cleaning.
12. Provide 5-10 sq. metre loaf space for each animal.
13. Provide proper shade and cool drinking water in summer.
14. In winter keep animals indoor during night and rain.
15. Provide individual bedding daily.
16. Maintain sanitary condition around shed.
17. Control external parasites (ticks, flies etc.) by spraying the pens, sheds with Malathion or Copper sulphate solution.
18. Drain urine into collection pits and then to the field through irrigation channels.
19. Dispose of dung and urine properly. A gobar gas plant will be an ideal way. Where gobar gas plant is not constructed, convert the dung alongwith bedding material and other farm wastes into compost.
20. Give adequate space for the animals.

##### **II. Selection of Animal:**

1. Immediately after release of the loan purchase the stock from a reliable breeder or from nearest livestock market.
2. Select healthy, high yielding animals with the help of bank's technical officer, veterinary/animal husbandry officer of State government/ Zilla Parishad, etc.
3. Purchase freshly calved animals in their second/third lactation.
4. Before purchasing, ascertain actual milk yield by milking the animal three times consecutively.
5. Identify the newly purchased animal by giving suitable identification mark (ear tagging or tattooing).
6. Vaccinate the newly purchased animal against disease.
7. Keep the newly purchased animal under observation for a period of about two weeks and then mix

with the general herd.

8. Purchase a minimum economical unit of two milch animals.
9. Purchase the second animal/second batch after 5-6 months from the purchase of first animal.
10. As buffaloes are seasonal calvers purchase them during July to February.
11. As far as possible purchase the second animal when the first animal is in its late stage of lactation and is about to become dry, thereby maintaining continuity in milk production vis-a-vis income. This will ensure availability of adequate funds for maintaining the dry animals.
12. Follow judicious culling and replacement of animals in a herd.
13. Cull the old animals after 6-7 lactations.

### **III. Feeding of Milch Animals**

1. Feed the animals with best feeds and fodders. (Feeding schedule is given in Annexure VIII).
2. Give adequate green fodder in the ration.
3. As far as possible, grow green fodder on your land wherever available.
4. Cut the fodder at the right stage of their growth.
5. Chaff roughage before feeding.
6. Crush the grains and concentrates.
7. The oil cakes should be flaky and crumbly.
8. Moisten the concentrate mixture before feeding.
9. Provide adequate vitamins and minerals. Provide salt licks besides addition of mineral mixture to the concentrate ration.
10. Provide adequate and clean water.
11. Give adequate exercise to the animals. Buffaloes should be taken for wallowing daily. In case this is not possible sprinkle sufficient water more particularly during summer months.
12. To estimate the daily feed requirement remember that the animals consume about 2.5 to 3.0 percent of their body weight on dry matter basis.

### **IV. Milking of Animals**

1. Milk the animals two to three times a day.
2. Milk at fixed times.
3. Milk in one sitting within eight minutes.
4. As far as possible, milking should be done by the same person regularly.
5. Milk the animal in a clean place.
6. Wash the udder and teat with antiseptic lotions/luke-warm water and dry before milking.
7. Milker should be free from any contagious diseases and should wash his hands with antiseptic lotion before each milking.
8. Milking should be done with full hands, quickly and completely followed by stripping.
9. Sick cows/buffaloes should be milked at the end to prevent spread of infection.

### **V. Protection against Diseases**

1. Be on the alert for signs of illness such as reduced feed intake, fever, abnormal discharge or unusual behaviour.
2. Consult the nearest veterinary aid centre for help if illness is suspected.
3. Protect the animals against common diseases.

4. In case of outbreak of contagious disease, immediately segregate the sick, in-contact and the healthy animals and take necessary disease control measures. (Vaccination schedule is given below).
5. Conduct periodic tests for Brucellosis, Tuberculosis, Johne's disease, Mastitis etc.
6. Deworm the animals regularly.
7. Examine the faeces of adult animals to detect eggs of internal parasites and treat the animals with suitable drugs.
8. Wash the animals from time to time to promote sanitation.

## **VI. Breeding Care**

1. Observe the animal closely and keep specific record of its coming in heat, duration of heat, insemination, conception and calving.
2. Breed the animals in time.
3. The onset of oestrus will be within 60 to 80 days after calving.
4. Timely breeding will help achieving conception within 2 to 3 months of calving.
5. Breed the animals when it is in peak heat period (i.e. 12 to 24 hours of heat).
6. Use high quality semen preferably frozen semen of proven sires/bulls.

## **VII. Care during Pregnancy**

Give special attention to pregnant cows two months before calving by providing adequate space, feed, water etc.

## **VIII. Marketing of Milk**

1. Marketing milk immediately after it is drawn keeping the time between production and marketing of the milk to the minimum.
2. Use clean utensils and handle milk in hygienic way.
3. Wash milk pails/cans/utensils thoroughly with detergent and finally rinse with chloride solution.
4. Avoid too much agitation of milk during transit.
5. Transport the milk during cool hours of the day.

## **IX. Care of Calves**

1. Take care of new born calf.
2. Treat/disinfect the navel cord with tincture of iodine as soon as it is cut with a sharp knife.
3. Feed colostrum to calf.
4. Assist the calf to suckle if it is too weak to suckle on its own within 30 minutes of calving.
5. In case it is desired to wean the calf immediately after birth, then feed the colostrum in bucket.
6. Keep the calf separately from birth till two months of age in a dry clean and well ventilated place.
7. Protect the calves against extreme weather conditions, particularly during the first two months.
8. Group the calves according to their size.
9. Vaccinate calves.
10. Dehorn the calves around 4 to 5 days of age for easy management when they grow.
11. Dispose of extra calves not to be reared/maintained for any specific purpose as early as possible, particularly the male calves.
12. The female calves should be properly reared.

### Housing Space Requirements for Crossbred cattle

Age-group	Manger Space (mtr.)	Standing or covered area (sq.mtr.)	Open Space (sq.mtr.)
4-6 months	0.2-0.3	0.8-1.0	3.0-4.0
6-12 months	0.3-0.4	1.2-1.6	5.0-6.0
1-2 years	0.4-0.5	1.6-1.8	6.0-8.0
Cows	0.8-1.0	1.8-2.0	11.0-12.0
Pregnant cows	1.0-1.2	8.5-10.0	15.0-20.0
Bulls*	1.0-1.2	9.0-11.0	20.0-22.0

### Feeding Schedules for Dairy Animals (Quantity in Kgs.)

S. No.	Type of animal	Feeding during	Green Fodder	Dry Fodder	Concentrate
1	6 to 7 litres milk per day	Lactation days	20 to 25	5 to 6	3.0 to 3.5
		Dry days	15 to 20	6 to 7	0.5 to 1.0
2	8 to 10 litres milk per day	Lactation days	25 to 30	4 to 5	4.0 to 4.5
		Dry days	20 to 25	6 to 7	0.5 to 1.0

### Programme for vaccination of farm animals against contagious disease

S. No.	Name of disease	Type of vaccine	Type of vaccination	Duration of immunity	Remarks
1	Anthrax (Gorhi)	Spore vaccine	Once in an year pre monsoon vaccination	One season	-
2	Black Quarter (Sujab)	Killed vaccine	- do -	- do -	-
3	Haemorrhagic Septicaemia (Galgotu)	Ocladjuvant vaccine	- do -	- do -	-
4	Brucellosis (Contagious abortion)	Cotton strain 19 (live bacteria)	At about 6 months of age	3 or 4 calvings	To be done only in infected herds
5	Foot and Mouth disease (Muhkhar)	Polyvalent tissue culture vaccine	At about 6 months of age with booster dose 4 months later	One season	After vaccination repeat vaccination every year in Oct./Nov.
6	Rinderpest (Mata)	Lapinised avianised vaccine for exotic and crossbred catte, caprinised vaccine for zebu cattle.	At about 6 months of age	Life long	It is better to repeat after 3 to 4 years

### Annexure 3.3 Environmental and Social Guidelines for Enterprises:

This part discusses the potential environmental issues and environment friendly alternatives (environment guidelines) of Farm Products and Non Farm Products. The farm and non farm products enterprises that TNRTTP may deal with are presented below:

Lists of Farm and Non Farm Enterprises

Farm based enterprises	Non Farm enterprises
Pickle Rice Mill Coconut Oil Sweet Milk Products Snacks & Bakery Papads Fruit Jams Turmeric Powder Powders(Onion, Curry leaves, drumstick) Minor Millet products Coir Products Bamboo products Banana Fibre products	Garment Stitching Granite Quarry Other handicrafts Pottery Welding Petty shop Textiles Construction Storage Retailing

Environmental Guidelines aims to derive social impact in terms of delivery of enhanced and improved quality of consumption at a rural household, by making available good quality, affordable, safe and nutritious food items.

#### Environment/ Social Guidelines for Processing and value addition of Farm products

Potential Environmental/ Social issues and Environment friendly alternatives in farm based food product preparation:

Activity in the value chain or steps in the process	Possible issues	Interventions, Best practices
Registration, licenses and permissions	Manufacturing and selling of chemical products without registration and license is illegal. Food processing units also need licenses along with small scale industries.	Registration of unit under DIC is required. Pollution Control Board (PCB) permissions are required based on type of activity. Food processing units should obtain licenses.
Storage of raw materials and finished products.	Improper storage of raw materials i.e. in moist, unclean conditions leads to spoilage or contamination of the products and chemical raw materials poses health risks to the people around. Few materials lead to explosions and fire hazards	Raw materials should be properly stored in containers with lids in clean and dry place (prescribed standards are to be followed for each material).  Finished products should be properly labeled with manufacture and expiry dates and stored in

	when not stored in required manner.	clean and dry place.
Manufacture	Manufacture without following prescribed standards under health and hygiene affects the quality of produce.	The machinery should be kept clean and the workers should follow the prescribed standards of hygiene such as bathing, hand washing, using gloves, masks and hair caps etc.
Use of additives, preservatives	Use of non permitted additives and preservatives is illegal and pose health risks to the workers and consumers	Only the permitted additives and preservatives should be used as per the recommendations given in activity specific guidelines in the Annexure 13 of Volume 1.
Energy use	Energy is required for heating, boiling, grinding, extraction, drying etc.	In case of cooking fuel efficient devices should be used. Biomass or solar devices can be promoted to conserve energy.
Use of water	Water is required for cleaning, washing, boiling etc.	Water efficient devices should be promoted.
Maintenance and upkeep of machinery	Irregular cleaning or maintenance will lead to contamination and improper functioning. Possibility of accidents during handling machinery.	Regular upkeep should be followed as per the prescribed standards. Personnel should be well trained and first aid kit should be available
Waste disposal	Open disposal of decomposable wastes leads to contamination of surroundings though decomposition, attracting insects, leaving chemical residues etc.	Using the food by-product as an animal feed. Composting or land spreading the food by-product.
Facilities at processing and manufacturing centres.	Lack of required basic amenities will affect health of workers.	The work space should be ventilated to the extent possible. Should have drinking water and toilet facilities.
Adoption of environment guidelines	Lack of awareness may lead to non adoption of the guidelines. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.	Awareness and training programmes need to be organized for the workers and entrepreneurs.
Workers safety	Lack of proper facilities to workers may result in health issues	Decent working condition should be provided
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in	Fair (not below minimum wages)/

	the wages	equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

### Manufacture of Food products

Food products: Masala products and Pickels, Papads, Snacks and Bakery, Sweet and milk products etc.

Potential Environmental/ Social issues and Environment friendly alternatives in food product preparation include:

Activity in the value chain or steps in the process	Possible issues	Interventions, Best practices
Registration and licenses	Manufacturing and selling of food products need license depending on the scale of activity.	Manufacturing and selling of food products need license depending on the scale of activity. License should be acquired as per Food Safety and Standards Act (FSSAI) 2006 if required.
Drying the raw materials, products	Drying on unclean floor will contaminate the produce by inducing microbial growth.	Clean and dry cement floor or mats should be used for drying. Solar dryers can be used depending on feasibility.
Use of machinery (for grinding masala and ingredients for pickle)	Use of unclean machinery for grinding raw materials may contaminate food.	Machinery (small mills and grinders) used for grinding ingredients should be cleaned and dried regularly.
Use of cook stoves (in bakery and snacks, sweet and milk products)	Use of LPG or fuel wood will lead to degradation of the resource and increase the fuel costs	Fuel efficient cook stoves or bio gas should be considered.
Use of preservatives, colour and flavor agents	Use of synthetic agents may have adverse effects.	Natural agents and permitted agents should only be used. Details of permitted agents are provided in Annexure 13 of Volume 1.
Handling and packing	Handling the food products with bare hands or un washed hands will contaminate the products through microbial attack.	Personnel involved in processing, packing etc. should wash hands with soap before and after work and use aprons,

		gloves, hair caps for handling, packing etc. Use of eye goggles is recommended while handling pungent items like spices.
Packing and labeling	Edible products beyond the shelf life may lead to illness when consumed.	The product labeling should include the expiry date and should be marked with in the shelf life period.
Storage	Storage in improper conditions like moist, dusty floor, walls etc. will spoil the produce due to mold infestation.	Raw materials and produce should be stored in clean and dry conditions.
Facilities at processing centre	Poor facilities will have impact on worker's health	The place should be well ventilated, should have drinking water and sanitation facilities.
Waste management	Open disposal of waste from food processing unit will give bad odour and create unhygienic environment due to decomposition.	Any waste or waste water should be disposed properly by composting or diverting to waste water drains.
Workers safety	Lack of proper facilities to workers may result in health issues. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.	Decent working condition should be provided
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

### Oil Extraction

Products: Coconut oil and ground nut oil

Potential Environmental/ Social issues and Environment friendly alternatives in oil extraction:

Activity in the value chain or steps in the process	Possible issues	Interventions, Best practices
Use of machine for grinding	Machinery handling should be clean and proper.	Machinery should be cleaned and maintained well. Care should be

		taken while handling machinery.
Handling and packing	Handling the raw material and oil with bare hands or unwashed hands will contaminate the products through microbial attack. Contamination of raw material may lead to fungal growth and aflatoxins	Personnel involved in processing, packing etc. should clean hands before and after work and use aprons, gloves, hair caps for handling, packing etc.
Extraction method	Manual extraction is time-consuming, dirty, arduous and fuel-intensive.	The efficient system of extraction of oil by the use of expellers.
Facilities at processing centre	Poor facilities will have impact on worker's health.	The place should be well ventilated, should have drinking water and sanitation facilities.
By product utilization	Possibility of not utilizing the by product	The oil cake obtained as a by-product will find a ready market as a cattle feed and in the manufacture of mixed cattle feeds
Workers safety	Lack of proper facilities to workers may result in health issues. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.	Decent working condition should be provided
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

### Forest based enterprises

Products: Hill brooms, tamarind, honey are dealt under forest based enterprises.

Potential Environmental/ Social issues and Environment friendly alternatives for forest based enterprises:

Activity in the value chain or steps in the process	Possible issues	Interventions, Best practices
Permissions for Forest based enterprises	Issues regarding use of forest land, ownership rights, regulations from forest	Required permission should be taken from Forest Department (differs from produce to

	departments.	produce) for collection.
Harvesting of NTFP	NTFP are scarce resources and unsustainable harvesting lead to loss of biodiversity.	Training on sustainable harvesting will check the loss of biodiversity.
Method of Collection of Raw material.	Destructive methods of collection such as cutting the branches, uprooting the plants, etc. damages the resource. Unscientific methods of collection may affect the quality of product there by leading to less revenue and thus over exploitation. Each forest product has some prescribed norms for collection.	Collection period and season of harvesting and tools used for collection should be as per standards prescribed. Trainings on these will help the communities to follow sustainable harvesting methods.
Processing of forest produce	Improper drying (drying on bare earth) and storage may contaminate the produce. Processing using machinery for grinding, mixing, boiling etc. may lead to injuries. Energy use in boiling, drying etc. will required fuel wood.	Drying of produce should be done on cemented platform. Care to be taken while processing using machinery to avoid injuries and members to be trained on use of machinery. Energy efficient devices should be promoted.
Workers safety	Lack of proper facilities to workers may result in health issues. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.	Decent working condition should be provided
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Issuing NTFP cards	Unsustainable extraction of NTFPs	Issuing Identity Cards to the NTFP collectors – giving area of collection, items to be collected, season and necessary authorization.
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can



## Environment/Social Guidelines for Non Farm Products

Potential Environmental/ Social issues and Environment friendly alternatives in nonfarm based enterprises:

Activity in the value chain or steps in the process	Possible issues	Interventions, Best practices
Registration, licenses and permissions	Manufacturing and selling of chemical products without registration and license is illegal.	Registration of unit under DIC and chemical license and testing for toxic material is required with help of Pollution Control Board.
Raw material (Chemical)	Poor quality raw material lead to burning of hands, breathing problems etc. during preparation and end use of the product.	Authentic source of raw material and suppliers to be ensured and training on proportion of raw material to be mixed up can be given.
Storage of raw materials and finished products	Improper storage of raw materials leads to spoilage or contamination of products.	Raw materials should be properly stored in containers with lids in clean and dry place as per prescribed standards. Finished products should be properly labeled with manufacture and expiry date and stored in clean and dry place.
Processing and manufacture	Manufacture without following prescribed standards affects the health of workers.	Hand gloves, nose masks and goggles should be used while handling the raw materials or finished products.
Energy use	Energy is required by machinery for heating, running mixing, packing, etc. and will have impact through GHG emissions.	Green sources of energy can be promoted to conserve energy based on feasibility.
Use of water	Water is required for cleaning, washing, boiling etc. As the requirement is in large quantities this will have impact on local water resources.	Water efficient devices should be promoted.
Maintenance and upkeep of machinery	Possibility of accidents during handling machinery.	Personnel should be well trained and first aid kit should be available.
Waste disposal	Open disposal of chemical wastes or cleaned water leads to contamination of surroundings and water bodies.	Wastes should be properly disposed as per the recommendations given in activity specific environment guidelines.
Facilities at processing and manufacturing centres	Lack of required basic amenities will affect health of workers.	The work space should be ventilated to the extent possible. Should have drinking water and toilet facilities.
Packaging	Use of packaging material	Bio degraded able ingredients and re-

	which is not compostable further causes the soil pollution.	useable packaging should be promoted.
Adoption of environment guidelines	Lack of awareness may lead to non adoption of the guidelines	Awareness and training programmes need to be organized for the entrepreneurs and workers.
Workers safety	Lack of proper facilities to workers may result in health issues. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to workers.	Decent working condition should be provided
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

### Environment Guidelines for Garment Stitching

Potential Environmental/ Social issues and Environment friendly alternatives in Garment Stitching process:

Activity in the value chain or steps in the process	Possible issues	Interventions, Best practices
Registration, licenses and permissions	Manufacturing and selling of garments / stitched garments which involve engagement of child labour; children at risk – street children; youth; exploitation of women.	<ul style="list-style-type: none"> <li>▪ As per scale of operations; registration of unit under DIC is required. Local Gram Panchayat / Municipality to be intimated about operations.</li> <li>▪ Follow Labour Act and Rules; Follow Shops and Commercial Establishment Acts (1961); Follow Licenses/Registration under the Factories Act, 1948,</li> <li>▪ Garment stitching may be categorized under “Green” category.</li> <li>▪ Proper payments; salaries; PFs; bank accounts; insurance; holidays; pay rolls; entitlements</li> </ul>

