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Technologies received from CSIR Labs as on 04.09.2020

1. Technologies developed by CSIR-Indian Institute of Petroleum(IIP), Dehradun

	Basic Information	
	Items	**Answers**
1)	**Title of the technology**	**Improved Jaggery Making Plant "Gur Bhatti"**
2)	About technology (in short)	*Jaggery making is one of the prominent cottage industries of rural India. The industry was struggling with the issues of low profitability and stringent pollution norms. The present technology therefore relates to an improved design of Jaggery making plant (Gur Bhatti) that results in 15% increased daily Jaggery production capacity and nearly 25% Fuel (Bagasse) savings. The plant smoke emissions are also reduced to minimum levels. With more than 50 installations so far, the present technology has played an important role in providing employment to rural masses, improved the quality of life by lowering local pollution and also helped in generating additional income to sugarcane farmers.*
3)	What is the scientific approach to choose the particular technology?	*The technical interventions in design of furnace and chimney improve the combustion of fuel and heat transfer. This ultimately improves the process efficiency. Simplicity of design, easy availability of material of construction, low capital inputs and easy maintenance makes this improved plant suitable for the rural area with sugarcane cultivation. Increasing shift of people towards natural sweeteners has opened a wide market for Jaggery and Jaggery Products.*
4)	After what duration the first output can be seen?	*Jaggery making is a seasonal activity (5 - 6 months a year). On the basis of financial inputs, the payback period is one season.*
5)	What kind of Resources Required (Raw material, Energy, water, others)?	*Raw material for the process is Sugarcane and a Crusher is required for taking out juice. Electricity /Petroleum fuel is required to run the crusher. The plant construction mainly requires civil and steel fabrication work.*
6)	What is the area foot print of the Process?	*Uttar Pradesh (U.P.), Maharashtra and Odisha are among the major sugarcane producing states of India. Out of 6 million tons of Jaggery produced in India, 60% is produced in U.P. CSIR-IIP improved Jaggery plant technology is implemented mainly in western U.P. area. Therefore, there is a large scope of implementing this technology in entire U.P. and in rest of the*

		sugarcane producing states of India. As per the estimate, there are 40,000 small Jaggery plants running all over India that can be replaced or improved using this technology.
7)	What kind of Climatic and Geographical location is required?	*The most suitable location for the Improved Jaggery making plant is sugarcane cultivating areas and near sugarcane fields.*
8)	Gestation period of the project?	*One sugarcane cultivation season*
9)	Minimum Economic Unit Size?	*1 ton/day Jaggery production*
10)	Indicative Investment	*6 - 7 lakh (excluding cost of land)*
	Salient Feature of Process/Technology Information	
11)	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	*Sugarcane farmer – Jaggery making plant – Local market / Super market / Export*
12)	Can it be part of Circular economy?	*No. The final product of the process (Jaggery) is consumed by the end user. However, 25% of the fuel used in the process (Bagasse) is saved and can be used as input to other cottage industries e.g. Mushroom growing.*
13)	What will be the Chain of Value addition?	*Sugarcane cultivation (organic) – Jaggery Production (15% additional production capacity + 25% Fuel Saving + Low smoke emissions) - Labelling & Marketing – Other Jaggery Products – Income of farmers and rural masses*
14)	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	*No, the plant requires civil and fabrication work with the inputs of skilled persons.*
15)	How everything from top to bottom to be made in the village itself (Circular and local)?	*The plant can be constructed locally by imparting skills to the local artisans. However, the required material of construction, boiling pans and crusher will be procured from the market.*
16)	How many Training Days or months required for the technology to be learned properly?	*A training of 5 - 7 days for an unskilled person and 2 - 3 days for a skilled person is required for technology to be learned properly*
17)	How to be implemented from the root to tip	*Identification of suitable interested beneficiary – Assessment of beneficiary (Financial / Agricultural / land holding etc.) – Assessment of raw material – Selection of Plant capacity / Nos. – Employability of rural masses – Funding opportunity – Branding / Marketing*
18)	If it can be implemented at Family level or external manpower is required?	*External manpower is required to run the plant*
	Additional Information	
19)	How many Manpower required?	*7 – 8 persons per plant*

20)	What is the Status of Commercialization	*The technology has been transferred to suitable interested farmers / rural entrepreneur on non-exclusive basis in western U.P. region with more than 50 installations.*
21)	Scale of Funding required all total?	*A total investment of 6 - 7 lakhs will be required for an entirely new improved Jaggery plant installation which excludes the cost of land. However, a retrofitting option is also available for existing plant owners which may cost roughly around 40 – 50 thousand Rupees per plant.*
22)	Budget with breakage?	*Boiling Pans = Rs. 2.00 lakhs, Fire Grates = Rs. 40,000/- Masonry Items = Rs. 2.00 lakhs, Crusher = Rs. 2.00 lakhs, Miscellaneous items = 20,000/-, Labour = Rs. 30,000/-* *The above mentioned are approximate costs and are likely to vary as per location and availability.*
23)	What type of Certification Required for the product? (If required)	*FSSAI (Food Safety & Standards Authority of India) certification is required for the marketing of Jaggery in supermarkets. However, no certification is required for local market.*
24)	Risk involved?	*Lower Market Price of Refined Sugar, Lower Sugarcane Cultivation, More Stringent Environmental / Emission Norms*

2. Technologies developed by CSIR-Indian Institute of Integrative Medicine – IIIM, Jammu

	Basic Information	
	Items	Answers
1)	Title of the technology	Agro-technology of Lemon grass (*Cymbopogon khasianus* x *C. pendulus*, Poaceae) [CKP-25], Kalam
2)	About technology (in short)	It is an interspecific hybrid strain of *C. khasianus* x *C. pendulus* and *C. pendulus x C. Khasianus* ware developed by CSIR-IIIM, which was named CKP-25 and Kalam, respectively. These varieties are superior to other variety being grown presently in terms of oil yield. Depending on the season to season, the oil recovery is 0.45 to 1.00% with 82 to 85% Citral content
3)	What is the scientific approach to choose the particular technology)?	It is very useful in perfumery, flavouring & pharmaceutical industry.
4)	After what duration the first output can be seen?	After transplanting the slips (plants) its takes Six month to twelve month for commercial yield.
5)	What kind of Resources Required (Raw material, Energy, water, others)?	Land, Water, Fertilizers and Manpower
6)	What is the area foot print of the Process?	Medicinal and Aromatic plants
7)	What kind of Climatic and Geographical location is required?	Tropical and Sub-tropical Climate
8)	Gestation period of the project?	Five Years
9)	Minimum Economic Unit Size?	Output (Net return): Rs. 80,000- 1,00,000 per ha per annum
10)	Indicative Investment	Cost of cultivation: Rs. 55000-70,000 per ha per Year
	Salient Feature of Process/Technology Information	
11)	Tentative Supply	CSIR-IIIM (QPM supplier) — Farmers (Producer)—Industry (User)

	Chain (Source of Raw material, Machinery to Possible Market)	
12)	Can it be part of Circular economy?	Yes
13)	What will be the Chain of Value addition?	Industry make the value added product
14)	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	No
15)	How everything from top to bottom to be made in the village itself (Circular and local)?	Cultivation and Processing of Medicinal and Aromatic plants by the Farmers/ growers based on CSIR technologies, is expected to provide enhanced income and new employment opportunities in village/ rural sector.
16)	How many Training Days or months required for the technology to be learned properly?	Approximate 15-20 days sufficient to learn about the Agro-technology for commercial cultivation.
17)	How to be implemented form the root to tip	Awareness cum training programmes and demonstration of technology at IIIM farm as well as Farmers field.
18)	If it can be implemented at Family level or external manpower is required?	It is the family occupation but the manpower is depending upon the area of cultivation.
	Additional Information	
19)	How many Manpower required?	25 manpower per ha. per Year (65-75 man days per ha. per year)
20)	What is the Status of Commercialization	Varieties are commercially cultivated in 500- 700 hectare throughout the country.
21)	Scale of Funding required all total?	NA

22)	Budget with breakage?	NA
23)	What type of Certification Required for the product? (If required)	Quality assurance certificate is required
24)	Risk involved?	Based on climatic condition

