Detailed Project Report (DPR)
Model template
NHB Scheme No. 1

For **Mushroom Production Technology**

Scheme No…… Development of Commercial Horticulture through Production and Post-Harvest Management of Horticulture Crops:

1. Mushroom production Technology

Crop Specify Common name(s) and Scientific name(s) of mushroom(s) on which project is proposed, e.g.

Button Mushroom (*Agaricus bisporus*)

Components

Tick (√) one or more component. You may choose only one component (1.1,1.3,1.4 or 1.5) or any combination of two or more or all components for integrated unit. ***Proper justification for choosing any combination of two or more may be provided under the heading Rationale of the Project****. Suggested combinations are given in annexure at end of the template.*

Unrelated combinations (like 1.2 & 1.6; 1.3 & 1.6 and others) may be avoided. It will be apt that 1.2 may be taken up along with 1.3 for project on button mushroom instead of 1.3 alone.

The amount of subsidy will be same for one or more components and can be availed only once in the scheme.

If required, details of each component may be provided separately where you may give back reference for the information that is already given in the previous component (like bio-data, land records/ site details, water quality, climatic parameters, etc). Consolidated financial viability analysis of the project may be given at the end.

Component 1.1 Spawn Production

Component 1.2 Casing Soil Production

Component 1.3 Compost/substrate production

Component 1.4 Ready To Fruit (RTF) bags

Component 1.5 Mushroom production/Cropping Unit

Component 1.6 Processing/ value addition

Title of Project :

Location of Project :

Approx cost :

Benefit Cost Ratio :

IRR :

Detailed Project Report (DPR) duly to be signed by
the applicant / authorized legal person on each page with date

Year : 2018

Published by
……
National Horticulture Board

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5.4.1. Site development

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a. Recommended and popular cultivars- varieties/hybrids, their specific characteristics, requirements and yields

b. Cultivar/Hybrid/Variety selected and criterion adopted for selection

c. Propagation methods

d. Accredited / good spawn suppliers in the area

e. Planting material - source, quality and suitability

5.4.3. Planning of mushroom unit - Lay out and management

a. Planning, establishment and layout systems

b. Step wise month wise operation details

c. Water and nutrient management

d. Straw, chicken manure and gypsum or other raw materials

e. Integrated pest and disease management and food safety measures

f. Physiological disorders- causes, preventive and management measures.

g. Special problems if any

5.4.4. Mushroom unit- structures and mechanisation

a. Protective cover /structure

b. Mechanisation

5.4.5. Harvesting and pre-processing technology

5.5. Post-Harvest Management

5.5.1. Post-Harvest infrastructure scenario in horticulture sector in the State and specially for the proposed crop / component

5.5.2. Product/ process flow chart

5.5.3. Floor plan

5.5.4. Post-harvest operations

a. Pre-cooling

b. Cleaning / washing

c. Sorting and grading

d. Packing and labelling

e. Transport

5.5.5. Post-harvest infrastructure – Integrated post-harvest management

a. Type of project
b. Location of the Project
c. Man power employed (On rolls and on contract)
d. Business model –
e. Packaging room
f. Cold Room

g. Primary processing

h. Value addition unit

i. Refer van

j. Retail outlet

k. Labour room

5.6. Marketing

5.6.1. Connectivity of project site and produce

5.6.2. Existing Market Institutions and agents

5.6.3. Alternative marketing strategies

5.6.4. Traceability record

5.6.5. Proposed value chain / method of marketing by the applicant

5.7. Value Addition / Processing

6. Technology Providers

6.1. Research Institutes (ICAR /CAU/ SAU/SHU, etc) and Experts Names

Project at a Glance

1.	Name of Applicant / Legal Entity	
2.	Nature of Applicant / Legal Entity	
3.	NHB Scheme for which DPR is made	
4.	Project Title and components/Activity (spawn, compost, cropping, RTF, etc)	
5.	Nature of project- Environment Controlled Unit/partial control unit	
	New or Expansion of existing project	
6.	Products, By-products and services	
7.	Project Area and Survey No.	
8.	Project Site Address with Postal Code and Police Station Name	
9.	Agro-climatic suitability	
10.	Research institution whose technology and package of practices are proposed to be followed	
11.	Existence of similar project activity in the said District	
12.	Whether the project is located in the crop cluster/ hub/ belt	Yes/No
13.	Project economic period/ economic life	
14.	Total Project Cost	
15.	• Spawn Production Unit	
	• Casing Soil Production	
	• Compost/substrate production	
	• Ready to fruit bag	

	• Mushroom production/Cropping Unit		
	• Processing/ value addition		
	TOTAL		
16.	Project completion Period (in months)		
	Expected implementation timeline	Commencement	
		Completion	
17.	Total Eligible Project cost as assessed by the Applicant as per NHB guidelines		
18.	Bank/ Financial Institution identified for Term loan		
19.	Proposed Means of Finance	Promoters contribution (Rs.) & share (%)	
		Bank Term loan (in Rs.) & Share (%)	
		Unsecured loan (in Rs.) & Share (%)	
		Total	
20.	Likely Employment generation (man days/Year)		
21.	Security		
22.	Gestation period		
23.	Projected Key Financial Parameters	Current Ratio other than export units	
		CR-Export units	
		IRR /NPV	
		BCR	

		DSCR & Average DSCR	
		Debt to Equity Ratio i.e. DER	
		TOL/TNW	
		Promoters Contribution(%)	
		Break Even Point	
		Security Coverage Ratio	
		Repayment period	
24.	Productivity expected (BE%)		
25.	Likely Gap in productivity compared to National /Global average		
26.	Potential Market(s)for the commodity and distance from the project site		

1. About the Applicant / Promoter

1.1 .In case of Individuals or Group of farmers	
Individual ??	
• Name of Farmer / Entrepreneur/Individual/ Proprietor	
• Parents or spouse name of Individual	
Group of Farmer growers / SHG- Promoters	
• Name of Group	
• Names of all members of group with their father, mother/husband/ wife name	
1.2. In case of Legal Entity	
Name / Title	
(i) Incorporation / Registration number & date of registration	
(ii) Act under which Registered	
(iii) Registering authority	
(iv) If it is FPO/ FPC/ Producers Co-op society / Growers Co-operative Marketing federation- Please specify	
(v) If it is Reg. Society/ Company/ Corporation / Partnership firm / Proprietary firm- Please specify	
(vi) Name of Promoter	
(vii) Status of the promoter / applicant in the legal entity-please specify	
(viii) Whether the promoter / applicant is authorised by the Legal entity-	Yes/No
(ix) In case of Company/partnership firms / legal person	

a. Certified copy of Company/ Partnership incorporation/ registration certificate issued by Competent Authority, as applicable b. Certified copy of MoA/Bye Laws c. Certified copy of Board of Directors Resolution duly passed and authorizing signatory of application to apply for IPA d. Certified copy of latest Audit Report, if applicable, are to be made available in case the project and the application is considered for processing	
(x) NGO- Specify	
1.3. Government Institutions / Organisations-- *Please specify*	
(xi) Marketing Board / Agricultural Produce Marketing Committee APMC	
(xii) Municipal Corporation	
(xiii) PSU/ Agro-Industries Corporation	
(xiv) ICAR/CAU/SAU/ Government R&D Institution/other (Pl specify)	
Name of Promoter / CEO/CMD/MD/ Director/Head of organisation	
1.4. Statutory registration	
a. PAN No	
b. Aadhaar No.	
1.5. Correspondence Address	
a. Postal Address with PIN code	
b. Telephone	

c. Mobile	
d. Email id	
e. Fax if any:	
f. Project Site Address with PIN	
Social Category (General / SC/ST/OBC/ Minority (Pl specify) (In case of legal entity the CEO and Board of Directors social category is to be mentioned) In case of SC/ST applicants a Certified copy of Caste Certificate issued by Competent Authority is to be enclosed. In case of others a self-declaration is to be enclosed.	
Location: TSP / NE Region / Hilly States/Others (Pl specify) (In case of TSP a self-attested copy of notification is to be enclosed.)	

CV / Biodata of Applicant (s) / Promoter (s) (Authorised by legal entity) in brief: (If applicants are more than one, all are to provide their CV / Biodata)

a. Name of Applicant:	
b. Gender (Male / Female/Transgender):	
c. Nationality	
d. Fathers' name:	
e. Date of Birth:	
f. Place of Birth (village/town/city, District and State) & Nationality	
g. Permanent Address	

g. **Educational qualification** (10th , 12th, Graduation Degree and above)

Education Qualification	Stream /subject	Board / College / University/ Institute	Year of Passing	Remarks
Matriculation				
12th				
Graduate				
Post Graduate				
Ph. D				
Others				

h. Current profession	
i. Previous profession during the last 5 Years	
j. Experience - General and Horticulture	

• General (Other than Horticulture)	
• Horticulture	

Many ICAR/CAU/SAU/SHU/ KVK/Research Station/ Centres of Excellence/ related Central or State Government institution/ others (including outside the country) provide trainings on mushroom production technology/spawn production technology, etc.

A certificate of training from above (min 7 days) by the applicant/promoter may be attached with the DPR.

An undertaking that the technical staff employed in the unit will also be got trained (if already not trained or having experience of working at a commercial unit for 6 months) may also be provided.

In case of a Partnership firm/ Company / Legal person

a. Objectives as per Memorandum of Association (MoA) / Rules:

b. Professional history of Legal entities Farmers Producer Organisations (FPOs), Self Help Groups, Partnership/ Proprietary Firms, NGOs, Companies (as a Board of Director), Corporations, Cooperatives, Co-operative Marketing federations/ Government Institutions.

c. Management structure if it is a company/ firm etc depicting the position of the applicant.

2. Details of benefits availed / proposed to be availed by the applicant- either individually or as a member of Association of growers, Group of Farmer Growers/consumers, Farmers Producer Organisations (FPOs), Self Help Groups, Partnership/ Proprietary Firms, NGOs, Companies (as a Board of Director), Corporations, Cooperatives, Co-operative Marketing federations from (i) NHB and (ii) other Ministries/ organisations of Central Government and (iii) State Governments including NHM for Horticulture related projects.

Note: The beneficiary should be truthful. In case any information is received later on at any stage about his/her availing of benefit which is not disclosed hereunder will entitle NHB to reject the current proposal and recover the funds if already released.

2.1. In this proposed project and location:

2.1.1 Whether the proposed project proposal has been submitted for consideration under any State Government or Central Government Scheme for financial grant? If yes give details.

2.1.2 Whether any subsidy has been availed from the Board, other Central Govt. organisation or State Government for the same activity on the same piece of land, khasra/ Gat/Dag/ etc no. etc. either in his / her own name individually or in the name of his/her family members or through any legal entity in which he/she is the beneficiary either in the same location, project. - Yes/ No. If Yes, Please provide details

Ministry/ Organisation	Scheme Name	Project / Activity	Project Location	Land Survey No	Eligible Project cost	Total subsidy	Current status of project- Operational / underutilised / closed

2.2. In earlier / any other Project (s)

2.2.1. NHB : either in his / her own name individually or in the name of his / her family members or through any legal entity in which he / she is the beneficiary either in the current proposed project location or any other location. Whether any assistance in the form of soft loan and subsidy has been availed earlier from the National Horticulture Board? If yes, give details thereof

Year	Scheme Name	Project / Activity	Project Location	Land Survey No	Eligible Project cost	Total subsidy availed	Current status of project- Operational / underutilised /

							closed

2.2.2. Central Government- Ministries / Organisations: either in his / her own name individually or in the name of his / her family members or through any legal entity in which he / she is the beneficiary either in the current proposed project location or any other location.

Year	Scheme Name	Project / Activity	Project Location	Land Survey No	Eligible Project cost	Total subsidy availed	Current status of project- Operational / underutilised / closed

2.2.3. State Governments: either in his / her own name individually or in the name of his / her family members or through any legal entity in which he / she is the beneficiary either in the current proposed project location or any other location.

Year	Scheme Name	Project / Activity	Project Location	Land Survey No	Eligible Project cost	Total subsidy availed	Current status of project- Operational / underutilised / closed

2.3. Operational status of earlier Scheme under NHB and other Central Ministries and State Government

Year	Organisation / Ministry	Activity	Project Operational status (Running or Closed)	Annual Turnover (of previous Year)	Exports if any	Profitable or loss making	Remarks / Reasons

2.4. Please provide map of earlier / other subjects and this project- Key map of project land showing project details and land boundary details

2.5. Provide the following details:

2.5.1 Have you ever been refused / denied subsidy claim from NHB, NHM, APEDA, NCDC, MoFPI? If Yes please provide details of (i) Project code, (ii) Name of Applicant, (iii) Address (iv) Project activity etc. and the reason for such refusal / denial:

2.5.2 If you were a recipient of Government subsidy, have you / your Bank/FI ever been asked to refund the subsidy / call back ? If Yes please provide details of (i) Project code, (ii) Name of Applicant, (iii) Address (iv) Project activity etc. and the reason for such refusal / denial:

Attention:

The applicant shall have to provide an undertaking (Affidavit on Rs 100/- stamp paper) that there is no duplication of funding for the project and that he/she is not availing /will not avail government subsidy from any other ministry for the said project.

3. About the Project - Name, Rationale, Management and Description

3.1 Name of Project, Activity, Objectives and expected Outcomes

a. Name of the Project	
b. Correspondence Address:	
c. Address of Project Site :	

d. Project Activity and Scheme components (Should be as per NHB scheme latest scheme guidelines- please verify):

No.	Name of the scheme and component	Tick mark relevant component
1	1. Mushroom Production Technology	
	1.1 Spawn Production	
	1.2 Casing Soil Production	
	1.3 Compost/substrate production	
	1.4 Ready to fruit bag	
	1.5 Mushroom production/Cropping Unit	
	1.6 Processing/ value addition	

e. Details of Crop (particularly in case of mushroom production unit):

Name of the Mushroom species	Variety / Hybrid/ Cultivar	Current National production	Current national productivity	Source of QPM (spawn)

f. Products, by products and Services of the Project

g. Objectives of the Project

h. Expected Outcomes of the Project including Products / and Services of the Project

i. Socio-economic benefit to the region /District / State

3.2 Rationale / Justification for the project

Details of similar projects / crop in the neighbourhood and the District -Area, Production, Productivity briefly. Provide more details in Market viability chapter.

About Bank/ FI: Name of the Bank/FI, branch and its code identified for Term loan and Rationale

Name of the Bank/FI from where the term loan is proposed to be availed by the Beneficiary

Name of Bank/ FI	
Bank/FI Branch Address	
Bank/FI Branch contact Number	
IFSC code	

3.3. Project Site/ Land details:

Proposed Project Area:

	Activity	Area proposed
1	Spawn Production	
	Casing Soil Production	
	Compost/substrate production	
	Ready to fruit bag	
	Cropping Unit	
	Processing/ value addition	
2	Open space & Storage structures	

3	Plant and Machinery	
4	Any other activity	
	Total Area of the Unit	

Land details- RoR/ Ownership / Registration of lease/ map etc.

	Name of Owner of land proposed for the project as per Land Revenue Records				
	Whether title of the land is clear in the name of applicant and is free from any litigation				
	How Title is derived	Ancestral			
		Purchased (with details of date)			
	Encumbrances if any				
	Name of the Owner in case of joint ownership		Survey/ Gat /khasra No etc.	Area in Sq.mt / Ha	Share
	Whether land boundaries are demarcated for the applicant clearly.		Yes/No		
	In case of Partnership				
	1. Whether land is owned by Partnership firm or jointly by its partners		Yes/No		
	2. NOC: If land is owned by one of the partner, an undertaking by land owner is required stating that he/she will not withdraw, sale or transfer his/her land during currency period of the project				
	In case of Lease				
	1. In case the land is that of leased, Registration details of the said leased land in the office of Sub-Registrar				

	2. No. of Years of lease	
	3. Whether lease is entered in RoR	Yes/No
	Whether land is mortgaged? If yes provide details of mortgagor and mortgagee	

3.4 Location of the Project- Identification (Longitude, Latitude, Altitude, Village, GP, Block, District, State), Area, Number of growers.