		<p>etc. to be maintained of workers.</p> <ul style="list-style-type: none"> <li>▪ Training and provision of VISAKA guidelines to be pursued (social vigilance) – legal norms for ‘exploitation and sexual harassment of women in workplace’ - to be implemented.</li> </ul>
<p>Storage of raw materials and finished stitched products.</p> <p>Risk reduction – workers and machinery</p>	<ul style="list-style-type: none"> <li>▪ Improper storage of raw materials i.e. in moist, humid unclean, unventilated conditions leads to spoilage of the garment/ raw materials.</li> <li>▪ Poses health risks to the workers.</li> <li>▪ Garment materials – especially polyester materials are at risk of fire hazards when not stored / handled in required manner.</li> <li>▪ Non-insurance of worker lives and unit/ machinery may trigger sever financial stress during emergency scenarios. Hence insurance required.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Raw materials should be properly stored in containers with lids in clean and dry place (prescribed standards are to be followed for each material).</li> <li>▪ Finished products should be properly labeled with manufacture and stored in clean and dry place.</li> <li>▪ Keep fire safety equipments handy and have emergency exit and fire handling operation procedures / drills periodically.</li> <li>▪ Insure all machinery, materials and workers against natural hazards or other emergency situations like fire etc. Workers to have bank accounts and insurance.</li> </ul>
<p>Production and worker health / working space.</p>	<ul style="list-style-type: none"> <li>▪ Machinery used in the production process must be kept clean and maintained periodically.</li> <li>▪ Electrical wiring should be done properly in a risk proof manner.</li> <li>▪ Seating arrangements and working conditions should be such that there is no noise pollution and comfortable / appropriate seating arrangements.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The machinery should be kept clean and the workers should follow the prescribed standards of hygiene such as bathing, hand washing, using gloves, masks and hair caps etc.</li> <li>▪ Introduce appropriate exercises to counter stress related issues – e.g. long working hours in sitting or standing position; prevention of back ache; chronic pain due to faulty posture; working posture. Introduce stress relieving exercises for better health and productivity.</li> <li>▪ Arrangements for toilets/rest rooms to be available and decent</li> </ul>

		<p>working conditions for workers.</p> <ul style="list-style-type: none"> <li>Use face masks to prevent inhalation of fine thread pieces and dust. Introduce noise reducing equipments / gadgets.</li> </ul>
Energy use	Energy is required for running the machines; ironing; heating, ventilation-fan.	<ul style="list-style-type: none"> <li>Solar energy may be used and power saving mode / good practices in energy conservation adopted.</li> <li>Install solar panels and LED lighting to reduce dependency on non-renewable energy. Premises may be designed for sufficient ventilation. Roofing material and walls may be such that it does not lead to excessive thermal heat and humid working conditions.</li> <li>Local surroundings may be planted with trees/ vegetation to provide cooler temperatures. Design of the stitching unit/ space may be such that it reduces heat radiation and has good ventilation.</li> </ul>
Waste disposal	Rags and cut cloth pieces during garment stitching may be collected and re-used / sold.	Rags and cut cloths pieces during production may be re-sold or re-used to make specific cloths, mops, door mats in the side value chain.
Adoption of environment guidelines and skilling.  Institutional capacity building – certification up gradation	<ul style="list-style-type: none"> <li>Lack of awareness may lead to non adoption of the guidelines.</li> <li>Lack of skilling may lead to lower productivity and access to sales of products.</li> <li>Lack of certification / institutional capacity building may restrict access to benefits of e-accounting; e-salary; certification and premium payments; lower branding; and access to markets.</li> </ul>	<ul style="list-style-type: none"> <li>Awareness and training programmers need to be organized for the workers and entrepreneurs.</li> <li>SHGs to capacity build themselves / skilling themselves in creating their own design, which may be based on traditional knowledge; traditional art and craft or based on partnership with other incubation / start-up companies dealing with social enterprises.</li> <li>Tie up with fashion technology institutions / external experts / fashion experts to get very specific design training and collaboration.</li> <li>Enterprise may bring out very</li> </ul>

		<p>specific designs and stitched garment that can be branded with niche customers and steady demand available. E.g. new materials may be explored like fire safety suits; mix materials; seat cover stitching etc.</p> <ul style="list-style-type: none"> <li>▪ Maintain e-accounts; online transactions; design clarifications over internet; web-site etc. to promote the Garment Stitching enterprise; ensure transparency and better branding to all customers as well as fulfilling compliance requirements; information sharing of working conditions and therefore higher scope to get certified and get external support / investment support.</li> <li>▪ Link the Garment Stitching enterprise to CSR programs of the nearby corporate / industrial units for support in investments and installations of energy efficient machinery; maintenance; repair; waste management.</li> <li>▪ Identify special textile suppliers – e.g. only organic textile produce suppliers and take special orders for converting into stitched garments by engaging SHGs. Thus the Green Stitching enterprise may function as an extended enterprise and part of the organic – textile branded value chain products. The SHGs can earn premium income by stitching only organic produce garments and contributing their social impact to the brand value.</li> </ul>
Workers safety	Lack of proper facilities to workers may result in health issues. Lack of proper facilities at work place (drinking water, toilet etc.) may cause inconvenience to	Decent working condition should be provided

	workers.	
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making
Including disabled beneficiaries	Exclusion of disabled beneficiaries	Enabling the possibility of involving disabled beneficiaries wherever they can

### Artisans and Handicrafts

Potential Environmental/Social issues and Environment friendly alternatives for Handlooms, handicrafts, basket making, paper plates and paper:

Activity in the value chain or steps in the process	Possible issues	Interventions, Best practices
Work space	Poor facilities will have impact on worker's health.	The work space should be well ventilated, provided with drinking water and toilet facilities.
Use of machinery and tools	Use of machines and tools may lead to injuries at times.	Members should be aware of safety precautions during use of machines and tools. First aid kit should be kept handy.
Energy use	Use of electricity in stitching, paper cup and plate manufacturing units is associated with carbon emission.	Possibility of solar energy run based machinery can be explored.
Use of dyes (handicrafts, handlooms)	Handling chemical dyes leads to skin and respiratory related problems.	Natural dyes must be referred and gloves and masks to be used for handling dyes.
Waste disposal	Open disposal of waste like cloth rags from handicraft will create unpleasant sight.	The waste should be sold for reuse, converted to other products (cushion filling etc.) or disposed properly.
Workers safety	Lack of proper facilities to workers may result in health issues	Decent working condition should be provided
Possibility of using child labour	There is a risk of hiring child labour	Engagement of children below 14 years will be avoided
Fair and equal wages	Possibility of discrimination in the wages	Fair (not below minimum wages)/ equal wages that will be paid to all workers
Women Participation	Exclusion of women workers	Increase the participation of women, especially those from the poor families; strengthen women in decision making

Including disabled beneficiaries	Exclusion of disabled beneficiaries.	Enabling the possibility of involving disabled beneficiaries wherever they can
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### Granite Quarry and Cutting Enterprises:

Environmental/ Social Guidelines and Greening points

Component	Possible Issue	Intervention, Best practice
<i>Interventions for Resource management and Productivity Enhancement</i>		
License and permissions	Establishment of Granite Quarry without licence may increase the environmental issues and social acceptance.	<ul style="list-style-type: none"> <li>▪ As per the Tamil Nadu Pollution Control Board – Stone and Mineral crushing units are categorized as “Orange” while Granite and Stone cutting, sizing and polishing is categorized as “Green”.</li> <li>▪ Licence has to be accordingly obtained after submission and approval of Environmental Impact Assessment (EIA) and Environment Management Plan (EMP). EIA and EMP have to be prepared through accredited and Government recognized Laboratories / Institutions / Consultants.</li> <li>▪ No objection of local municipality and Panchayat has to be taken for quarry establishment.</li> <li>▪ The Granite Conservation and Development Rules, 1999 under the Mines and Minerals 2[(Development and Regulation)] Act, 1957 - Central Government Act, shall apply to prospecting and quarrying of granite proposed by any project proponent.</li> <li>▪ The area of mining should not be less than 1 hectare and lease period would normally not exceed 30 years. Only a certified qualified geologist or mining engineer has to provide to the State Authority the scheme of prospecting: viz. <ul style="list-style-type: none"> <li>(a) particulars of the area;</li> <li>(b) the scale of the plan and the area of geological mapping;</li> <li>(c) the number of pits, trenches, and bore holes which he proposes to put in the area and the locations thereof;</li> <li>(d) the particulars of the machines to be used;</li> </ul> </li> </ul>

		<p>(e) the details of exploratory mining to be undertaken;</p> <p>(f) the number of samples proposed to be drawn and tested;</p> <p>(g) baseline information of prevailing environmental conditions before the beginning of the prospecting operations;</p> <p>(h) any other matter relevant for the preparation of a scheme of prospecting, as directed by the State Government or any person so authorised from time to time by a general or specific order.</p>
<p>Environmental Clearance Certificate</p>	<p>Environmental non clearance may increases the negative impacts of the Granite operation activities. Operation without Environmental Clearance is an offence.</p>	<ul style="list-style-type: none"> <li>• Environmental Clearance for the granite mining (both establishment and site approval and operational approval) has to be got from the State Environmental Management Authority.</li> <li>• A comprehensive Environmental Impact Assessment (EIA) report has to be submitted along with the proposed Environmental Management Plan (EMP) through accredited and government certified environmental laboratories and EIA consultants.</li> <li>• Once the environmental clearance and operational licence is given by the State Government; the project proponent may operate as per the environmental compliance directions and rules and regulations of stipulated by the state authority. Further, periodic monitoring shall be made by the state authorities and periodic compliance report has to be submitted and licence renewed. The EMP plan has to be strictly adhered to.</li> </ul> <p>The main objectives of the EMP plan is to:</p> <ul style="list-style-type: none"> <li>• To establish the present environmental scenario considering the other activities in the study area.</li> <li>• To anticipate the impacts of existing and proposed mining operations on the environment.</li> <li>• To prepare a detailed action plan for</li> </ul>

		<p>implementation of mitigation measures.</p> <ul style="list-style-type: none"> <li>• To suggest preventive and mitigation measures to minimise adverse impacts and to maximize beneficial impacts.</li> <li>• To suggest a post operational monitoring programmes of mitigation measures to ensure the quality of environment.</li> <li>• To suggest the formation of a core group responsible for implementation of protective measures and regular monitoring of such implementation.</li> <li>• To prepare a capital cost estimate and annual recurring cost for Environmental Management Plan</li> </ul>
<p>Regulations and safeguards.</p> <p>Safe handling of granite tailings; waste.</p>	<p>Improper handling may increase the risk of negative impact to environment and human health from Granite processing operations.</p>	<ul style="list-style-type: none"> <li>• The following regulations need to be followed:</li> <li>• Removal and utilisation of top soil. <ul style="list-style-type: none"> <li>(1) Where top soil exist and is to be excavated for prospecting or mining operations for granite, it should be removed separately.</li> <li>(2) The top soil so removed shall be utilised for restoration and rehabilitation of the land which is no longer required for prospecting or mining operations or for stabilising or landscaping the external dumps.</li> <li>(3) Where top soil cannot be used concurrently, it shall be stored separately for future use.</li> </ul> </li> <li>• Storage of overburden, waste rock, etc. <ul style="list-style-type: none"> <li>(1) The overburden, waste rock and non-saleable granite generated during prospecting or mining operations for granite shall be stored separately in properly formed dumps on grounds earmarked.</li> <li>(2) Such dumps shall be properly secured to prevent the escape of material in harmful quantities which may cause degradation of the surrounding land or silting of water courses.</li> </ul> </li> </ul>

		<p>(3) Wherever possible, such waste rock or overburden or other rejects, shall be backfilled into the worked out granite quarry, where granite has been recovered upto the optimum depth, with a view to restore land to its original use or desired alternate use, as far as possible and where the backfilling is not feasible, the waste dumps shall be suitable terraced and stabilized by planting vegetation or otherwise.</p> <ul style="list-style-type: none"> <li>• Reclamation and Rehabilitation of lands - Every lease holder shall undertake in a phased manner restoration, reclamation and rehabilitation of lands affected by prospecting or mining operations and shall complete this work before the conclusion of such operations and the abandonment of the granite quarry.</li> <li>• Precaution against air pollution - Air pollution due to dust, exhaust emissions or fumes during prospecting, mining or processing operations for granite and related activities shall be controlled and kept within permissible limits specified under any environmental laws for the time being in force.</li> <li>• Discharge of effluents. Every holder of a prospecting licence or a lease shall take all possible precautions to prevent or reduce to a minimum the discharge of toxic and objectionable liquid effluents from granite quarry, workshop or processing plant, into surface or ground water bodies, and usable lands. These effluents shall conform to the standards laid down in this regard.</li> <li>• Precaution against noise - Noise arising out of prospecting, mining and processing operations for granite shall be abated or controlled by the holder of prospecting licence or a lease at the source so as to keep it within the</li> </ul>
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		<p>permissible limit.</p> <ul style="list-style-type: none"> <li>• Permissible limits and standards -The standards and permissible limits of all pollutants, toxins and noise referred to in rules 33, 34 and 35 shall be those notified by the concerned authorities under the provisions of the relevant statutes from time to time.</li> <li>• Restoration of flora-Every lease holder shall take immediate measures for planting in the area held under the lease or any other area selected by the State Government for this purpose, such number of trees sufficient to improve the environment and to minimise effects of land degradation during the entire period of such lease. He shall look after such tree plantations during the subsistence of the lease.</li> </ul>
<p>Waste Management in Granite operations – by products</p>	<p>Improper handling may increase the risk of negative impact to environment and human health from Granite processing operations.</p>	<ul style="list-style-type: none"> <li>• Waste produced from granite quarrying</li> <li>• Most of the wastes produced from granite quarrying are in the form of: <ul style="list-style-type: none"> <li>○ Under-size masses unsuitable for sawing with the gang saws,</li> <li>○ Blocks showing structural defects make them unsuitable for sawing</li> <li>○ Blocks showing wide color variation in the same block.</li> <li>○ Blocks have zones of varying crystal sizes.</li> <li>○ Blocks having many xenoliths of dark colors.</li> <li>○ Fragmented small masses and granite debris.</li> </ul> </li> <li>• These wastes are difficult to be removed away from the quarrying areas as its removal is not economic; they are only removed from the quarry roads to facilitate the transportation and are accumulated in a random way.</li> <li>• Waste produced from granite cutting factories (factory waste)</li> </ul>

		<ul style="list-style-type: none"> <li>• Wastes in marble and granite factories result from two main sources; irregular unshaped blocks (solid wastes), and sawing processes (slurry). The re-use of these wastes were studied through the evaluation of their quantity and quality (mineralogical and chemical composition) to be used as a raw material substitution in the production of green concrete elements. The solid wastes take away storage space and based on their mineralogy may be further used in manufacture of products like green concrete being developed under R&amp;D.</li> <li>• Slurry (Sludge) wastes - These wastes result during the sawing and polishing processes of the marble and granite (estimated as &gt;30% of the volume of the sawn block). The equipments used in the processing activities require large amounts of water, which plays an important role in cooling, lubrication and cleaning. Granite blocks require more water than limestone or marble blocks.</li> <li>• The amount of water used for cooling varies markedly from one factory to another according to the number, size and type of blocks sawn per year as well as the water recycling efforts of the factory. Some factories use additives like slaked lime and iron powder to act as abrasive and lubricants to facilitate the sawing process (especially of granitic blocks) and to extend the life of the saw blade.</li> <li>• This mixture of water and fine powder produces thousands of cubic meters of a semi liquid substance that is generally known as “natural stone slurry” or “sludge”, due to its appearance. This slurry is then subjected to different treatment</li> </ul>
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		<p>activities, according to the technology available in the processing plant. In some factories, the ornamental stone slurry is discharged into settling tanks or ponds; the supernatant water is removed into storage tanks for its reuse as cooling water in the processing line.</p> <ul style="list-style-type: none"> <li>• The settled sludge (with up to 50% water content) is collected and thrown outside the factory on land or in landfills as waste. In other factories, the use of a filter press has decreased the water content of the sludge to about 20%, thereby recovering more water for recycling and generating more quantities of rock powder in the form of coherent cake that is easier to be transported to the disposal sites. Such very fine powder when completely dries is dispersed in the air as suspended particles causing air pollution in the industrial areas and the adjacent areas</li> </ul>
Mitigation measures for prevention of unauthorized usage of waste tailings	Unauthorized usage of waste tailings	<ul style="list-style-type: none"> <li>• Re-use and innovation of Granite Tailings for landscaping and in buildings (innovation)</li> <li>• Waste tailings of granite quarry must be safeguarded lest be used in unauthorized manner. It should primarily used as per EMP plan approved.</li> <li>• However, Granite Tailings may be re-used for landscaping and for customers with specific housing/building requirements. Care should be taken such that EMP or land filling requirements of quarry are not compromised.</li> </ul>
Workers safety	Lack of proper facilities to workers may result in health issues	Decent working condition should be provided
Possibility of using child labour	Exclusions of women workers	Engagement of children below 14 years will be avoided
Fair and equal wages	Exclusions of disabled beneficiaries	Fair (not below minimum wages)/ equal wages that will be paid to all workers

## ***Annexure 4***

### **Pest Management Plan**

The primary aim of Pest Management Plan (PMP) is to manage pests and diseases that may negatively affect production of crops so that they remain at a level that is under an economically damaging threshold. Pesticides should be managed to reduce human exposure and health hazards, to avoid their migration into off-site land or water environments and to avoid ecological impacts such as destruction of beneficial species and the development of pesticide resistance. PMP consists of the judicious use of both chemical and nonchemical control techniques to achieve effective and economically efficient pest management with minimal environmental contamination. PMP therefore may include the use of:

- Mechanical and Physical Control;
- Cultural Control;
- Biological Control, and
- Rational Chemical Control

### **Non Chemical Pest Management:**

The pest management will be restricted the methods of mechanical, physical, biological methods unless chemical methods are highly desired. The key methods to be followed are:

- Selection of pest resistant varieties recommended for the state
- Crop rotation to reduce the presence of insects, disease, or weeds in the soil or crop ecosystems
- Support beneficial bio-control organisms such as insects, birds, mites, and microbial agents to perform biological control of pests (e.g., by providing a favorable habitat, such as bushes for nesting sites and other original vegetation that can house pest predators and parasites)
- Favor manual, mechanical weed control and/or selective weeding
- Using mechanical controls such as traps, barriers, light, and sound to kill, relocate, or repel pests.

The non chemical methods will also include the promotion of the following plant and animal based preparations as pesticides and growth promoters which are proven to be effective.