	Items	Answers
1)	Title of the technology	Agro-technology of Rosagrass (*Cymbopogon nardus/khasianus) RRL (J)CN- 5 & IIIM (J)CK- 10*
2)	About technology (in short)	*Cymbopogon* belongs to Poaceae family which is one of the most important essential oil bearing genera. The members of this genus usually occur abundantly in tropics and sub tropics regions of Asia, Africa and America. These varieties were developed by CSIR-IIIM which is rich in Geraniol (60 - 80%), Geranyl acetate (15-25%) and CIS-Ocimene (12-13%), the major constituent from this species.
3)	What is the scientific approach to choose the particular technology)?	It is very useful in perfumery, flavouring & pharmaceutical industry.
4)	After what duration the first output can be seen?	After transplanting the slips (plants) its takes Six month to twelve month for obtaining commercial yield.
5)	What kind of Resources Required (Raw material, Energy, water, others)?	Land, Water, Fertilizers and Manpower
6)	What is the area foot print of the Process?	Medicinal and Aromatic plants
7)	What kind of Climatic and Geographical location is required?	Tropical and Sub-tropical Climate
8)	Gestation period of the project?	Five Years
9)	Minimum Economic Unit Size?	Net profit ranges from Rs. 1,20,000 to Rs. 1,50,000 in first year and Rs. 1,50,000 to 2,00,000 in second and subsequent years.
10)	Indicative Investment	Cost of cultivation: Rs. 50000-60,000 per ha per Year
	Salient Feature of Process/Technology Information	
11)	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	CSIR-IIIM (QPM supplier) — Farmers (Producer)—Industry (User)
12)	Can it be part of Circular economy?	Yes
13)	What will be the Chain of Value addition?	Industry make the value added product
14)	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	No
15)	How everything from top to bottom to be made in the village itself (Circular and local)?	Cultivation and Processing of Medicinal and Aromatic plants by the Farmers/ growers based on CSIR technologies, is expected to provide enhanced income and new employment opportunities in village/ rural

		sector.
16)	How many Training Days or months required for the technology to be learned properly?	Approximate 15-20 days sufficient to learn about the Agro-technology for commercial cultivation.
17)	How to be implemented form the root to tip	Awareness cum training programmes and demonstration of technology at IIIM farm as well as Farmers field.
18)	If it can be implemented at Family level or external manpower is required?	It is the family occupation but the manpower is depending upon the area of cultivation.
	Additional Information	
19)	How many Manpower required?	20-25 manpower per ha. per Year (60-70 man days per ha. per year)
20)	What is the Status of Commercialization	Varieties are commercially cultivated in more than 1500 hectare throughout the country.
21)	Scale of Funding required all total?	NA
22)	Budget with breakage?	NA
23)	What type of Certification Required for the product? (If required)	Quality assurance certificate is required
24)	Risk involved?	Depend On climatic condition and management

	Basic Information	
	Items	Answers
1)	Title of the technology	Agro-technology of *Mentha spps. (M. longifolia, M. Piprata, M. spicata, M. Arvensis)*
2)	About technology (in short)	Mentha is an annual aromatic herb which is grown easily in tropical and sub-tropical region. The varieties of menthe developed by CSIR-IIIM are a major source of Menthol, Menthone, Linalool, L-carvone, Limonene etc. Mostly propagated by Suckers and should be planted in the month of January to mid February.
3)	What is the scientific approach to choose the particular technology)?	Essential oil used in pharmaceutical, flavour & fragrance industry.
4)	After what duration the first output can be seen?	After transplanting the suckers, its takes Six month for commercial yield.
5)	What kind of Resources Required (Raw material, Energy, water, others)?	Land, Water, Fertilizers and Manpower
6)	What is the area foot print of the Process?	Medicinal and Aromatic plants
7)	What kind of Climatic and Geographical location is required?	Requires ample sunshine and rainfall during harvesting period. Areas with average annual rainfall of 95 -105 cm and average temperature of up to 40°C associated with relative humidity ranging from 50 to 75% are considered suitable for its cultivation.
8)	Gestation period of the project?	Six month to One Year
9)	Minimum Economic Unit Size?	Net profit ranges from Rs. 1,00,000 to Rs. 1,20,000 per hectare.
10)	Indicative Investment	Cost of cultivation: Rs. 35000-40,000 per ha per Year
	Salient Feature of Process/Technology Information	
11)	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	CSIR-IIIM (QPM supplier) — Farmers (Producer)—Industry (User)
12)	Can it be part of Circular economy?	Yes
13)	What will be the Chain of Value addition?	Industry make the value added product
14)	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee	NA

	boxes locally	
15)	How everything from top to bottom to be made in the village itself (Circular and local)?	Cultivation and Processing of Medicinal and Aromatic plants by the Farmers/ growers based on CSIR technologies, is expected to provide enhanced income and new employment opportunities in village/ rural sector.
16)	How many Training Days or months required for the technology to be learned properly?	Approximate 15-20 days sufficient to learn about the Agro-technology for commercial cultivation.
17)	How to be implemented form the root to tip	Awareness cum training programmes and demonstration of technology at IIIM farm as well as Farmers field.
18)	If it can be implemented at Family level or external manpower is required?	It is the family occupation but the manpower is depending upon the area of cultivation.
	Additional Information	
19)	How many Manpower required?	25 manpower per ha. per Year (45-50 man days per ha. per year)
20)	What is the Status of Commercialization	*Mentha spps* are commercially cultivated in 100 hectare throughout the country.
21)	Scale of Funding required all total?	NA
22)	Budget with breakage?	NA
23)	What type of Certification Required for the product? (If required)	Quality assurance certificate is required
24)	Risk involved?	It is based on good agricultural practices and climatic condition

	Basic Information	
	Items	Answers
1)	Title of the technology	Agro-technology of Jammu Monarda (*Monarda citriodora*) *Var.* IIIM (J) MC02
2)	About technology (in short)	Jammu Monarda is an annual aromatic plant. It is also known by its common name lemon beebalm. In India, Jammu Monarda was first developed by Indian Institute of Integrative Medicine in the year 1999. The plant grows upto a height of 50-90 cm above the ground level. Jammu Monarda is known for its essential oil in which an aromatic major chemical constituent is present called as Thymol in which 55 to 75% of Thymol is present in its essential oil.
3)	What is the scientific approach to choose the particular technology)?	Jammu Monarda is one of the important source of Thymol due to which it is used in the pharmaceutical, flavour and fragrance industries. It's essential oil contains many antiseptic properties which is used for the preparation of various hand sanitizer and soaps.
4)	After what duration the first output can be seen?	Monarda can easily cultivated in well drained sandy loam soil which having pH 6.5 to 8. Its require 6 month for maturity.
5)	What kind of Resources Required (Raw material, Energy, water, others)?	Land, Water, Fertilizers and Manpower
6)	What is the area foot print of the Process?	Medicinal and Aromatic plants
7)	What kind of Climatic and Geographical location is required?	Monarda is a rabi season crop. Warm and humid climate is favourable for its growth and development. In India, it can easily be cultivated under tropical, subtropical and temperate climate having temperature range between 15 to 40°C. For the better germination of seeds temperature ranges between 20 to 25°C is required.
8)	Gestation period of the project?	Six month
9)	Minimum Economic Unit Size?	On an average 100 - 125 kg/ha of essential oil can be obtained. Net profit ranges from Rs. 80,000 to Rs. 1,00,000 per hectare.
10)	Indicative Investment	Cost of cultivation: Rs. 30,000-35,000 per ha per Year
	Salient Feature of Process/Technology Information	
11)	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	CSIR-IIIM (QPM supplier) — Farmers (Producer)— Industry (User)
12)	Can it be part of Circular	Yes

	economy?	
13)	What will be the Chain of Value addition?	Industry make the value added product
14)	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	No
15)	How everything from top to bottom to be made in the village itself (Circular and local)?	Cultivation and Processing of Medicinal and Aromatic plants by the Farmers/ growers based on CSIR technologies, is expected to provide enhanced income and new employment opportunities in village/ rural sector.
16)	How many Training Days or months required for the technology to be learned properly?	Approximate 15-20 days sufficient to learn about the Agro-technology for commercial cultivation.
17)	How to be implemented form the root to tip	Awareness cum training programmes and demonstration of technology at IIIM farm as well as Farmers field.
18)	If it can be implemented at Family level or external manpower is required?	It is the family occupation but the manpower is depending upon the area of cultivation.
	Additional Information	
19)	How many Manpower required?	25 manpower per ha. per Year (45-50 man days per ha. per year)
20)	What is the Status of Commercialization	*Jammu Monarda* is commercially cultivated in 100 hectare throughout the country.
21)	Scale of Funding required all total?	NA
22)	Budget with breakage?	NA
23)	What type of Certification Required for the product? (If required)	Quality assurance certificate is required
24)	Risk involved?	On the basis of climatic condition and good agricultural practices