	Location Address	
	• Survey/Khasra/ Dag/ Other No	
	• Habitation/ Village	
	• Gram Panchayat / Urban body	
	• Block / Urban body	
	• Sub-Division	
	• District	
	• State /UT	
	Location Longitude, Latitude & Altitude	
	Total Area of land owned	
	Total Area proposed for project	

3.5 Current usage of land of proposed Project Area

Proposed Project			**Current usage**		
Survey / Dag etc.No	Nature of land Dry/ Irrigated/ Waste land	Area	Activity	Area	Mortgage Yes/No If Yes with whom

3.6 Current infrastructure and assets available on site/possessed by the Applicant

Category	Asset Name	Year of Purchase	Make	Capacity	Cost
Fixed Assets	Tube well				
	Dug Well				
	Electric Motors				
	Tractor				
	Tiller				
	Transport vans/ reefer van				
	Vermi compost shed				
	stores				
	Pack house				
	Labour room				
	Water harvesting pond				
	installation/digging				
	Pipeline				
	Others				
Operating Assets	Planting Material				
	Support system				
	Tools and implements				

3.7 Lay out plan of the project/ *Map of project showing project details and land boundary details*

Provide Brief of Technology to be used as annexure

3.8 Conversion of Land Use (CLU) if applicable

3.9 Whether project site is part of production belt / cluster / hub? *If yes provide details of working relations with other farmers*

3.10 Rationale for the choosing the said Location for implementation of the project / Location advantages and disadvantages

3.11 Compliance of project site for food safety

The information on soil condition and site on water logging, industrial waste and effluents.

Run off and contaminated water is not allowed to enter the mushroom production site.

3.12 Components / Activities of the Project with justification *(Please refer NHB scheme guidelines)*

No.	Name of the scheme and component	Justification
1	Mushroom Production Technology	
	1.1 Spawn Production	
	1.2 Casing Soil Production	
	1.3 Compost/substrate production	
	1.4 Ready to fruit bag	
	1.5 Cropping Unit	
	1.6 Processing/ value addition	

Component wise cost of the Project and NHB Norms

(when more than one component is considered, then some of the facilities like boiler, generator, transport, data logger, office space, etc may be common and may be shown only once)

In the remarks Colum provide details of type of construction (PUF, bricks, insulated, etc) and also justification for the size of rooms and machines proposed, esp those costing more than one lakh)

Component wise cost of the projects of different sizes is attached in the end.

Scheme Component	Items	Sub- items	Size	No. of units	Unit cost	NHB Norm	Remarks
Spawn Production	Infra-structure	Room for grain boiling					
		Mixing room					
		Autoclaving room					
		Pre-cooling room					
		Inoculation room					
		Incubation room					
		Cold Room					
		Boiler Room					
		Office/sale room					
		Store					
		Workers' room and facilities					
	Machinery	Autoclaves, Horizontal					
		Autoclave vertical, small					
		Laminar Flow					
		Boiler					
		Boiling kettle					
		Racks					
		Grain siever/sieves					
		Grain mixer					
		Bag filling machine					

		Fridge					
		Incubator					
		pH meter					
		Balance					
		Refrigeration system with positive pressure (AHU + HEPA filters)					
		Reefer Van					
		Generator					
		Misc. like lab coat, gas cylinder, burner, inoculation needles, gloves, footwear, masks, digital thermometers, ozone generator, oven, microwave, UV tubes, air curtain, data logger, etc					
	Raw materials,	Wheat, Jowar Grains, etc/ saw dust					
		PP bags, rings					
		Polyfill/ Non-Absorbent cotton					
		Glass bottles, flasks, Petri-plates, culture tubes, parafilm, butter paper, rubber bands, labels					
		Various Chemicals like Calcium carbonate, Calcium Sulphate, Spirit, Agar-agar, Glucose, Malt Extract, PDA, etc					
		Misc items like floor					

		cleaner, acids, etc					
Casing Soil Production Unit	Infra-structure	Boiler Room					
		Casing material store					
		Casing mixing area					
		Casing Pasteurisation Tunnel					
	Machinery	Boiler					
		Centrifugal fan with ducting					
		Generator					
		HEPA filters					
		Trays, Sieves, Shovels, misc equipments					
		Autoclave (in case of milky mushroom cultivation					
	Raw materials	Coir Pith					
		FYM					
		Lime, Gypsum					
		Others					
Compost production Unit	Infra-structure	Pre wetting yard/ lagoon					
		Compost yard					

		Bunkers					
		Compost Tunnel					
		Spawning area					
		Store/sheds					
		Boiler Room					
	Machinery	Front end loader/JCB					
		Bunker filler					
		Tunnel filling line					
		Spawn dozing machine					
		Centrifugal fans for bunker					
		Centrifugal fans for tunnel					
		Pipes for bunker and ducting for tunnel					
		AC system in tunnel					
		HEPA filters					
		AHU in spawn area for positive pressure					
		Generator					
	Raw Materials	Wheat/paddy Straw, etc					
		Chicken manure					
		Gypsum					
		Urea					
		Polythene bags					

		Coir pith					
		FYM					
RTF	Infra-structure	Mixing room					
		Autoclaving room					
		Pre-cooling room					
		Inoculation room					
		Incubation room					
		Cold Room					
		Boiler Room					
		Store					
		Sale hut					
		Labour hut/Facilities					
	Machinery	Raw material mixer					
		Bag filling machine					
		Autoclave					
		Laminar Flow					
		HEPA filters					
		Air conditioning Unit					
		Racks					
		Trolleys					
		Complete assembly line for speciality mushrooms including liquid spawn injection system					

	Raw materials	Saw dust/straws/ bagasse/ corn cobs/ others					
		PP bags & boxes					
		Chemicals					
		Misc					
Cropping Unit	Infra-structure	Insulated cropping rooms (Thermocol or PUF based)					
		Corridor for AHUs					
		Cold room					
		Pre-processing /Packing room					
	Machinery	Water spray tank					
		AHUs with VFD & duct					
		CO2 sensors					
		Humidity sensors					
		Racks, Filters					
		Computer control systems					
		Generator					
		Reefer van					
		Integrated PHM					
	Raw materials	Punnets, film , knives, etc					

		Misc					
Processing and value addition	Facilities for canning, drying, pickling, preparing biscuits, noodles, cakes, mushroom powder, are similar to PHT of other crops with slight modifications as mushrooms have 90% moisture.						
	• Packaging room						
	• Cold Room						
	• Primary Processing						
	• Retail outlet (environmentally controlled)						
	• Others						

Note: NHB Norm: means Over all ceiling in project mode

3.13 Operations Planning

1.	Name of Unit / Project Manager (working directly under the applicant / CEO) if any.-optional	
2.	Name of agency executing erection of unit-and contact person Name and contact numbers	
3.	Name of agency providing technical know-how and turn key for the project- and contact person Name and contact numbers	
4.	Operations:	
	1. Site preparation	
	2. Spawn	
	3. Compost	
	4. Water and nutrient management	
	5. Mushroom harvesting and packing	
	6. Integrated Pest & Disease management	
	7. Physiological disorders	
	8. Mushroom unit Mechanisation	
	9. Post-Harvest Management	
	a. Pre-cooling/Cold room	
	b. Cleaning / Washing	
	c. Sorting and Grading	
	d. Packing and labelling	
	e. Transport	
	f. Refer van	
	g. Retail outlet	
	h. Cold chain	
	10. Marketing	

	11. Processing	

3.14 Month wise operational chart / Implementation schedule: Commencement to completion

Project Implementation period in case of approval: Months.

Proposed/ Tentative dates of	Bench mark / Activity	Approximate date
Project Commencement	Completion of infrastructure and installation of machineries	
First Commercial Crop / plantation / operations if any	First crop harvested for three/two flushes	
Project Completion		

Activity	Units	Months					
		JF	MA	MJ	JA	SO	ND
1. Site development and lay out							
2. Erection of Protected structure							
3. Mechanisation- procurement							
4. Water management							
5. Procuring raw materials and spawn							
6. Starting of composting operations							
7. Integrated Pest & Disease							

management							
8. Check for Physiological disorders							
9. Farm Mechanisation operations							
10. Harvesting/ mushroom care management							
11. Post-Harvest Management							
a) Pre-cooling							
b) Cleaning / Washing							
c) Sorting and Grading							
d) Packing and labelling							
e) Transport							
f) Cold chain							
12. Marketing							
13. Value/ addition Processing							

Note: The table can be extended as per need.

JF: January/ February; MA: March/April and similarly other abbreviations.

3.15 Backward & Forward linkages -with growers, input suppliers etc

Backward linkages

About availability of inputs (spawn, compost, casing, pesticides, etc)/ raw material/Technical knowhow/ Labour/Electricity/water, etc (Provide name and address of 2-3 possible suppliers)

Input/operation	Make/ quality/ reference (of knowhow)	Addresses of suppliers (Govt and private)/ Self	Telephone numbers/email	Remarks
Spawn				

…				
….				

Forward linkages- for Domestic and Export Market

Operations	Agency / Agents / Service providers	Remarks
Processing Unit		
Local Market		
Terminal market		
Farm Market		

Briefly explain as to how the produce will be consolidated (backward linkages) and marketed/exported (forward linkages)

3.16 Manpower (Skilled Labour, Expertise etc.), Required, Already available, Gaps and the management

		Requirement		Availability	
		Number	No. of Days	Number	No. of Days
	Operations/ activity				
	PERMANENT STAFF (skilled)				
	a) Administration				
	b) Manager				
	c) Finance & Accounts				
	d) Typing / IT operations				

	e) Boiler attendant				
	f) Driver				
	g) Watch man				
	CONTRACTUAL/ TEMPORARY (unskilled)				
	a) Labour for compost making				
	b) Harvesters				
	c) Packers				
	d) Others				
	e)				
	f)				

Availability of both Skilled and Un-skilled labour: Yes / No.

3.17 Employment Generation per annum

No. of man days / Annum	
Permanent man power -Permanent (on rolls)	
Casual / Temporary (mandays)	

3.18 Infrastructure (Power, Fuel, Water, Plant and Machinery, Effluents treatment etc.) -

Required, Already available, Gaps and the Management

Utility	Requirement	Remarks
Power	Likely requirement per month for the purposes of ……	
	Source of Power	

	Access to Power is assured or not	
	Alternative Source of Power in case of breakdowns	
Water	Source – Ground Water /Surface Water	
	Existing or New source	
Plant & Machinery		
Fuel	Access to fuel to power- Generators- Yes/No	
	Nearest fuel depot	
Effluent treatment	Facility and method adopted for effluent treatment.	
Road connectivity	Distance from the State Highway and National Highway.	
Rail connectivity		
Air connectivity		
Market connectivity		
Environmental issues of the project if any		
Fencing		
Any other		

Risk Management in case of any shortcomings:

3.19 SWOT Analysis

1 Strengths

2 Weaknesses

3 Opportunities

4 Threats

3.20 Monitoring and evaluation of Project

ICAR Institute or CAU/SAU / SHU or Consultant or any other organisation

Attention of the applicant:

1. Applicant has to intimate the Board before effecting change of project land, activity, bank etc in the proposal before claim of subsidy. (page 121 of guidelines point 10(vi). Thus Any change in mushroom species/component/activity or project site without prior approval of NHB shall make the component or project, as the case may be, ineligible for getting subsidy.
2. Even the change in FI / Banker should be done with prior approval of NHB.

(Signature of the Applicant) with date and time

Place:

4. NHB Scheme under which the project is proposed with rationale / justification??

1. Scheme.1: Copy paste scheme guidelines

2. Cost Norms and pattern of assistance: Copy paste scheme guidelines

3. Rationale for justification for taking up the proposed project under the scheme No.1 and its components.

5. Project Details

5.1. Agro-climatic suitability

5.1.1 Origin, History, and Distribution, its introduction into India, Distribution of crop across the country and world

Earlier the consumption of mushrooms was low as many were not aware of food and medicinal values of mushrooms. Mushrooms contain about 90% moisture and are a low calorie food highly suited to those with obesity. They contain about 2.5-3.5 % protein which is of very good quality, contains all the essential amino acids and is essentially rich in lysine. Mushrooms are low in fat but the fat is rich in linoelic acid (PUFA). Cholesterol, the dreaded sterol, is absent which make the choice of the dieticians for heart patients. Due to nil starch and low sugars, these are the delight of the diabetic patients. Mushrooms are highly suited to those suffering from hypertension, hyperacidity and constipation. These are especially rich in vitamin B complex. and vitamin B12 also. Besides, mushrooms have many medicinal properties like anti cancer, hypocholesterolemic and hypolipidimic effects. Justifiably mushrooms are called the " ultimate health food", the neutaceuticals.

The demand for mushrooms, domestic as well as international is rising at a phenomenal speed. The present world production of mushrooms is about 28 million tons and China remains the main producer and exporter of mushrooms. India is roughly producing around 1,29,000 tons of mushrooms annually of which 85% is of button mushroom. Agro Dutch Foods Lalru, Punjab boasts the single largest producer and exporter of mushrooms in India. Besides this very big unit there are many other small white button mushroom units in HP, Punjab, Maharashtra, Gujrat and Karnataka cultivating mushroom all the year round and are running successfully. These units are located in Phagwara, Jullandhar, Bhatinda, Banga, Bannore etc. The prevailing retail rates of mushroom in the state range between Rs 150 to Rs 250/kg.

Leading producers of mushrooms are European, American and East Asian countries. The so called G-6 (USA, Germany, France UK, Italy and Canada) are major consumers of mushrooms. China is the leading producer and exporter of the mushrooms to the American, European and Asian countries. China's mushroom production is on seasonal basis employing temporary structures. Mushroom cultivation is not organized on scientific footings in China. It is the right time that India, with its relatively cheap labour and raw materials, which had made Chinese mushrooms competitive, should enter the billion-dollar mushroom market. But as indicated above our annual production is very low because mushrooms are being grown by small farmers seasonally during the winters only and the venture is being taken up by a very few players as a modern technical industry. Now with adoption of latest technology of mushroom production under controlled environmental conditions, it is possible to grow high quality mushrooms throughout the year to meet the domestic and international demand. The promoters have under taken the market surveys and made inquiries regarding the demand for mushrooms. Besides the big demand in the countries mentioned above there is a fast developing mushroom market in the gulf countries. Domestic market is also expanding at phenomenal rate, which is reflected in the

increase in the production. Our per capita of mushrooms consumption is the lowest in the world which is 40-50 g against the 3 kg in the developed countries. This poor consumption is mainly due to non-availability of mushrooms in most part of the country for most of the year.

5.1.2 Agro-climatic / Horticultural zones including Rainfall, temperatures at critical stages and suitability of the project (Graphic representation of weekly data of humidity, maximum temp and minimum temperature may also be given)

Month	**Humidity**	**Max Temp**	**Min Temp**	**Recommended Temp**
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Indicate source /website of data

Risk management/ Deviation Management if any:

Conclusion: Whether project crop is recommended for the project location **Yes/No**

5.1.3 Raw materials - requirements and availability

	As recommended by ICAR /CAU /SAU /SHU	What is easily available near site	Cost per Ton	Remarks

Carbohydrate source	Wheat straw, paddy straw, sugarcane bagasse, mustard stalks soybean stalk, others			
Nitrogen source	Chicken manure, Cotton cake, wheat bran, rice bran			
Gypsum	Normal gypsum Phospho-gypsum			

@ Note: Organisation / Institution (ICAR/CAU/SAU/SHU/ other) making recommendation and its source should be specified.

5.1.4 Water Quality -requirements and availability

	As recommended by ICAR /CAU/SAU/SHU	Project location data as per latest Water Analysis test#
pH	7.0 - 8.0	
EC	< 700 mS/cm	
Total salt concentration,	< 500 mg/L	
Sodium Absorption Ratio (SAR)	--	
Bi-Carbonate	--	
Boron concentration	--	
Heavy metals	Lesser is better	
Pesticide residue	Should be below detectable limits	

@ Note: Organisation / Institution (ICAR/CAU/SAU/SHU/ other) making recommendation and its source should be specified.

#: Provide details of Laboratory (should be that of Agriculture Dept/ Agric. Univ/ Central or State Government) where water is tested with contact details of Head of Laboratory/ Analyst with telephone and mobile details. A self-attested copy of the laboratory results should be submitted in case project is qualified for processing for subsidy claim.