1. Seed treatment with *Beejamrutha* to offer protection from pathogens, pests and promote good germination (a mixture of cow dung, cow urine, water, lime and handful of soil)
2. Application of *GhanJeevamrutha* – culture of micro organisms to improve nutrient availability to the crop (a mixture of cow dung, cow urine, jiggery, gram flour and soil - preferably from forest)
3. Plant protection by natural pesticides like *Agni Astra*, *Brahma Astra*, *Neem Astra*
  - a. *Agni Astra*: prepared by boiling and fermenting chillies, garlic, tobacco and neem leaves in cow urine.
  - b. *Brahma Astra*: prepared by boiling and fermenting leaves of neem, milk weed, datura, arjun, gilory, karanj and guava in cow urine.
  - c. *Neem Astra*: prepared by adding neem leaf extract in cow dung and urine.

### **Pest Management Plan:**

IPM is the combined use of multiple methods mentioned above to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control may be an option used in conjunction with other methods. In cases where chemical methods are adopted, it will be in compliance with the OP 4.09, i.e. the pesticides falling under classes 1a, 1b and II will be excluded (Annexure 11 of Volume 1). Integrated pest management strategies will depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts. Pest surveillance is an effective tool as an information system, which renders pest control methods more effective. It aims at monitoring and forewarning of likely buildup of pests in order to facilitate planning and adoption of suitable control strategy based on ETL. The project will make the necessary arrangements and will provide the trainings for the ECPs on the same.

The following precautions will be ensured under IPM practices:

#### Pesticide Application

In cases where the pesticide application is justified, then the beneficiaries will be oriented on the following actions:

- The personnel will be trained to apply pesticides with all necessary precautions during mixing, applications, washing of the sprayers, disposal of spray equipment etc.
- Review and follow the manufacturer's directions on maximum recommended dosage or treatment as well as published reports on using the reduced rate of pesticide application without loss of effect, and apply the minimum effective dose
- Avoid routine "calendar-based" application, and apply pesticides only when needed and useful based on criteria such as field observations, weather data (e.g. appropriate temperature, low wind, etc.),
- Avoid the use of highly hazardous pesticides, particularly by uncertified, untrained or inadequately equipped users. This includes:
  - Pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a, 1b and II should be avoided in all cases and class III to be used only when no practical alternatives are available and where the handling and use of the products will be done in careful manner to avoid affects on health and environment
  - Use only pesticides that are approved by the WHO, that are slightly hazardous (Class III) and are unlikely to present acute hazards (Class IV) Annexure 11 of Volume 1. Use only pesticides that are manufactured under license and registered and approved by the appropriate authority and in accordance with the Food and Agriculture Organization's (FAO's) International Code of Conduct on the Distribution and Use of Pesticides;
  - Use only pesticides that are labelled in accordance with the national and international standards and norms
  - Avoid use of pesticides that have been linked to localized environmental problems and threats
- Maintain and calibrate pesticide application equipment in accordance with manufacturer's recommendations. Use application equipment that is registered in the country of use
- Establish untreated buffer zones or strips along water sources, rivers, streams, ponds, lakes, and ditches to help protect water resources

### Pesticide Handling and Storage

Improper pesticides handling and storage may lead to contamination of soils, groundwater, or surface water resources, due to accidental spills during transfer, mixing etc. The following measures will be taken to avoid the issues. The Enterprises will be trained in handling and storage of pesticides especially on the following:

- Storage of pesticides in their original packaging, in a dedicated, dry, cool and well aerated location that can be locked and properly identified with signs, with access limited to authorized people. No human or animal food may be stored in this location. The store room should also be designed with spill containment measures and sited in consideration of potential for contamination of soil and water resources
- Purchase and store, no more pesticide than needed and rotate stock using a “first-in, first-out” principle so that pesticides do not become obsolete. Additionally, the use of obsolete pesticides should be avoided under all circumstances; a management plan that includes measures for the containment, storage and ultimate destruction of all obsolete stocks to be prepared by the enterprises (in accordance to guidelines by FAO and consistent with country commitments under the Stockholm, Rotterdam and Basel Conventions).
- Operators must read, understand, and follow product label directions for safe mixing, application, and disposal; farmers/labours applying pesticides to be trained on critical operations (e.g., mixing, transfers, filling tanks, and application).
- Mixing and transfer of pesticides should be undertaken in ventilated and well-lit areas, using containers designed and dedicated for this purpose
- Use of Personal Protective Equipment (PPE) such as gloves, overalls, eye protection worn at all times when handling and applying pesticides.
- Mixing and filling the pesticides should be done away from watercourses and drains.
- Spray operation should be done in early mornings and evenings, avoid spraying on cloudy day or a windy day/direction of wind.
- Rinsed water should be collected in a separate tank and disposed of as a hazardous waste, spills should be cleared. The spray equipment and containers should not be washed in water courses and drains
- Collect rinse water from equipment cleaning for reuse (such as for the dilution of identical pesticides to concentrations used for application);
- Empty pesticide containers should not be used for any other purpose (e.g. storing food, water containers). Contaminated containers should be handled as hazardous waste, and should be disposed safely
- Expired chemicals should be disposed off immediately
- Maintain records of pesticide use and effectiveness
- Shower or bath at the end of every day’s work and wear new clean clothes.
- Wash overalls and other protective clothing at the end of every working day in soap and water and keep them separate from the rest of the family’s clothes. If the insecticide touches the skin, wash off immediately with soap and water.
- Change clothes immediately if they become contaminated with pesticides. Inform the supervisor immediately if one feels unwell.
- In case of accidental swallow or exposure to the spray or pesticides the first aid should be administered immediately and medical help should be sought immediately

### Use of antibiotics/growth promoters in livestock rearing (piggery, poultry, fishery):

Use of antibiotics as growth promoters (E.g: tylosin, quinolone, tetracycline, gentamicin, amantadine) is one of the issues in livestock rearing especially in intensive farming. These antibiotics are used in low doses which are believed to improve the quality of the meat with low fat and high protein content. However there are ill effects associated with this and one of them is imposing selection pressure for bacterial strains that are resistant to antibiotics (E.g: *Escherichia coli*, *Salmonella spp*). Over time the residues of antibiotics in the meat also affects human health leading to side effects. There are also chances of resistance build up in human pathogens. The project will create awareness among the beneficiaries on the side effects of using antibiotics along with food and water for growth promotion. The Enterprises guidelines will include ban on using the antibiotics for growth promotion.

### **Implementation Arrangements for PMP:**

The PMP will be implemented in all agriculture and irrigation system development activities. The implementation will be supported by capacity building of project teams including CPs and monitoring.

### Capacity Building:

As part of PMP, the project the Agriculture Enterprises beneficiaries will be trained on PMP in the first year ad refresher trainings will be conducted once every year. The training will be organized by MaKamai and facilitated by the Enterprises and sourced by the resource agency.

- Training the Enterprises beneficiaries on
  - Importance and need for pest management
  - Pest Management Plan for the project
  - Technical aspects in Pest management:
    - Identification of pests and beneficial insects in the field
    - Determining the economic threshold levels (the density at which they begin to cause economically significant losses).of different pests in different crops
    - Designing and supporting the implementation of a pest management strategy giving preference to alternative pest management strategies, with the use of synthetic chemical pesticides as the last option. The indicative list of pest management practices for different crops in provided in the appendix 1.
    - Precautions to be taken during the purchase, store and use of pesticides and disposal of the wastes and containers.
- Information Education and Communication (IEC) materials will be developed targeting the Enterprise and Producer Collectives which will include – posters, films, hand books etc.

### Monitoring:

During every crop cycle the monitoring will be done the CPs end of every crop they will give will capture the progress on PMP (number of PMPs adopted). Review of PMP will be done as part of regular review meetings on agriculture. The state consultant will provide yearly update on the PMP status based on the field visits and progress reports on PMP. The external audit will also capture the impact of PMP.

## Appendix 1: Pest Management Practices for the common Crops

### Rice:

Pest/disease/crop stage	Pest Management Practices
<b>Nursery stage</b> Leaf blast	<ul style="list-style-type: none"> <li>• Varieties: Rasi, Vikas, Krishna Hamsa, Tulasi, IR 64, Aditya, Swarnadhan, Himalaya 1, Himalaya 2, Himalaya 2216, Pant dhan 10, HKR 228 and PNR 519.</li> <li>• Seed selection by putting in plain water and stirring well. Select the sunken seeds and reject the floating ones.</li> <li>• Pre-sowing seed treatment by wet method: Soak the selected seeds in a container containing fungicidal solution of mancozeb</li> <li>• Seed treatment for eliminating seed borne pathogens can be carried out by dry seed treatment method.</li> </ul>
Stem borer	<ul style="list-style-type: none"> <li>• Apply neem cake or mustard oil cake (500 g/m<sup>2</sup>) in soil 15 days prior to sowing in root –knot nematode and stem borer endemic areas.</li> </ul>
<b>Main Field</b>	
Stem borer	<ul style="list-style-type: none"> <li>• Deep ploughing to expose the soil harbouring insect pests</li> <li>• Field sanitation to prevent pest multiplication .Clean cultivation with line sowing</li> <li>• Placement of branches of <i>Chromoleana odoratum</i>, <i>Schima wallibii</i>, <i>Artemisia vulgaris</i> in the field for repellent of insect and it also act as perch for predatory birds. Or use wooden bar or bamboo made Birds perch @ 6 no/bigha</li> <li>• Clipping of leaf tip of rice seedlings in nursery after uprooting to prevent the spread of insect infestation from nursery to the main field.</li> <li>• Installation of pheromone traps @ 16-20/ha in a triangular patter at 60 m distance for trapping the adult male.</li> <li>• 6-8 release of egg parasitoides, <i>Trichogramma japonicum</i> and <i>T. chilonis</i> @ 50,000/ha/week starting from 30 days after transplanting. “Trichocard” should be put over the entire infested area throughout the egg laying period of pests. Cut each Trichocard by scissor into 6-12 pieces and distribute over the entire field by fixing them to the plant by using a stapler or adhesive.</li> <li>• Spraying of Neem oil 0.03% @ 3 ml/l at 10 DAT followed by second spray after 20 day interval.</li> </ul>
Leaf folder	<ul style="list-style-type: none"> <li>• Varieties: Vikramarya, Nidhi, IR 24, Radha, Mahananda and Kunti.</li> <li>• Deep ploughing to expose the soil harbouring insect pests</li> <li>• Clean cultivation with line sowing</li> <li>• For bio-control of leaf folder: 6-8 release of egg parasitoides, <i>Trichogramma japonicum</i> and <i>T. chilonis</i>@ 50,000/ha/week starting from 30 days after transplanting. “Trichocard” should be put over the entire infested area throughout the egg laying period of pests. Cut each Trichocard by scissor into 6-12 pieces and distribute over the</li> </ul>

	<p>entire field by fixing them to the plant by using a stapler or adhesive.</p> <ul style="list-style-type: none"> <li>• Spraying of Neem oil 0.03% @ 3 ml/l at 10 DAT followed by second spray after 20 day interval</li> </ul>
Brown Plant Hopper	<ul style="list-style-type: none"> <li>• Varieties: Vijetha, Chaitanay, Krishnaveni, Pratibha, Vajram, Makom, Pavizham, Mansarovar, CO 42, Jyoti, Chandana, Nagarjuna, Sonasali, Rasmi, Neela, Annanga, Daya, Bhadra, Karthika, Aruna, Remya, Kanakam, Bharathidasan, Remya, Triguna, IET 8116, Rajendra Mahsuri-I, Pant dhan, 11, Rajshree, Bhudeb and Hanseshwari .</li> <li>• Sensible use of fertilizer by splitting nitrogen applications can also reduce chances of plant hopper outbreaks.</li> <li>• Draining rice fields can be effective in reducing initial infestation levels. The field should be drained for 3 - 4 days when heavy infestations occur.</li> <li>• Growing no more than two crops per year and using early-maturing varieties reduces plant hopper abundance and damage.</li> <li>• Synchronous planting (planting neighboring fields within 3 weeks) and maintaining a rice-free period may be effective.</li> </ul>
Green Leaf Hopper	<ul style="list-style-type: none"> <li>• Transplanting older seedlings (&gt;3 weeks) also reduces viral disease susceptibility transmitted by leafhoppers.</li> <li>• Avoid planting at peak activity (shown by historical records) period to avoid infestation.</li> <li>• Early planting within a given planting period, particularly in the dry season, reduces the risk of insect-vector disease.</li> <li>• Nitrogen should be applied at an optimal level to discourage population build-up and influence plant recovery.</li> <li>• Good weed control in the field and on the bunds removes the preferred grassy hosts and promotes crop vigor.</li> <li>• Crop rotation with a non-rice crop during the dry season decreases disease reservoirs.</li> <li>• Upland rice intercropped with soybean reduces the incidence of leafhoppers on rice compared to rice alone.</li> </ul>
Sheath Blight	<ul style="list-style-type: none"> <li>• Varieties: Rasi, Vikas, Krishna Hamsa, Tulasi, IR 64, Aditya, Swarnadhan, Himalaya 1, Himalaya 2, Himalaya 2216, Pant dhan 10, HKR 228 and PNR 519.</li> <li>• Destruction of crop residue</li> <li>• Spray talc based formulation of <i>Trichoderma harzianum</i> along with CMC (Carboxyl Methyl Cellulose) @ 8 g/l</li> <li>• Spraying of Botanicals viz., Cymbopogon 20 EC (Wanis) (5 ml/l) and Neemazal (neemoil) (3 ml/l ) at 10 days interval, starting the first spray at symptom appearance..</li> <li>• Soil amendment with saw dust and FYM at the rate of 1% and application of carbendazim (0.1%) followed by spraying of <i>Trichoderma viride</i> (0.5%).</li> </ul>
Rice Blast	<ul style="list-style-type: none"> <li>• Adjust planting time. Sow seeds early, when possible, after the onset of the rainy season.</li> </ul>

	<ul style="list-style-type: none"> <li>Split nitrogen fertilizer application in two or more treatments. Excessive use of fertilizer can increase blast intensity.</li> </ul>
Bacterial Leaf Blight	<ul style="list-style-type: none"> <li>Grow tolerant variety: Govinda, IR-36</li> <li>Avoid top dressing with nitrogenous fertilizers at panicle initiation stage, instead, top dressing with K<sub>2</sub>O (@ 10 kg/ha or application of K<sub>2</sub>O @ 5 kg/ha in the form of foliar spray of 3 % solution.</li> <li>Combine application of <i>Pseudomonas fluorescence</i> and <i>Trichoderma harzianum</i> (0.5%).</li> </ul>
<p>Application of natural pesticides/microbial cultures like <i>Beejamrutha</i> for seed treatment, <i>GhanJeevamrutha</i> as microbial culture and <i>Agni Astra</i>, <i>Bharma Astra</i>, <i>Neem Astra</i> for pest control will be promoted through training.</p>	

### Maize:

Pest/disease/crop stage	Pest Management Practices
Measures at Pre sowing state – resting stages of insects, pathogens	<ul style="list-style-type: none"> <li>Adoption of crop rotation</li> <li>Clean plow down of crop debris</li> <li>Destruction of crop residue</li> <li>Selection of tolerant varieties</li> <li>Collection and destruction of white grub stages</li> <li>Deep summer ploughing</li> </ul>
Stem borers, Aphids, Thrips, Termites, Turcicum leaf blight (TLB), Maydis leaf blight (MLB), Common rust, Polysora rust, Brown spot, Curvularia leaf spot, etc.	<ul style="list-style-type: none"> <li>Varieties: HM 10, PAU 352, MALVIYA HYBRID MAKKA 2, PEMH 1, HQPM 7, HQPM 5, HQPM1, SHAKTIMAN 3, SHAKTIMAN 4, PEMH 5, HQPM4 and HSC 1</li> <li>Removal and destruction of dead hearts</li> <li>Release of <i>Trichogramma chilonis</i> @ 1,60,000/ha. on 7 and 15 days old crop onwards at weekly interval</li> </ul>
Banded leaf & sheath blight	<ul style="list-style-type: none"> <li>Varieties: PRATAP KANCHAN 2, PRATAP MAKKA 3, PRATAP MAKKA 5,</li> <li>SHAKTIMAN 1 and SHAKTIMAN 3</li> <li>Stripping of 2 lower leaves along with leaf sheath</li> <li>Seed treatment with <i>Trichoderma harzianum</i> 2.0% WP @ 20 g/kg of seeds</li> </ul>
Pythium stalk rot	<ul style="list-style-type: none"> <li>Plant population should not to exceed 50,000 ha</li> <li>Good field drainage</li> <li>Removal of previous crop debris/wheat straw</li> </ul>
Bacterial stalk rot	<ul style="list-style-type: none"> <li>Varieties: PAU 352, PEMH 5, DKI 9202, DKI 9304</li> <li>Avoidance of water logging</li> <li>Field should have proper drainage</li> <li>Planting of the crop on ridges rather than flat soil</li> <li>Avoid use of sewage water for irrigation</li> </ul>

Fusarium stalk rot	<ul style="list-style-type: none"> <li>• Varieties: PEMH 1, PEMH 2, PRATAP KANCHAN 2, PRATAP MAKKA 3,</li> <li>• PRATAP MAKKA 5, SHEETAL, JH 6805, X 1280</li> <li>• Sanitation and removal of previous crop debris</li> <li>• Lower plant population</li> <li>• Balanced soil fertility, avoid high level of N and low level of K</li> <li>• Use crop rotation with non host crop like soybean</li> </ul>
Charcoal rot	<ul style="list-style-type: none"> <li>• Varieties: JHMH 1701, JH 6805 and BIO 9639</li> <li>• Sanitation and removal of previous crop debris</li> <li>• Deep ploughing</li> <li>• Avoiding water stress at flowering time reduces disease incidence</li> <li>• Balanced soil fertility, avoid high level of N and low level of K</li> <li>• Add <i>Trichoderma harzianum</i> formulation 2.0% WP in furrows at the time of sowing prior mixing with FYM @ 10 g/kg FYM &amp; incubated for 10 days in moist condition for Charcoal rot</li> </ul>
<p>Application of natural pesticides/microbial cultures like <i>Beejamrutha</i> for seed treatment, <i>Ghan Jeevamrutha</i> as microbial culture and <i>Agni Astra</i>, <i>Bharma Astra</i>, <i>Neem Astra</i> for pest control will be promoted through training.</p>	

### Red Gram:

Pest/disease/crop stage	Pest Management Practices
Pre sowing measures	<ul style="list-style-type: none"> <li>• Field sanitation, rouging</li> <li>• Deep summer ploughing to control juveniles and adults of nematodes, and resting stages of insect pests.</li> <li>• Sow/plant sorghum/maize/bajra in 4 rows all around cumin crop as a guard/barrier crop</li> <li>• Destroy the alternate host plants</li> <li>• Follow crop rotation with non host crops such as rice, maize, sorghum, tobacco or castor</li> </ul>
Soil borne pathogens nematodes and resting stages of insects	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Deep ploughing of fields during summer to control nematodes and <i>Helicoverpa</i>.</li> <li>• Three summer ploughings at 10 days interval reduce juvenile population of pests.</li> <li>• For anthracnose and BLB hot water treatment of seeds at 52° C for 10 min.</li> <li>• Growing intercrops such as Pigeon pea, marigold and castor for the control of blister beetle, whitefly and leaf hoppers.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Seed treatment with <i>Trichoderma viride</i> 1% WP @ 4g per Kg seeds.</li> </ul>
Seed sowing/seedling	<ul style="list-style-type: none"> <li>• Use resistant/tolerant varieties</li> <li>• Select seeds from disease free fields</li> <li>• Grow pigeon pea intercropped or mixed with cereal crops like</li> </ul>