	Basic Information	
	Items	Answers
1)	Title of the technology	Agro-technology of Ocimum species (*Var.* Og 14 & Ob 15)
2)	About technology (in short)	*Ocimum grassimum* (Var. Ob 14) is a Clove-scented, a hybric strain developed as an alternate source of clove oil, rich in eugenol (80-85%). As well as *Ocimum basilicum* (var. Ob 15) is an indigenous to South Indian basil which has been wel acclimatized in the sub-troical climatic conditions of Jammu region. The strain has been developed as a rich source o methyl chavicol (85-90%) which is characterized for its conversion into trans-anethol, a flavouring materia extensively used in food flavours, mouth freshners and gripe water etc.
3)	What is the scientific approach to choose the particular technology)?	The major constituent Eugenol and Methyl chavicol is important essential oil isolate, is of great value in perfume, flavour and pharmaceutical industry.
4)	After what duration the first output can be seen?	Ocimum is perennial and annual herbs can easily cultivated in well drained sandy loam soil which having pH neutral to slightly alkaline condition. Its require 6 to 12 month for maturity.
5)	What kind of Resources Required (Raw material, Energy, water, others)?	Land, Water, Fertilizers and Manpower
6)	What is the area foot print of the Process?	Medicinal and Aromatic plants
7)	What kind of Climatic and Geographical location is required?	Its grown under tropical and sub-tropical climatic condition with average rainfall varies from 50- 100 cm and average temperature up to 40°C associated with relative humidity ranging from 50% to 75% are considered suitable for its cultivation.
8)	Gestation period of the project?	06 to 12 month
9)	Minimum Economic Unit Size?	Net profit ranges from Rs. 1, 10,000 to Rs. 1,50,000 per hectare.
10)	Indicative Investment	Cost of cultivation: Rs. 45,000-50,000 per ha per Year
	Salient Feature of Process/Technology Information	
11)	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	CSIR-IIIM (QPM supplier) — Farmers (Producer)—Industry (User)
12)	Can it be part of Circular economy?	Yes
13)	What will be the Chain of Value addition?	Industry make the value added product
14)	Can the complete value	No

	chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	
15)	How everything from top to bottom to be made in the village itself (Circular and local)?	Cultivation and Processing of Medicinal and Aromatic plants by the Farmers/ growers based on CSIR technologies, is expected to provide enhanced income and new employment opportunities in village/ rural sector.
16)	How many Training Days or months required for the technology to be learned properly?	Approximate 15-20 days sufficient to learn about the Agro-technology for commercial cultivation.
17)	How to be implemented form the root to tip	Awareness cum training programmes and demonstration of technology at IIIM farm as well as Farmers field.
18)	If it can be implemented at Family level or external manpower is required?	It is the family occupation but the manpower is depending upon the area of cultivation.
	Additional Information	
19)	How many Manpower required?	25-30 manpower per ha. per Year (50-75 man days per ha. per year)
20)	What is the Status of Commercialization	*Ocimum* Varieties of IIIM *is* commercially cultivated in approx. 500- 600 hectare throughout the country.
21)	Scale of Funding required all total?	NA
22)	Budget with breakage?	NA
23)	What type of Certification Required for the product? (If required)	Quality assurance certificate is required
24)	Risk involved?	On the basis of climatic condition

	Basic Information	
	Items	Answers
1)	Title of the technology	Agro-technology of Lavender (*Lavandula angustifolia* [RRL 12]
2)	About technology (in short)	Lavender is an incredible and much sought aromatic plant having significant position in trade all over the world due to its essential oil which has multifarious uses and market outlets. Main constituents are Linalool, Linalyl acetate, 1,8 cineole, borneol, caryophyllene, terpineol, ocimenes, Lavandulyl acetate. It is useful in perfumery, flavour and cosmetic industry.
3)	What is the scientific approach to choose the particular technology)?	The major constituent Linalool, linalyl acetate, 1,8 - cineole, borneol, caryophyllene, terpineol, ocimenes, Lavandulyl acetate is important essential oil constituents, is of great demand in perfume, flavour and pharmaceutical industry.
4)	After what duration the first output can be seen?	First commercial yield obtained in 3rd Year onwords.
5)	What kind of Resources Required (Raw material, Energy, water, others)?	Land, Water, Fertilizers and Manpower
6)	What is the area foot print of the Process?	Medicinal and Aromatic plants
7)	What kind of Climatic and Geographical location is required?	It's grown under temperate climatic condition with snow bound areas.
8)	Gestation period of the project?	3 to 14 Years
9)	Minimum Economic Unit Size?	Net profit ranges from Rs. 2,00,000 to Rs. 2,50,000 per hectare per year, 3rd year onwards.
10)	Indicative Investment	Cost of cultivation: Rs. 60,000-70,000 per ha per Year
	Salient Feature of Process/Technology Information	
11)	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	CSIR-IIIM (QPM supplier) — Farmers (Producer)—Industry (User)
12)	Can it be part of Circular economy?	Yes
13)	What will be the Chain of Value addition?	Industry make the value added product
14)	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	No
15)	How everything from top	Cultivation and Processing of Medicinal and Aromatic plants

	to bottom to be made in the village itself (Circular and local)?	by the Farmers/ growers based on CSIR technologies, is expected to provide enhanced income and new employment opportunities in village/ rural sector.
16)	How many Training Days or months required for the technology to be learned properly?	Approximate 15-20 days sufficient to learn about the Agro-technology for commercial cultivation.
17)	How to be implemented form the root to tip	Awareness cum training programmes and demonstration of technology at IIIM farm as well as Farmers field.
18)	If it can be implemented at Family level or external manpower is required?	It is the family occupation but the manpower is depending upon the area of cultivation.
	Additional Information	
19)	How many Manpower required?	30-35 manpower per ha. per Year (75-90 man days per ha. per year)
20)	What is the Status of Commercialization	*Lavender* variety of IIIM *is* commercially cultivated in approx. 200- 300 hectare in temperate region of J& K and North East states of India.
21)	Scale of Funding required all total?	NA
22)	Budget with breakage?	NA
23)	What type of Certification Required for the product? (If required)	Quality assurance certificate is required trough certified agencies.
24)	Risk involved?	On the basis of climatic condition and good agricultural practices

3. Technologies developed by CSIR-Institute of Himalayan Bioresource Technology (IHBT), Palampur

Basic Information		
	Items	**Answers**
1.	Title of the technology	Ready To Serve Teas
2.	About technology (in short)	Tea is the second most consumed beverage after water that has gained wide interest due to numerous health benefits. A process has been developed to prepare concentrates from tea with refreshing taste and natural health attributes of tea. The concentrate can be reconstituted with hot as well as cold water. This technology is beneficial for upliftment of tea industry through value addition of low-grade teas.
3.	What is the scientific approach to choose the particular technology)?	A sustainable process for value addition of low-grade teas for preparation of ready to serve teas.
4.	After what duration the first output can be seen?	One week after complete setup
5.	What kind of Resources Required (Raw material, Energy, water, others)?	Made Teas (Premium and low grades), Water
6.	What is the area foot print of the Process?	Tea Industry Value Addition
7.	What kind of Climatic and Geographical location is required?	Not- specific
8.	Gestation period of the project?	1 Week
9.	Minimum Economic Unit Size?	200 L Batch
10.	Indicative Investment	80-90 Lakhs
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Tea from tea factories - Processing- Packaging -Marketing
12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	Low grade teas – Valued added tea beverage
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	No
16.	How many Training Days or months	1 month

	required for the technology to be learned properly?	
17.	How to be implemented form the root to tip	Procurement of tea from tea factories - Processing- Packaging -Marketing
18.	If it can be implemented at Family level or external manpower is required?	No
	Additional Information	
19.	How many Manpower required?	**2-3**
20.	What is the Status of Commercialization	Know How by CSIR-IHBT
21.	Scale of Funding required all total?	80-90 Lakhs
22.	Budget with breakage?	Recurring - 20-30 Lakhs Non-recurring - 50 -60 Lakhs Technology transfer fee will be additionally charged
23.	What type of Certification Required for the product? (If required)	FSSAI
24.	Risk involved?	No