Conclusion: Whether project location water source is suitable for the crop/ activity. Yes / No

5.2. Market viability of the Project

5.2.1. Commercial and nutritive (where ever applicable) importance / significance, composition and uses.

5.2.2. Target market:

Domestic or International. In case of International market, the applicant have to refer APEDA export requirements and should specify compliance appropriately with in the document. In case of domestic market specify the intended market briefly while more details be provided in Marketing chapter.

5.2.3. Statistics: India and State

1. India: Production and Productivity in the area, State and India for the last 5-10 years

   Few mushrooms like *Agaricus bisporus*, *Lentinula edodes*, *Auricularia* spp, *Pleurotus* spp, *Flammulina velutipes*, *Volvariella volvacea* contribute about 90% of the world mushroom production. According to FAO mushroom production has increased from 0.5 million ton in 1960 to 10.38 MT by 2014. According to various other agencies the mushroom production has increased from 0.17 MT to 34.8 MT in 2013. That FAOstat does not cover all the mushrooms cultivated in Asia has been exemplified by comparing data of FAO and MAFF, Japan where FAOstat includes data of only fresh shiitake production which at present is only about 14% percent of total mushroom production of Japan.

   There are number of publications quoting various sources indicating that current world mushroom production is more than three times than that reported by FAO. Even if we consider growth curve to be sigmoid and relatively less increase in coming years, the current estimated mushroom production should be around 40 MT. The world mushroom production as reported in different publications from different sources (Chang 1999, Delcaire 1978; Sharma 1997; Chang 2005, 2006, 2007; Chang & Buswell 2008; Chang & Wasser 2012, 2017; Royse, et al. 2017).

   Despite of favourable agro-climate, abundance of agro wastes, relatively low-cost labour and a rich fungal biodiversity, India has witnessed a lukewarm response in its growth. At present, the total mushroom production in India is approximately 0.13 million tons. From 2010-2017, the mushroom industry in India has registered an average growth rate of 4.3% per annum. Out of the total mushroom produced, white button mushroom share is 73% followed by oyster mushroom (16%), paddy straw mushroom (7%) and milky mushroom (3%).

Year	National picture		Global Scenario			
	Production Million Tons	Productivity (Kg/100kg compost)	Production Million Tons	Highest productivity	Country with highest production	% share in world production
2000	45	18 %	10.40	22-25%	China	70%

2005	60	20 %	19.10	25-27%	China	70%
2010	120	20%	27.5	30-32%	China	72%
2015	129	25%	40.00	30-32%	China	85%

Source: http://epubs.icar.org.in/ejournal/index.php/MR/issue/view

2. Latest States wise picture- Top 10 producing states (specify year)

State	Production MT	Productivity Kg/100kg compost	% Share	Remarks
Punjab	18000	20-24%	13.87	
Odisha	15986	20-24%	12.32	Mainly paddy straw mushroom is cultivated
Haryana	15100	18-20%	11.63	
Maharashtra	12050	20-24%	9.28	
Gujrat	11200	20-24%	8.63	
Uttarakhand	10236	20-24%	7.89	
Tamil Nadu	10000	20-24%	7.71	
Himachal Pradesh	9150	20-24%	7.05	
Uttar Pradesh	7100	20-24%	5.47	
Goa	4220	20-24%	3.25	

Source:

3. Project State Picture (Mandatory)

Year	Production MT	States' contribution to Nation	Productivity T/ha	Gap in Productivity (T/Ha)		
				State Av.	National Av	Global Highest

Source:

4. Project crop in the state: District wise production (in Tons) in different years at 5 yearly interval (Mandatory)

District	1995	2000	2005	2010	2015
District.1					
District.2					

Source:

5. Share of project Crop- in terms of Production in overall fruits/vegetables

	Production	% share	Average Approx Price (Rs/kg)
Mushroom			
Other vegetables			

6. Estimate of Agro-wastes produced in the state (specify current/latest year)

Crop	Area		Production		grain: straw ratio	Est. agro-waste (MT)
	Ha	%	MT	%		
Total		100		100		

Source:

7. Availability of spawn in and near the state (List Govt and other organisations supplying spawn

Name	Address	State	Contact No	Remarks

8. List of Machinery suppliers related to the proposed project

Name of machine	Name of firm	Address of supplier	State	Contact No
AHU				
Centrifugal fans				
PUF panels				
…..				

5.2.4 Clusters of the project crop in the state (Mandatory)

Cluster	District	No. of villages	No. of farmers	Total Area
1				
2				
3				
4				

Crop Agricultural Economic Zones in the State / UT, if any (Desirable)

Cluster	District	No. of villages	No. of farmers	Total Area
1				
2				
3				
4				

Projections of production, productivity, targets for domestic and export market (Desirable)

Year	Production	Productivity	Local Market	Value in Rs.	Terminal market	Value in Rs.	Export Market	Value in Rs.

Demand for the commodity: (based on the available data- minimum for the project area, district and the state)

5.2.5 Estimated Demand -Supply gap for the commodity

Unit	Demand	No. of growers	Supply / production	Gap	Remarks
Project area					
District where project is located					
State					
Country					
Globally					

Note: Applicant may take the help of District Horticulture Officer

5.2.6 Global producers- Country, Area, Production, Productivity and global market share for the last 5-10 years

	Major producing country	Production	Productivity	% share in global market
1				
2				
..				
10	India			

5.2.7 International trade: markets and potential (for export oriented projects)

(collect from APEDA Agri-exchange website at http://agriexchange.apeda.gov.in/; including product profile, statistics and market intelligence sites esp. International trade and Global Analytical report in brief to the extent of relevance; may also refer DGCIS site http://www.dgciskol.gov.in/ for more information)

5.2.8 Seasonality matrix of mushrooms (Desirable Data):

Seasonality matrix of cultivation of different mushroom species on your location under seasonal/ partly controlled conditions (Draw as per temp profile of your location)

Mushroom species	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Temp °C												
Button												
Oyster												
Milky												
Volvariella												
Shiitake												

Lean Season

Peak Season

Demand and Supply issues specific to project area:

5.2.9 Price variation of Commodity in the State / UT Capital or nearby markets

	Local Market: 1 Unit=Rs. Per Qtl/MT/kg											
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

	Major Terminal Market: 2 Unit=Rs. Per Qtl/MT/kg											
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

Projected prices of project produce from current year onwards

	Market: …… Unit=Rs. Per Qtl/MT/kg											
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

5.2.10 Balance sheet of commodity in the Major market in the State or around it (Desirable Data/ Voluntary)

	Year:							Qty: 000Tons					
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Fresh Production/ Arrivals													
Imports													
Availability													
Consumption													
Exports													
Post Production losses													

Source:

Note:

Balance sheet of Spawn production and utilization in the state (Desirable Data/ Voluntary)

	Year:							Qty: Tons					
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Mushroom production													
Used within state													
Sent to other states/ exported													
Procured from other states/ imported													

Total spawn utilization in the state													

Source:

Note:

5.2.11 Central and State Government policies to promote the commodity:
(towards its promotion, area expansion and organised marketing, processing and export).

5.2.12 Value chain in the commodity

Whether transportation infrastructure is available

- Mode of transportation / arrangement:

- Whether cold chain facility available locally if so details of service providers and contact person name.

Value Addition

5.2.13 Proposed Business Strategy by the Applicant for Marketing and Market viability

5.3. Financial Viability of the Project

5.3.1. Due Deligence Status

	Date of Pre-Sanction / Due Deligience		Remarks
1	Examination of CIBIL report	Yes/No	
2	Credit rating / scoring is done	Yes/No	
3	Whether name of promoters/company appearing in the list of- a) RBI defaulter list b) RBI wilfull defaulter list c) ECGC list	 Yes/No Yes/No Yes/No	
4	a)Verfication of CERSAI (Central Registry of Securitisation Asset Reconstruction and Security Interest) b) In case of company whether financial data verfied with ROC .	Yes/No Yes/No	

5.3.2. Project Cost (Rs in Lakhs) – (sub items are to be decided based on need)

Scheme Component	Items	Sub- items	Capacity/ Area/ spacing etc.	Units/ Numbers	Unit cost	Cost
Spawn Production	Infra-structure	Room for grain boiling				
		Mixing room				
		Autoclaving room				
		Pre-cooling room				
		Inoculation room				
		Incubation room				
		Cold Room				

		Boiler Room				
		Office/sale room				
		Store				
		Workers' room and facilities				
	Machinery	Autoclaves, Horizontal				
		Autoclave vertical, small				
		Laminar Flow				
		Boiler				
		Boiling kettle				
		Racks				
		Grain siever/sieves				
		Grain mixer				
		Bag filling machine				
		Fridge				
		Incubator				
		pH meter				
		Balance				
		Refrigeration system with positive pressure (AHU + HEPA filters)				
		Reefer Van				
		Generator				
		Misc. like lab coat, gas cylinder, burner, inoculation needles, gloves, footwear, masks, digital thermometers, ozone generator, oven, microwave, UV tubes, air				

		curtain, data logger, etc				
	Raw materials	Grains				
		PP bags, rings				
		Polyfill/ Non-Absorbent cotton				
		Glass bottles, flasks, Petri-plates, culture tubes, parafilm, butter paper, rubber bands, labels				
		Various Chemicals like Calcium carbonate, Calcium Sulphate, Spirit, Agar-agar, Glucose, Malt Extract, PDA, etc				
		Misc items like floor cleaner, acids, etc				
Casing Soil Production Unit	Infra-structure	Boiler Room				
		Casing material store				
		Casing mixing area				
		Casing Pasteurisation Tunnel				
	Machinery	Boiler				
		Centrifugal fan with ducting				
		Generator				
		HEPA filters				
		Trays, Sieves, Shovels, misc equipments				

		Autoclave (in case of milky mushroom cultivation)				
	Raw materials	Coir Pith				
		FYM				
		Lime, Gypsum				
		Others				
Compost production Unit	Infra-structure	Pre wetting yard/ lagoon				
		Compost yard				
		Bunkers				
		Compost Tunnel				
		Spawning area				
		Store/sheds				
		Boiler Room				
	Machinery	Front end loader/JCB				
		Bunker filler				
		Tunnel filling line				
		Spawn dozing machine				
		Centrifugal fans for bunker				
		Centrifugal fans for tunnel				
		Pipes for bunker and ducting for tunnel				

		AC system in tunnel				
		HEPA filters				
		AHU in spawn area for positive pressure				
		Generator				
	Raw Materials	Wheat/paddy Straw, etc				
		Chicken manure				
		Gypsum				
		Urea				
		Polythene bags				
		Coir pith				
		FYM				
RTF	Infra-structure	Mixing room				
		Autoclaving room				
		Pre-cooling room				
		Inoculation room				
		Incubation room				
		Cold Room				
		Boiler Room				
		Store				
		Sale hut				
		Labour hut/Facilities				
	Machinery	Raw material mixer				
		Bag filling machine				

		Autoclave				
		Laminar Flow				
		HEPA filters				
		Air conditioning Unit				
		Racks				
		Trolleys				
		Complete assembly line for specialty mushrooms including liquid spawn injection system				
	Raw materials	Saw dust/straws/ bagasse/ corn cobs/ others				
		PP bags & boxes				
		Chemicals				
		Misc				
Cropping Unit	Infra-structure	Insulated cropping rooms (Thermocol or PUF based)				
		Corridor for AHUs				
		Cold room				
		Pre-processing /Packing room				
	Machinery	Water spray tank				
		AHUs with VFD & duct				
		CO2 sensors				
		Humidity sensors				
		Racks, Filters				
		Computer control systems				

		Generator				
		Reefer van				
		Integrated PHM				
	Raw materials	Punnets, film , knives, etc				
		Misc				
Processing and value addition	Facilities for canning, drying, pickling, preparing biscuits, noodles, cakes, mushroom powder, are similar to PHT of other crops with slight modifications as mushrooms have 90% moisture.					
	Packing Room					
	Pre-cooling unit/Cold room					
	Primary Processing					
	Retail outlet (environmentally controlled)					
	Others					

Summary of Project Cost

		Project Cost	Max. possible NHB support (self appraisal)
Spawn Production	Infrastructure		
	Machinery		
Casing Soil Production	Infrastructure		
	Machinery		
Compost/substrate production	Infrastructure		
	Machinery		
Ready To Fruit (RTF) bags	Infrastructure		
	Machinery		
Mushroom production/Cropping	Infrastructure		

Unit	Machinery			
Processing/ value addition	Infrastructure			
	Machinery			
Total	Infrastructure			
Total	Machinery			
Grand Total				

5.3.3. Means of Finance

S.No	Item	Components			
1	Promoters share				
2	Bank/FI Term loan				
3	Un secured loan/VCA				
	Total				

5.3.4. Information on subsidy available under different schemes:-

1.	Subsidy from NHB				
2.	Subsidy from State				
3.	Subsidy from Centre				
4.	Subsidy from other sources				
	Total				

5.3.5. Financial Indicators of the Project : Key Indicators of the proposed project for the projected years is as below (In lakhs)

FINANCIAL INDICATORS	Project							
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
Capital								
Reserves								
Intangibles								
Tangible Net Worth								
Net Working Capital								
Current Ratio								
Net Sales								
Op. Profit								
Net Profit Before Tax								
Net Profit After Tax								
TOL/ TNW								
Debt-equity ratio								
Depreciation								
Dividend								
Retained Profit								

Justification for the above (wherever there is wide variation)

NOTE:- In case of existing projects, the above financial indicators for last three years should also be furnished. Also data for associate concerns be provided for the last three years.

5.3.6 Project Financing

a. Rate of Interest :
b. Returns from the Project (IRR):
c. NPV (Net Present Value)
d. Economic Rate of Return
e. Cost of Production and Profitability

f. Yield and Sales Chart
g. Proposed Balance Sheet
h. Proposed Cash flow Statement for next 7 years
i. Proposed Profit & Loss Account
j. Proposed Repayment of Term loan and Schedule
k. Break even Analysis

5.3.7. Percentage of Term Loan: ??????

5.3.8. Summary of Repayment of proposed Term Loan:

Particulars	Remarks
Total Term Loan	
First Disbursement	
Final Disbursement	
Commercial Operation date	
Repayment holiday (Moratorium)	
Repayment starts from	
Repayment ends on	
Repayment Period	

5.3.9. Sensitivity analysis on the projects projected performance.

Base Case	2018-19 (First Full Year of Operation)				
Case I	Decrease in capacity utilization by 10%.				
Case II	Decrease in Sales by 10%.				

Case III	Increase in Raw Material Cost by 10%			
	Base Case	Case I	Case II	Case III
PBIDT				
PBT				
PAT				
Min DSCR				
Max DSCR				
Overall DSCR				

5.3.10. Key Financial Parameters for the proposal:

Sl. No.	Ratio	Benchmark	As calculated by Project Finance Expert				
			1st yr	2nd yr	3rd yr	4th yr	5th Yr
1.	Current Ratio other than export units	1.25:1					
2.	CR-Export units	1.10:1					
3	IRR /BCR	8 -12%*					
4	DSCR*	1.50:1					
5	Average DSCR						
6	Debt to Equity Ratio i.e DER	3:1					
7	TOL/TNW	4:1					
8	Promoters Contribution	25% minimum					
9	Break Even Point	Lower the % is better					
10	Security Coverage Ratio	More than 100% of Loan Amount					
11	Repayment period	Up to 7 Years excluding moratorium, but not to exceed an overall tenor of 10 years					

*Projects with repayment period up to three years – 8%

More than three years -12%

5.3.11. Statement of Assets & liability as on…….

1. Immovable Assets

(Rs. In lakh)

Sl.No	Description	Extent	Location	Face value	Market value
1	Land				
2	Building				
3	Plant & machinery				
4	Commercial plots				

2. Movable Assets

Sl.No	Description	Modle	Face value	Market value
1	Car/Scooter/Truck/Bus/Mobile phone			

3. Bank/FI balances and cash

Sl.No.	Name of the institutions	Date of opening	Face value	Market value/Present value

4. Shares & debentures

Sl No	Name of the Company/Institutions	Date of purchase	Face value	Market value

5. Investment in business & other associates concern

Sl No	Name of the Company/Institutions	Date of Investment	Face value	Market value

Total assets…….