	<p>sorghum.</p> <ul style="list-style-type: none"> <li>• Use certified and weeds free seeds.</li> </ul>
Leaf Webber	<ul style="list-style-type: none"> <li>• Growing intercrops such as marigold, castor etc.</li> </ul>
Pigeon pea sterility mosaic (PSM), Mug Bean Yellow Disease (MBYD)	<ul style="list-style-type: none"> <li>• Varieties: ICPL 157, NP(WR)15, Bihar</li> <li>• Destroy sources of sterility mosaic inoculums.</li> <li>• Use yellow sticky traps for the control of whitefly insect vector of MBYD.</li> </ul>
Gram pod borer, spotted pod borer	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Growing trap crop like marigold on the borders and in between rows as intercrop.</li> <li>• Their flowers shall attract ovipositor which can be plucked and disposed off</li> <li>• Follow ridge planting + cover crops like soybean, cowpea, black gram, green gram, moth bean.</li> <li>• Raise one row of sunflower as intercrop for every 9 rows of pigeon pea.</li> <li>• Field sanitation</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• <i>Bacillus thuringiensis sero var kurstaki</i> (3a, 3b, 3c) 5% w WP @ 400-500 g/acre in 200- 400 l of water or <i>Bacillus thuringiensis var. kurstaki</i>, serotype h-CA, 3b, strain z-52 @ 200-300 g/acre or NPV of <i>Helicoverpa armigera</i> 2.0% AS @100-200 ml/acre in 200-300 l of water or NPV of <i>Helicoverpa armigera</i> 2.0% AS strain no. GBS/HNPV-01 @ 100-200 ml/acre in 200-300 l of water or Bio-tech international strain no. IBH/HV-9 @ 100-200 ml/acre in 200-300 l of water or Indore bio-tech input &amp; research strain no. IBL-17268 @ 100-200 ml/acre in 200-300 l of water.</li> <li>• Azadiractin 0.03% (300 ppm) neem oil based WSP @ 1000-2000 g in 200-300 l of water/acre.</li> </ul> <p><b>Mechanical control:</b></p> <ul style="list-style-type: none"> <li>• Setting up light traps @ 1/acre for adults</li> <li>• Erecting of bird perches @ 40/acre for encouraging predatory birds such as King crow, mynah etc.</li> <li>• Use of ovipositional trap crops such as marigold @ 100 plants/acre and collection of larvae from flowers</li> <li>• Installing pheromone traps @ 4-5/acre for monitoring and mass trapping the pests.</li> <li>• Handpick and kill caterpillars or feed them to poultry. This helps when their numbers are low and in small fields.</li> <li>• However, if possible wear gloves when handling hairy caterpillars. Some of them have urticating hairs, which may cause skin irritation.</li> </ul>
<p>Application of natural pesticides/microbial cultures like <i>Beejamrutha</i> for seed treatment, <i>GhanJeevamrutha</i> as microbial culture and <i>Agni Astra</i>, <i>Bharma Astra</i>, <i>Neem Astra</i> for pest control will be promoted through training.</p>	

### Cabbage/Cauliflower:

Pest/disease/crop stage	Pest Management Practices
Diamond Back Moth	<ul style="list-style-type: none"> <li>• Varieties: Pusa Hybrid-2, Pusa Kartik Sankar,</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Removal and destruction of plant remnants, stubbles, debris after harvest and ploughing the field.</li> <li>• Trap crop: Sowing 2 rows of bold seeded mustard as a trap crop for every 25 rows of cabbage to attract moths to mustard. Plant the first row 12 days before transplanting and the second row 25 days after transplanting</li> <li>• Grow intercrops such as tomato, garlic, coriander and carrot in alternate rows with cabbage</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Release egg parasitoid, <i>T. chilonis/pretiosum</i> @ 20,000/acre 4-6 times at weekly interval.</li> <li>• Release larval parasitoids, <i>Diadegma semiclausm</i> @ 1,00,000/acre (Hills – below 25 –27°C) or <i>Cotesia plutellae</i> (plains) @ 20,000/acre from 20 days after planting</li> <li>• Conserve other parasitoids such as <i>Brachymeria</i> spp., <i>Eriborus</i> spp. etc.</li> <li>• Fungal pathogens, for example, <i>Paecilomyces</i> spp. and <i>Zoophthora radican</i> are effective.</li> <li>• Foliar spray with 5% NSKE or azadirachtin 0.03% (300 ppm) neem oil based WSP @ 1000-2000 ml in 200-400 l of water/acre</li> </ul>
Black rot	<ul style="list-style-type: none"> <li>• Varieties: Pusa Shubra, Pusa Snowball K-1, Pusa Snowball Kt-25</li> </ul> <p><b>Cultural control</b></p> <ul style="list-style-type: none"> <li>• Crop sanitation</li> <li>• Resistant varieties</li> <li>• Crop rotation for 2-3 years with non-cruciferous crops</li> </ul>
Damping off	<p><b>Cultural control</b></p> <ul style="list-style-type: none"> <li>• Quality seed and a chemical or heat pasteurized planting medium should be used.</li> <li>• Excessive watering and poorly drained areas of field should be avoided</li> <li>• <b>Use raised beds:</b> more than 15cm height is better for water drainage or use pro trays for raising seedlings</li> </ul>
Alternaria leaf spot	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Long rotations (3 years) without crucifer crops or cruciferous weeds such as wild mustard.</li> <li>• Plant later plantings upwind of earlier plantings.</li> <li>• Allow for good air circulation (i.e. wide spacings, rows parallel to prevailing winds, not close to hedgerows).</li> </ul>
Cabbage Aphid	<p><b>Cultural Control:</b></p> <ul style="list-style-type: none"> <li>• Install yellow sticky traps, yellow water pan traps @ 12/acre</li> </ul> <p><b>Biological control:</b></p>

	<ul style="list-style-type: none"> <li>• Conserve parasitoids such as <i>Aphidius colemani</i> (adult and nymph), <i>Diaeretiella</i> spp. (adult and nymph), <i>Aphelinus</i> spp. (adult and nymph) etc.</li> <li>• Conserve predators such wasps, green lacewings, earwigs, ground beetles, rove beetles, spiders etc.</li> </ul>
Tobacco caterpillar	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Field sanitation and rouging</li> <li>• Repellant plants: Ocimum/Basil</li> <li>• Setting up light traps for adults @ 1/acre.</li> <li>• Erecting of bird perches for encouraging predatory birds such as mynah, drongo etc.</li> <li>• Use of ovipositional trap crops such as castor @ 250 plants/acre and collection of larvae from flowers</li> <li>• Installing pheromone traps @ 4-5/acre for monitoring insect activity</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Spray NSKE 5% against eggs and first instar larvae.</li> <li>• Spray NPV @ 40LE/ac in combination with jaggery 1 kg, sandovit 100 ml or Robin Blue 50 g thrice at 10-15 days interval on observing the eggs or first instar larvae in the evening hours.</li> <li>• Conserve parasitoids such as <i>Trichogramma chilonis</i> (egg), <i>Tetrastichus</i> spp. (egg), <i>Telenomus</i> spp. (egg), <i>Carcelia</i> spp. (larval-pupal), <i>Campoletis chlorideae</i> (larval) etc.</li> <li>• Conserve predators such as lacewings (<i>Chrysoperla carnea</i>), coccinellids, king crow, dragonfly, spider, robber fly, reduviid bug, praying mantis, fire ants etc.</li> </ul>
Cabbage butterfly	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Fine-mesh netting in nursery will stop butterflies from reaching the crop and lay eggs. Collect and destroy eggs or caterpillars mechanically by hand- usually on the underside of the leaves.</li> <li>• Intercropping cabbages with <i>Nasturtium</i> results in fewer eggs laid on cabbage by the butterflies.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Release <i>Trichogramma</i> spp.</li> <li>• Erect bird perches</li> <li>• Conserve parasitoids such as <i>Cotesia glomeratus</i> (larval), <i>Pteromalus puparum</i> (larval) etc.</li> </ul>
<p>Application of natural pesticides/microbial cultures like <i>Beejamrutha</i> for seed treatment, <i>GhanJeevamrutha</i> as microbial culture and <i>Agni Astra</i>, <i>Bharma Astra</i>, <i>Neem Astra</i> for pest control will be promoted through training.</p>	

**Brinjal:**

<b>Pest/disease/crop stage</b>	<b>Pest Management Practices</b>
Damping off, wilt, root rot in nursery and main field	<ul style="list-style-type: none"> <li>• Varieties: Pusa Purple Cluster, Pusa Anupama, Arka Anand, Arka Keshav, Arka Nidhi, Arka Neelkanths, JC-1, JC-2, Pant Samrat, Pant Brinjal Hybrid1</li> </ul> <p><b>Cultural control</b></p> <ul style="list-style-type: none"> <li>• Raised nursery bed.</li> <li>• Avoid excess dose of nitrogenous and phosphorous fertilizers.</li> <li>• Use of plug tray method and sterilized potting mixture</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Seed treatment with <i>Trichoderma viride</i> 1% WP @ 5 g/kg of seed. Make a thin paste of required quantity of <i>Trichoderma viride</i> 1% WP with minimum volume of water and coat the seeds uniformly, shade dry the seeds just before sowing.</li> <li>• Seedling root dip treatment: Mix 10 g of <i>Trichoderma viride</i> 1% WP in one l of water and dip the brinjal seedling root for 15 minutes</li> <li>• Soil treatment (main field): Mix 1.0 kg of <i>Trichoderma viride</i> 1% WP with 25 kg FYM and broadcast uniformly over an acre of land and irrigate the field immediately</li> </ul>
Cultural/mechanical/biological measures at vegetative stage	<p><b>Common cultural practices:</b></p> <ul style="list-style-type: none"> <li>• Collect and destroy diseased and insect infected plant parts.</li> <li>• Provide irrigation at critical stages of the crop</li> <li>• Avoid water stress and water stagnation conditions.</li> <li>• Enhance parasitic activity by avoiding chemical spray, when 1-2 larval parasitoids are observed</li> </ul> <p><b>Common mechanical practices:</b></p> <ul style="list-style-type: none"> <li>• Collection and destruction of eggs and early stage larvae</li> <li>• Handpick the older larvae during early stages</li> <li>• The infested shoots may be collected and destroyed</li> <li>• Handpick the gregarious caterpillars and the cocoons which are found on stem and destroy them in kerosene mixed water.</li> <li>• Use yellow sticky traps for aphids and whitefly @ 4-5 trap/acre.</li> <li>• Use light trap @ 1/acre and operate between 6 pm and 10 pm</li> <li>• Install pheromone traps @ 4-5/acre for monitoring adult moths activity (replace the lures with fresh lures after every 2-3 weeks)</li> <li>• Erecting of bird perches @ 20/acre for encouraging predatory birds such as King crow, common mynah etc.</li> <li>• Set up bonfire during evening hours at 7-8 pm</li> <li>• Collection and destruction of eggs and early stage larvae</li> <li>• Handpick the older larvae during early stages</li> <li>• The infested shoots may be collected and destroyed</li> <li>• Handpick the gregarious caterpillars and the cocoons which are found on stem and destroy them in kerosene mixed water.</li> </ul>

	<ul style="list-style-type: none"> <li>• Use yellow sticky traps for aphids and whitefly @ 4-5 trap/acre.</li> <li>• Use light trap @ 1/acre and operate between 6 pm and 10 pm</li> </ul>
Shoot and fruit borer	<ul style="list-style-type: none"> <li>• Varieties: HLB-12, JC-1, GBH-1, JC-2, Pant Brinjal Hybrid1, PPI 1</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Continuous cropping of brinjal and potato in the same area encourages the pest activity and hence proper rotation should be followed.</li> <li>• Use resistant varieties</li> <li>• Intercropping of brinjal (2 rows) with coriander (one row) or fennel (1 row).</li> <li>• Install pheromone traps @ 4-5/acre for monitoring and 10/acre for mass trapping at 10 m distance from 20 DAT, the pheromone septa should be changed at regular interval. Place the traps either at canopy level or at slightly above the canopy level for effective attraction</li> <li>• Promptly remove and destroy infested shoots and fruit at regular intervals until final harvest.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Release <i>Trichogramma chilonis</i> at 20,000/acre/week commencing from 21 days after transplanting (based on adult activity) till end of the crop. Trichocards should be tied to sticks placed at 4-5 m apart in the field in the evening prior to 1 day of parasitoid adult emergence</li> <li>• Conserve predators such as <i>Campyloneura</i> sp (a bug), <i>Cheilomenes sexmaculata</i> (a ladybird beetle), <i>Coccinella septempunctata</i> (seven spotted ladybird beetle), <i>Brumoides suturalis</i> (three striped ladybird), <i>C. carnea</i> (lacewing)</li> <li>• Conserve parasitoids such as <i>Pseudoperichaeta</i> sp (tachinid fly) <i>Phanerotoma</i> sp, <i>Itamoplex</i> sp, <i>Eriborus argenteopilosus</i>, <i>Diadegma apostate</i>, <i>Pristomerus testaceus</i>, <i>Trathala flavo-orbitalis</i>, <i>Bracon greeni</i></li> <li>• Spray azadirachtin 1% EC (10000 ppm) nee based EC @ 400-600 ml in 400 l of water/acre or azadirachtin 0.03% (300 ppm) nee oil based WSP @ 1000-2000 ml in 200-400 l of water/acre</li> <li>• Spray NSKE 5%</li> </ul>
Bacterial wilt	<ul style="list-style-type: none"> <li>• Varieties: Pusa Purple Cluster, Pusa Anupama, Arka Anand, Arka Keshav, Arka Nidhi, Arka Neelkanths, JC-1, JC-2, Pant Samrat, Pant Brinjal Hybrid1</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Growing resistant varieties</li> <li>• Crop rotation with non-solanaceous hosts. Since pathogen is soil born, a rotation with inclusion of maize, soybean, wheat, rice, gingelly and green manuring has been found effective in reducing the disease in infested soil.</li> <li>• Green manuring with <i>Brassica</i> sp (biofumigation)</li> </ul>

	<ul style="list-style-type: none"> <li>• Soil solarization with a transparent polyethylene sheet (125 µm thick) for 8-10 weeks during March-June in nurseries</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Use neem cake.</li> <li>• Mix 1 kg of <i>Trichoderma viride</i> 1% WP with 25 kg FYM and broadcast uniformly over an acre of land and irrigate the field immediately.</li> </ul>
Mealybugs	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Removal of weeds and alternate host plants like hibiscus, bhindi, custard apple, guava etc in and nearby vineyards throughout the year.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Conserve the natural enemies.</li> </ul>
Aphids	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Check transplants for aphids before planting.</li> <li>• Reflective mulches such as silver colored plastic can deter aphids from feeding on plants.</li> <li>• Sturdy plants can be sprayed with a strong jet of water to knock aphids from leaves.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Release 1st instar larvae of green lacewing bug (<i>Chrysoperla zastrowi sillemi carnea</i>) @ 4,000 larvae/acre.</li> <li>• Spraying with tobacco decoction (1 Kg tobacco boiled in 10 l of water for 30 minutes and making up to 30 l + 100 g soap).</li> </ul>
Whitefly	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Water sprays may also be useful in dislodging adults.</li> <li>• A small, hand-held, battery-operated vacuum cleaner has also been recommended for vacuuming adults off leaves. Vacuum in the early morning or other times when it is cool and whiteflies are sluggish. Kill insects by placing the vacuum bag in a plastic bag and freezing it overnight. Contents may be disposed of the next day. Fumigating with small petrol soaked cotton ball.</li> <li>• For biological control follow common practices.</li> </ul>
<p>Application of natural pesticides/microbial cultures like <i>Beejamrutha</i> for seed treatment, <i>GhanJeevamrutha</i> as microbial culture and <i>Agni Astra</i>, <i>Bharma Astra</i>, <i>Neem Astra</i> for pest control will be promoted through training.</p>	

**Chilli:**

Pest/disease/crop stage	Pest Management Practices
Aphids	<ul style="list-style-type: none"> <li>• Varieties: Pusa Sadabahar, Arka Harita, Arka Meghana, Arka Sweta, Hisar Shakti, Hisar Vijay, Pant C-1</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Conserve parasitoids such as <i>Aphidius colemani</i>, <i>Diaeretiella</i> spp. <i>Aphelinus</i> spp. etc.</li> <li>• Conserve predators such as anthocorid bugs/pirate bugs (<i>Orius</i> spp.), mirid bugs, syrphid/hover flies, green lacewings (<i>Mallada basalis</i> and <i>Chrysoperla carnea</i>), predatory coccinellids (<i>Stetborus punctillum</i>), staphylinid beetle (<i>Oligota</i> spp.), predatory cecidomyiid fly (<i>Aphidoletis aphidimyza</i>) and predatory gall midge, (<i>Feltiella minuta</i>), earwigs, ground beetles, rove beetles, spiders, wasps etc.</li> </ul>
Yellow mite/other mites	<ul style="list-style-type: none"> <li>• Varieties: Phule Jyoti, Phule Mukta</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Chilli crop bordered by two rows of maize at every 0.5 acre area (31.2 x 60 sqm).</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Conserve the predators such as predatory mite (<i>Amblyseius ovalis</i>), predatory bug (<i>Orius</i> spp.), spiders etc.</li> <li>• If the incidence of mites is low, spray neem seed powder extract 4% at 10 days interval</li> </ul>
Tobacco caterpillar	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Field sanitation and rouging</li> <li>• Castor can be grown as a trap crop along the field border to attract the egg laying female adult moths (collect and destroy the laid egg masses and gregarious neonates)</li> <li>• Pest repellent plants: Ocimum/Basil</li> <li>• Setting up light traps for collecting adults @ 1/acre</li> <li>• Erecting of bird perches for encouraging predatory birds such as king crow, mynah etc.</li> <li>• Install pheromone traps @ 4-5/acre for monitoring adult moth activity. Replace the lures with fresh lures after every 2-3 weeks</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Spray NSKE 5 % against eggs and first instar larva.</li> <li>• Spray B. t. var gallariae @ 600-800 g in 400 l of water/acre</li> <li>• Conserve parasitoids such as <i>Trichogramma chilonis</i> (egg), <i>Tetrastichus</i> spp. (egg), <i>Telenomus</i> spp. (egg), <i>Chelonus blackburni</i> (egg-larval), <i>Carcelia</i> spp. (larval-pupal), <i>Campoletis chlorideae</i> (larval), <i>Eriborus argentiopilosus</i> (larval), <i>Microplitis</i> sp etc.</li> <li>• Conserve predators such as <i>Chrysoperla carnea</i>, coccinellids, King crow, common mynah, wasp, dragonfly, spider, robber fly, reduviid bug, praying mantis, fire ants, big eyed bugs (<i>Geocoris</i> sp), pentatomid bug (<i>Eocantbecona furcellata</i>), earwigs, ground beetles, rove beetles etc.</li> </ul>