Basic Information		
	Items	**Answers**
1.	Title of the technology	Cultivation of Stevia: a low-calorie natural sweetener
2.	About technology (in short)	Institute has developed and released 'Him Stevia'(CSIR-IHBT-ST-01), which contains higher proportion of Reb-A content as compared to stevioside. The cultivar 'Him Stevia' has high content of Reb-A (~7.4%) compared to stevioside (~5.8%), Reb-A/stevioside ratio is 1.25 and total glycoside content of about 14.5% (on dry weight basis). Good Agricultural Practices have also been developed by CSIR-IHBT for higher biomass yield for different agroclimatic conditions. On an average, dry leaf yield of stevia is 3.5–4.0 t/ha/year, which fetches market price of Rs. 120/ kg, resulting in net return of Rs. 2.40-3.00 lakhs/ha/year. Dry leaf yield of stevia has been increased up to 28 % through advanced agrotechnology developed by CSIR- IHBT.
3.	What is the scientific approach to choose the particular technology)?	The cultivar 'Him Stevia' (CSIR-IHBT-ST-01; selection U-22-5-1) of Stevia rebaudiana Bertoni (Bertoni) has been developed by CSIR-IHBT, Palampur through hybridization and selection approach. The cultivar was selected through half-sib family selection followed by clonal selection. CSIR-IHBT has developed Good Agricultural Practices for higher biomass yield for different agroclimatic conditions like nutrient management technique, water management, standardization of crop geometry and plant population. Agro-technologies for cultivation under conservation agriculture and salt stress conditions have also been developed. So that stevia can be grown in different parts of India.
4.	After what duration the first output can be seen?	The first output will be seen after 6 months
5.	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural land, Planting materials (seed/seedling), irrigation facility, Field labour, Drying shade etc.
6.	What is the area foot print of the Process?	Stevia can be grown in any amount of land , but to run a viable processing unit 20 ha land is required to supply the biomass throughout the year.
7.	What kind of Climatic and Geographical location is required?	Stevia is grown under tropical and sub-tropical conditions. The plant prefers warm and sunny weather, long day-length and 65-80% relative humidity for higher leaf production. It grows well in sandy loam soil with pH range of 5.0-7.5. High rainfall (>2000 mm) and water logging conditions are not suitable for the commercial cultivation of the crop.
8.	Gestation period of the project?	Only 6 month, after 6 month the produce will come
9.	Minimum Economic Unit	For cultivation one acre of land , but to run a viable processing

	Size?	unit 50 acres (20 ha) land is required to supply the biomass throughout the year.
10.	Indicative Investment	For cultivation: 1.80 lakh per ha
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Source of Raw material: From own cultivation or from farmers. Machinery: Huge machinery is not required, only basic implements for agricultural operation Marketing: Established national and International market
12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	Ready to serve stevia liquid and powder sachet, High quality steviol glycosides powder with purity >95%
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	The complete value chain can be made local. Farmers are already generating quality planting materials and cultivating with the help of CSIR-IHBT.
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	• Generation of quality planting material • Cultivation of stevia • Buy back arrangement with Industry • Establishment of stevia processing unit (MSME, Private party)
16.	How many Training Days or months required for the technology to be learned properly?	Two days training is required for agrotechnology of stevia
17.	How to be implemented form the root to tip	• Contact with concerned organisation for training • Arrangement of agricultural inputs • Generation of quality planting material • Cultivation of stevia • Buy back arrangement with Industry
18.	If it can be implemented at Family level or external manpower is required?	It can be implemented at Family level for small scale cultivation, but for large scale cultivation external manpower (field worker) is required
	Additional Information	
19.	How many Manpower required?	Two manpower is required to manage a viable agricultural farm.
20.	What is the Status of Commercialization	The agrotechnology of stevia has been transferred to several parties for large-scale commercial cultivation in Punjab, Haryana, Uttrakhand, HP, Uttar Pradesh, Andhra Pradesh, Gujrat, Odisha, Jharkhand and Chhattisgarh.
21.	Scale of Funding	Cost of Cultivation: about Rs. 1.80 lakh/ha/yr (including cost of

	required all total?	seeds). Cost of seed: Rs 15000/kg Seed require : 250 g /ha
22.	Budget with breakage?	As mentioned in Sr. No. 21
23.	What type of Certification Required for the product? (If required)	NA
24.	Risk involved?	NO

Basic Information		
	Items	**Answers**
1.	Title of the technology	Improved bee hive for quality and hygienic extraction of honey
2.	About technology (in short)	❖ Traditional method of harvesting of honey is time consuming, labour intensive, mortality of bees during harvesting, non-hygienic and poor quality which get low price in the market. Therefore CSIR-CSIO and CSIR-IHBT developed improved bee hive and evaluated successfully in the field with the following advantages ❖ Extraction and harvesting of honey without disturbing the frames and honey bees. ❖ No mortality of honey bees during harvesting as compared to honey extractors. ❖ Harvested honey is hygienic and high quality which fetches good price in the market. ❖ Bee hive is cost effective, easy to operate and requires less human intervention during extraction of honey.
3.	What is the scientific approach to choose the particular technology)?	The honey production and its quality in India are up to the mark as per the global standard. Traditional method of harvesting of honey is time consuming, labour intensive, mortality of bees during harvesting, non-hygienic and poor quality which get low price in the market. In India, there is no improved bee hive (flow hive) and honey extractor is available in the market for quality and hygienic extraction of honey. Therefore, CSIR-CSIO, Chandigarh and CSIR-IHBT, Palampur developed improved bee hive and evaluated successfully in the field.
4.	After what duration the first output can be seen?	Three months after installation in the field
5.	What kind of Resources Required (Raw material, Energy, water, others)?	Wood, Wax, Fibre/plastic etc.
6.	What is the area foot print of the Process?	
7.	What kind of Climatic and Geographical location is required?	Tropical, subtropical and temperate climate
8.	Gestation period of the project?	One year
9.	Minimum Economic Unit Size?	500
10.	Indicative Investment	50 lakhs (Budget vary with no. of units required)
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Local market**

12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	NA
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	Both (Circular and local)
16.	How many Training Days or months required for the technology to be learned properly?	1-2 months depends on skills of the person
17.	How to be implemented form the root to tip	
18.	If it can be implemented at Family level or external manpower is required?	External manpower
	Additional Information	
19.	How many Manpower required?	2
20.	What is the Status of Commercialization	Under process
21.	Scale of Funding required all total?	50 lakhs
22.	Budget with breakage?	Manpower and consumables. Technology transfer fee will be additionally charged
23.	What type of Certification Required for the product? (If required)	NA
24.	Risk involved?	No

Basic Information		
	Items	**Answers**
1.	Title of the technology	AGRO-TECHNOLOGY FOR GERBERA
2.	About technology (in short)	• Him Saumya, Him Gaurav, Him Abha, Him Apoorva, Him Keerti, Him Glow, Him Peace • Tissue culture as well as nursery production protocols available • Having vase life of more than 12 days • Net Profit per year in 500 sq.m. under polyhouse conditions: Rs. 1.84 lakhs
3.	What is the scientific approach to choose the particular technology)?	**Import substitute, high value crop**
4.	After what duration the first output can be seen?	**6 months**
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Polyhouse, planting material, growing media, fertilizers, irrigation, packaging material**
6.	What is the area foot print of the Process?	• Suitable for protected cultivation under plains, low and mid hills
7.	What kind of Climatic and Geographical location is required?	**-do-**
8.	Gestation period of the project?	**2nd year onwards**
9.	Minimum Economic Unit Size?	**1000 sqm**
10.	Indicative Investment	**Rs. 2.78 lakhs/ 500 sqm**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Tissue culture labs/ nurseries Market: Gazipur Flower Market**
12.	Can it be part of Circular economy?	**Yes**
13.	What will be the Chain of Value addition?	**-**
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
16.	How many Training Days or months required for the technology to be learned properly?	**5 days**
17.	How to be implemented form the root to tip	**-**
18.	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
19.	How many Manpower required?	**2 persons/ 1000 sqm**
20.	What is the Status of Commercialization	**TRL:7**
21.	Scale of Funding required all total?	**-**
22.	Budget with breakage?	**Rs. 2.78 lakhs/ 500 sqm**
23.	What type of Certification Required for the product? (If required)	**-**
24.	Risk involved?	**Market demand**