1. Liabilities

Sl.No.	Nature of the loan	Name of the institution	Date of loan	Face value	Market value/ Present value

Total liabilities…….....
Net of assets & liabilities…….....

Date: Signature of the Promoter/Guarantors/Directors /partner

5.3.12. Risk Analysis & Management

a. Promoters & Management Risks:
b. Project Completion and Operational Risk:
c. Other Risks:

	Risk	**Management**
	Excess production / Glut situation in Market	
	Crop failure	Crop insurance
	Price volatility-low prices	
	Pests and Diseases	
	Natural calamities- fire, cyclone, Floods etc.	

Action to be taken by Bank/FIs:

1. All Bank/Financial institution while sanctioning the limits certify whether the project is technically feasible and economically viable. (This certificate may be obtained from bank/financial institution) in case the NHB inform that the project comes under its consideration.

5.3.13. Farm record keeping/ Maintenance proposed

5.4: Site Development and Crop husbandry

5.4.1.Site development: (Leveling, fencing, etc)

5.4.2. Selection of Quality Planting Material (Spawn)

The available strains with details are given below. Any of the strain can be selected on the basis, which is suitable for Indian conditions.

Strain: M 7205: Heavy, large mushroom with very good storage. Very suitable for the fresh market. This strain produces mushrooms with large, evenly rounded caps which, according to the growing conditions, is smooth to slightly scaly. The stem is white, cylindrical and straight. Rather difficult species concerning the fructification, but in the adequate growing conditions this strain produces mushrooms of an excellent quality, with a very long shelf-life. Average yield-27 à 31 kg/m² at a fill weight of 90 kg/ m² fully grown compost under European condition.

Strain: M 7206: Very tolerant and aggressive species with respect to growing conditions and the compost quality. Rapid and exuberant budding, especially in 1° and 2° flush. The cap is of a small to average size, nice and smooth without risk of scales, and is carried by a short, thick stem. Is less suitable for the fresh market, but is the ideal species for cultivators wanting a profitable yield in a short term. Average yield- 28 à 33 kg/ m² at a fill weight of 90 kg/ m² fully grown compost under European condition.

Strain: M 7215: Very popular, medium-size mushroom strain. Ability to produce larger as well as smaller mushrooms. Very good quality for the fresh market. Very versatile strain, equivalent to some of the currently most popular White Bud Mushroom strains worldwide. It has the ability to produce both high-density medium and larger sized fruitbodies and maintains high yields in both cases, even though picking is easier when the fruitbodies are grown to medium size. The caps are smooth and round. Average yield - 30 à 35 kg/ m² at a fill weight of 90 kg/ m² fully grown compost under European condition.

Strain: M 7218: Excellent, medium-size mushroom strain. Ability to produce larger as well as smaller mushrooms. Very good quality for the fresh market. Versatile strain, very popular strain type worldwide. It also has the ability to produce both high-density medium and larger sized fruitbodies and maintains high yields in both cases, even though picking is easier when the fruitbodies are grown to medium size. The caps are smooth and rounded. Average yield - 30 à 35 kg/ m² at a fill weight of 90 kg/ m² fully grown compost under European condition.

Strain: M 7218: Medium-size mushroom strain. Also has the ability to produce larger mushrooms. Very good quality fruit bodies. Although this strain also has the ability to produce both high-density medium and larger sized fruitbodies, it is mostly used to grow medium sizes and offers exceptionally high yields. Picking is easy, caps are smooth and round. Average yield - 29 à 36 kg/ m² at a fill weight of 90 kg/ m² fully grown compost under European condition.

Strain NCH-102: Cap Colour-White, Cap Shape-Dome shaped, Average Cap dia - 3.5 cm, Cap surface-Scaly, Gill colour-Light Pink, Veil Opening-Late, Stipe dia-1.4 cm, Stipe length-2.6 cm, Temperature for Spawn run-24 ± 2°C, Fruiting-17 ± 1 °C. Yield (kg/100 kg compost)-18-19 kg under Indian condition.

Strain U-3: Cap Colour-Off White, Cap Shape-Dome shaped, Average Cap size-4.0 cm, Cap surface-Scaly, Gill colour-Light pink, Veil Opening-Late, Stipe dia-1.6 cm, Stipe length-1.8 cm, Temperature-Spawn run-24 ± 2°C, Fruiting-17 ± 1 °C, Yield (kg/100 kg compost)-16-18 kg under Indian condition

Strain Bel-1: Cap Colour-White, Cap Shape-Dome shaped, Average Cap size-3.0 cm, Cap surface-Scaly, Gill colour-Pink, Veil Opening-Late, Stipe dia-1.5 cm, Stipe length -2.6 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 16 ± 1 °C, Yield (kg/100 kg compost)-16-18 kg under Indian condition.

Strain Bel-2: Cap Colour-White, Cap Shape-Dome shaped, Average Cap size-3.9 cm, Cap surface-Scaly, Gill colour-Pink, Veil Opening-Late, Stipe dia-1.8 cm, Stipe length -2.5 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 16 ± 1 °C, Yield (kg/100 kg compost)-16-18 kg under Indian condition.

Strain S-454: Cap Colour - White, Cap Shape-Dome shaped, Average Cap size- 4.1 cm, Cap surface-Scaly, Gill colour- Light Pink, Veil Opening-Late, Stipe dia-1.7 cm, Stipe length -2.6 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 16 ± 1 °C, Yield (kg/100 kg compost)-16-18 kg under Indian condition.

Strain NCS-100: Cap Colour-White, Cap Shape-flat, Average Cap size-3.4 cm, Cap surface-Scaly, Gill colour-Pink, Veil Opening-Late, Stipe dia-1.3 cm, Stipe length -2.5 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 17 ± 2 °C, Yield (kg/100 kg compost)-16-19 kg under Indian condition.

Strain NCS-101: Cap Colour-White, Cap Shape-Flat, Average Cap size-3.8 cm, Cap surface-Scaly, Gill colour- Light Pink, Veil Opening-Late, Stipe dia-1.6 cm, Stipe length -3.1 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 17 ± 2 °C, Yield (kg/100 kg compost)-16-19 kg under Indian condition.

Strain S-11: Cap Colour- Off White, Cap Shape-Flat, Average Cap size-4.2 cm, Cap surface-smooth, Gill colour- Dark Pink to brown, Veil Opening - early, Stipe dia-1.2 cm, Stipe length -3.2 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 18 ± 2 °C, Yield (kg/100 kg compost)-14-16 kg under Indian condition.

Strain DMR-button-03: Cap Colour-White, Cap Shape-Dome shaped, Average Cap size-4.3 cm, Cap surface-Scaly, Gill colour- whitish Pink, Veil Opening - very late, Stipe dia-1.8 cm, Stipe length -1.7 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 17 ± 1 °C, Yield (kg/100 kg compost) - 20-22 kg under Indian condition.

Strain DMR-NBS-1: Non-browning strain, Cap Colour- Pure White, Cap Shape-Dome shaped, Average Cap size-4.8 cm, Cap surface-Scaly, Gill colour- whiteish Pink, Veil Opening - very late, Stipe dia-1.5 cm, Stipe length -1.8 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 15 ± 1 °C, Yield (kg/100 kg compost) - 20-25 kg under Indian condition. Best suited for processing.

Strain DMR-NBS-5: Non-browning strain, Cap Colour-White, Cap Shape-Dome shaped, Average Cap size-4.0 cm, Cap surface-Scaly, Gill colour- Light Pink, Veil Opening - late, Stipe dia-1.2 cm, Stipe length -1.8 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 15 ± 1 °C, Yield (kg/100 kg compost) - 22-27 kg under Indian condition. Best suited for fresh marketing.

Strain DMR-Button-04: Cap Colour-Pure White, Cap Shape-Dome shaped, Average Cap size-4.5 cm, Cap surface-Scaly, Gill colour- Light Pink, Veil Opening - late, Stipe dia-1.8 cm, Stipe length -2.2 cm, Temperature Spawn run - 24 ± 2°C, Fruiting- 15 ± 1 °C, Yield (kg/100 kg compost) - 22-25 kg under Indian condition. Best suited for fresh marketing.

a. Recommended and popular Cultivars- varieties/hybrids, their specific characteristics, requirements and yields and list of reputed / accredited Nurseries

1. Recommended and popular cultivars/ varieties/ Hybrids	Potential yield
• NBS-5	22-27 kg/100 kg
• NBS-1	20-25 kg/100 kg
• DMR-Button-03	20-22 kg/ 100 kg
• DMR-Button-04	22-25 kg /100 kg
• Strain S-454	18-20 kg/100 kg
2. Classification of cultivars / Varieties/ Hybrids based on purpose	
• Fresh sale	NBS-5, DMR-Button-03, DMR-Button-04
• Canning	NBS-1, M-7205
• Drying/ Freeze drying	NBS-1
• Others	

b. Cultivar/Hybrid/Variety / Planting material Selected:

d. Method of Propagation / technology

Production or procurement of spawn

To get improved yields and quality latest hybrids like 459, S -130, S- 140, A-15, Delta, NBS-5, etc. which give optimum production in 30 days (after spawn run) of cropping will be used to ensure minimum 6 crops per room per year. After meeting its requirements, surplus spawn will be sold to other growers for additional profit.

This activity involved high technical skill and only trained Mycologist can perform this job judiciously. Production of spawn requires construction of minimum of four rooms. One room is utilized for boiling and autoclaving the grains, second room for inoculation, third for incubation and fourth room is used as the cold room for spawn storage. Incubation and cold room should be suitably insulated with 2" to 4" thick insulation provided with racks and cooling facilities to maintain the temperature between 25-27^{0}C for incubation and 0.4 ^{0}C for spawn storage.

Method of spawn preparation:

For preparing mushroom spawn various cereal grains like wheat, rye, jowar, bajra, etc. can be employed. However, best spawn is prepared on wheat grains. There are three basic steps involved in the mushroom spawn production:

A. **Preparation of pure culture:** A culture of button mushroom can be prepared
   1. By taking tissue of selected mushroom from joint of pileus and stipe
   2. By multi-spore culture
   3. By single spore culture
   4. By hybridization of non-fertile single spore isolates
   5. By sub-culturing it from a culture procured from a reliable source

For a commercial lab, it is apt to procure a promising culture and maintain it by sub-culturing

How to maintain a culture

A culture can be maintained for short period by sub-culturing it on a suitable media and keeping it under refrigerated conditions (4 °C). By using more media, covering the plugs, etc cultures by this method can be maintained for 3-4 months. Prolonged storage beyond this period is not recommended.

For medium term (4-5 years) cultures can be maintained in liquid paraffin oil and for long term conservation these are stored below -130 °C in liquid nitrogen or mechanical refrigerators. These methods are normally used where culture collections are maintained for research purposes and biodiversity conservation.

For repeated sub-culturing always use fresh medium and pick up small inoculum plug from margins or any area except the original plug. Always observe the Petri plate or tube before sub-culturing it. Tubes showing any contamination, sectoring, fluffy growth, aerial mycelium, retarded growth, brown coloured mycelium or any other abnormality may not be used.

While sub culturing, media can be changed after 3-4 cycles. Normally cultures are maintained on Potato Dextrose Agar, Yeast PDA, Compost agar, Malt Extract Agar, Wheat agar, etc.

Many times the growers tend to select strains and cultures based on the growth rate on medium. However, this is not correlated with growth on compost and yield.

How to prepare media

PDA / YPDA

1. Procure 250 gram fresh medium sized potatoes free from disease and and other abnormalities (don't use potatoes that have turned green on exposure to light)
2. Wash thoroughly by scrubbing, remove eyes or any other damaged/bad part using knife (no need to peel potatoes)
3. Slice/dice potatoes into small pieces of less than half inch and wash these with tap water 2-3 times and finally wash with distilled water
4. Add about one litre of water and cook potatoes till tender.
5. Filter the above by using double layered cheese cloth. Discard the potatoes
6. Add water to above potato broth to make it one litre
7. Heat this one litre situation and when it starts to boil, add 20 g Dextrose Anhydrous
8. When preparing YPDA, add 1.5 g yeast extract as well and use only 10g dextrose
9. Check the pH of the medium and adjust to 7.0 if needed with 0.1N HCl or O.1N NaOH
10. Add 15-20 g Agar-agar to the above
11. Keep on stirring slowly till all ingredients get dissolved
12. Autoclave for 15 minutes at 121 °C.

Compost Agar

Procure fresh compost from tunnel that is ready to spawn. Do not use compost made using long method. Air/oven dry the compost, coarsely grind it and store for future use. Ensure that the compost procured was of good quality

Boil 40 g of dry compost in one litre of water for 15-20 minutes, filter through cheese cloth to remove all debris, raise the volume of broth to one litre. Sterilize using autoclave for 1 hr at 15p.s.i.

Add 15-20 g agar and 10 g dextrose per litre compost extract. Heat and stir till fully dissolved. Autoclave for 20 minutes at 121°C.

Malt Extract Agar

1. Heat 1 litre water and add 20 g malt extract powder. Dissolve and check the pH. Adjust to 7.0 if required.
2. Add 15-20 g agar-agar to the above and dissolve by heating.
3. Sterilize using autoclave for 20 min at 15 p.s.i.

B. Preparation of spawn substrate:

1. Select the type of grain to be used. Normally grains in use are wheat, sorghum, millet and paddy.
2. Select the grains which are free from diseases/insects and debris/foreign matters; not damaged and are from the current crop season. There can be variations in performance of different cultivars and it is appropriate to select suitable varieties. The grains should be uniform in size as far as possible.
3. Sieve the grains to remove debris and achieve a uniform product
4. Soak for two hrs and parboil the grains till soft. Ensure that the grains are cooked but not ruptured.
5. Sieve to drain out excess water; allow to surface dry and cooling; mix calcium carbonate (chalk powder) @ 0.5% and calcium sulphate (Gypsum) @ 2% on dry weight basis. The amount of gypsum and chalk powder will vary for other than button mushroom.
6. Fill mixed grains in glass bottle or Polypropylene bags (3/4th volume of the container); plug with non-absorbent cotton/polyfill; cover the plug with butter paper.
7. Autoclave at 22 p.s.i. for 2 hour; allow to cool and transfer to inoculation room.

C. **Inoculation and incubation:** Sterilized grain bottles/ pp bags after cooling are inoculated with 2-3 bits of mushroom mycelium from the culture tubes under aseptic condition. These bottles or bags are then incubated at 25 ± 1°C. The spawn bottles so produced are commonly known as mother spawn and are further used for spawn multiplication. Multiplied spawn is used for seeding the compost.

e.

Mother culture/ spawn to be made or procured.	
If to be made, source of technology	
Expert guiding the project	

d. Accredited / Good spawn suppliers in the area

The spawn can be procured from ICAR-DMR, Solan or any of the All India coordinated centre of AICRP Mushroom Located at State Agriculture University (http://nrcmushroom.org/html/aicrpm.html) or private suppliers (http://nrcmushroom.org/html/spawnsuppliers-private.html) or from international spawn supplier (http://nrcmushroom.org/html/int_spawnsuppl_.html) at the prescribed rates.

Name of Lab	Address	Phone No	email/remarks

e. Planting material - source, quality and suitability

1. Proposed cultivar / variety/Hybrid	
2. Criterion / Rationale for Selection	
From where it is proposed to be purchase Name of Lab Proprietor Name Contact Number:	
3. Warranty provided if any	
4. Whether the spawn has label describing variety, time of inoculation, source of culture, etc	
5. Applicability of Seed Act and any State Act on planting material	
6. Parentage if known	
7. Original manufacturer / Source of planting material	
8. Whether the culture/spawn is imported. If Yes, provide details and whether plant quarantine and disease free certification was done	

5.4.3. Planning of mushroom unit (Spawn lab/Casing compositing unit/ Cropping area/ Pre-packing and PHM area) - Lay out and management

a. Planning, establishment and layout systems : Provide detailed maps with specifications of the structures to be constructed. Also provide the primary source of technology and changes being made to suit the local conditions (with adequate justification)

b. Step wise month wise operation details for each component : Specify the organisation / institution recommending. (Mention source of publication with date/Year or weblink with date)

c. Water and Raw material Management

Water Source	Water Quality	Water Availability	Last Year consumption	Current Year demand

Availability of Water management plan: Yes/ No

d. Straw, Chicken manure and gypsum or other raw materials required for the project

Raw material	Quantity required	Availability	Whether suppliers shortlisted or not	Remarks

e. Integrated Pest and Diseases Management including Biological control and Food Safety

Disease management

Compost should be prepared on a concrete floor and never on uncovered soil as during composting there is rise in temperature, which activates the ascospores present in the soil. Pasteurization and conditioning of the compost should be carried out carefully with ample supply of fresh air. Higher temperatures (above 60°C) for longer time should be avoided. Do not add nitrogen sources like, ammonium sulphate, urea, chicken manure or similar materials just before filling. Composting should be carried out carefully using sufficient gypsum and not too much water. The compost should not be too wet before or after peak heating/ pasteurization.