Gram pod borer	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Field sanitation and rouging</li> <li>• Erecting suitable physical barriers such as nylon nets.</li> <li>• Growing intercrops such as cowpea, onion, maize, coriander, urdbean in 5 or 4:1 ratio</li> <li>• Guard crop sorghum or maize in 4 rows all around cotton crop as guard crop.</li> <li>• Rotate the chilli crop with a non-host cereal crop, cucurbit, or cruciferous vegetable.</li> <li>• Repellant plants: Ocimum/Basil</li> <li>• Erecting of bird perches for encouraging predatory birds such as king crow, mynah, and drongo etc.</li> <li>• Install pheromone traps @ 4-5/acre for monitoring adult moths activity. Replace the lures with fresh lures after every 2-3 weeks.</li> <li>• Use of ovipositional trap crops such as marigold @ 100 plants/acre 1 row of marigold for every 18 rows of chilli and collection of larvae from flowers (marigold seedling of 45 days should be planted along with chilli transplanting)</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Release of egg parasitoid <i>Trichogramma pretiosum</i> @ 50,000 adults (in the form of parasitized card)/acre/week commenced right from the start of flower initiation to till end of the crop, tie the egg cards on the stick placed through out the field at 4-5 m apart, in the evening, a day prior to the emergence of adult.</li> <li>• Conserve parasitoids such as <i>Tetrastichus</i> spp. (egg), <i>Telenomus</i> spp. (egg), <i>Campoletis chlorideae</i> (larval) etc.</li> <li>• Conserve predators such as <i>Chrysoperla carnea</i>, coccinellids, King crow, common mynah, wasp, dragonfly, spider, robber fly, reduviid bug, praying mantis, fire ants, big eyed bugs (<i>Geocoris</i> sp), pentatomid bug (<i>Eocanthecona furcellata</i>), earwigs, ground beetles, rove beetles etc.</li> </ul>
Die back and fruit rot	<ul style="list-style-type: none"> <li>• Varieties: Hisar Shakti, Hisar Vijay, TNAU Chilli Hybrid Co 1</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Production of pathogen-free planting materials is the key control measure used to manage the disease.</li> <li>• Use healthy pathogen-free chilli seed</li> <li>• Early removal of affected plants will control the spread of the diseases.</li> <li>• Transplants should be kept clean by controlling weeds and solanaceous volunteers in the vicinity of the transplant houses</li> <li>• Stagnation of water should not be allowed in nursery beds and fields in order to avoid fungal infection. The field should have good drainage and be free from infected plant debris.</li> </ul>
Mosaic	<ul style="list-style-type: none"> <li>• Varieties: Arka Suphal, Arka Harita, Arka Meghana, Hisar Shakti, Hisar Vijay, Phule Mukta</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Select healthy seed for planting.</li> </ul>

	<ul style="list-style-type: none"> <li>• Crop rotation with non-hosts.</li> <li>• Control perennial weed hosts.</li> <li>• Rogue out and destroy infected plants in early stages of infection.</li> <li>• Grow disease tolerant varieties.</li> <li>• Raise 4 rows of maize or sorghum as border crop to restrict the spread of aphid vectors.</li> <li>• Cover the seed bed with nylon net or paddy straw.</li> </ul>
<p>Application of natural pesticides/microbial cultures like <i>Beejamrutha</i> for seed treatment, <i>Ghanjiveeamrutha</i> as microbial culture and <i>Agni Astra</i>, <i>Bharma Astra</i>, <i>Neem Astra</i> for pest control will be promoted through training.</p>	

### Tomato:

Pest/disease/crop stage	Pest Management Practices
Pre sowing	<p><b>Common cultural practices:</b></p> <ul style="list-style-type: none"> <li>• Deep summer ploughing</li> <li>• Follow crop rotation with non-host crops</li> <li>• Destroy the alternate host plants</li> <li>• Sow sorghum/maize/ryegrass in 4 rows all around the main crop as guard/barrier crop</li> </ul>
Measures at vegetative stage	<p><b>Common cultural practices:</b></p> <ul style="list-style-type: none"> <li>• Collect and destroy crop debris</li> <li>• Provide irrigation at critical stages of the crop</li> <li>• Avoid water logging</li> <li>• Avoid water stress during flowering stage</li> <li>• Judicious use of fertilizers</li> <li>• Enhance parasitic activity by avoiding chemical spray, when 1-2 larval parasitoids are observed</li> <li>• Field sanitation</li> <li>• Ecological engineering of tomato with growing intercrops such as cowpea, onion, maize, coriander, urdbean etc.</li> <li>• Grow 4 rows of maize/sorghum/bajra around the field as a gourd guard/barrier crop.</li> </ul> <p><b>Common mechanical practices:</b></p> <ul style="list-style-type: none"> <li>• Collection and destruction of eggs and early stages of larvae</li> <li>• Collect and destroy disease infected and insect damaged plant parts</li> <li>• Handpick the older larvae during early stages of plant</li> <li>• The infested shoots and seed capsules may be collected and destroyed</li> <li>• Handpick the gregarious caterpillars and the cocoons which are found on stem and destroy them in kerosene mixed water.</li> <li>• Use yellow/blue pan water / sticky traps @ 4-5 trap/acre</li> <li>• Use light trap @ 1/acre and operate between 6 pm and 10 pm</li> <li>• Install pheromone traps @ 4-5/acre for monitoring adult moths activity (replace the lures with fresh lures after every 2-3 weeks)</li> <li>• Erecting of bird perches @ 20/acre for encouraging predatory birds</li> </ul>

	<p>such as king crow, common mynah etc.</p> <ul style="list-style-type: none"> <li>• Set up bonfire during evening hours at 7-8 pm</li> </ul>
Damping off	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Excessive watering and poorly drained areas of field should be avoided</li> <li>• Use raised beds: 15 cm height is better for water drainage or use pro-trays for raising seedlings</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Seed treatment with <i>Trichoderma viride</i> 1 % WP@ 9 g/Kg of seed.</li> </ul>
Early blight	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Change the nursery beds location every season, eradicate weeds and volunteer tomato plants, fertilize properly</li> </ul>
Bacterial Wilt	<ul style="list-style-type: none"> <li>• Varieties: Arka Ananya, Arka Abhijit, Arka Abha, Arka Alok</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Rotate with non-host crops, particularly with paddy</li> <li>• Restriction of irrigation water flowing from affected field to healthy field</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Neem cake @ 100 Kg/acre</li> </ul>
Fusarium wilt	<p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Seed treatment with <i>Trichoderma viride</i> 1% WP @ 9 g/Kg seed</li> <li>• Root zone application: Mix thoroughly 2.5 Kg of the <i>T. viride</i> 1% WP in 150 Kg of compost or farmyard manure and apply this mixture in the field after sowing/ transplanting of crop</li> </ul>
Leaf curl	<ul style="list-style-type: none"> <li>• Varieties: Arka Ananya, Kashi Vishesh, Kashi Amrit, COTh 2, TNAU Tomato Hybrid Co3</li> </ul> <p><b>Cultural control:</b></p> <p>Raising nursery in protected condition (with net of sufficient mesh size to prevent the entry of vector, whitefly)</p>
Gram Pod borer	<p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Inundatively release <i>T. pretiosum</i> @ 40,000/acre 4-5 times from flower initiation stage at weekly intervals</li> <li>• Spray azadirachtin 1% (10000 ppm) neem based EC @ 400-600 ml in 200 l of water/acre or azadirachtin 5% W/W neem extract concentrate @ 80 g in 160 l of water/acre</li> <li>• Spray Ha NPV 0.43% AS @ 600 ml in 160-240 l of water/acre or Ha NPV 2% AS @ 100-200 ml in 200 l of water/acre in combination with jaggery @ 1 Kg in the evening hours at 10-15 days interval on observing the eggs or early instar larvae or Ha NPV 0.43% AS (Strain No. BIL/HV-9) @ 600 ml in 160-240 l of water/acre or NPV 2% AS Strain No. GBS/HNPV-01 (BIL/HV-9) @ 100-200 ml in 200 l of water/acre</li> <li>• Spray <i>Bacillus thuringiensis var. galleriae</i> @ 400-600 g in 200 l of water/acre</li> </ul>
<p>Application of natural pesticides/microbial cultures like <i>Beejamrutha</i> for seed treatment, <i>Ghanjeevamrutha</i> as microbial culture and <i>Agni Astra</i>, <i>Bharma Astra</i>, <i>Neem Astra</i> for pest control will be promoted through training.</p>	

**Papaya:**

Pest/disease/crop stage	Pest Management Practices
Pre planting	<ul style="list-style-type: none"> <li>• Deep ploughing of fields during summer to control nematodes population and weeds</li> <li>• Soil solarization</li> <li>• Timely sowing should be done.</li> <li>• Field sanitation, rogueing.</li> <li>• Apply manures and fertilizers as per soil test recommendations.</li> <li>• Plant tall border crops like maize, sorghum or millet to reduce white fly and aphids</li> </ul>
Planting	<ul style="list-style-type: none"> <li>• Planting to be done in pits already filled with top soil and farm yard manure.</li> <li>• Apply 20g each of Azospirillum and Phospho bacterium per plant at planting and again six months after planting</li> </ul>
Main crop – soil borne pathogens	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Intercropping of marigold reduces nematode population</li> <li>• Nursery should be raised in nematode free sites or fumigated or solarized beds</li> <li>• Application of decomposed poultry manure @ 200 g / sq. m</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Apply neem cake @ 100 Kg/acre at the time of transplanting for reducing nematodes and borer damage.</li> </ul>
Soil borne diseases	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Seedling raised in insect proof conditions.</li> <li>• Sow 4-5 seeds/bag then retain 3 seedlings.</li> <li>• 2 month old seedling is ready for transplanting</li> <li>• Papaya don't withstand water logging, hence well drained upland fields should be selected for cultivation.</li> <li>• Under drip, ring method should be followed.</li> <li>• <b>Wind break:</b> should be grown to protect from strong wind also save tree from cold damage</li> </ul> <p><b>Mechanical control:</b></p> <ul style="list-style-type: none"> <li>• Remove and destroy virus infected seedlings/plants.</li> </ul> <p><b>Biological control</b></p> <ul style="list-style-type: none"> <li>• Apply Neem seed kernel extract (NSKE) 5%/groundnut oil @ 1-2% on to the plants to manage the vector population.</li> </ul>
Nematodes and insects	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Use resistant/tolerant varieties.</li> <li>• Sowing should be completed within recommended periods.</li> <li>• Intercropping with sun hemp or marigold or daincha.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Use mahua [<i>Madhuca longifolia</i>], castor, neem and karanj [<i>Pongamia pinnata</i>] cakes, biogas sludge applied at 1.0 t/acre during pit</li> </ul>

	<p>preparation.</p> <ul style="list-style-type: none"> <li>• Apply 2 tons of FYM enriched with <i>Pochonia chlamydosporia</i> and <i>Paecilomyces lilacinus</i>/acre before sowing, along with 100-200 Kg of neem or pongamia cake.</li> <li>• Apply neem based products (Neemagon, Bioneem, Neemraj etc.) for controlling this pest.</li> </ul>
Mealy bugs	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Removal of weeds and alternate host plants like hibiscus, bhindi, custard apple, guava etc in and nearby vineyards throughout the year.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Conserve the natural enemies.</li> </ul>
Aphids	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Check transplants for aphids before planting.</li> <li>• Reflective mulches such as silver colored plastic can deter aphids from feeding on plants.</li> <li>• Sturdy plants can be sprayed with a strong jet of water to knock aphids from leaves.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Release 1st instar larvae of green lacewing bug (<i>Chrysoperla zastrowi sillemi carnea</i>) @ 4,000 larvae/acre.</li> <li>• Spraying with tobacco decoction (1 Kg tobacco boiled in 10 l of water for 30 minutes and making up to 30 l + 100 g soap).</li> </ul>
Whitefly	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Water sprays may also be useful in dislodging adults.</li> <li>• A small, hand-held, battery-operated vacuum cleaner has also been recommended for vacuuming adults off leaves. Vacuum in the early morning or other times when it is cool and whiteflies are sluggish. Kill insects by placing the vacuum bag in a plastic bag and freezing it overnight. Contents may be disposed of the next day. Fumigating with a small petrol soaked cotton ball.</li> <li>• For biological control follow common practices.</li> </ul>
Stem borer	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Pierce the infested plants with a sharp needle or knife to kill the caterpillar in the stem.</li> <li>• For others see common practices.</li> </ul>
Papaya hoppers	<ul style="list-style-type: none"> <li>• Removal of weeds and alternate host plants such as Hibiscus, bhindi, custard apple, guava etc.</li> <li>• For other practices follow common practices.</li> </ul>
Mite	<ul style="list-style-type: none"> <li>• See common cultural practices; Spray NSKE(5%)</li> </ul>
Foot Rot	<p><b>Cultural control :</b></p> <ul style="list-style-type: none"> <li>• The crop should be irrigated by adopting the ring method of irrigation so that the water does not come in direct contact with the stem.</li> <li>• Avoid water logging.</li> </ul>
Anthracoese	<p><b>Cultural control:</b></p>

	<ul style="list-style-type: none"> <li>• Diseased leaves, twigs, gall midge infected leaves and fruits, should be collected and burnt.</li> <li>• Covering the fruits on trees, 15 days prior to harvest with news or brown paper bags.</li> </ul>
Powdery mildews	<p><b>Mechanical control:</b></p> <ul style="list-style-type: none"> <li>• Prune diseased leaves to reduce primary inoculum load.</li> <li>• Keep proper spacing during sowing.</li> </ul>
Papaya mosaic virus	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Good field sanitation such as removal and destruction of affected plant reduce the spread of the disease.</li> <li>• Losses can be minimized controlling the population of aphid.</li> </ul>
Papaya leaf curl virus	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Uproot the virus affected plants</li> <li>• Avoid growing tomato, tobacco near papaya.</li> <li>• Control whitefly vector.</li> <li>• Removal and destruction of the affected plants is the only control measure to reduce the spread of the disease.</li> <li>• The field should be kept weed free. Tobacco, tomato, sunnhemp, cape gooseberry, chilli, petunia, <i>Datura stramonium</i>, <i>Zinnia elegans</i> etc. should not be grown nearby papaya field.</li> </ul>
Papaya ring spot virus	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Use of yellow sticky trap to control of aphid vector.</li> <li>• Use of resistant varieties.</li> <li>• Early detection of infected plants and prompt removal can check the spread of the disease.</li> <li>• Rogue out infected plants of papaya as early as possible to avoid further infection within the field.</li> <li>• Avoid taking mixed crop of tobacco, chilli, <i>Zinnea</i>, tomato and gooseberry in papaya field or nearby.</li> </ul>
Fruit fly	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Prior to harvest, collect and dispose off infested and fallen fruits to prevent further, multiplication and carry-over of population.</li> <li>• Ploughing of orchard during November-December to expose pupae to sun's heat which kills them.</li> <li>• Managing fruit flies also reduces anthracnose disease and prevents late fruit fall.</li> </ul> <p><b>Physical control:</b></p> <ul style="list-style-type: none"> <li>• Hot water treatment of fruit at <math>48 \pm 1</math> °C for 45 min.</li> <li>• Male annihilation technique: Set up fly trap using methyl eugenol. Prepare methyl eugenol 1 ml/L of water + 1 ml of malathion solution. Take 10 ml of this mixture per trap and keep them at 25 different places in one ha between 6 and 8 am. Collect and destroy the adult flies</li> </ul> <p><b>Biological control:</b></p>

	<ul style="list-style-type: none"> <li>• See common practices.</li> </ul>
Scale insects	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Prune heavily infested plant parts to open the tree canopy and destroy' them immediately and preferably during summer.</li> <li>• These should be placed in a pit constructed on one corner of the orchard. Allow branches and twigs to dry until the parasites escape.</li> <li>• Burn the remaining debris.</li> <li>• Removal of attendant ants may permit natural enemies to control the insect.</li> </ul>
Grey weevil	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Collection and destruction of infested and fallen fruits at weekly interval till harvest fruit.</li> <li>• Destroy all left over seeds in the orchard and also in the processing industries.</li> </ul>
Aphids	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Check transplants for aphids before planting.</li> <li>• Reflective mulches such as silver colored plastic can deter aphids from feeding on plants.</li> <li>• Sturdy plants can be sprayed with a strong jet of water to knock aphids from leaves.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Release 1st instar larvae of green lacewing bug (<i>Chrysoperla zastrowi sillemi carnea</i>) @ 4,000 larvae/acre.</li> <li>• Spraying with tobacco decoction (1 Kg tobacco boiled in 10 l of water for 30 minutes and making up to 30 l + 100 g soap).</li> </ul>

**Banana:**

<b>Pest/disease/crop stage</b>	<b>Pest Management Practices</b>
<p><b>Pre planting</b> Nematodes, banana corm weevil and diseases</p>	<ul style="list-style-type: none"> <li>• Varieties: Poovan, Kadali, Kunnan, Poomkalli</li> </ul> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Deep ploughing during summer.</li> <li>• Use of disease free planting material.</li> <li>• Storage of large corms in the sun for two weeks prior to planting.</li> <li>• Select healthy suckers.</li> <li>• Avoid growing Robusta, Karpooruvally, Malbhog, Champa and Adukkar.</li> <li>• Grow less susceptible varieties like Poovan, Kadali, Kunnan, Poomkalli.</li> <li>• Intercropping of banana with <i>Crotalaria juncea</i>, marigold reduces burrowing nematodes</li> </ul>
Leaf eating caterpillar	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Collect and destroy egg masses and caterpillars</li> <li>• Use burning torch to kill the congregating larvae</li> <li>• Summer ploughing to expose to the pupae.</li> </ul>

	<ul style="list-style-type: none"> <li>• Grow repellent plants: Ocimum/basil</li> <li>• Attractant plants: Carrot family, sunflower family, buckwheat, alfalfa, corn</li> <li>• Nectar rich plants with small flowers i.e anise, caraway, dill, parsley, mustard, sunflower, buckwheat and cowpea (Braconid wasp)</li> </ul> <p><b>Mechanical control:</b></p> <ul style="list-style-type: none"> <li>• Hand pick and destroy the egg masses and caterpillars</li> <li>• Collect and destroy the damaged plant parts.</li> <li>• Use pheromone @ 4-5 traps/acre.</li> <li>• Use light trap to attract and kill the adults.</li> </ul> <p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>• Field release of egg parasitoids such as <i>Telenomus spodopterae</i>, <i>T. remus</i></li> <li>• Encourage the activity of larval parasitoids <i>Ichneumon promissorius</i>, <i>Carveliaspp.</i>, <i>Campoletis chlorideae</i></li> <li>• Pupal parasitoids such as <i>Ichneumon</i> sp etc.</li> <li>• Predators such as <i>Chrysoperla zastrowi sillemi</i>, Coccinellids, King crow, Braconid wasp, dragonfly, spider, robber fly, reduviid bug, praying mantis, red ants</li> <li>• Conserve nematode such as <i>Ovomermis albicans</i></li> </ul>
Banana rhizome weevil	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Removal of pseudostems below ground level</li> <li>• Trimming the rhizome</li> <li>• Prune the side suckers every month.</li> </ul> <p><b>Mechanical control:</b></p> <ul style="list-style-type: none"> <li>• Pheromone lure ('cosmolure') can be used for monitoring as well as trapping of banana rhizome weevil. Installing traps at low trap density 2/acre.</li> <li>• Initially placed in a line of 10 meters from a border and 20 meters apart.</li> </ul>
Banana lacewing bug/ tingid bug	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Collect and destroy the damaged leaves, flowers and fruits along with life stages</li> </ul>
Banana thrips	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Collect and destroy the damaged leaves, flowers and fruits along with life stages</li> <li>• Use blue pan water sticky trap @ 4-5/acre</li> <li>• Destroy all volunteer plants and old neglected plantations. Use healthy and pest free suckers for planting</li> <li>• Hot water treatment of suckers prior to planting.</li> <li>• Bunch covers (which cover the full length of the bunch) protection applied very early.</li> <li>• Regular checking of fruit under the bunch covers is essential to ensure that damage.</li> <li>• Conserve predators such as coccinellid and lacewings</li> </ul>
Banana aphids	<p><b>Cultural control:</b></p>