Basic Information		
	Items	**Answers**
1.	Title of the technology	AGRO-TECHNOLOGY FOR CALLA LILY
2.	About technology (in short)	• Can be used as cut-flowers, potted plants and also as landscape plants for bog gardens • Him Sumukh and Him Shweta cultivars • Nursery production protocols available • Having vase life of more than 10 days • Net Profit per year in 500 sq.m. under open field conditions: Rs. 1.00 lakh
3.	What is the scientific approach to choose the particular technology)?	**Import substitute, high value crop**
4.	After what duration the first output can be seen?	**1 year**
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Planting material, fertilizers, irrigation, packaging material**
6.	What is the area foot print of the Process?	• Suitable for open cultivation under low and mid hills
7.	What kind of Climatic and Geographical location is required?	**-do-**
8.	Gestation period of the project?	**2nd year onwards**
9.	Minimum Economic Unit Size?	**2000 sqm**
10	Indicative Investment	**Rs. 1.25 lakhs/ 500 sqm**
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Nurseries** **Market: Gazipur Flower Market**
12	Can it be part of Circular economy?	**Yes**
13	What will be the Chain of Value addition?	**-**
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
15	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
16	How many Training Days or months required for the technology to be learned properly?	**5 days**
17	How to be implemented form the root to tip	**-**
18	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
19	How many Manpower required?	**2 persons/ 2000 sqm**
20	What is the Status of Commercialization	**TRL:7**

Basic Information		
	Items	**Answers**
1.	Title of the technology	AGRO-TECHNOLOGY FOR LILIUM
2.	About technology (in short)	• Developed agro-technology of lilium for offseason flower production • Net Profit per year in 500 sq.m. under open field conditions: Rs. 1.62 lakh
3.	What is the scientific approach to choose the particular technology)?	**Import substitute, high value crop**
4.	After what duration the first output can be seen?	**1 year**
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Planting material, fertilizers, irrigation, packaging material**
6.	What is the area foot print of the Process?	• Suitable for open cultivation under plain, low.mid and high hills
7.	What kind of Climatic and Geographical location is required?	**-do-**
8.	Gestation period of the project?	**2nd year onwards**
9.	Minimum Economic Unit Size?	**500 sqm**
10.	Indicative Investment	**Rs. 2.50 lakhs/ 500 sqm**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Nurseries Market: Gazipur Flower Market**
12.	Can it be part of Circular economy?	**Yes**
13.	What will be the Chain of Value addition?	**-**
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
16.	How many Training Days or months required for the technology to be learned properly?	**5 days**
17.	How to be implemented form the root to tip	**-**
18.	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
19.	How many Manpower required?	**1 person/ 500 sqm**
20.	What is the Status of Commercialization	**TRL:9**
21.	Scale of Funding required all total?	**-**
22.	Budget with breakage?	**Rs. 2.50 lakhs/ 500 sqm**
23.	What type of Certification Required for the product? (If required)	**-**
24.	Risk involved?	**Market demand**

Basic Information

	Items	Answers
1.	Title of the technology	AGRO-TECHNOLOGY FOR MARIGOLD
2.	About technology (in short)	• Suitable for open cultivation in plains, low and mid hills • Net Profit per year in 1 ha under open field conditions: Rs. 3.00 lakh
3.	What is the scientific approach to choose the particular technology)?	**Increase yield**
4.	After what duration the first output can be seen?	**6 months**
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Planting material, fertilizers, irrigation, packaging material**
6.	What is the area foot print of the Process?	• Suitable for open cultivation under plain, low.mid hills
7.	What kind of Climatic and Geographical location is required?	**-do-**
8.	Gestation period of the project?	**6th month onwards**
9.	Minimum Economic Unit Size?	**1 ha**
10.	Indicative Investment	**Rs. 1.00 lakhs/ ha**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Nurseries Market: Local market/ temples**
12.	Can it be part of Circular economy?	**Yes**
13.	What will be the Chain of Value addition?	**-**
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
16.	How many Training Days or months required for the technology to be learned properly?	**1 day**
17.	How to be implemented form the root to tip	**-**
18.	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
19.	How many Manpower required?	**2 person/ ha**
20.	What is the Status of Commercialization	**TRL:>6**
21.	Scale of Funding required all total?	**-**
22.	Budget with breakage?	**Rs. 1.00 lakhs/ ha**
23.	What type of Certification Required for the product? (If required)	**-**
24.	Risk involved?	**Market demand**

Basic Information

	Items	Answers
1.	Title of the technology	AGRO-TECHNOLOGY FOR CARNATION
2.	About technology (in short)	• Net Profit per year in 500 sq.m. under polyhouse conditions: Rs. 2.10 lakhs
3.	What is the scientific approach to choose the particular technology)?	**Import substitute, high value crop**
4.	After what duration the first output can be seen?	**6 months**
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Polyhouse, Planting material, fertilizers, irrigation, packaging material**
6.	What is the area foot print of the Process?	• Suitable for protected cultivation under mid hills
7.	What kind of Climatic and Geographical location is required?	**-do-**
8.	Gestation period of the project?	**2nd year onwards**
9.	Minimum Economic Unit Size?	**500 sqm**
10.	Indicative Investment	**Rs. 3.13 lakhs/ 500 sqm**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Tissue culture labs/ nurseries Market: Gazipur Flower Market**
12.	Can it be part of Circular economy?	**Yes**
13.	What will be the Chain of Value addition?	**-**
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
16.	How many Training Days or months required for the technology to be learned properly?	**3 days**
17.	How to be implemented form the root to tip	**-**
18.	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
19.	How many Manpower required?	**2 person/ 500 sqm**
20.	What is the Status of Commercialization	**TRL:>6**
21.	Scale of Funding required all total?	**-**
22.	Budget with breakage?	**Rs. 3.13 lakhs/ 500 sqm**
23.	What type of Certification Required for the product? (If required)	**-**
24.	Risk involved?	**Market demand**

Basic Information		
	Items	**Answers**
1.	Title of the technology	AGRO-TECHNOLOGY FOR ALSTROEMERIA
2.	About technology (in short)	• Net Profit per year in 500 sq.m. under poly house conditions: Rs. 2.10 lakhs
3.	What is the scientific approach to choose the particular technology)?	**Import substitute, high value crop**
4.	After what duration the first output can be seen?	**1 year**
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Polyhouse, Planting material, fertilizers, irrigation, packaging material**
6.	What is the area foot print of the Process?	• Suitable for protected cultivation under mid hills
7.	What kind of Climatic and Geographical location is required?	**-do-**
8.	Gestation period of the project?	**2nd year onwards**
9.	Minimum Economic Unit Size?	**500 sqm**
10.	Indicative Investment	**Rs. 3.00 lakhs/ 500 sqm**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Tissue culture labs/ nurseries Market: Gazipur Flower Market**
12.	Can it be part of Circular economy?	**Yes**
13.	What will be the Chain of Value addition?	**-**
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
16.	How many Training Days or months required for the technology to be learned properly?	**3 days**
17.	How to be implemented form the root to tip	**-**
18.	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
19.	How many Manpower required?	**2 person/ 500 sqm**
20.	What is the Status of Commercialization	**TRL:>6**
21.	Scale of Funding required all total?	**-**
22.	Budget with breakage?	**Rs. 3.13 lakhs/ 500 sqm**
23.	What type of Certification Required for the product? (If required)	**-**
24.	Risk involved?	**Market demand**