Temperature above 26-27°C during spawn run and after casing should be avoided. During cropping, temperatures should be kept below 18°C. Casing soil suspected to harbour traces of spores should not be used. Good cook out (compost temperature 70°C for 12h.) at the end of the crop should be carried out, which will kill mycelium and spores of the pathogen in the compost. Initial infection can be checked by treating the affected patches with formaldehyde (2%) solution. The fermentation period of the compost should not be too short. It is essential to achieve active compost that is not too wet and has a good structure.

Manipulation of relative humidity, temperature, air velocity and air movement are of great significance in managing the disease. Temperature above 20°C and relative humidity of more than 85 per cent should be avoided. Additional ventilation and air circulation after watering can ensure quick drying of mushrooms. Temperature fluctuations at higher relative humidity leading to water condensation must be avoided. Application of bleaching powder @ 0.15% is effective in managing the disease.

Pest management

Hygiene is the primary method of pest control in mushroom farming. It is the foundation upon which success of all other control techniques depends. The objectives of any hygiene programme include exclusion of pests and diseases from production cycle, elimination of pest and pathogens and destruction of pest and disease present in a crop at its termination. Such measures help to reduce the contamination level and ensure clean start for subsequent crops. Sanitation focuses on elimination or killing a pest. Routinely removing stumpage from the rooms, where the crop is growing, is a sound sanitary practice. Sanitary practices are designed not only to remove mushroom pests but to kill significant crop threats.

Screening of doors and ventilators

Mushroom flies can easily pass through ordinary wire screen and enter the mushroom house to breed on spawned compost and mushroom beds. Screening of doors and ventilators with nylon net of 35 meshes or more can effectively check the entry of flies in the cropping rooms.

Light trap

Polythene sheets coated with sticky material and attached to a fluorescent tube light in each cropping room help in controlling adult flies. Insects are attracted to white light above 15ºC and to yellow light at lower temperature. Use of light trap (15 W yellow bulb and polythene sheet coated with mustard oil) is very effective for monitoring as well as for the management of the flies.

Cookout

The most heavily contaminated area on a farm is the older crops about to be terminated. Elimination of pests that have built up within the crops is one of the essential step in any effective control programme. Temperature of 70ºC held for 2-3 hours effectively kills all stages of pest and pathogens.

Disposal of spent compost

The spent compost and casing material contain the insects, mites and nematodes. Dumping the spent compost and casing material in moist and shady places helps it to become ideal substrate for breeding of pests. Putting this material in the compost pit and covering it with at least 10 cm thick layer of manure helps in checking the fly breeding.

Curative methods

i. When mushroom flies are noticed in cropping rooms, spray 30 ml Nuvan 76 EC at 0.01% concentration (1.33 ml/ 10 liters of water) on the walls. Close the doors and ventilators for 2 hours after spraying. Avoid direct spray on mushroom beds. Observe minimum interval of 48 hours between spray and picking of mushrooms

ii. Flies can be killed by application of Permethrin dust (10 g a.i/kg), without any residue problem

iii. Malathion (2-3 g/m2) and Diazinon (0.5-1 g/m2) can be applied between flushes and near harvest. Malathion (0.01%) can also be sprayed on beds 7 days after spawning on walls

iv. Spray of Decis (0.05%) on walls, floors and galleries effectively to check the adults

Continuous application of the above chemicals result in the development of resistance in insects. Therefore, care should be taken to rotate the chemicals.

As recommended by ICAR Institute/ CAU/SAU/SHU	1. Fungal diseases and Management 2. Bacterial diseases and Management 3. Viral diseases and Management 4. Insect Pests and Management 5. Nematodes and management 6. Pesticide residue management (including waiting period) (Mention source of recommendation with date/Year)
Action taken / proposed by the applicant	
Points of Deviation if any and justification	

Residue Analysis: Address and contact details of NABL approved laboratory proposed for testing pesticide residue:

f. Physiological disorders- causes, preventive and management measures.

Physiological Disorders and control

Storma
Stroma or sectors / sectoring are noticeable agreegations of mushroom mycelium on surface of spawned compost or the casing. Discrete aerial patches of white mycelium form a dense tissue layer on the substrate surface. Stroma can easily be peeled from the surface of compost or casing. Storma appearing on the compost in small-localized patches can coalesce into larger areas. After casing, stroma may form on the casing above a patch of compost-borne stroma or on casing where stroma does not exist in the compost. Stroma on casing develops in advance of pinning but rapidly putrefies once watering begins. Mushrooms can develop on stroma, but this is somewhat unusual. Stroma and sectors are related to the genetic character of the spawn but are sometime induced if spawn is mishandled or exposed to harmful petroleum based fumes or chemicals or certain detergents during preparation, storage, transit or at the farm.

Production practices during cropping also affect the appearance of these abnormalities but specific relationship has not been elucidated. Excessive CO2, with high water content in the compost and prolonged spawn run period may also result in stroma. Large patches of stroma of 8 to 12 inches are often removed from the compost or casing surfaces with the hope that next growth of spawn will be normal and bear mushrooms.

Weepers / Strinkers / Leakers
Mushrooms described as being 'Weepers' typically exude considerable amount of water from mushroom cap. When small water droplets exude from stem or cap, the mushrooms are called leakers. These water droplets may be few in number and relatively isolated from each other or may be sufficiently numerous to cover the mushrooms. A weeping mushroom can dissolve into white foam. Water collects on the casing surface beneath a weeper and the area developes a putrid odour becoming a 'stinker'. Factors that induce a mushroom to become a weeper are not known but low-moisture compost (less than 64%) coupled with high moisture casing is where weepers are frequently seen. The combination of these two conditions often foster weeper mushrooms prior to and during the first break. In some strains it may also symbolize the degeneration of the strain.

Hollow core and brown pith
These two disorders seem to affect cream strains much more than other strains, although off-white strains can also have hollow core. When the bottoms of the stems are trimmed after harvesting, a circular gap is seen in the centre of the stem. This hole may extend the length of the stipe or it may be shorter. When the hollow cut end portion is brown in colour the sale price is considerably reduced. This abnormality seems to be related to watering and water stress.

Purple stem / Black leg / Storage bum
Cut stems of the mushrooms develop a deep purple colour within few hours of harvest or after being in cold storage overnight. At times colour is closer to balck than purple and it occurs in all strains smooth white, off-white, cream and brown. Generally mushrooms from 3rd break to the end of the crop are most susceptible. Conditions that predispose mushrooms to this phenomenon are unknown but the frequency and the amount of water applied before harvest seems to affect its occurrence.

Rose comb
As the name indicates pinkish gills form large lumps and grow on the cap in an abnormal manner giving the appearance of the comb. These abnormal gills appear at various places on the fruit body and give it swollen or spongy appearance. Such mushrooms are not marketable. The abnormality is caused by smoke or gases or vapours of kerosene oil, petrol, diesel paint or oil products etc.

Scales or crocodiles
On the top of the cap, scales arise due to high velocity of air coupled with low RH. Strong vapours of formaldehyde or pest control products in excess can also cause the outer layer of the skin to tear off. The scale symptoms reduce the value of the mushrooms.

Long stemmed mushrooms
Mushroom with long stems and small caps that may look like drum sticks can indicate virus diseases but it is often the result of high CO2 concentration. With the improvement of aeration such conditions can be corrected.

Brown discolouration
Browning of small pin heads or half grown mushrooms is very common on On the top of the cap, scales arise due to high velocity of air coupled with low RH. Strong vapours of formaldehyde or pest control products in excess can also cause the outer layer of the skin to tear off. The scale symptoms reduce the value of the

mushrooms seasonal mushroom farms. This may be caused by high temperature, sprinkling water with high pressure (maximum pressure is 0.4 atm), highly chlorinated or excessive use of formalin for spray.

Mass pinning
In many instances symptoms of mass pinning or pinning below the casing are observed, especially during seasonal cultivation. Sudden fall in temperature, excessive aeration or early lowering of CO2 concentration than recommended can lead to such symptoms. Many of the abiotic disorders are strain specific and some high yielding strains may be more sensitive.

Control Measures

- Maintain the required environmental parameters such as temperature, humidity and ventilation.
- Use hygiene, precaution and biologicals control to manage disease and pest. Hygiene covers all the measures, which are necessary to minimize the possible incidence of the pests and pathogens. Thus, hygiene and sanitation go hand in hand at all stages of mushroom growing. Farm hygiene is the best defense for a mushroom grower against mushroom pests and diseases particularly during the present time, when use of chemicals on food crops is being discouraged.
- Use of safe and minimum doses of specific fungicides, antibiotic, etc
- The location of mushroom unit should be away from chemical industries and should be free from toxic fumes or gases
- Floor for the preparation of compost should be cemented/tiled and covered with a roof.
- The fresh air should be filtered before it enters the growing rooms to exclude all particles of 2 micron and above.
- Casing mixture should be stored in a clean and disinfected place. All the containers, equipments and machinery used for casing should be thoroughly washed and disinfected.
- Picking should start from new or cleaner crop towards older crops.
- Waste from picking, trash, stems, unsaleable mushrooms should be carefully collected not allowing to fall on the floor and be disposed off carefully.
- Avoid surface condensation of water on developing mushrooms.

As recommended by ICAR Institute/ CAU/SAU / SHU	(Mention source of publication with date/Year)
Action taken / proposed by the applicant	
Points of Deviation if any and justification	

g. Special problems if any

Special Problem	Recommendation by ICAR/ CAU/SAU/SHU	Proposal / action taken by applicant	Points of deviation and justification

5.4.4. Mushroom Unit Structures and Mechanisation

a. Protective cover/ structure

Objectives of Protected cover / structures

Mushroom Unit Structures- Design and Layout. Provide details of all proposed structures including their design, type of material to be used, insulation, machinery to be installed in each.

Type of Protected structure:

From where the technical standards have been procured and what are the deviations proposed.

b. Mechanisation

Provide details of all proposed machinery to be procured (specifying their size, capacity, power or other parameters)

Available Machinery and equipment's / implements

	Operations	Available Machinery and equipment's / implements	Proposed use	justification

Plant & Machinery proposed to be used or procured on outsourcing and on his own

	Operations	Plant & Machinery proposed to be used	Out sourcing / own purchase	Cost	justification

5.4.5. Harvesting and pre-processing Technology

Harvesting stage based on purpose and market (local/distant market):

Harvesting technology

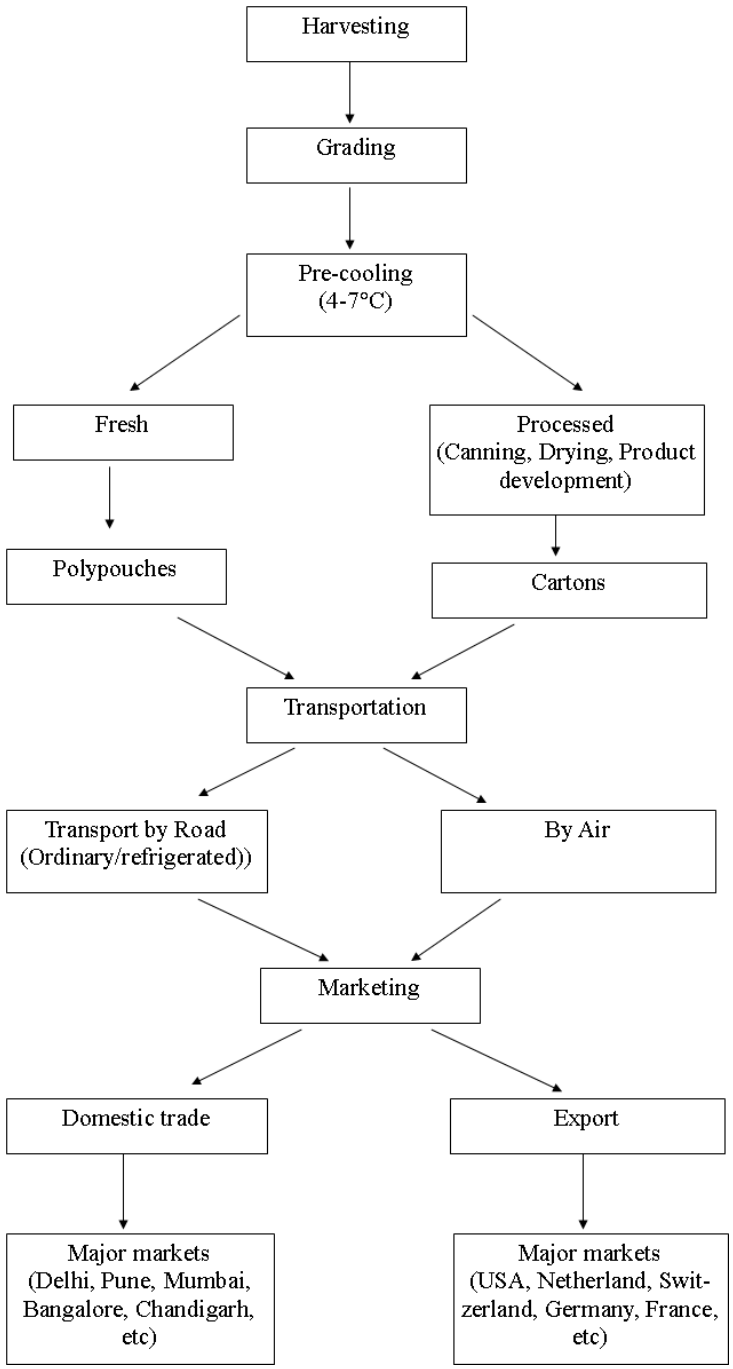
<table>
<tr><td>Global best practices</td><td colspan="2">(Mention source of publication with date/Year)</td></tr>
<tr><td>As recommended by ICAR Institute/ CAU/SAU/SHU</td><td colspan="2"><table>
<tr><td>Pre-harvest Management</td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Technique</td><td></td></tr>
<tr><td>Devices</td><td></td></tr>
<tr><td>Skills and training</td><td></td></tr>
<tr><td>Time/ Period</td><td></td></tr>
<tr><td>Handling</td><td></td></tr>
<tr><td>Containers</td><td></td></tr>
<tr><td>Others</td><td></td></tr>
</table>(Mention source of publication with date/Year)</td></tr>
<tr><td>Relevant Photographs if any</td><td colspan="2"></td></tr>
<tr><td>Action taken / proposed by the applicant</td><td colspan="2"></td></tr>
<tr><td>Points of Deviation if any and justification</td><td colspan="2"></td></tr>
</table>

Expected output of spawn, RTF, Compost /year or Yield / 100 kg compost

5.5. Post-Harvest Management

5.5.1 Post-Harvest infrastructure scenario in horticulture sector in the State and specially for the proposed crop / component

5.5.2 Product / Process Flow chart- Illustrative (It should be crop and project specific)



Source: https://agmarknet.gov.in/Others/phmmushroom.pdf

5.5.3 Floor Plan

1. Sorting
2. Cleaning / Washing
3. Grading
4. Pre-cooling
5. Pre-treatments
6. Packing / processing
7. Transport

Note: Some of these activities will be part of the project and will be needed on small scale. However, if a full-fledged project on post harvest management is proposed, then project may be submitted under other set of guidelines provided????