	<ul style="list-style-type: none"> <li>• Use yellow pan water sticky trap @ 4-5/acre</li> <li>• Ensure clean cultivation</li> <li>• Encourage activity of predator coccinellids such as <i>Scymnus</i>, <i>Chilomenes</i></li> <li>• <i>sexmaculatus</i>, and lacewing, <i>Chrysoperla zastrowi sillemi</i></li> </ul>
Hard scale insect	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Collect and destroy the affected plant parts.</li> </ul> <p><b>Biological control:</b> Field release of coccinellid predators like <i>Chilocorus nigritus</i>, <i>Symnus coccivora</i></p>
Sigatoka disease	<p>Varieties: Ney Poovan, Pachanadan, Karpuravalli, Fhia 1 (Gold finger), Sannachenkadali</p> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Removal and destruction of the affected leaves.</li> <li>• Prevent water accumulation around the plant and go for periodical weeding.</li> <li>• Select tolerant varieties such as Ney Poovan, Pachanadan, Karpuravalli, Fhia 1 (Gold finger), Sannachenkadali</li> </ul>
Bunchy top disease	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Select suckers from disease free areas.</li> <li>• Infected plants are destroyed using 4ml of 2, 4, D (50g in 400 ml of water).</li> <li>• Remove weeds which are attractant to aphids.</li> <li>• Select tolerant varieties such as Poovan, Pachanadan</li> </ul>
Panama disease	<p>Varieties: Dwarf Cavendish, Robusta, Fhia 1 (Gold finger), Anai komban, Nivedya Kadali</p> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Avoid growing of susceptible cultivars viz., Rasthali, Monthan, Red banana and Virupakshi.</li> <li>• Grow resistant cultivar Poovan.</li> <li>• Removal and destruction of affected leaves followed by spraying with BM (1%) +linseed oil (2%).</li> <li>• Select tolerant varieties such as Dwarf Cavendish, robusta, Fhia 1 (Gold finger), Anai komban, Nivedya Kadali.</li> </ul>
Bunchy top disease	<p>Varieties: Poovan, Pachanadan</p> <p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Select suckers from disease free areas.</li> <li>• Infected plants are destroyed using 4ml of 2, 4, D (50g in 400 ml of water).</li> <li>• Remove weeds which are attractant to aphids.</li> <li>• Select tolerant varieties such as Poovan, Pachanadan</li> </ul>
Banana stem weevil	<p><b>Cultural control:</b></p> <ul style="list-style-type: none"> <li>• Remove dried leaves periodically and keep the field clean</li> <li>• Prune the side suckers every month</li> <li>• Use healthy and pest free suckers to check the pest incidence</li> <li>• Do not dump infested materials into manure pit</li> <li>• Uproot infested trees, chop into pieces and burn</li> <li>• Use longitudinally split pseudostem trap at 26/acre.</li> </ul>

	<ul style="list-style-type: none"> <li>• 2ml at 45 cm from ground level; another 2m at 150 cm from ground level.</li> <li>• Uproot infested trees, chop into pieces and burn.</li> </ul>
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### Black Pepper:

Pest/disease/crop stage	Pest Management Practices
Resistance and Tolerance Varieties	Panniyur-1, Panniyur-2, Panniyur-3, Panniyur-4, Panniyur-5, Panniyur-6, Panniyur- 7, Subhakara, Sreekara, Karimunda, Panchami, Pournami, Kottanadan, Kuthiravally, Arakulam Munda, Balankotta and Kalluvally are the commonly cultivated varieties. Of these, Panniyur-1 is to be grown in comparatively open areas.
<b>Pre sowing</b> Control Nematodes and soil pathogens	<p><u>Common cultural practices:</u></p> <ul style="list-style-type: none"> <li>• With the receipt of the first rain in May-June, primary stem cuttings of Erythrina sp.(Murukku) or Garuga pinnata (kilinjil) or Grevillea robusta (silver oak) are planted in pits of 50 cm x 50 cm x 50 cm size filled with cow dung and top soil, at a spacing of 3 m x 3 m which would accommodate about 1110 standards per hectare (Seedlings of Alianthus malabarica (Matti) can also be planted and the black pepper vines can be trailed on it after 3 years when they attain sufficient height).</li> <li>• Pits of 50 cm 3 at a distance of 30 cm away from the base, on the northern side of supporting tree are taken with the onset of monsoon.</li> <li>• The pits are filled with a mixture of top soil, farmyard manure @ five Kg/pit and 150 g rock phosphate. With the onset of monsoon, twothree rooted cuttings of black pepper are planted individually in the pits on the northern side of each standard. At least one node of the cutting Should be kept below the soil for better anchorage.</li> <li>• Follow the spacing recommended 3 m X 3 m in plain lands and 2 m X 4 m in sloppy lands.</li> </ul> <p><u>Botanical control:</u></p> <ul style="list-style-type: none"> <li>• Neem cake @ 1 Kg /vine may be mixed with the soil at the time of planting.</li> </ul>
Pollu beetle, Top shoot borer, Leaf gall thrips	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Regulation of shade in the plantation reduces the population of the pest in the field.</li> <li>• For others follow common practices.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Spraying Neem gold (0.6 per cent) (neem-based insecticide) during August, September and October is effective for the management of 24 the pest. The underside of leaves (where adults are generally seen) and spikes are to be sprayed thoroughly.</li> </ul>
Mealy bugs	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Removal of weeds and alternate host plants like hibiscus, bhindi,</li> </ul>

	<p>custard apple, guava etc in and nearby vineyards throughout the year.</p> <ul style="list-style-type: none"> <li>• Deep ploughing in summer or raking of soil in vineyards helps to destroy its nymphal stages and minimizing the incidence.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Release exotic predator, <i>Cryptolaemus montrouzieri</i> @ 10 beetles/vine.</li> </ul> <p><u>Physical control:</u></p> <ul style="list-style-type: none"> <li>• Detrash the crop on 150 and 210 DAP.</li> </ul>
Phytophthora foot rot (quick wilt), basal wilt	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Planting material must be collected from disease free gardens and the nursery preferably raised in fumigated or solarized soil.</li> <li>• Adequate drainage should be provided to reduce water stagnation.</li> <li>• Injury to the root system due to cultural practices such as digging should be avoided.</li> <li>• The freshly emerging runner shoots should not be allowed to trail on the ground. They must either be tied back to the standard or pruned off.</li> <li>• The branches of support trees must be pruned at the onset of monsoon to avoid build up of humidity and for better penetration of sunlight.</li> <li>• Reduced humidity and presence of sunlight reduces the intensity of leaf infection.</li> </ul>
Slow wilt	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Nematode free root cutting raised in fumigated nursery mixture should be used for fresh planting.</li> <li>• Remove the severely affected vines which are beyond recovery.</li> </ul>
Spike shedding, Stunt disease, Phyllody disease	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Use virus free healthy planting material</li> <li>• Regular inspection and removal of infected plants; the removed plants may be burnt or buried deep in soil.</li> <li>• Insects such as aphids and mealy bugs on the plant or standards should be controlled with insecticide spray.</li> </ul>

#### Coconut:

Pest/disease/crop stage	Pest Management Practices
<b>Nursery stage</b>	
Nematodes	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Use of less susceptible, tolerant cultivars or hybrids of coconut and intercrops in infested areas.</li> <li>• Avoid use of banana as a shade crop in coconut nurseries. Biological control:</li> <li>• Application of cow dung, FYM, oil cakes and green manure to the basins.</li> </ul>

	<ul style="list-style-type: none"> <li>• <i>Crotolaria juncea</i> may be cultivated in the basin and interspaces and used as green manure.</li> <li>• Incorporate leaves and tender stem of <i>Crotolaria juncea</i>, <i>Pueraria javanica</i> and <i>Glyricidia maculata</i> into the soil in Sep-OCT</li> </ul>
Pre planting stage  Soil borne pathogens, wilt, nematodes and resting stages of insect pests	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Deep ploughing of fields during summer.</li> <li>• Early sowing of the crop prevents it from nematode infestation</li> <li>• Liming the soil to pH 6.0-7.0, as well as reducing nitrogen levels in the soil, significantly reduces wilt.</li> </ul>
Rhinoceros Beetle	<p><u>Cultural Method:</u></p> <ul style="list-style-type: none"> <li>• Remove and burn all dead coconut trees in the garden (which are likely to serve as breeding ground) to maintain good sanitation.</li> <li>• Collect and destroy the various bio-stages of the beetle from the manure pits (breeding ground of the pest) whenever manure is lifted from the pits.</li> </ul> <p><u>Mechanical Method:</u></p> <ul style="list-style-type: none"> <li>• During peak period of population build up, the adult beetle may be extracted from the palm crown using GI hooks.</li> <li>• Set up light traps following the first rains in summer and monsoon period to attract and kill the adult beetles</li> </ul> <p><u>Trap Method:</u></p> <ul style="list-style-type: none"> <li>• Set up Rhino lure pheromone trap @ 5 traps/ha to trap and kill the beetles. The dispenser may be hanged in a plastic bucket having 2 liter of insecticide solution once in a week. Trapped beetles can be disposed off.</li> </ul> <p><u>Biological Method:</u></p> <ul style="list-style-type: none"> <li>• Application of green muscardine fungus, <i>Metarrhizium anisopliae</i> @ 5 x 10<sup>11</sup> spores / m<sup>3</sup> - spray 250ml <i>Metarrhizium</i> culture + 750ml water in manure pits to check the perpetuation of the pest.</li> <li>• Field release of <i>Baculovirus oryctes</i> inoculated adult rhinoceros beetle @ 15 beetles/ha reduces the leaf and crown damage caused by this beetle.</li> <li>• Soak castor cake at 1 kg in 5 liter of water in small mud pots and keep them in the coconut gardens to attract and kill the adults.</li> <li>• Apply mixture of either neem seed powder + sand (1:2) @150 g per palm or neem seed kernel powder + sand (1:2) @150 g per palm in the base of the 3 inner most leaves in the crown.</li> </ul>
Coconut Eriophyid Mite	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Grow intercrop (sun hemp, four crops/year) and shelter belt with <i>Casuarina</i> all around the coconut garden to check further entry.</li> <li>• Apply urea 1.3 Kg, super phosphate 2.0 Kg and muriate of potash 3.5 Kg/palm/year.</li> <li>• Increased quantity is recommended to increase the plant resistance to the mite.</li> <li>• Soil application of micro nutrients such as borax 50 g + gypsum 1.0</li> </ul>

	<p>Kg + manganese sulphate 0.5 Kg/palm</p> <p><b><u>Biological Method:</u></b></p> <ul style="list-style-type: none"> <li>Entomofungal pathogen <i>Hirsutella thompsonii</i> and <i>Verticillium lecanii</i> are reported to be promising in managing the mites. Both the pathogens are mass multiplied by a commercial firm and sold in the market.</li> </ul>
Red palm weevil	<p><b><u>Cultural control:</u></b></p> <ul style="list-style-type: none"> <li>Avoid the cutting of green leaves. If needed, they should be cut about 120 cm away from the stem in order to prevent successful inward movement of the grubs through the cut end. Mechanical control:</li> <li>Set up pheromone trap for red palm weevil @ 1 trap/100 ha by fixing it to the plant at 0.6 to 1 m height to trap and kill the beetles.</li> <li>Coconut log traps: Setting up of attractant traps (mud pots) containing sugarcane molasses 2½ Kg or toddy 2½ l (or pineapple or sugarcane activated with yeast or molasses) + acetic acid 5 ml + yeast 5 g + longitudinally split tender coconut stem/ logs of green petiole of leaves of 30 numbers in one acre to trap adult red palm weevils in large numbers.</li> </ul>
Leaf eating caterpillar / black headed caterpillar	<p><b><u>Cultural control:</u></b></p> <ul style="list-style-type: none"> <li>As a prophylactic measure, the first affected leaves may be cut and burnt during the beginning of the summer season</li> </ul> <p><b><u>Biological methods</u></b></p> <ul style="list-style-type: none"> <li>Release the larval (<i>Bethylid</i>, <i>Braconid</i> and <i>Ichneumonid</i>) and pupal (<i>Eulophid</i>) on (chalcid) parasitoids and predators periodically from January, to check the build up of the pest during summer.</li> <li>Among the larval parasitoids, the Bethylid, <i>Goniozus nephantidis</i>, (<i>Elasmus nephantidis</i> (brown species) and <i>Brachymeria nosatoi</i> – KAU) is the most effective in controlling the pest. The optimum level of release is 1:8 of host-parasitoid ratio. The parasitoid should be released @ 3000/ha under the coconut trees when the pest is in the 2nd or 3rd instar larval stage. Parasitoid release trap may be used to release the parasitoid at the site of feeding. Parasitoids should not be released in the crown region since they will be killed by predators like spiders and reduviid bugs.</li> </ul>
Coried Bug	<p><b><u>Mechanical Method:</u></b></p> <ul style="list-style-type: none"> <li>Set up light traps to trap and collect adult moths.</li> </ul>
Bud rot	<p><b><u>Cultural Method:</u></b></p> <ul style="list-style-type: none"> <li>Provide adequate drainage in gardens.</li> <li>Adopt proper spacing and avoid over crowding in bud rot prone gardens.</li> </ul>
Leaf Rot Disease	<p><b><u>Physical Method:</u></b></p> <ul style="list-style-type: none"> <li>Remove the rotten portions from the spear and the two adjacent leaves.</li> </ul>

**Ginger:**

Pest/disease/crop stage	Pest Management Practices
Pre Plantation Resting stages of diseases & pests and nematodes	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Deep summer ploughing during summer.</li> <li>• Soil solarization: Cover the beds with polythene sheet of 45 gauge (0.45 mm) thickness for three weeks before sowing for soil solarization which will help in reducing the soil borne pests.</li> <li>• Apply neem cake @ 8 qt/ acre.</li> </ul>
Soft rot/yellows	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Use of resistant/tolerant varieties to rhizome wilt/ rot.</li> <li>• Crop rotation with maize, cotton, soybean. • Plant disease free seed rhizomes. • Use raised beds.</li> <li>• Flooding treatment for 30 days, soil solarization during hottest months for 60 days • Treat the rhizomes with hot water at 47° C for 30 minutes.</li> <li>• Use bio-fumigation using cabbage and mustard plant refuses</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Planting of perennial /seasonal flowering plants like basil, marigold, fennel, sunflower etc. along the border to attract and enhance the population of biocontrol agents for managing pests/disease.</li> <li>• Application of pine needle or neem cake powder treatments @ 0.8t/acre</li> </ul>
Bacterial wilt	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Soil solarisation for 60 days during summer • Planting of disease-free seed rhizomes.</li> <li>• Use crop rotation with non-host crops like ragi, paddy, maize, sorghum etc.</li> <li>• Avoid crop rotation with tomato, potato, chillies, brinjal and peanut, as these plants are hosts for the wilt pathogen Ralstonia solanacearum.</li> <li>• Rhizome treatment with hot water 47o C for 3 minutes.</li> <li>• Use bio-fumigation using cabbage and mustard plant refuses.</li> </ul>
Rhizome fl y	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Use preventive measures like destruction of stray plants in off season, selection of healthy rhizome for planting.</li> <li>• Removal and destruction of rotting rhizomes along with the maggots from the field after the harvest of the crop may help to check the breeding of the pest.</li> <li>• Intercropping ginger with paddy or other crops reduces or lessens pest attacks.</li> </ul>
Leaf roller	<p><u>Cultural control:</u></p> <p>Intercropping ginger with paddy or other crops reduces or lessens pest attacks.</p>
Soft rot	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Ensure proper drainage. Adopt phytosanitary measures like infected plants should be uprooted and destroyed.</li> </ul>

	<ul style="list-style-type: none"> <li>• Mulching with green leaves (Vitex negundo) @ 4-4.8 t/acre is at the time of planting (it is repeated @ 2 t/acre 40 and 90 days after planting). Biological control:</li> <li>• Cow dung slurry or liquid manure may be poured on the beds after each mulching to enhance microbial activity and nutrient availability.</li> </ul>
Bacterial wilt	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Ensure proper drainage.</li> <li>• Ensure crop rotation with cereal crops</li> </ul>
Rhizome scale	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Collect and destroy damaged leaves</li> <li>• Apply well rotten sheep manure @ 4 t/ acre in two splits or poultry manure in 2 splits</li> </ul>
Rhizome development stage Shoot Borer	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Use the attractant plant for natural biocontrol conservation.</li> <li>• Cut open the shoot and pick out the caterpillar and destroy. Spray neem oil (0.5%) at fortnightly intervals if found necessary.</li> <li>• Mulching with green Vitex negundo leaves @ 2 t/acre at 40 and 90 days after planting. Biological control:</li> <li>• Conserve the natural bioagents such as ladybird beetle, spiders, Chrysopids, Trichogrammatids, Bracon sp (larval), myosoma sp (larval), Apanteles sp (larval) , Xanthopimpla sp (larval and pupal) etc.,</li> <li>• Release Trichogramma chilonis @ 40000/ acre.</li> </ul>
Rhizome fly	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Destroy stray plants in off season</li> <li>• Select and plant healthy rhizomes.</li> <li>• Remove and destroy rotting rhizomes along with the maggots from the field after the harvest of the crop.</li> <li>• Ecological engineering in ginger with paddy reduces pest attacks.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Conserve or inundate the natural bioagents such as ladybird beetle, spiders, Chrysopids, Trichogrammatids etc</li> </ul>
Skipper/ leaf roller	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Collect and destroy the larvae, egg masses</li> <li>• Do not allow the weed host to grow near the field</li> </ul> <p>Biological control</p> <ul style="list-style-type: none"> <li>• Conserve the natural bioagents such as ladybird beetle, spiders, Chrysopids, Trichogrammatids, Bracon sp (larval), myosoma sp (larval), Apanteles sp (larval) , Xanthopimpla sp (larval and pupal) etc.,</li> <li>• Release of Trichogramma chilonis @ 20,000 per acre.</li> </ul>
White grub	<p><u>Cultural methods</u></p> <ul style="list-style-type: none"> <li>• Up root the infested plants, collect and destroy the infected plant along with larva.</li> <li>• Use well decomposed FYM</li> <li>• Installing light traps immediately after first monsoon showers</li> <li>• Tilling of the soil during land preparation and solarisation practices that can reduce the chances of insect pests, particularly in controlling white grubs which get exposed at the time of tilling and are foraged by the birds. Biological control</li> <li>• EPN Steinernema sp. can be mixed in the FYM and can be applied in</li> </ul>

	the field
Harvesting & storage	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Select healthy rhizomes from pest &amp; disease free beds • Store the harvested rhizomes free from pest/disease in pits dug under shade, the floor of which is lined with sand or saw dust.</li> <li>• It is advisable to spread layers of leaves of Glycosmis pentaphylla (Panai).</li> <li>• Cover the pits with coconut fronds.</li> <li>• Destroy the soft rot/ bacterial rot infected rhizomes.</li> </ul>