Basic Information		
	Items	**Answers**
1.	Title of the technology	AGRO-TECHNOLOGY FOR CUT-ROSES
2.	About technology (in short)	• Net Profit per year in 500 sq.m. under polyhouse conditions: Rs. 1.83 lakhs
3.	What is the scientific approach to choose the particular technology)?	**Import substitute, high value crop**
4.	After what duration the first output can be seen?	**1 year**
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Polyhouse, Planting material, fertilizers, irrigation, packaging material**
6.	What is the area foot print of the Process?	• Suitable for protected cultivation under plains, low and mid hills •
7.	What kind of Climatic and Geographical location is required?	**-do-**
8.	Gestation period of the project?	**2nd year onwards**
9.	Minimum Economic Unit Size?	**500 sqm**
10.	Indicative Investment	**Rs. 2.68 lakhs/ 500 sqm**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Nurseries Market: Gazipur Flower Market**
12.	Can it be part of Circular economy?	**Yes**
13.	What will be the Chain of Value addition?	**-**
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
16.	How many Training Days or months required for the technology to be learned properly?	**3 days**
17.	How to be implemented form the root to tip	**-**
18.	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
19.	How many Manpower required?	**2 person/ 500 sqm**
20.	What is the Status of Commercialization	**TRL:>7**
21.	Scale of Funding required all total?	**-**
22.	Budget with breakage?	**Rs. 2.68 lakhs/ 500 sqm**
23.	What type of Certification Required for the product? (If required)	**-**
24.	Risk involved?	**Market demand**

Basic Information		
	Items	**Answers**
25.	Title of the technology	AGRO-TECHNOLOGY FOR CHRYSANTHEMUM
26.	About technology (in short)	• Cultivars: Him Aditya, Him Pushkar, Him Shikhar, Him Ujjwala, Him Shringar • Nursery production protocols available
27.	What is the scientific approach to choose the particular technology)?	**Import substitute, high value crop**
28.	After what duration the first output can be seen?	**1 year**
29.	What kind of Resources Required (Raw material, Energy, water, others)?	**Polyhouse, Planting material, fertilizers, irrigation, packaging material**
30.	What is the area foot print of the Process?	• Suitable for protected cultivation under plains, low and mid hills
31.	What kind of Climatic and Geographical location is required?	**-do-**
32.	Gestation period of the project?	**2nd year onwards**
33.	Minimum Economic Unit Size?	**500 sqm**
34.	Indicative Investment	**Rs. 2.66 lakhs/ 500 sqm**
	Salient Feature of Process/Technology Information	
35.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Nurseries Market: Gazipur Flower Market**
36.	Can it be part of Circular economy?	**Yes**
37.	What will be the Chain of Value addition?	**-**
38.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**-**
39.	How everything from top to bottom to be made in the village itself (Circular and local)?	**Local**
40.	How many Training Days or months required for the technology to be learned properly?	**3 days**
41.	How to be implemented form the root to tip	**-**
42.	If it can be implemented at Family level or external manpower is required?	**Both**
	Additional Information	
43.	How many Manpower required?	**2 person/ 500 sqm**
44.	What is the Status of Commercialization	**TRL:>6**
45.	Scale of Funding required all total?	**-**
46.	Budget with breakage?	**Rs. 2.66 lakhs/ 500 sqm**
47.	What type of Certification Required for the product? (If required)	**-**
48.	Risk involved?	**Market demand**

Basic Information		
	Items	**Answers**

1.	Title of the technology	**Barley Coffee –Roasted Barley Grain Beverages**
2.	About technology (in short)	CSIR IHBT, Palampur has develop and standardize the process for grain beverage from selected hull-less barley grains of high altitude regions Kaza, Lahaul & Spiti (Himachal Pradesh). Barley grain beverage is caffeine free alternative of coffee drink with a specific aroma and health benefits. In addition, it gives similar mouth feel and relish with respect to original taste of coffee beverage.
3.	What is the scientific approach to choose the particular technology)?	Coffee beans are known to be rich in caffeine; bitter in taste, strong oily flavor as well as regular consumption can have serious implications on human health. Coffee substitutes are non-coffee products used to imitate coffee without caffeine, can be used for medical, economic and regular habit reasons.
4.	After what duration the first output can be seen?	Within one month from the month of installation of machinery and equipments
5.	What kind of Resources Required (Raw material, Energy, water, others)?	Local barley grain, water, and 25Kw Power load
6.	What is the area foot print of the Process?	Approximate 3000 -4000 square feet area required for pre- processing, cutting /grading, drying & packaging, storage etc.
7.	What kind of Climatic and Geographical location is required?	Proposed project can be setup anywhere in India, where continuous electricity supply and easily availability of raw materials
8.	Gestation period of the project?	Six Months
9.	Minimum Economic Unit Size?	1000kg per day processing
10.	Indicative Investment	Rs 95 lakhs
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Hull less barley of High Altitute region
12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	NA
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	NA
16.	How many Training Days or months required for the technology to be learned properly?	1-2 months
17.	How to be implemented form the root to tip	CSIR-IHBT has develop and standardized complete knowhow related to this technology
18.	If it can be implemented at Family level or	External manpower is required to

	external manpower is required?	implement proposed unit
	Additional Information	
19.	How many Manpower required?	04 Skilled manpower
20.	What is the Status of Commercialization	Technology is ready for commercialization
21.	Scale of Funding required all total?	Rs 95 lakhs
22.	Budget with breakage?	Recurring: 10 lakhs Non Recurring: 85 lakhs Technology transfer fee will be additionally charged
23.	What type of Certification Required for the product? (If required)	FSSAI, New Delhi
24.	Risk involved?	NO

Basic Information		
	Items	**Answers**
1.	**Title of the technology**	**Crispy fruits and vegetable technology**
2.	About technology (in short)	The food processing industry is one of the largest industries in India, it is ranked fifth in terms of production, consumption, export and expected growth. The Indian food market is estimated at over $ 200 billion likely to grow from around $ 70 billion in 2008 to $ 150 billion by 2025 **Advantages of the product /technology** • Fruits & vegetables can be dried at low temperature • without damaging their physical and nutritional value • Not need to be refrigerated after processing • Preserved without chemicals • Can be reconstituted quickly • Shelf life up to six months
3.	What is the scientific approach to choose the particular technology)?	The technology for production of crispy fruits and vegetable can help to reduce the post harvest loses, which are estimated to be about 25% of its production due to inadequate storage and processing facilities, crispy fruits are high grade consumer products made available in packaged form.
4.	After what duration the first output can be seen?	Within one month from the month of installation of machinery and equipments
5.	What kind of Resources Required (Raw material, Energy, water, others)?	Seasonal available fruits and vegetable or other processed products, 50 kW powder load, 1000 ltrs. per day
6.	What is the area foot print of the Process?	Approximate 3000 -4000 square feet area required for pre-processing, cutting /grading, drying & packaging ,storage etc.
7.	What kind of Climatic and Geographical location is required?	Proposed project can be setup anywhere in India or abroad where continuous electricity availability at cheaper price
8.	Gestation period of the project?	Eight months
9.	Minimum Economic Unit Size?	200-300 kg per day (fresh input)or depend upon selection of raw material
10.	Indicative Investment	Rs.3 Crores
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	• Local fruits and vegetables growers • Indigenous machinery fabricator & supplier • Certified marketing channels
12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	Using this technology can increase shelf life of any agri produce with high quality end product having several months shelf life at room temperature
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	NA
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	NA

16.	How many Training Days or months required for the technology to be learned properly?	1-2 months
17.	How to be implemented form the root to tip	CSIR-IHBT has develop and standardized complete knowhow related to this technology
18.	If it can be implemented at Family level or external manpower is required?	External manpower is required to implement proposed unit
	Additional Information	
19.	How many Manpower required?	5-6 Manpower
20.	What is the Status of Commercialization	Ready to commercialize
21.	Scale of Funding required all total?	Rs 300 lakhs
22.	Budget with breakage?	Reccuring: Rs 40 Lakhs Non Reccuring : 260 lakhs Technology transfer fee will be additionally charged
23.	What type of Certification Required for the product? (If required)	FSSAI
24.	Risk involved?	NO