While including component 1.6 (Processing/ Value addition) along with other components, the following information may be provided in the DPR:

5.5.4 Post-harvest operations (Pre-processing, Processing/ Value addition)

Provide details of operations recommended and to be followed during:

Procedure for canning: The mushrooms should be processed and canned as soon as possible after picking in order to get quality products. Diseased mushrooms should rightly be rejected at the collection point. In the present case mushrooms are proposed to be processed in semi automatic canning line, which consists of under mentioned parts: -

1, Vibrating table
2. Blower washer
3. Conveyer belt
4. Steam blancher
5 Cooling tanks
6. Flighted elevator
7. Drum grader
8. Cutting and slicing machine
9. Brine tank
10. Brine filler
11. Exhauster
12. Conveyer
13. Seamer
14. Steam autoclave with recorder
15 Labeling machine.

Mushrooms at the initial stage of canning are unloaded on the vibrating table. The vibrating table vibrates in such a manner that very small mushroom unsuitable for canning as well as dirt is removed. Hey are than washed in the blower washer. After this process the sorted mushrooms are conveyed to blanching line where they are blanched by steam or by hot water at 80-85^{0}C for 4-5

minutes. Mushrooms after that are put in to water cooler where they are cooled. Afterwards cooled mushrooms can either be graded manually or are put into feeder tank where they are conveyed to the grading drum. The grading drum has ports of different dimensions, which grades the mushrooms suitably. Graded mushrooms can either be sliced or canned whole.

Mushrooms will be canned in the A/1, A / 2.5 or A 10 size cans, depending on the requirement of the market. Mushrooms after grading are conveyed to filling machine, which fill the cans with required quantity of mushrooms. The can afterwards is filled with the measured quantity of brine (1.5-2%) and citric acid (0.1%), which is otherwise prepared by a separate plant attached to the same line. These cans are then conveyed to the exhaust line for steam treatment (85C). After this the cans are seamed by an automatic seamer and are then transferred to a steam-operated autoclave, which sterilizes them at 15 pounds steam pressure (120^0C) for 45-60 minutes. The autoclave also records the temperature data. After sterilization the cans are cooled in a cold-water tank immediately for creating vacuum inside the cans. Finally after cooling the cans are labeled and packed for delivery. On an average 35% weight loss of mushrooms occurs in the entire canning operations if hydrator is not employed.

Including date of harvest, name of the product, batch number for traceability, etc. Provide a sample of tag for spawn, casing/compost, mushrooms and mushroom products proposed to be made.

In case of exports are you aware of compliance requirements as provided by APEDA.

Source: http://www.dcmsme.gov.in/publications/pmryprof/food/ch2.pdf

a. Transport

Mode of Transport including the requirement of Refer vans

	Recommended	Present status	Gap / Remarks
Transport method-			
Local Market			
District Market			
Distant Market			
Exports			

5.5.5. Post-harvest Infrastructure

Type of project	New Project/ Expansion/Modernisation
Location of the Project	

Man power employed (On rolls and on contract)	
Business model -	Rental, Captive, Part of Supply chain service, mixed

Components of project

Infrastructure under the scheme — Tick mark

a. Packaging room
b. Cold Room
c. Primary Processing
d. Value addition unit
e. Refer van
f. Retail outlet
g. Labour room

Details of the specifications of size, type of walls, air conditioning system (part of it may be covered in other components), rooms and machinery required for processing and value addition may be provided. Reference data sheets provided in guidelines for separate Post Harvest management project may be seen for guidelines. Standard construction materials and machinery, wires, AC systems etc may be used as per approved standards by the Government. Documents for reference are reproduced below:

For food safety guidelines in mushroom crop, please follow the guidelines

http://americanmushroom.org/wp-content/uploads/2016/11/20161118_MGAP_2016_All_Species_FINAL_1.3.pdf

DOCUMENTS FOR REFERENCE

Various codes and Standards of measures are listed for reference here

Electrical: Bureau of Indian Standards (BIS)

#	Title	Reference
1.	PVC Insulated cables (light duty) for working voltage up to 1100 volts	IS 694-1977 Part I & II
2.	PVC Insulated cables (heavy duty) for working voltage up to 1100 volts	IS 1554-1976 Part-I
3.	PVC Insulated cables for voltage 3.3 KV to 11 KV	IS 1554-1976 Part-II
4.	Specification of Polyurethane insulated PVC sheeted heavy duty electrical cables, voltage not exceeding 1100 V	IS 5959-1970 Part-I
5.	Specification of Polyurethane insulated PVC sheeted heavy duty electrical cables, voltage 3.3 KV to 11 KV	IS 5959-1970 Part-II
6.	Guide for making of insulated conductors	IS 5578-1970
7.	Code of practice for installation and maintenance of paper insulated power cables	IS 1255-1967
8.	Code of practice for earthling	IS 3043-1966
9.	Guide of practice for installation and maintenance of induction motors	IS 5216-1969
10.	Code of practice for installation and maintenance of AC induction motor starters	IS 5214-1969
11.	Code of practice for installation and maintenance of AC induction motors	IS 900-1965
12.	Code of practice for installation and maintenance of switchgears	IS 372-1975
13.	Code of practice for installation and maintenance of transformers	IS 1886-1967
14.	Code of practice for electrical wiring installation, voltage not exceeding 650V	IS 732-1963
15.	Code of practice for electrical wiring installation (system voltage exceeding 650V)	IS 2274-1963
16.	Guide for testing three-phase induction Motor	IS 4029-1967
17.	Three Phase induction Motors	IS 325
18.	Electrical measuring instruments and there accessories	IS 248
19.	Current transformers	IS 2705
20	Dimensions of slide rails of electric motors	IS 2968
21.	Flexible Steel conduits for electric wiring	IS 3480
22.	Air-Break Switches	IS 4064
23.	Motor Starters for voltage not exceeding 1000 Volts	IS 8544
24.	Conduits for electrical installation	IS 9537
25.	Selection, installation & maintenance of Transformers	IS 10028
26.	Selection, installation & maintenance of switch gear & control gear	IS 10118
27.	National Electrical Codes	SP: 30

Mechanical: Bureau of Indian Standards (BIS)

#	Title	Reference
1.	Safety codes for Mechanical Refrigeration	IS 660
2.	Code of practice for thermal insulation of cold storages	IS 661
3.	Code of practice for application of polyurethane insulation by in-situ pouring method	IS 13205
4.	Rigid phenolic foams for thermal insulation	IS 13204
5.	Application for spray applied insulation code of practice – Polyurethane / Poly-isocyanurate	IS 12432 Part-III
6.	Specifications for preformed rigid polyurethane (PUR) and poly isocyanurate (PIR) foams for thermal insulation	IS 12436
7.	Expanded polystyrene for thermal insulation	IS 4671
8.	Code for practice for fire safety of industrial buildings: General Storage and warehousing including cold storage	IS 3594
9.	Anhydrous ammonia	IS 662
10.	Industrial Bitumen	IS 702
11.	Gunmetal gate, globe and check valve for general purpose	IS 778
12.	Ball Valves including floats for water supply purposes	IS 1703
13.	Mild Steel Tubes, tubular and other wrought steel pipes fittings	IS 1239
14.	Steel Plates for pressure vessels used at moderate and low temperature	IS 2041
15.	Color code for identification of pipe lines	IS 2379
16.	V-belts for industrial purposes	IS 2494
17.	Hot dip galvanizing of iron and steel	IS 2629
18.	Code for unfired pressure vessels	IS 2825
19.	Glossary of terms for safety and relief valves	IS 3233
20	Steel for pressure vessels and welded structures	IS 3503
21.	Steel tubes for mechanical and general engineering purposes	IS 3601
22.	Steel for general structural purposes	IS 2062
23.	Steel tubes for structural purposes	IS 1161
24.	Specifications for steel doors, windows and ventilators	IS 1038
25.	Code of practice for design loads (other than earthquake) for building and structures	IS 875 Part I to V
26.	Criteria for earthquake resistant design of Structures	IS 1893
27.	Specifications for cold formed light gauge structural steel sections	IS 811
28.	Code of practice for use of Steel Tubes in general building construction	IS 806
29.	Code of practice for use of cold form light gauge steel structural members in general building construction	IS 801
30.	Code of practice for general construction in steel	IS 800
31.	Glossary of terms used in refrigeration and air-conditioning	IS 3615
32.	Pressure and vacuum gauges	IS 3624
33.	Safety Codes for scaffolds and ladders	IS 3696
34.	Formed ends for tanks and pressure vessels	IS 4049
35.	Shell an tube type heat exchangers	IS 4503
36.	Code of safety for ammonia	IS 4544
37.	Expanded polystyrene for thermal insulation purposes	IS 4671
38.	Hot-dip Zinc coating on steel tubes	IS 4736
39.	Units and symbol for refrigeration	IS 4831
40.	HDPE pipes for potable water supplies, sewage and industrial effluents	IS 4984

#	Title	Reference
42.	Specification for sprayed aluminum and zinc coating on iron and steel surfaces	IS 5905
43.	Steel Pipe flanges	IS 6392
44.	Injection molded HDPE fittings for portable water supplies	IS 8008
45.	Vertical steel ladders	IS 8172
46.	Treatment of water for industrial cooling systems	IS 8188
47.	Nominal sizes of valves	IS 9520
48.	Selection, use and maintenance of respiratory protective devices	IS 9623
49.	Polythene floats for ball valves	IS 9762
50.	General purpose ball valves	IS 9890
51.	SI units	IS 10005
52.	Recommendations for general pipeline welding	IS 10234
53.	Ammonia valves	IS 11132
54.	Finned type heat exchanger for room air conditioner	IS 11329
55.	Refrigeration oil separators	IS 11330
56.	MS tubes for vertical condenser	BS 3059
57.	Specification for metal air duct	IS 655
58.	Specification for galvanized steel sheet	IS 227
59.	Specifications for Performed Rigid Polyurethane	IS 12436 -1988
60.	Glossary of Terms used in Refrigeration& Air conditioning	IS 3615: 2007
61.	Code of Practice for Fire Safety of Ware housing including cold storages	As per Relevant IS specification
62.	Food Hygiene – General Principle – Code of Practice	IS 2491-1998
63.	Self-blasted lamps for general lighting service	IS 15111 Part 1 and 2

Publication by International Societies and Associations in relation to Building works

#	Title	Reference
1.	Building Code	IBC 2006
2.	Design Code	AISC 2005
3.	Tolerance Code	MBMA 2002
4.	Purlin Code	AISI 2001
5.	Welding Code	ANS 2006
6.	Wind Load & Seismic Load	IS 875 & IS A893-2002&Relevant Codes

REEFER CONTAINER

Component Definition

A reefer container describes a multi-modal insulated container box with integrated refrigeration equipment. Unlike fixed body trucks, reefer containers can be released from the trailer chassis and handled as a unit load or be stationed on site for localised use as a temporary temperature controlled store pending subsequent operations. This allows the prime motive and/or trailer to be utilised for other carriage.

Component Description

A cost norm of Rs 6 lakh per 9 MT (20 foot container) as defined in code ISO/ TC 104, ISO 668:2013, ISO Code 22R1, 45R1 is applied as part of add-on components.

The component name "Reefer Container" is a temperature controlled unit whose insulating body is made of prefabricated insulating panels. The container is designed to be liftable for mounting on or unloading off a carrier-bed and has both forklift and top lift tolerant design. It has one fixed door at the end opposite to the reefer unit. The air transit pattern is bottom-up from floor to ceiling and the floor section is designed to allow air to circulate under the cargo. A fresh air intake system is in-built making it most suitable for horticulture produce.

Reefer container shall be designed for the full range of standard temperatures ranging from -25 degree Celsius to +25 degree Celsius. There shall be provision for temperature recording, capable to program set-point for either supply air or return air. As this equipment is a removable unit on a transport chassis, the corner posts must have locking facility to secure the container on its carrier.

Such container designs are of the same standard use for export and import of horticultural produce by sea and the design is considered optimal for long haul of perishables. All applicable safety norms shall apply to reefer containers.

Remarks/ Recommendations

The subsidy is intended to incentivise use of reefer containers in domestic cold-chain and beneficiary should be advised not to view this as an option to procure containers for international haulage.

There are multiple advantages to utilising such reefer containers, some of which are enumerated-

1. Dimensions are optimised for standardised pallet carriage; thereby allowing for standardisation in handling of perishable cargo in cold stores and in transit.
2. Available on demand as prefabricated units (in use globally) and hence is delinked with fabrication (delivery delays) as in case of fixed body reefer trucks.
3. Design incorporates fresh air venting which is necessary for perishable crops under long haul movement, for e.g. Himachal to Bangalore, a road trip of more than 9 days (equivalent to a trans-Atlantic crossing by ship). Venting also helps minimise ethylene build up (fruits and vegetables).

4. Design allows for multi-modal utility – by road / rail / ship. This will help develop and optimise goods movement by rail or coastal shipping without undue handling of goods.
5. Designed for plug-in electricity source and can be used as mini storage at various locations, pending further activity.
6. Refrigerated body can be dismounted / delinked from primary vehicle, freeing the prime motive or vehicle for other gainful work or other carriage options.
7. There are other design aspects that allow for innovative application of this component.

The reefer containers have computerised cooling system controls, enabling precise temperature control which is important in case of long haulage of horticulture goods. The air ventilation port allows for high respiring perishable goods to continue to have life sustaining oxygen, especially when in-transit in enclosed space for longer than 3 days. These ventilation ports are adjustable to suit the varied demand pattern of fresh fruits and vegetables. It must be noted, that lack of oxygen and build-up of respired CO_2 cause demise of horticulture goods when enclosed over long periods.

Photographs sourced from NCCD members

Reference Data Sheet

#	Component: Reefer Container	Description
1	Container dimensions	20 standard: 8' x 8.5' x 20', 27 to 28 cum
2	Insulation details	Thermal Conductivity value / mm
3	Tare weight	kgs
4	Gross weight	kgs

#	Component: Reefer Container	Description
5	Temperature recording	type
6	GPS System	Must be fitted
7	Refrigeration capacity	kW
8	Refrigerant used	Technical name of refrigerant
9	Fresh air exchange	Describe system fitted
10	Diesel/electric auto-switching	Describe dual power unit
11	Air flow cum/hr (CFM)	Evaporator air flow in CFM
12	Temperature control precision +/- °C	Precision in controls in °C
13	Name of Manufacturer	
14	Year of manufacture	
15	Any design enhancement	Describe design changes is any

Codes and References		
1	ISO/ TC 104	Freight containers
2	ISO 668:2013	Classification, dimensions and ratings
3	ISO/NP 1161:1990	Corner fittings
4	ISO 1496/2 : 1996	Specification and testing
5	ISO Code 22R1, 45R1	Size of container
6	ISO 6346: 1995	Coding, Identification and Marking
7	ISO-14001:2004	Environmental Management
8	ISO 1496/2	Performance test of thermal appliances

All mandatory rules & regulations (BIS, ISO, IS etc.) relevant to the item must be complied with.

Retail outlet

1.Introduction:

RETAIL SHELF

Component Definition

The Retail Shelf equipment's are temperature and/or humidity controlled cabinets or shelves that help in merchandising of fresh horticulture produce by maintaining the on-shelf quality of fruits and vegetables.

Component Description

A maximum admissible cost norm of Rs 10 lac per establishment is applicable for a Retail shelf as part of add on components for credit linked subsidy. This does not limit the establishment from utilising more retail shelves as per requirement or from sourcing equipment with higher costs or options.

The Component name "Retail Shelf" can consist of individual items such as:

1. Multi-decks
2. Small Multi-decks
3. Roll In decks
4. Vertical Decks
5. Specialised cool shelving
6. Associated refrigeration and humidification equipment.

All applicable safety and performance norms shall apply to Retail Shelf component.

2. Rationale for the proposal
3. Product / Process flow chart.
4. Produce / Raw Material:
    a. Types/ Quality of raw material- Grades/ Specifications
    b. Raw material availability and procurement: Details of own production if any and local production annually with 5 years data with future projections. Markets and farm areas of procurement and reliability.
    c. Produce/ Raw material quality and assurance testing
5. Enterprise:
    a. Existing number of units, available capacity and utilisation in the project block, district and the State.
    b. Products and services and projections.
    c. Statutory requirements / licensing details if any.
6. Market :
    a. Quality grades/ specifications/ kinds of products
    b. Demand and Supply data for the products and services.
    c. Business model for the unit.
7. Source of Technology
8. Civil infrastructure, Plant and Machinery. Design, layout and Photographic evidence certified by charter engineer is required to be submitted in case the project is considered for processing.