### Sugarcane:

<b>Pest/disease/crop stage</b>	<b>Pest Management Practices</b>
<p><b>Pre Sowing</b> Soil &amp; seed borne diseases, insect pests</p>	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Select tolerant / resistant varieties</li> <li>• Select the seed cane from aerated steam treated nurseries</li> <li>• Crop like potato, mustard, lentil, pulses and winter vegetables can be grown as inter crop during autumn planted sugarcane i.e. Oct-Nov &amp;, sunflower, soybean, green gram , groundnut etc. during Feb-March planted sugarcane to reduce the pests population and to conserve bioagents of white woolly aphid and other pests</li> <li>• Adopt paired row method of planting</li> </ul>
Nematodes	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Deep ploughing, solarisation, flooding, crop rotation and apply organic manure.</li> <li>• Under wetland conditions, intercropping with sun hemp or marigold or daincha</li> <li>• Apply pressmud at 6 t/acre or poultry manure @ 0.8 t/acre or neem cake</li> <li>• 0.8 t/acre or poultry manure @ 0.4 t/acre before last ploughing.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Application of biocontrol agents like Pochonia chlamydosporia, Paecilomyces lilacinus or Trichoderma viride or Pseudomonas fluorescens @ 4 Kg/acre at the time of planting mixed with moist FYM or cured pressmud and distributed uniformly helps in suppressing the plant parasitic nematodes</li> </ul>
Early shoot borer, root borer	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Deep summer ploughing</li> <li>• Inter culture and hand weeding</li> <li>• Timely irrigation</li> <li>• Light earthing up of crops three months after planting</li> <li>• Grow onion/garlic/coriander as intercrop</li> <li>• In ratoon crop mulching with trash reduce shoot borer attack</li> </ul> <p><u>Mechanical control:</u></p> <ul style="list-style-type: none"> <li>• Use of pheromone traps @ 4-5/acre for monitoring</li> <li>• Remove and destroy the dead hearts along with larvae</li> </ul>

	<ul style="list-style-type: none"> <li>• Installation of light trap with exit option for natural enemies @ 1 per acre</li> <li>• Biological control:</li> <li>• Release 125 gravid females of <i>Sturmiopsis inferens</i> a tachinid parasitoid per acre.</li> <li>• Release <i>Trichogramma chilonis</i> @ 20,000/acre @ 10 days interval at the time of incidence.</li> </ul>
Top shoot borer	<p><u>Mechanical control:</u></p> <ul style="list-style-type: none"> <li>• Collection and destruction of adult moths</li> <li>• Collection and destruction of egg masses</li> <li>• Collection and destruction of dead hearts</li> <li>• Use of pheromone traps @ 4-5/acre for monitoring coinciding with brood emergence</li> <li>• Installation of light trap with exit option for natural enemies @ 1/ acre</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Release of <i>Trichogramma</i> spp. @ 20,000/acre 2-3 times at 10 days interval</li> </ul>
White grubs and Termites	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Remove stubble and debris of previous crops</li> <li>• Dig the termatoria and destroy the queen.</li> </ul> <p><u>Physical control:</u></p> <ul style="list-style-type: none"> <li>• Locate and destroy the termite colony and affected setts.</li> <li>• Set up light trap for trapping of white grubs adults and kill them in kerosene oil water.</li> <li>• At onset of monsoon collect and destroy the adult beetles by shaking the branches of trees on which they settle during night.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Entomopathogenic nematodes (EPNs) can be sprayed at the rate of 100 million nematodes per acre, in root grub and termite infested sugarcane fields OR</li> <li>• EPN infected cadavers of <i>Galleria/Corcyra</i> larvae containing live infected juveniles (IJs) are implanted in soil at plant bases at the rate of four cadavers per plant during May/ June and/or September for sugarcane root grub control.</li> </ul>
Scale insect	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Use resistant/tolerant varieties.</li> <li>• Select the healthy and pest free setts for planting.</li> <li>• Keep the fields and bunds free from weeds.</li> <li>• Avoid water stagnation in the field for the longer period.</li> <li>• Avoid repeated ratoons.</li> </ul> <p><u>Physical control:</u></p> <ul style="list-style-type: none"> <li>• Detrash the crop at 150th and 210th day of planting.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Release coccinellid predators.</li> </ul>
White woolly aphid	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• De-trashing of canes if infestation exceeds low intensity and remove water shoots.</li> </ul>

	<ul style="list-style-type: none"> <li>• Paired row system of planting.</li> <li>• Avoid excessive use of nitrogenous fertilizers.</li> <li>• Use of organic fertilizers.</li> <li>• Rapping of canes all along the rows.</li> <li>• Do not transport Infested tops</li> <li>• Infested canes should not be used as seed for planting.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Conserve and augment the natural enemies</li> <li>• Create congenial conditions for promoting entomo pathogens such as Cladosporium oxysporum, Metarhizium anisopliae, Verticillium lecanii and Beauveria bassiana.</li> </ul>
Internodes borer,	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Proper water management to avoid lodging</li> <li>• De-trashing of canes and removal of water shoots once in a month from 5th months on wards.</li> <li>• Balanced doses of fertilizers.</li> <li>• Use of pheromone traps @ 4-5/acre</li> </ul> <p><u>Biological method:</u></p> <ul style="list-style-type: none"> <li>• Release egg parasitoid, Trichogramma chilonis @ 20,000/acre six releases at fortnightly intervals starting from 4th month onwards.</li> <li>• Setting pheromone traps at spindle level on 5th month of the crop @ 4-5 traps/acre 15 meter grid. The pheromone septa need to be changed twice at 45 days interval</li> </ul>
Whitefly	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Clipping of infested leaves.</li> <li>• Avoid water stress and water logged conditions.</li> <li>• Avoid planting in low land areas</li> <li>• Synchronization of sugarcane planting and harvesting maybe adopted zone wise.</li> </ul> <p><u>Mechanical control:</u></p> <ul style="list-style-type: none"> <li>• Detrashing the puparia bearing leaves and immediately disposing by burning or burying to prevent emergence of adult whiteflies.</li> <li>• Use yellow sticky trap.</li> </ul> <p><u>Biological Control:</u></p> <ul style="list-style-type: none"> <li>• Conserve and augment the natural enemies such as Encarsia sp, Eretmocerus spp.,</li> <li>• Mirid bug, dragonfly, spider, robber fly, praying mantis, fire ants, coccinellids, lacewings, big eyed bugs (Geocoris sp) etc</li> </ul>
Mealy bug	<p><u>Cultural control:</u></p> <ul style="list-style-type: none"> <li>• Use resistant/tolerant varieties</li> <li>• De-trashing of canes and removal of water shoots.</li> <li>• Drain excess water from the field and avoid water stress conditions.</li> </ul> <p><u>Biological control:</u></p> <ul style="list-style-type: none"> <li>• Conserve and augment the natural enemies such as Chilocorus, Hyperaspis, Chrysoperla, Aphytis, Coccophagus and Encarsia etc.</li> </ul>
Red rot, smut, grassy	<p><u>Cultural control:</u></p>

shoot, wilt, leaf scald, red stripe, mosaic diseases**, rust** and pokkahboeng**	<ul style="list-style-type: none"> <li>• Use resistant or moderately resistant varieties.</li> <li>• Any sett showing reddening at the cut ends or at the nodal region should be discarded.</li> <li>• Healthy setts should be planted. Such setts must be produced from crop raised from heat treatment of seed canes in moist hot air at 54° C for 2.5 hour at 99% humidity.</li> <li>• Remove affected clump along with root system and burn.</li> <li>• Bunding of affected field should be done to avoid movement of rain or floodwater to healthy fields.</li> <li>• Ratooning of diseased crop should be avoided.</li> <li>• Diseased crop should be harvested as early as possible.</li> <li>• Crop rotation should be followed in affected fields.</li> <li>• Use yellow sticky traps for the control of aphid vector.</li> </ul>
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**Arecanut:**

<b>Pest/disease/crop stage</b>	<b>Pest Management Practices</b>
Basal stem rot/foot rot/anaberoga/Ganoderma Wilt	<u>Cultural control:</u> <ul style="list-style-type: none"> <li>• Improve drainage.</li> <li>• Avoid dense planting.</li> <li>• Avoid flood irrigation and water flowing from infected palms to healthy palms.</li> <li>• Avoid repeated ploughing and digging in the diseased gardens.</li> <li>• Balanced manuring and fertilizer application.</li> <li>• Cutting and burning of dead palms along with the bole and roots should be followed strictly</li> </ul>
Yellow leaf disease	<u>Mechanical control:</u> <ul style="list-style-type: none"> <li>• Remove and destroy the diseased palms in the mildly affected areas to prevent the spread. Cultural control</li> <li>• Biomass recycling and excess application of phosphorus 100g/palm</li> </ul>
Bud rot	<u>Mechanical control:</u> <ul style="list-style-type: none"> <li>• Remove and destroy the diseased palms in the mildly affected areas to prevent the spread.</li> </ul>
Root grub	<u>Cultural control:</u> <ul style="list-style-type: none"> <li>• Deep summer ploughing to expose the immature stages for avian predation. Mechanical control:</li> <li>• Collection and destruction of beetles emerging from the soil during pre-monsoon showers in the evening hours</li> <li>• Install light traps @ 1 trap/acre and operate between 6 pm and 10 pm</li> </ul> <u>Biological control:</u> <ul style="list-style-type: none"> <li>• Conserve and augment entomopathogenic nematodes such as Heterorhabditis spp. and Steinernema spp.</li> <li>• Application of neem cake @ 2 Kg/palm/year at the base of the plant during June-July</li> </ul>
Inflorescence caterpillar	<u>Mechanical control:</u>

	<ul style="list-style-type: none"> <li>Affected spadices may be opened and if all the female flowers have been damaged the inflorescence should be removed and 25 burnt</li> </ul>
Phytophagous mite	<u>Cultural control:</u> <ul style="list-style-type: none"> <li>Collect and destroy the heavily infested and drying leaves of young palm in the initial foci of colonization</li> </ul>
Scales	<u>Biological control:</u> <ul style="list-style-type: none"> <li>Release <i>Chilocorus nigritus</i> periodically @ 4-5 beetles/palm</li> <li>Conserve predators such as coccinellid beetles (<i>C. nigritus</i> and <i>C. circumdatus</i>)</li> </ul>
Spindle bugs	<u>Cultural control:</u> <ul style="list-style-type: none"> <li>Digging and forking of the soil before and after the monsoon will help in eliminating the various developmental stages of the beetle.</li> </ul>

(Source: Farmer Portal, Ministry of Agriculture, Government of India,-  
<http://farmer.gov.in/IPMPackageofPractices.html>)

## ***Annexure 5***

### **Environmental Guidelines for Producer Collectives**

#### **1) Agriculture**

##### *Compulsory actions*

- Take license to sell, stock, exhibit and distribute pesticides from the competent authority.
- If pesticides are to be sold or stocked at more than one place, take separate licenses for every such place.
- Display the license in a prominent part of the premises that is open to public.
- Do not sell pesticides in classes Ia, Ib, and II (WHO Classification of Pesticides by Hazard)
- Do not sell pesticides without ISI Mark Certification.
- Do not stock or sell any insecticide unless it is: properly packed, properly labelled (including name of active ingredient, expiry date, toxicity level, etc.) and the package includes information leaflet (including safety guidelines).
- Do not change or remove any inscription or mark made by the manufacturer on the container, label or wrapper of any pesticide.
- For sale of the insecticide Sulphur and its formulations, maintain a separate register showing names and addresses of all the persons to whom it has been sold or distributed and the quantities to be sold or distributed.
- Do not sell or store pesticide in the same building where any articles consumable by human beings or animals are manufactured, stored or exposed for sale. Store in a separate room which is well built, dry, well-lit and ventilated and of sufficient size.
- Immediately after the date of expiry segregate and stamp all such stocks as 'not for sale' and keep in a separate place with clear sign displaying that it is date-expired pesticide. Dispose these stocks in an environment friendly manner taking advice from the Pollution Control Board.
- Take license to sell fertilizers from the competent authority (Dy. Director, Agriculture).
- Do not sell fertilizers without ISI Mark Certification.
- For seed production obtain license from the competent authority.

##### *Good practices*

- Maintain proper records of procurement and sale of pesticides specifying the brand name and name of active ingredients.
- Stock and promote sale of safety gear to be used while handling pesticides (for example, hand gloves, plastic masks, etc.).
- Stock and sell inputs/equipment for non-chemical pest management (neem oil, pheromone traps, etc.).
- Stock and sell bio fertilizers and organic manures such as neem seed cake, vermicompost, etc.
- Provide soil testing and fertilizer recommendation services to member farmers.
- Coordinate with Department of Agriculture and Krishi Vigyan Kendra to provide training to farmers on integrated pest and nutrient management suitable for the region.

## 2) Dairy

### *Compulsory actions*

- Take required permission from Pollution Control Board to establish and operate a milk processing unit.
- Coordinate with Forest Department for permission to member farmers for grazing of livestock in forest area.

### *Good practices*

- Encourage fodder management practices among member farmers including – fodder cultivation, rotational grazing, fodder enrichment, etc.
- Encourage composting by member farmers.
- Ensure hygiene in the milk cooling / processing unit premises.
- Dispose waste water from the milk cooling / processing unit premises into a soak pit located at least 15 metres away from any drinking water hand pump or tubewell.
- Coordinate with Department of Agriculture/Animal Husbandry for training/technical support to member farmers on fodder management and composting.

## 3) NTFP

### *Compulsory actions*

- Take required permission from Forest Department for collection, storage, transport, sale, processing of forest produce including NTFP.
- Coordinate with Forest Department for permission to members for collection of NTFP.

### *Good practices*

- Ensure proper storage of NTFP (ventilation, humidity control, etc.) to prevent wastage of produce and to avoid health risk.
- Encourage sustainable NTFP harvesting practices among members.
- Coordinate with Forest Department or other technical support agencies (NGOs) for training/technical support to members on sustainable NTFP harvesting.

## 4) Enterprises

### *Compulsory actions*

- License has to be obtained for legal compliance and maintenance of quality standards.
- As per scale of operations; registration of unit under DIC is required. Local Gram Panchayat/ Municipality to be intimated about operations
- Provision of safety measures like nose masks, hand gloves, Provision of first aid box, fire safety, spacious and ventilated workspace, proper pest free storage areas.
- Members should be aware of safety precautions during use of machines and tools. First aid kit should be kept handy.

### *Good practices*

- Workforce handling the production and packaging section should be healthy and handle product in hygienic manner to avoid contamination
- Waste generated during activities may be managed for better productivity, reducing negative impacts and explore scope for re-use.
- The work space should be well ventilated, provided with drinking water and toilet facilities
- Arrangements for toilets/rest rooms to be available and decent working conditions for workers.

## Annexure 6

### Guidelines for collection of most Common Non Timber Forest produce:

Scientific Name	Common Name (C.N.) & Local Name (L.N.)	Useful part/s of Plant	Tips for collection/extraction
<i>Strychnos nuxvomica</i>	C.N.: Nuxvomica L.N.: Yetti	Seed	<ul style="list-style-type: none"> <li>• Seeds that are collected from the ground are of lower quality and therefore fetch lesser prices than seeds that are collected from the trees.</li> <li>• Seeds should be cleaned, sun-dried and stored in gunny bags to avoid loss of alkaloid content and to retain good quality over long periods of time</li> </ul>
<i>Sapindus trifoliatus, var: emarginatus</i>	C.N.: Soap Nut L.N.: Ponnai Kottai	Fruit	<ul style="list-style-type: none"> <li>• The round bunches of fruits ripen from mid-March to April</li> <li>• 3 grades of fruit:               <ul style="list-style-type: none"> <li>- 1<sup>st</sup> grade: large sized shining brown fruits</li> <li>- 2<sup>nd</sup> grade: small sized shining brown fruits</li> <li>- 3<sup>rd</sup> grade: small and blackish-brown fruits</li> </ul> </li> </ul>
<i>Asparagus racemosus</i>	C.N.: Sathaveri	Root	<ul style="list-style-type: none"> <li>• For regeneration of two common species <i>Asparagus sprengeri</i> and <i>Asparagus pulmosus</i>:               <ul style="list-style-type: none"> <li>- Rich soil, plenty of water and occasional application of liquid manure is useful</li> <li>- They thrive in partial shade and at 15-26 degrees Centigrade</li> </ul> </li> <li>• Only 75% of the produce needs to be collected. The mother root should be left untouched. After extraction the pit should be cover with soil properly.</li> </ul>
<i>Azadirachta indica</i>	C.N.: Neem L.N: Vempu	Fruit	<ul style="list-style-type: none"> <li>• Fruit bearing begins when the tree is 4-5 years and continues for about 100 years</li> <li>• Fruits mature in May-June in S. India</li> <li>• Absolute yellow coloured fruits are ripe and should be harvested. They should not be allowed to fall on the ground or collected after they have fallen to the ground</li> <li>• This is because fallen fruits have the risk of picking up moisture from the ground. At moisture content above 14% neem</li> </ul>

		Seed	<p>fruits carry the fungus <i>Aspergillus flavus</i>. These fungi under many conditions produce aflatoxins. Aflatoxins are extremely potent carcinogens and could also contaminate seeds inside the fruits.</p> <ul style="list-style-type: none"> <li>• Fruits should be harvested by shaking tree branches as well as plucking fruits. A cloth or tarpaulin has to be spread under the tree to prevent the fruit from contacting the ground.</li> <li>• Fresh fruits should be collected in the morning</li> <li>• These fruits should not be mixed with semi-dried fruits that are collected from the ground.</li> <li>• Moisture in commercial Neem fruits should be between 6-9% and after drying 5%</li> <li>• Collected fruits should be kept immediately in warm water to avoid fungal growth. Soaking for 12-24 hours also softens the pulp</li> <li>• Seeds should be spread in thin layers on gunny bags or perforated sheets for sun drying in an open space/partially covered space</li> <li>• Cold storage of seeds prolongs shelf life</li> <li>• Dried seeds should be stored in airy containers, jute or perforated bags but never in plastic bags at room temperature under moisture free conditions: the seeds can be stored up to 1 year</li> <li>• After collection and drying of seeds immediate transport arrangements should be made for processing</li> </ul>
<i>Terminalia chebula</i>	C.N.: Myrobalan L.N: Kadookai	Fruit	<ul style="list-style-type: none"> <li>• Collection: January-April</li> <li>• Collect mature fruits by shaking trees and then dry in thin layers, preferable in the shade</li> <li>• The fruit is preferred for medicinal purposes when it is: <ul style="list-style-type: none"> <li>○ the size of a barley corn</li> <li>○ the size of a raisin</li> <li>○ fully grown, heavy large-sized</li> </ul> </li> </ul>