Basic Information		
	Items	**Answers**
1.	Title of the Technology	**Ready to eat Foods**
2.	About Technology (in short)	Indian ready-to-eat market was valued at Rs. 225 Cr. in 2013 and expected to grow with increasing demand for convenience and on-the-go foods by 25-30% over the next 6 years to Rs. 2900 Cr. by 2020. Consumers are rapidly adapting to convenient portion packs of hygienic, branded and well packaged food products. Reduction of heating time by 30-50% with improved food appearance, better nutrition and taste are the factors popularizing retort packaging in India. CSIR-IHBT has developed an indigenous technology for commercial production of ready-to-eat foods without adding any preservatives. The greatest advantage is that these products remain fresh for seven months without loss in taste and flavour. Regulatory studies have shown prebiotic health benefits of these products.
3.	What is the scientific approach to choose the particular technology)?	• The developed products are new of their kind. • Chemical and Preservative free • Long shelf-life and convenience packages • Prebiotic health benefits
4.	After what duration the first output can be seen?	Within one month from the month of installation of machinery and equipments
5.	What kind of Resources Required (Raw material, Energy, water, others)?	Seasonal available vegetable and pulses processed for ethnic and local cuisines, 2500kg per day
6.	What is the area foot print of the Process?	Approximate 3500 -4500 square feet area required for pre- processing, cutting /grading, drying & packaging, storage etc.
7.	What kind of Climatic and Geographical location is required?	Proposed project can be setup anywhere in India, where continuous electricity supply and easily availability of raw materials
8.	Gestation period of the project?	**Si x months**
9.	Minimum Economic Unit Size?	**2500 kg per day i.e. 1400 cans**
10.	Indicative Investment	**Rs. 150 lakhs**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	• Local pulses, legumes and vegetable growers • Indigenous machinery fabricator & supplier
12.	Can it be part of Circular economy?	**Yes**
13.	What will be the Chain of Value addition?	Using this technology can increase demand of local legumes, pulses and vegetables for market of traditional and ethnic cuisines with high quality end

		product having several months shelf life at room temperature
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	NA
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	NA
16.	How many Training Days or months required for the technology to be learned properly?	1-2 months
17.	How to be implemented form the root to tip	CSIR-IHBT has develop and standardized complete knowhow related to this technology
18.	If it can be implemented at Family level or external manpower is required?	External manpower is required to implement proposed unit
	Additional Information	
19.	How many Manpower required?	**08 Skilled manpower**
20.	What is the Status of Commercialization	**Technology is ready for commercialization**
21.	Scale of Funding required all total?	**Rs. 150 lakhs**
22.	Budget with breakage?	**Recurring: 20 lakhs** **Non Recurring: 130 lakhs** **Technology transfer fee will be additionally charged**
23.	What type of Certification Required for the product? (If required)	**FSSAI, New Delhi**
24.	Risk involved?	**NO**

Basic Information		
	Items	**Answers**
25.	Title of the technology	**Herbal Incense Cones**
26.	About technology (in short)	**Herbal incense cones developed using flower wastes from various temples with natural herbs. The level of harmful pollutants has been determined in herbal incense cones compared with various commercial Dhoop and Agarbatti samples available in market. The levels of pollutants were significantly higher in commercial Dhoop and Agarbatti samples. The ones developed by CSIR-IHBT hardly emits any of these pollutants.**
27.	What is the scientific approach to choose the particular technology)?	**Floral waste into value added product or waste management**
28.	After what duration the first output can be seen?	**One week after complete setup**
29.	What kind of Resources Required (Raw material, Energy, water, others)?	**Flowers, natural herbs, resinoids, essential oils, water and others.**
30.	What is the area foot print of the Process?	**Utilization of waste flowers**
31.	What kind of Climatic and Geographical location is required?	**Not specific**
32.	Gestation period of the project?	**One week**
33.	Minimum Economic Unit Size?	**10-15 Rs/20 Cones**
34.	Indicative Investment	**10-15 Lakh**
	Salient Feature of Process/Technology Information	
35.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Source of Raw material- **Temples**, Machinery to Possible Market**-**
36.	Can it be part of Circular economy?	**Yes**
37.	What will be the Chain of Value addition?	**1. Collection of waste flowers from temples 2. Processing of raw material 3. Manufacturing of incense cones 4. Packing and marketing**
38.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**Yes**
39.	How everything from top to bottom to be made in the village itself (Circular and local)?	**These can be made by hand.**
40.	How many Training Days or months required for the technology to be learned properly?	**1 Month**
41.	How to be implemented form the root to tip	**1. Collection of waste flowers from temples 2. Processing of raw material 3. Manufacturing of incense cones Packing and marketing**
42.	If it can be implemented at Family level or external manpower is required?	**It can be implemented to family level easily**

<table>
<tr><td></td><td colspan="2">Additional Information</td></tr>
<tr><td>43.</td><td>How many Manpower required?</td><td>5</td></tr>
<tr><td>44.</td><td>What is the Status of Commercialization</td><td>Commercialised to 3 companies</td></tr>
<tr><td>45.</td><td>Scale of Funding required all total?</td><td>10-15 Lakh</td></tr>
<tr><td>46.</td><td>Budget with breakage?</td><td>
<table>
<tr><th>S. No.</th><th>Equipment</th><th>Nos.</th><th>Total (in Rs.)</th></tr>
<tr><td>1.</td><td>Raw material</td><td>1</td><td>1,00,000</td></tr>
<tr><td>2.</td><td>Dhoop cone formulation machine</td><td>1</td><td>3,50,000</td></tr>
<tr><td>3.</td><td>Sieve shaker</td><td>1</td><td>50,000</td></tr>
<tr><td>4.</td><td>Powder Mixing Machine (Ball Mill Machine)</td><td>1</td><td>1,00,000</td></tr>
<tr><td>5.</td><td>Pulveriser</td><td>1</td><td>1,00,000</td></tr>
<tr><td>6.</td><td>Mechanical Drier</td><td>1</td><td>2,00,000</td></tr>
<tr><td>7.</td><td>Mixer and grinder</td><td>2</td><td>50,000</td></tr>
<tr><td>8.</td><td>Others miscellaneous items</td><td></td><td>1,00,000</td></tr>
<tr><td></td><td>Total cost (Appx.)</td><td></td><td>10,50,000</td></tr>
</table>
Technology transfer fee will be additionally charged</td></tr>
<tr><td>47.</td><td>What type of Certification Required for the product? (If required)</td><td>-</td></tr>
<tr><td>48.</td><td>Risk involved?</td><td>No</td></tr>
</table>

	Basic Information	
	Items	**Answers**
1.	Title of the technology	Vitamin D_2 enriched *Shiitake* mushroom production and processing
2.	About technology (in short)	The salient features and applications of the *shiitake* mushroom production and processing technology are as following: • *Shiitake* and its value added products may cater to the population affected with vitamin D deficiency. For vegetarians, mushrooms are the only food source of Vitamin D. • Fresh and dried shiitake mushroom is popular for its meaty texture and smoky flavour. • Shorter production time of 2 months (typically takes 8-12 months). • Capsule of 350 mg shiitake powder meets 100% RDA of Vitamin D. • Vitamin D_2 enriched shiitake powder may be used to prepare a range of value added products like *Shiitake* pickles, *shiitake* soups, Shiitake drinks, Shiitake chocolates, etc.
3.	What is the scientific approach to choose the particular technology)?	Vitamin D deficiency is prevalent in >70% of Indian population. Beyond bone health, the deficiency is associated with cancer, autoimmune diseases, infections, type 2 diabetes, hypertension, cardiovascular disease, etc. For vegetarians, mushrooms are the only food source of Vitamin D. Mostly in the Himalayan States *Shiitake* is produced in natural conditions as the climate is suitable for its cultivation. However, in natural conditions *shiitake* mushroom cultivationis done in wooden logs and it takes 8-12 months for fruiting, it requires large area and it has poor yield due to excess contamination. To cope up with the challenges faced by natural production of *Shiitake* mushroom, CSIR-IHBThas developed the technology of production of Vitamin D_2 enriched *Shiitake* mushroom in captive conditions by utilizing the sawdust substrate available as waste from timber industry. Shiitake mushroom can be produced in record 2 months' duration hence harvesting can be done throughout the year. The yield of fresh mushroom is 0.5-0.6 kg per 1 kg dry weight of sawdust substrate. *Shiitake* mushroom are rich in vitamin D precursor ergosterol, and with optimized photo conversion experiments Vitamin D_2 concentration can be considerably enhanced. Shiitake mushroom are popular edible mushroom rich in vitamin D precursor ergosterol
4.	After what duration the first output can be seen?	*Shiitake* mushroom can be produced in record 2 months' duration.
5.	What kind of Resources Required (Raw material, Energy, water, others)?	The raw material to produce *shiitake* mushroom under captive cultivation is cheap hard wood broad leaf saw dust substrate available locally in different timber houses. For additional supply of raw materials paper mills, large timber houses can be contacted for supply of sawdust substrates from nearby region. Other requirements for spawn and *shiitake* production such as wheat grains, wheat bran, etc. can be locally procured from local traders.