Facility / utility	Recommended	Proposed.	Remarks

9.Skilled Manpower availability:

Representative Photographs from www

Reference Data Sheet

#	Component: Retail Shelf	Description
1	Name of Manufacturer	Provide the name of manufacturer and model.
2	Type	Specify the kind of Retail Shelf i.e. Multi-decks, Small Multi-decks, Roll In's.
3	Produce to be handled	Name types of produce to be handled
4	Capacity	Storable volume of fresh products the shelf can store in m^3.
5	Dimension external	Specify the floor area occupied by the retail and height in mtr
6	Electronics	Specify energy saving electronics and the automatic cut-off/start are provided.
7	Temperature Range	Specify the operating Temperature Range of the Retail Shelf as specified by the Manufacturer.
8	RH control	Provide details of RH controls
9	Lighting system	Provide details and kW of lights used
10	Total Refrigeration capacity	Provide the capacity of refrigeration unit of the shelf in kW.
11	Refrigerant used	Provide the technical name of refrigerant.
12	Energy consumption	Total power consumption of the shelf in kW.
13	Years in business	Provide details of retail shop, years in business, annual sales volume, etc.

5.6 Marketing

5.6.1. Connectivity of project site and produce

Road connectivity	
Rail connectivity	
Air connectivity	

Nearest produce Assembling / Aggregation unit/ place if any

5.6.2. Existing Market Institutions – Agri.Produce Market Committees, …….

a) Near to Project site

b) Within the District / Neighbourhood districts

c) Within the State

d) In Adjacent State

5.6.3. Alternative Marketing strategies:

a. Pre-harvest contract
b. On Farm Marketing
c. Retail Marketing
d. Wholesale marketing
e. Online Marketing
f. Exports

5.6.4. Traceability Record/ system proposed if any for packs.

5.6.5. Proposed value chain / method of Marketing by the Applicant

5.7 Value Addition/ Processing

Potential for the processing of crop produce / commodity and facilities / infrastructure available

	Processing product (s)	Infrastructure / Processing units available	Capacity	% capacity utilisation	Remarks

6 Technology providers

6.1 Research Institute (s) [ICAR/CAU/SAU/SHU etc.] providing / from which technical details are ascertained

Details of Crop expert / Subject Matter Specialist (SMS) and other experts consulted DPR preparation.

Crop Expert	Name of Horticulturist/ Crop Expert	
(Mandatory)	Current profession:	
	Educational Qualification and University passed out	
	Registration Number if any	
	Permanent Address:	
	Contact Number:	
Hi Tech Expert	Name of Expert	
(Desirable)	Current profession:	
	Educational Qualification and University passed out	
	Registration Number if any	
	Permanent Address:	
	Contact Number:	
Post-Harvest Management Expert	Name of PHM Expert	
(Desirable)	Current profession:	
	Educational Qualification and University passed out	
	Registration Number if any	
	Permanent Address:	
	Contact Number:	
Market Expert	Name of Expert	
(Desirable)	Current profession:	

	Educational Qualification and University passed out	
	Registration Number if any	
	Permanent Address:	
	Contact Number:	
Project Finance	Name of Expert	
(Mandatory)	Current profession:	
	Educational Qualification and University passed out	
	Registration Number if any	
	Permanent Address:	
	Contact Number:	

6.2. Agri-Business Incubators

1. List of Incubators nearest to the project.
2. If any assistance is taken from the incubators, details

7 Food Safety – With / Without Good Agricultural Practices Certification

	GAP	Optional
	Whether the applicant proposes to undertake Good Agricultural Practices?	Yes/No
	If Yes. What brand / kind GAP – Provide details of brand	
	Provide Certifying Agency details and contact person	
	NABL lab whose services are proposed to be availed to assure compliance with regard to pesticide / chemical residue.	

FOOD SAFETY MEASURES

- Pre-Planting Measures
- Production Measures
- Harvest
- Post-Harvest Handling

1. Worker hygiene
   a) Hands can contaminate fresh fruits and vegetables with harmful microbes
   b) Packing area should be cleaned and sanitized.
   c) Supply liquid soap in dispensers, potable water, and single-use paper towels for hand washing.
   d) Packing area should be cleaned and sanitized. Supply liquid soap in dispensers, potable water, and single-use paper towels for hand washing.
   e) Workers should be properly educated about the importance of restroom use and proper hand washing.
   f) Encourage proper use of disposable gloves on packing lines.
   g) Sick employee should not be given food-contact jobs.

2. Monitor wash water quality
   a. Potable water should be preferably used in all washing operations.
   b. Clean water should be maintained in dump tank by sanitizing and changing water regularly.
   c. Use chlorinated water and other labeled disinfectants to wash fresh produce.

3. Sanitize packinghouse and packing operations
   a. Loading, staging, and all food contact surfaces should be cleaned and sanitized at the end of each day.
   b. Exclude all animals, especially rodents and birds from the packinghouse.
   c. Wash, rinse and sanitize the packing line belts, conveyors, and food contact surfaces at the end of each day to avoid buildup of harmful microorganisms.
   d. Packaging material should be stored in a clean area

4. Pre-cooling and cold storage
   a. After harvesting, fruits and vegetables should be quickly cooled to minimize the growth of pathogens and maintain good quality.
   b. Water bath temperature for cooling should not be more than 10F cooler than the produce pulp temperature.
   c. Refrigeration room should not be overloaded beyond cooling capacity.

5. Transportation of produce from farm to market
   a) Proper cleanliness of the transportation vehicles should be ensured before loading.
   b) Farmers have to make sure that fresh fruits and vegetables are not shipped in trucks which have carried live animals or harmful substances.
   c) If these trucks must be used, they should be washed, rinsed, and sanitized them before transporting fresh produce.

d) For traceability norms, it must be ensured that each package leaving the farm can be traced to field of origin and date of packing

Source: TNAU
http://agritech.tnau.ac.in/gap_gmp_glp/gap_fresh%20_%20fruits%20&%20veg.html

8. Innovation if any

9.Profitability of the project (Horti-business): Critical observations of Applicant

10 Checklist

Check list for Detail Project Report (DPR)

		Mandatory	Document / Evidence *	Tick Mark
	Project at a Glance	√		
1	**About the Applicant /Promoter**	√	Registration Number and other details of legal entity/Society, etc Copy of Pan and Aadhar SC/ST certificate TSP/NE certificate Training certificate and undertaking	
2	**Details of benefits availed by the Applicant / Promoter**	√	Attach brief note and map where ever applicable	
3	**About Project -Name, rationale, Management and Description**			
	1. Name of Project, Activity, Objectives and expected Outcomes	√		
	2. Rationale / Justification for the project	√		
	3. Site/ Land details- RoR/ Ownership / Registration of lease/ map etc.	√	Certified Land revenue documents	

	4. Location of the Project- Identification	√		
	5. Current usage of land of proposed Project Area	√		
	6. Current infrastructure and assets possessed by the Applicant:	√		
	7. Lay out plan of the project	√	Lay out Plan	
	8. Conversion of Land Use (CLU)	√		
	9. Whether project site is part of production belt / cluster / hub	√		
	10. Rationale for the location of the project	√		
	11. Compliance of project site for food safety	√		
	12. Components / Activities of the Project with justification	√		
	13. Operations planning	√		
	14. Month wise operational chart / Implementation schedule	√		
	15. Backward and Forward linkages.	√		
	16. Manpower (Skilled & Unskilled labour etc.) availability	√		
	17. Employment generation	√		
	18. Infrastructure (Power, Fuel, Water, Plant and Machinery, connectivity, Effluents treatment etc.)- Required, Already available, Gaps and the management.	√		
	19. SWOT Analysis	√		
	20. Monitoring and evaluation	√	Certificate	
4	**NHB Scheme under which the project is**			

	proposed with rationale / justification.			
5	**Project details**			
5.1	**Agro-climatic suitability / feasibility**			
	1. Origin and distribution of crop in the said location and India and in the world (briefly)			

Earlier the consumption of mushrooms was low as many were not aware of food and medicinal values of mushrooms. Mushrooms contain about 90% moisture and are a low calorie food highly suited to those with obesity. They contain about 2.5-3.5 % protein which is of very good quality, contains all the essential amino acids and is essentially rich in lysine. Mushrooms are low in fat but the fat is rich in linoelic acid (PUFA). Cholesterol, the dreaded sterol, is absent which make the choice of the dieticians for heart patients. Due to nil starch and low sugars, these are the delight of the diabetic patients. Mushrooms are highly suited to those suffering from hypertension, hyperacidity and constipation. These are especially rich in vitamin B complex. and vitamin B12 also. Besides, mushrooms have many medicinal properties like anti cancer, hypocholesterolemic and hypolipidimic effects. Justifiably mushrooms are called the " ultimate health food", the neutaceuticals.

The demand for mushrooms, domestic as well as international is rising at a phenomenal speed. The present world production of mushrooms is about 28 million tons and China remains the main producer and exporter of mushrooms. India is roughly producing around 1,29,000 tons of mushrooms annually of which 85% is of button mushroom. Agro Dutch Foods Lalru, Punjab boasts the single largest producer and exporter of mushrooms in India. Besides this very big unit there are many other small white button mushroom units in HP, Punjab, Maharashtra, Gujrat and Karnataka cultivating mushroom all the year round and are running successfully. These units are located in Phagwara, Jullandhar, Bhatinda, Banga, Bannore etc. The prevailing retail rates of mushroom in the state range between Rs 150 to Rs 250/kg.

Leading producers of mushrooms are European, American and East Asian countries. The so called G-6 (USA, Germany, France UK, Italy and Canada) are major consumers of mushrooms. China is the leading producer and exporter of the mushrooms to the American, European and Asian countries. China's mushroom production is on seasonal basis employing temporary structures. Mushroom cultivation is not organized on scientific footings in China. It is the right time that India, with its relatively cheap labour and raw

materials, which had made Chinese mushrooms competitive, should enter the billion dollar mushroom market. But as indicated above our annual production is very low because mushrooms are being grown by small farmers seasonally during the winters only and the venture is being taken up by a very few players as a modern technical industry. Now with adoption of latest technology of mushroom production under controlled environmental conditions, it is possible to grow high quality mushrooms throughout the year to meet the domestic and international demand. The promoters have under taken the market surveys and made inquiries regarding the demand for mushrooms. Besides the big demand in the countries mentioned above there is a fast developing mushroom market in the gulf countries. Domestic market is also expanding at phenomenal rate, which is reflected in the increase in the production. Our per capita of mushrooms consumption is the lowest in the world which is 40-50 g against the 3 kg in the developed countries. This poor consumption is mainly due to non-availability of mushrooms in most part of the country for most of the year.

	2. Agro-climatic / Horticultural zones and suitability of the crop (s)	√	IMD Data	
	3. Raw materials -requirements	√		
	4. Water Quality and availability	√	Latest Water Analysis report (not more than 1 month old)	
5.2	**Market viability**			
	1. Commercial and Nutritive importance / significance, composition and Uses			
	2. Target Market	√		
	3. Statistics: India and State			
	4.			
	5. Clusters of the project crop in the state.	√		
	6. Estimated Demand and Supply Gap	√	State Horticulture Dept.	
	7. Global producers- Country, Area,			

	Production, Productivity and global market share in the last available 5 years.			
	8. International trade: markets and potential (for export oriented projects)	√ @		
	9. Seasonality matrix of mushrooms			
	10. Price variation of commodity in the State and nearby markets	√	State Govt.	
	11. Balance sheet of commodity in the State			
	12. Central and State Government policy			
	13. Value chain in the commodity	√		
	14. Proposed Strategy by the Applicant for Marketing and Market viability	√		
5.3	**Financial viability**			
	1. Due diligence status	√		
	2. Project Cost	√	Certified by CA	
	3. Means of Finance	√		
	4. Information on subsidy	√		
	5. Key financial Indicators	√		
	6. Project Financing	√		
	a. Rate of Interest	√		
	b. Returns from the Project (IRR):	√		
	c. NPV (Net Present Value)	√		
	d. Economic Rate of Return	√		
	e. Cost of Production and Profitability	√		

	f. Yield and Sales Chart	√		
	g. Proposed Balance Sheet:	√		
	h. Proposed Cash flow Statement for next 7 years	√		
	i. Proposed Profit & Loss Account: (Annexure)	√		
	j. Proposed Repayment of Term loan and Schedule	√		
	k. Break even Analysis)	√		
	7. Percentage of term loan	√		
	8. Summary of repayment	√		
	9. Sensitivity analysis	√		
	10. Key financial parameters	√		
	11. Statement of assets & liabilities	√		
	12. Risk analysis & management	√		
	13. Farm record keeping/ Maintenance proposed	√	Records	
5.4	**Site development and Crop Husbandry**			
	5.4.1. Site development			
	5.4.2.Selection of Quality Planting Material			
	a. Recommended and popular Cultivars-varieties/hybrids, their specific characteristics, requirements and yields	√		
	b. Cultivar/Hybrid/Variety selected and Criterion adopted for selection	√		
	c. Propagation methods	√		
	d. Accredited / Good Nurseries in the	√		

	area			
	e. Planting material-source, quality and suitability	√	Nursery / Shop Invoice with Seed quality	
	5.4.3. Planning of mushroom unit - Lay out and management			
	1. Planning, establishment and layout systems	√		
	2. Land preparation	√		
	3. Planting Season / time and density and transplanting	√		
	4. Water and Nutrient management	√	Written plan	
	5. Intercultural operations including Weed management	√		
	6. Plant canopy architecture management/ training and pruning	√		
	7. Planting systems and transplanting of horticultural crops	√		
	8. Use of Pollinators & pollinisers	√		
	9. Use of Plant growth regulators	√		
	10. Flowering & fruiting	√		
	11. Integrated Pest and Disease Management and Food Safety measures	√		
	12. Physiological disorders- causes, preventive and management measures.	√		
	13. Special problems if any	√		

	5.4.4. Mushroom Unit Structures and mechanisation	√		
	1. Protective cover structure	√	Technical standards	
			Undertaking of expertise / competency by Agency	
	2. Mechanisation	√	Company Brochures	
	5.4.5. Harvesting and Pre-processing Technology			
5.5	**Post-Harvest Management**	√		
	1. Post-Harvest infrastructure scenario in horticulture sector in the State and specially for the proposed crop / component			
	2. Product/ Process Flow chart	√		
	3. Lay out / Floor Plan of post-harvest operations	√		
	4. Post-harvest operations (Based on applicability)	√	Protocols	
	5. Pre-cooling	√		
	6. Curing	√		
	7. Cleaning / Washing	√		
	8. Sorting and Grading	√		
	9. Packing and labelling	√	Models	
	10. Ripening	√		
	11. Transport	√		
	12. Storage- Low cost / cold storage/ CA	√		
	13. Post-harvest infrastructure – Integrated Post-harvest Management- (Which ever	√	Technical Standards	

	component is proposed)			
	1. Integrated Pack house			
	2. Pack House			
	3. Pre-cooling unit			
	4. Cold Room (Staging)			
	5. Mobile Pre-cooling unit			
	6. Ripening Chamber			
	7. Primary Processing			
	8. Refer van			
	9. Retail outlet			
	10. Labour room			
5.6	**Marketing**			
	1. Aggregation & Assembling: Marketing infrastructure	√		
	2. Market Institutions and agents	√		
	3. Demand and Supply trends and forecast both in local and National markets.			
	4. Traceability system	√		
	5. Proposed value chain / method of Marketing by the Applicant	√		
5.7	**Value addition / Processing**	√		
6	**Technology providers**	√		
	1. ICAR /CAU/ SAU/SHU / Research Stations and Experts names	√		
	2. Agri/Horti-Business incubators	√		
7	**Food Safety -With /Without GAP**			

	certification			
	1. GAP Certification if any	√		
	2. Food safety measures	√	Clean farm, Trained workers; Protective clothing, Safety equipment; First Aid; Safety and Hygiene policy; Waste Management Plan	
	a. Pre-planting	√		
	b. Crop husbandry	√		
	c. Harvestings	√		
	d. Post-harvest	√		
8	Innovation if any			
9	**Risk Management**	√	Proposed insurance details if any	
10	**Checklist**	√		
11	Declaration from Crop Expert and Project Finance Expert	√		
	Self-declaration by the Applicant	√		

NOTE: *: DOCUMENTS ARE TO BE SUBMITTED ONLY WHEN NHB ACCORDS PRE- IPA APPROVAL.