			<ul style="list-style-type: none"> <li>• having a golden brown colour</li> <li>• The fruit is preferred for tanning purposes when it is: <ul style="list-style-type: none"> <li>○ greenish-yellow and somewhat hard</li> <li>○ nearly mature</li> </ul> </li> </ul>
<i>Tamarindus indica</i>	C. N.: Tamarind L.N: Puli	Fruit (large flat pod)  Tender leaves, flowers & seedlings	<ul style="list-style-type: none"> <li>• Fruit bearing begins at the age of 13-14 years and continues for more than 60 years</li> <li>• Pods ripen during cold season</li> <li>• Pods should be allowed to ripen on the tree until the outer shell is dry and can be separated from the pulp easily</li> <li>• Pods should be harvested by shaking the branches. They should not be beaten down with sticks as this injures the blossoms and buds of future leaves <ul style="list-style-type: none"> <li>○ Flowers appear in April-June</li> <li>○ Edible purposes</li> </ul> </li> </ul>
<i>Strychnos potatorum</i>	C.N.: Clearing Nut	Fruits  Seed	<ul style="list-style-type: none"> <li>• Green globose fruits ripen from October to March</li> <li>• Seeds are collected during February-March <ul style="list-style-type: none"> <li>○ Pulp must be washed off to obtain the seed.</li> <li>○ Dry the seed in the shade</li> </ul> </li> </ul>
<i>Madhuca indica</i> <i>Madhuca latifolia</i> <i>Madhuca langifolia</i>	C.N.: Mohwa L.N: Nattu illupppai	Flower  Fruit	<ul style="list-style-type: none"> <li>• Falls to the ground during February-April</li> <li>• Ground under the tree should be cleaned to facilitate collection</li> <li>• Drying of flowers should be done with less exposure to light to retain colour and quality</li> <li>• Flowers can be stored in bulk clarification</li> <li>• Buyers look for good quality flowers that resume their shape after being pressed in a fist once or twice</li> <li>• Trees bear fruit at age of 8 years and continue to do so for next 60 years</li> <li>• Mature fruit falls to the ground in August-September in S. India</li> <li>• Mature fruits are green egg-sized and pulpy</li> <li>• Seeds containing more than 8% moisture</li> </ul>

		Seed	<p>are liable to fungal attack when stored</p> <ul style="list-style-type: none"> <li>• Seeds should be properly dried before storing</li> <li>• Seeds from fully ripe fruits that are shed from trees with little effort are usually of good quality</li> <li>• Immature and dull-coloured seeds are obtained from relatively immature fruits that are obtained by shaking the branches</li> </ul>
<i>Sterculia urens</i>	C.N.: Gum Karaya L.N: Velley Putali	Gum	<ul style="list-style-type: none"> <li>• Season: around the year.</li> <li>• Best quality material is obtained from January-June when flow is more copious due to hot weather</li> <li>• Single tree should not be tapped continuously as it will effect the tree vitality in long run</li> <li>• For tapping gum, the tree should be at least 3 ft in girth</li> <li>• Blazing should be confined to main stem 3 ft from ground level</li> <li>• Gum should be dried (sun/tray drying for 5-15 days) properly before storage in bags since excess moisture in the material may lead to change of colour from white to dark. There is also danger of fungal attack</li> <li>• Powdered gum should be stored in airtight containers</li> </ul>
<i>Phyllanthus emblica</i>	C.N.: Aamla L.N: Nelli	Fruit  Fruit, Bark, Leaves	<ul style="list-style-type: none"> <li>• Appropriate harvesting time for fruit is February</li> <li>• Fruit is light green when tender and changes to light yellow or brick-red colour when mature</li> <li>• Fruit can be collected either by vigorous shaking of the Aamla tree or by using a long bamboo pole with an attached hook rich in tannin</li> </ul>
<i>Laccifer lacca</i>	C.N.: Lac	Lac is the secretion of a tiny insect <i>Laccifer lacca</i> that depends on the following major host	<ul style="list-style-type: none"> <li>• The general health and strength of the tree should be maintained by avoiding excessive pruning</li> <li>• Cutting should be done so as to allow plenty of room for growth of new shoots</li> <li>• Ordinarily branches exceeding 2“ in</li> </ul>

		<p>trees:  Acacia  catechu  (Khair)  Zizyphus  mauritiana  (Ber)  Zizyphus  xylopyra  (Ghont)  Butea  monosperma  (Palas)  Schleichera  oleosa  (Kusum)</p>	<p>diameter should not be cut</p> <ul style="list-style-type: none"> <li>• Best results are obtained by cutting branches that are 1-2” in diameter</li> <li>• Thin branches under 1/2” diameter should be cut close to the branches or trunk from which they originate.</li> <li>• Dead and diseased branches should be removed and split or broken branches should be cut below the split or break</li> </ul>
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## ***Annexure 7***

### **The format for Environmental Appraisal of Business Plans:**

Name of the Enterprise:

Village:

Cluster:

Block:

District:

Activity proposed:

1. Screening was done or not (Yes or No):
2. Any activity that falls under negative list, if yes required permissions are taken or planned to be taken, (or) the particular activity is dropped or changed: (give details)
3. Categorization of activity (White, Orange, Green, Red) – (Please tick)
4. Details of environment guidelines integrated and support requested

<b>Environment Issue identified</b>	<b>Environment Guidelines or mitigation measures integrated</b>	<b>Greening Measures identified</b>	<b>Support requested (training, budget etc.)</b>	
		(for green, orange and red categories)	To implement the mitigation measures	To implement the greening measures

Name and Signature of Appraiser/CP:

Details of environmental Appraisal:

## ***Annexure 8***

### **Integration Environment aspects into District Diagnostic Studies**

<u>Land Use</u>	
▪ <u>Current Status</u>	
▪ Trends in Land-Use	
▪ Current Issues	
<u>Rainfall</u>	
▪ Trends	
▪ Implications	
<u>Cropping Pattern</u>	
▪ Trends in Cropping Pattern	
▪ Current Issues	
<u>Crop Varieties</u>	
▪ Current Status	
▪ Trends in Crop Varieties	
▪ Issues	
<u>Fertilizer and Manure Application</u>	
▪ Current Status	
▪ Trends	
▪ Factors contributing	
<u>Pest Incidence and Pesticide Usage</u>	
▪ Current Status	
▪ Trends in Pesticide Usage	
▪ Issues	
<u>Crop Yields</u>	
▪ Trends in Crop Yields	
▪ Factors Contributing	
<u>Agro-forestry</u>	
▪ Current Status	
▪ Trends in Argo-forestry	

▪ Issues	
<u>Livestock Population</u>	
▪ Current Population	
▪ Trends Population	
▪ Factors contributing	
▪ Issues	
<u>Grazing Resources</u>	
<u>Area</u>	
<u>Present condition</u> (Degraded pasture land/ encroachment/ Cultivation/ legal issues with panchayat, PWD etc)	
<u>Water resources</u>	
▪ Current Sources	
▪ Issues	
<u>Soil Quality</u>	
<u>Energy Sources</u>	
<u>Enterprises</u>	
▪ Common enterprises (top 2 to 3)	
▪ Raw materials used	
▪ Natural Resources used	
▪ Scope for expansion,	
▪ <u>Key environmental issues</u>	
▪ Energy source and consumption	
▪ Water Usage	
▪ Waste disposal.	

## ***Annexure 9***

### **Integration of environmental aspects in Village Investment Plans**

#### **Natural Resources available in the villages**

<b>Resources</b>	<b>Current Issus</b>
Land	
Water bodies	
Forests	
Agriculture/ Horticulture	
Livestock	
Locally available herbs	
Building materials	

#### **Environmental issues in the villages**

<b>Resource degraded</b>	<b>Activities affected</b>	<b>Possible Intervention</b>

#### **Existing Income generation activities**

<b>Activities</b>	<b>Issues related to environment</b>

#### **Possible Green Enterprises**

<b>Resources available</b>	<b>Possible Green Enterprises</b>

## ***Annexure 10***

### **List of Few Green Enterprise Ideas**

- Organic Community Supported Agriculture
- Sustainable Fast Food
- Biodiesel Cooperative
- Organic Food Delivery Services
- Eco transport Rental Service
- Permaculture Design Service
- Car Sharing Service
- Organic Foods Caterer
- Green Wedding and Event Planner
- Green Franchise
- Organic Cosmetics
- Eco Fashion Designer
- Organic Garden Creation and Maintenance
- Sustainable Roofing
- Mobile Food Vendor
- Urban Farming and Permaculture
- Eco-Housing
- Solar powered Vehicle Rental
- Sustainable Foods Preparation and Cooking Instruction
- Recycled Paper Products
- Green Product/Building Supply Store
- Sustainable Printing Solutions Retail Store
- Organic Farming
- Upcycled Tyre Products
- Granite waste reuse for concreting and brick
- Banana fiber home décor products
- Eco tourism
- Wild honey collection
- Sugarcane waste table ware products
- Coconut shell table wares.
- Medicinal plants farming
- Vettiver cultivation and products
- Bio fuel
- Bio degradable sanitary napkins
- Natural dyes
- Solid waste management

## ***Annexure 11***

### **Negative List of Activities**

The activities contained in this list will not be supported by the project due to non conformance to local environmental legislations and due to major environmental implications.

*Due to non conformance with Rules and regulations of Government of Tamil Nadu, Government of India:*

#### Forest and Wildlife:

- Use of any forest land or any portion of it for any non forest purposes is not allowed without prior approval of the Central Government - Forest (Conservation) Act, 1980
- Activities like clearing, kindling fire, damaging trees (felling, girdling, lopping, topping, burning, stripping bark and leaves), quarrying stone, etc in reserved and protected forests is not allowed - *Tamil Nadu Forest Act, 1882* Any person desiring to sell the specified forest produce should sell to concern Government Officer or Agent at any Depot situated within the said area/unit - *Indian Forest Act, 1927*
- The divisional forest officer can issue transit permit for transportation of timber from farmers land to any place outside the district - *Tamil Nadu Timber Transit Rules 1968*
- Water flow in to or from any wild life sanctuary should not be stopped or diverted – *Wild Life (Protection) Act 1972*
- Destruction, exploitation or removal of any wild life including specified plants and forest produce from a sanctuary or the destruction or diversification of habitat of any wild animal, or diversion, stoppage or enhancement of the flow of water into or outside the sanctuary, cultivation of specified plants is prohibited without a permit granted by the Chief Wildlife Warden - *Wild Life (Protection) Act 1972*
- Do not permit activities like cattle grazing in sanctuaries without vaccination - *Wild Life (Protection) Act 1972*

#### Agriculture:

- A license is required for the sale, stock or exhibition of sale or distribution of any insecticide. (Insecticides Act, 1968).
- Do not allow stocking, exhibiting for sale, sell, offer for sale, stock or exhibit for sale or distribute any fertilizer which is not of prescribed standard – The Fertilizer (Control) Order, 1985
- No wells should be sunk in the notified areas without permission from Ground water Department Tamil Nadu Ground Water (Development and Management) Act 2003
- Use of banned and restricted pesticides by Government of India, Government of Tamil Nadu and WHO is not allowed (*Pest Management (OP 4.09)*)

#### Enterprises:

- Do not cause or permit any poisonous, noxious or polluting matter into stream or well or sewer or on land. – Water (Prevention and control of pollution) Act, 1974.
- Do not permit stream any other matter which may impede the proper flow of the water of the stream should not be allowed- *Water (Prevention and Control of Pollution) Act, 1974*

- Do not allow activities like curing, tanning of skins and hides near residential areas or water bodies<sup>2</sup>.
  - Tanning units should be 5 kms away from ecologically sensitive areas
  - Preferably half km away from flood plains affected by dam in the upstream or flood control system
  - Preferably half km away from high way or railway line
- Site located near water resources, lakes, ponds, rivers etc. used for drinking water purpose or bird sanctuaries with in 2 kms should not be allowed for tanning activity.
- Loud speakers should not be used without written permission from concerned authority (Local Police Station) - *The Noise Pollution (Regulation And Control) Rules 2000*
- Activities involving alcoholic beverages
- Construction activities involving use of asbestos
- Mining of sand, soil etc. without applicable permissions under *TN minor mineral concession rules*
- Any industrial activity (related to food processing or cottage industries) will not be supported without requisite permission from the State Pollution Control Board. Fruit and vegetable product manufacturing units are not allowed without license and use of banned food colours is not permitted. (*Food Products Standard and Food Additives) Regulations 2011*
- Consent for establishment and consent for operation is required from State Pollution Control Board for the following value addition/processing interventions falling under green and orange category industries:

<i>Examples for Orange category industries</i>	<i>Examples for Green category industries</i>
Poultry, hatchery, steeping and processing of grain, flour mills, handloom weaving and power looms (without dyeing and bleaching), organic manure	Rice mills, dal mills, fish/poultry fed manufacture, food processing (fruit and vegetable), spice grinding.

- Manufacture, sale and use of recycled and coloured plastic carry bags less than 20 microns in thickness in the state is banned and levying penalties for violation under Environment Protection Act, 1986 (Plastics Wastes Rules, 1999).
- No person shall slaughter any animal within a municipal area except in a slaughter house recognised or licensed by the concerned authority empowered under the law for the time being in force to do so The Prevention of Cruelty to Animals (Slaughter House) Rules, 2001
- For any projects causing water pollution, it is mandatory to obtain consent for discharge of effluents and pay consent fees to Tamil Nadu State Pollution Control Board (TNSPCB)

#### Fisheries:

- In coastal zones, activities which involve:
  - Discharge of untreated wastes and effluents
  - Harvesting or drawal of ground water within 200 m of High Tide Level in the 200 m to 500 m zone unless when done manually through ordinary wells for drinking, horticulture, agriculture and fisheries
  - Land reclamation, bunding or disturbing the natural course of sea water except those required for control of coastal erosion and maintenance or clearing of water ways, channels or for prevention of sandbars or for tidal regulators, storm water drains or

<sup>2</sup> Ministry of environment and forest, technical guidelines for leather/skin/hide processing industry, Sourced at <http://moef.nic.in/Manuals/CETP.pdf> accessed on 23th July 2010

- for structures for prevention of salinity ingress and sweet water recharge
- Mining of sands, rocks and other substrata materials
- Any construction activity between the Low Tide Line and High Tide Line in the CRZ-I and III without permission from the West Bengal State Coastal Zone Management Authority
- Construction of buildings on seaward side from the existing road in CRZ II

*Due to non conformance with World Bank's Environmental Safeguard Policies:*

- All activities financed by the project should go through environmental assessment - *Environmental Assessment (OP/BP/GP 4.01)*
- No activities should be carried in protected areas without prior written permission from State Forest Department - *Natural Habitats (OP/BP 4.04)*
- Activities that involve significant conversion or degradation of critical forest areas or related critical natural habitats are not allowed. – *Forests (OP/BP 4.36)*
- Activities involving significant excavations, demolition, movement of earth, flooding, or other environmental changes in, or in the vicinity of, a recognized physical cultural resources site will not be allowed without detailed assessment and management plan. – *Physical Cultural Resources (OP/BP 4.11)*
- Pesticides classified by WHO as falling in Class Ia (extremely hazardous), Ib (highly hazardous) and II (moderately hazardous) should not be used under project activities. Pesticides classified as class III (slightly hazardous) can be used along with integrated Pest Management measures - *Pest Management (OP 4.09)*.

## *Annexure 12*

### **Summary of Stakeholder Consultation Workshop**

#### **Social Assessment & Environmental and Social Management Framework (ESMF)**

**Date: 30.03.2017**

The Stake holder consultation workshop for Social Assessment (SA) and Environmental and Social Management Framework (ESMF) Stakeholder were organized by TNRTP and the respective agencies viz., Economic Perspectives Ltd and Center for Environment Education (CEE). The Objective of the consultation is to further strengthen the Framework and also it will help to take adequate support. Welcome note and Inaugural address were given by TNRTP staff and the Project Director. The Project Director requested for Beneficiaries' inputs, because the beneficiaries are the important stakeholder to decide the type of income generation activities.

#### **Key points in the presentation:**

- Tamil Nadu Rural Transformation Project will be inaugurated by April 2017. TNRTP is an extension of TNPVP.
- From July 1 2017 on TNRTP will function in 120 Non PVP blocks.
- Objective of TNRTP is mainly to uplift the job opportunities and value addition.

#### Social Assessment:

- Group activities are less in the field; the reasons are no working capital and not getting loan with lesser interest.
- 65 % of the communities are ready to do business/enterprises provided with required knowledge, funds & hand holding support.
- SHGs showed interest on doing Dairy, Floriculture and Food business. Concerns with middleman interventions in Horticulture and Floriculture were put forth by the beneficiaries.
- Farmer's producers companies & Value addition of Products is the key component to be focused on transforming the Livelihoods of the project beneficiaries.
- Differently abled, Psycho social, autistic, neurologically impaired persons are to be included in social assessment for the possibility of catering them in TNRTP

#### Suggestions on Environmental and Social Management Frame work:

- Process of Categorization and Responsibility: of activities; how it will happen and person in charge - All Business plans will be categorized into four (red, orange, green and white) based on PCB criteria. And Community Professionals with the help of Block Team will identify the categorization. Adequate training will be given for them to do Environmental Assessment.
- About Disposal method of sanitary napkin, since it is not infectious waste it will not be considered as a biomedical waste. The beneficiaries will be trained on proper disposal methods of used napkins. Innovative disposal machines will be explored as part of the Green Enterprises
- Carbon foot print of the business activities to be measured
- During District Diagnostic Studies ESMF components will be incorporated. This is to ensure that natural resources are being safeguarded and improved.

- 48 % population of Tamil Nadu is urban. Strengthening of existing Business & promotion is safer than going to totally new business. Both should be environmentally enhancing and should not damage the Environment.
- Develop skills and business for Local business.
- NTFP collection from forest – Training for alternative resource business can be given to – minimize the pressure on resources and to secure the resources from forests.
- Gulf of manner – more fisheries is going on and hence the Resources are getting depleted – We need to search for alternative business –TNRTP to handhold these alternate business.
- Women should come out of stereotypic work (Tailoring).
- Women are already involved successfully in the works like masonry, courier service, EB meter reading, and Auto driving in the TNPVP districts, such examples will be explored for TNRTP also

Glimpses:



Inaugural Talk by the PD



About TNRTP



Experts Discussion



About SA by Economic Perspective



About ESMF by CEE



Community Discussion

List of Participants:

Social Assessment Study & ESMF – State Level Stakeholders Consultation on 30.03.17 at PVP State Office

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