@ In case of export units.

10.1.Declaration by Crop Expert (if the Project / Crop specific information, data and chapters of DPR are prepared by the expert and not by the applicant)

I have read and understood the latest NHB Schemes operational guidelines and made the applicant understand the same.

The technical information provided in the Detail Project Report are as recommended by ICAR/ State Agriculture / Horticulture University/ …….Research Institute as published in their publication……../ genuine website…….

The project is technically feasible and economically viable and is bankable.

Certified that the information/contents as above furnished by me/us in the application are true to the best of my/our knowledge & belief and nothing material has been concealed.

My details are as follows:

Name of Crop Expert		(Could be any working or retired faculty / scientist in ICAR/ CAU/SAU/SHU/State Horticulture Dept. or ICAR Agri/Horti-business incubators)
Current/ previous profession:		
Educational qualification and University passed out		
Registration number if any		
Permanent address:		
Contact Number:	Tel	
	Mobile	
	Email	

Place	Signature
Date	Designation and Seal

For any queries regarding mushroom cultivation, please contact

Dr. VP Sharma

Director, ICAR-Directorate of Mushroom Research
Chambaghat, Solan – 173213 (HP)
Email: directordmr@gmail.com
Phone: 01792 230451; 01792 230541
Mobile: 9418372972

10.2.Declaration by Project Finance Expert (Chartered accountant)

(if the Market viability and Financial Viability chapters are prepared by the Project Finance Expert and not done by the applicant on his/her own)

I have read and understood the latest NHB Schemes operational guidelines and made the applicant understand the same.

The project is technically feasible and economically viable and is bankable.

The Financial and Market viability as provided in the Detail Project Report is true to the best of my knowledge.

Certified that the information/contents as above furnished by me/us in the application are true to the best of my/our knowledge & belief and nothing material has been concealed.

Name of Chartered Accountant	
Current profession:	
Educational qualification and University passed out	
Registration number if any	
Permanent address:	
Contact Number:	Tel
	Mobile
	Email

Place	Signature
Date	Designation and Seal

11.Self-Declaration by applicant

1. I have read and understood the latest NHB Schemes operational guidelines including conditions, norms and pattern of assistance.
2. The information provided in the Detail Project Report is true to my knowledge.
3. In case the details provided by me viz., (i) my personal details, land, previous benefits availed by me from either Central and State Government if proved false at any stage NHB is entitled to recover any subsidy if any released by it from me.
4. I have personally ascertained technical details of the projector or I have availed the services of a competent Horticulturist for technical details and viability. Accordingly declaration is provided herewith.
5. I have personally ascertained Financial and Market viability of the project or I have availed the services of a competent Project Finance expert for the requisite project finance details and project viability. Accordingly declaration is provided herewith.
6. In case the project is approved for pre-IPA, I shall undergo a 2 Weeks (min.10 working days) training programme in case of Open field condition and protective cover (with or without PHM component) and a minimum of 1 Week programme in case of standalone PHM component at my own expenses in one of the ICAR/CAU/SAU/SHU/ Research Station/ Centres of Excellence/ related Central or State Government institution/ others as found appropriate / approved by NHB.
7. I shall adopt scientific package of practices / technology and maintain proper farm accounts.
8. The project is technically feasible and economically viable and is bankable.
9. In case the project application is considered for application processing, I am bound to submit all required / requisite mandatory documents to establish veracity of my DPR and eligibility to claim subsidy under NHB Schemes in the form prescribed with in 3 months of any such intimation from NHB for according In principle approval (IPA). Else I acknowledge that my application stands vacated and rejected by default of my omission.
10. Incomplete/ NPA projects and default cases shall not be eligible for subsidy.
11. In case the project is approved for subsidy claim I shall undertake a MOU with NHB to comply with all the terms and conditions of the scheme guidelines as effective on the date of subsidy claim approval and any other condition/ advisory in the interest of projects success and sustainability.

Applicant (Name and signature) and Seal if any

Date

Location:

Annexure I

Proposed Stages in NHB Scheme Implementation

Stage	Player	Step	Mode	Timeline	Remarks / Enclosures
1	Applicant	Submission of Prescribed Application -specific to the scheme enclosing DPR based on model template.	Online		No document is required to be enclosed but with requisite fees.
2	NHB	Examines the Application and DPR and gets it appraised for Agro-climatic suitability, Market viability, Financial viability, Technological feasibility and capability of applicant duly considering the budget, priority (Sabka Saath Sabka Vikas) and design of implementation of the offer / Year.		Max. 2 months Target 1 Month	-
3	Applicant + Bank	If the project is sound, NHB informs Pre-In Principle Approval (Pre-IPA) to the applicant to submit all the prescribed / requisite documents along with • Bank Appraisal of Market viability and Financial viability (should be after NHB Pre-IPA) ; • and Sanction (after Appraisal) within 3 months of NHB Pre-IPA.		Max. 3 months	Prescribed documents including those specified in DPR checklist.

		Any lapse in time line, the Pre-IPA stands vacated / rejected. However he is eligible for fresh submission.			
4	Applicant	Undergoes 2 Weeks training programme (if not already trained) on the project / Crop at his own expenses in an institute recommended / approved by NHB			
5	NHB	NHB examines the application, DPR with reference to documentary evidence and Bank Appraisal of Market viability and financial viability duly considering the budget, priority (Sabka Saath Sabka Vikas) and design of implementation of the offer / Year.		Max. 3 months Target 1 Month	
6		NHB takes decision on according In-Principle Approval (IPA) to the applicant. In case it is approved, it is informed to the applicant.			
7	Applicant	Applicant completes the project within the prescribed time limit. Else the IPA stands vacated / rejected		18 months	
8	Applicant	Applicant submits subsidy claim within 3 months of completion of the project. Else the IPA stands vacated		3 months	Prescribed documents

		and rejected			
9	NHB + Bank/ FI+ Applicant	NHB undertakes Joint Inspection of the field/ activity		Target: Max. 30 days of request	
10	NHB	NHB JIT submits JIT report		15 days	
11	NHB	NHB examines the JIT report and takes decision on release of subsidy subject to Scheme conditions and publish decision / minutes of competent authority with reasons in NHB website.		2 months	
12	NHB	In case NHB approves release of subsidy, releases funds with in 15 working days of minutes of competent authority to SRF account.			
13	Bank/ Applicant	1. Confirms the receipt of subsidy. 2. Closely monitor the project health for over 5 years. 3. Takes into consideration the NHB advisories.			
14	Applicant	1. Confirms the receipt of subsidy. 2. Maintain farm records and accounts. 3. Adopts technology / scientific package of practices and innovate marketing / business strategies. 4. Takes into consideration the NHB advisories.			

		5. Regularly reports the performance of project health 6. Share best practices if any to NHB.			

Annexure 2

Suggested Combinations

Single components

Spawn or compost or RTF bags or cropping (casing alone may not be viable and for Processing and value addition alone, there are other schemes of NHM)

Two component combinations

Spawn + RTF bags or cropping or processing

Casing + compost

Compost + casing or cropping

RTF bags + spawn or cropping or processing

Cropping + spawn or RTF bags or compost or processing

Processing + spawn or RTF bags or cropping

The choice of two component combinations given above is only suggestive and can vary with the choice of species.

You may choose any three or more or all components. In fact for integrated unit you may need more components. Choice and number of components will vary according to mushroom species, location, demand, etc. Proper justification for taking up only one or two or more or all components may be provided.

Annexure - Component wise cost of the project

For 50 TPA Unit

Infrastructure

S.No	Facility	Area (Sq Ft)	Unit Cost (Rs)	Total cost (Rs in Lakhs)
1	Cropping rooms including insulation @ Rs. 900/- sq.ft	2400	900	21.6
2	Pasteurized tunnel @900 sq.ft	408	900	3.672
3	Spawning area @ Rs. 500/-	300	500	1.5
4	Bunkers 2 Nos. @ Rs.500.00	1014	500	5.07
5	Compost yard @ Rs.300/- 1 No	1500	300	4.5
6	Casing chamber @ 700	120	700	0.84
	Total			37.182

Plant and machinery

S. No.	Particulars	Price (Rs in Lakhs)
1	12.5 ton capacity self contented AHU complete in all aspects - 2 Nos.	6.00
2	Steel racks in the growing rooms and iron gratings in the Tunnel	4.50
3	Boiler 200 kg steam generation capacity	2.00
4	Tunnel ventilation system	0.60
6	Multi channel thermometers	0.30
	Total	**13.40**

For 100 TPA Unit

Infrastructure

S.No	Facility	Area (Sq Ft)	Unit Cost (Rs)	Total cost (Rs in Lakhs)
1	Cropping Room (Including Insulation)	5400	900	48.60
2	Bulk chamber (inclusive of insulation)	330	900	2.97
3	Spawning area	375	600	2.25
4	Phase-I bunkers	840	500	4.20
5	Lagoon	1600	200	3.20
6	Composting yard	900	300	2.70
7	Casing soil room	120	600	0.72
8	Office	200	700	1.40
9	Utilities	600	500	3.00
	Total			**69.04**

Plant and machinery

S. No.	Particulars	Total Capacity	No	Price (Rs in Lakhs)
1	Central chilling station including AHU'S (Including ducting, piping, and controllers, complete in all respect.)	50 tonnes	12	13.00
2	Blowers for the Phase-I bunkers, tunnel and casing chamber		4	1.00
3	Boiler 200 kg steam generation capacity		1	2.00
4	Tunnel ventilation system		1	0.60
5	Temp. & Humidity controllers for growing rooms		12	0.80
6	Multi channel thermometers		1	0.30
7	Steel racks for the growing rooms & gratings for the tunnel		16	15.00
8	Spray system		1	0.50
9	DG Set (KW)	80	1	5.00
10	Transformer (One)		1	5.00

11	Tractor with trolly/Front head loader		1	10.00
	Total			**53.20**

For 200 TPA Unit

Infrastructure

Facility	**Area (Sq Ft)**	**Unit Cost (Rs)**	**Total cost (Rs in Lakhs)**
Cropping Room (Including Insulation)	9600	900	86.40
Bulk chamber (inclusive of insulation)	1120	900	10.08
Spawning area	513	600	3.08
Phase-I bunkers	2720	600	16.32
Lagoon	1600	100	1.60
Composting yard	1300	300	3.90
Casing soil room	120	600	0.72
Office	200	600	1.20
Utilities + cold store	732	500	3.66
Total			**126.96**

Plant and machinery

Particulars	Total Capacity	Number	**Price (Rs in Lakhs)**
Central chilling station including AHU'S (Including ducting, piping, and controllers, complete in all respect.)	100	8	25.00
Blowers for the Phase-I bunkers, tunnel and casing chamber		7	1.75
Boiler 200 kg steam generation capacity		1	2.00
Tunnel ventilation system		2	1.20
Temp. & Humidity controllers for growing rooms		8	0.48
Multi channel thermometers		1	0.30
Steel racks for the growing rooms & gratings for the tunnel		15	22.50
Spray system		1	0.50
DG Set (KW)	160	1	10.00
Transformer (One)		1	5.00
Tractor with trolley/Front head loader		1	10.00
Total			**78.73**

For 500 TPA Unit

Infrastructure

S.No	Facility	Area (Sq Ft)	Unit Cost (Rs)	Total cost (Rs in Lakhs)
1.	Cropping Room (Including Insulation)	24000	900	216.00
2.	Bulk chamber (inclusive of insulation)	2240	900	20.16
3.	Spawning area	975	600	5.85
4.	Phase-I bunkers	3400	600	20.40
5.	Lagoon	1600	100	1.60
6.	Sorting room	660	500	3.30
7.	Workers room	660	500	3.30
8.	Service room	400	500	2.00
9.	Composting yard	1300	400	5.20
10.	Casing soil room	240	600	1.44
11.	Spawn laboratory	1500	900	13.50
12.	Poultry manure shed	2500	300	7.50
13.	Processing Unit	3000	600	18.00
14.	Office	450	600	2.70
15.	Utilities	1500	500	7.50
16.	Bore well	2 no.		6.00
	Total			334.45

PLANT AND MACHINERY

S. No.	Particulars	Total Capacity	No.	Price (Rs in Lakhs)
1.	Central chilling station including AHU'S (Including ducting, piping, and controllers, complete in all respect.)	250 tons	20	63.00
2.	Blowers for the Phase-I bunkers, tunnel and casing chamber		11	2.75
3.	Boiler 300 kg steam generation capacity		1	3.00
4.	Tunnel ventilation system		4	2.40
5.	Temp. & Humidity controllers for growing rooms		20	1.20
6.	Multi channel thermometers		4	1.20
7.	Steel racks for the growing rooms & gratings for the tunnel		40	46.50
8.	Spray system		4	2.00
9.	Canning unit (1ton capacity) with slicer		1	30.00
10.	Laminar flow (6x2x2ft)		1	5.00
11.	Autoclave		2	0.75
12.	BOD incubator 12cft		1	0.5
13.	Nitrogen determination apparatus		1	0.25
14.	PH and conductivity meter		1	1.00
15.	Air conditioners		3	3.00
16.	Cold room with product cooler 10x10x8ft		1	0.30
17.	Refrigerator 300 liters		1	1.00
18.	Boiling kettles 25 liters capacity		2	3.00
19.	Misc. equipments			5.00
20.	DG Set (KW)	400	1	25.00
21.	Transformer (One)		1	5.00
22.	Tractor with trolly/Front head loader		1	10.00
	Total			**211.85**

1000 TPA Unit

Infrastructure

SN.	Facility	Area sq.ft.	Unit cost (RS.)	Total cost (in lakhs)
1	Cropping Room (Including Insulation)	35,000	1000	350.00
2	Bulk chamber (inclusive of insulation)	3,275	1000	32.75
3	Spawning area	2,100	600	12.60
4	Sorting room	660	400	2.64
5	Workers room	660	400	2.64
6	Phase 1 bunkers	7056	600	42.34
7	Composting yard	5821	300	17.46
8	Service room	400	500	2.00
9	Casing soil chambers	960	700	6.72
10	Spawn laboratory	1500	500	7.50
11	Utilities	1500	400	6.00
12	Poultry manure shed	2500	150	3.75
13	Water tank	-	-	2.00
14	Road	--	---	5.00
15	Small anc. Structures	--	--	5.00
16	Bore wells	2 nos		6.00
	Total			**504.40**

Plant and machinery

S.No.	Particulars	Numbers	Price (Lakhs)
1	Central chilling station including AHU'S (Including ducting, piping, and controllers, complete in all respect.)	20	125.00
2	Boilers 300 & 1000 kg steam generation capacity each	2	10.00
3	Blowers for the tunnels (phase 1&2) and casing chamber	13	3.25
4	Tunnel ventilation system	4	2.40
5	Tractors	2	20.00

6	Filling line with hopper regulator	1	8.00
5	Canning unit (1ton capacity) with slicer	1	30.00
6	Temperature & humidity controllers for growing rooms and tunnels	20	2.00
7	Multi channel thermometers		1.00
8	Steel racks for growing rooms & gratings for the tunnels	33	61.88
9	Laminar flow (6x2x2ft)	1	1.00
10	Autoclave	2	5.00
11	BOD incubator 12cft	1	0.75
12	Nitrogen determination apparatus	1	0.5
13	PH and conductivity meter	1	0.25
14	Air conditioners	3	1.00
15	Cold room with product cooler 10x10x8ft	1	3.00
15	Refrigerator 300 liters	1	0.30
16	Boiling kettles 25 liters capacity	2	1.00
17	Misc. equipments		3.00
	Total		**279.33**

Miscellaneous fixed assets

	Rs in Lakhs
Electric fittings	8.00
Furniture's and fixtures	3.00
Sprayers system	8.00
Computers	3.00
DG Set 2 Nos. 400 &100 KVA	25.00
Structural steel for support	3.00
Transformer 2 Nos.	10.00
Miscellaneous	8.00
Total	**68.00**