Spawn Preparation process and raw material required:
Raw material cost used for preparation of 20 spawn bags:

Raw materials		Cost (Approx.)
Wheat grains	Rs 20 per Kg	Rs. 200
Polypropylene bags	Rs 3 per bag	Rs 120
Cotton plugs	Rs 225/roll)	Rs 75
Polypropylene Rings	Rs 2 per ring	Rs 40
Chemicals (Calcium carbonate = 310 per 500 g Calcium Sulphate = Rs 305 per 500 g)	100 grams (each 25 grams)	Rs 120
Total		Rs. 555

Cost per spawn Bag = Rs. 555/20 = Rs 28/-
Estimated production of Spawn Per month = 100 bags
Estimated cost of raw materials = Rs 2800/-

***Shiitake* production raw material required:**
Raw material required for preparation of 20 *Shiitake* bags:

Raw materials		Cost (Approx.)
Sawdust	Rs 5 per kg	Rs. 60
Wheat bran	Rs 20 per Kg	Rs 60
Polypropylene bags	Rs 3 per bag	Rs 120
Cotton plugs	Rs 225/roll	Rs 75
Polypropylene Rings	Rs 2 per ring	Rs 40
Chemicals (Calcium carbonate = 310 per 500 g Calcium Sulphate = Rs 305 per 500 g)	100 grams (each 25 grams)	Rs 120
Total		Rs 475

Cost per *Shiitake* Bag = Rs. 475/20 = Rs. 24/-
Estimated production of Shiitake Bag Per month = 300 bags.
Estimated cost of raw materials = Rs 7200/-

6.	What is the area foot print of the Process?	**25X 25 feet (for batch production of 50 kgs)**
7.	What kind of Climatic and Geographical location is required?	*Shiitake* mushroom production can be carried out throughout the year under controlled conditions. The focus of the technology has been towards the development of cost-effective method for *shiitake* production, and value addition for ensuring food security and innovative food processing with an underpinning on food safety to provide health

		and nutrition to all sections of the population.
8.	Gestation period of the project?	**2 months**
9.	Minimum Economic Unit Size?	**Infrastructure Requirements** For the captive production of *shiitake* mushroom under controlled conditions. Two rooms, packing space, autoclave area and laminar room with an area foot print of approximately 25 X 25 feet is required for 50 kg *shiitake* mushroom production. **Incubation room** requires a split air conditioner, and aluminum racks with temperature maintained at 21-25 ^{o}C for yearlong cultivation. If seasonal cultivation is preferred by farmers, the month of September and early October is the appropriate time of incubation. **Fruiting room** requires a set of split air conditions, aluminum racks and a humidifier. Fruiting is done under control conditions i.e. temperature 16-18^{o}C and 80-95% humidity. For seasonal farmers, starting from month of November till the end of February fruiting conditions can be maintained without any use of air conditioners. **Mushroom bag preparation room** requires autoclave for sterilization, iron grating and furnace for boiling of spawn, laminar airflow for inoculation of spawn, UV and tray dryer for further processing, drying and value addition.
10.	Indicative Investment	**12-15 lakhs**
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	The raw material to produce *shiitake* mushroom under captive cultivation is cheap hard wood broad leaf saw dust substrate available locally in different timber houses. For additional supply of raw materials paper mills, large timber houses can be contacted for supply of sawdust substrates from nearby region. Other requirements for spawn and shiitake production such as wheat grains, wheat bran, etc. can be locally procured from local traders.
12.	Can it be part of Circular economy?	Yes, the technology utilizes waste from timber houses for high value mushroom production and the waste generated in form of spent, is a degraded organic material that may be used as manure and soil conditioner in the farm land.
13.	What will be the Chain of Value addition?	**Value chain analysis for 100 kg fresh and dried mushroom**
14.	Can the complete	Once the required machineries are procured, rest recurring requirement can

Item	**Total Investment (Rs)**	**Gross Returns (Rs)**	**NetReturns (Rs)**	**Benefit/ Cost Ratio**
Fresh *Shiitake*	33000	88000	47000	1.42
Dried *Shiitake*	48000	99000	51000	1.06

<table>
<tr><td></td><td>value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally</td><td>be obtained locally. Hard wood waste from local timber houses can be used as substrate, spawn can be prepared using wheat grains and the spent of the mushroom can be converted to organic manure to be used in farmland as soil conditioner.</td></tr>
<tr><td>15.</td><td>How everything from top to bottom to be made in the village itself (Circular and local)?</td><td>Recurring requirements for the Shiitake mushroom production can be fulfilled locally. Also the spent can be utilized in the farmlands.</td></tr>
<tr><td>16.</td><td>How many Training Days or months required for the technology to be learned properly?</td><td>The number of training days required to learn the techny:
<table>
<tr><th></th><th>Shiitake mushroom training duration</th><th>Days</th></tr>
<tr><td>1.</td><td>Culture maintenance, Spawn production training programme</td><td>10</td></tr>
<tr><td>2.</td><td>Shiitake processing training programme</td><td>10</td></tr>
<tr><td>3.</td><td>Packaging and marketing training programme</td><td>5</td></tr>
<tr><td></td><td>Total</td><td>25</td></tr>
</table></td></tr>
</table>

17.	How to be implemented form the root to tip	**Process for shorter cultivation cycle of *Shiitake* mushroom in synthetic logs** Shiitake mushroom captive conditions is performed by utilizing the sawdust substrate available as waste from timber industry. Shiitake mushroom is produced in record 1.5-2 months' duration. The yield of fresh mushroom is 0.5-0.6 kg per 1 kg dry weight of sawdust substrate. **Comparative nutritional analysis of Oven dried and Freeze-dried shiitake mushroom (100 gm)**

S. No	Parameters	Oven dried samples
1.	Moisture, % by wt.	7.14
2.	Total Ash, % by wt.	6.65
3.	Fat, % by wt	2.55
4.	Crude fiber, % by wt	7.20
5.	Protein, % by wt	28.01
6.	Carbohydrate, % by wt.	48.45
7.	Calorific value, K.cal/100g	328.79
8.	Iron, mg/100g	2.47
9.	Zinc, mg/100g	6.30
10.	Vitamin A, µg/g	BDL*of 0.150

Quantification of UV treated Shiitake samples for Vitamin D_2

Samples	Vitamin D2 (µg/g)
Caps 20	44.3 ± 0.91
Caps 25	42.9 ± 1.14
Gills 30	99.83 ±9.8
Gills 40	7.9 ± 0.94
Stipes 20	25.6 ± 0.52
Stipes 30	77.4 ± 0.79

Third party analysis:

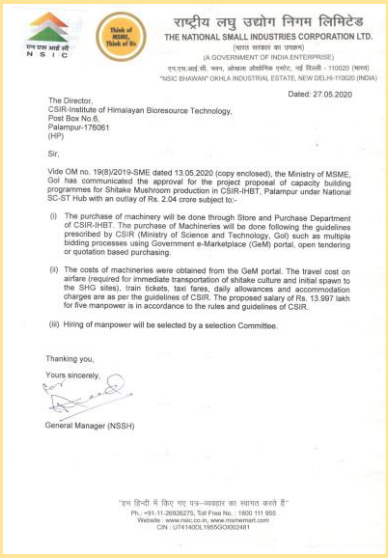
The third-party analysis of shiitake mushroom was performed at NABL certified Interstellar Testing centre and SGS India Pvt. Ltdto further verify

<table>
<tr><td></td><td></td><td>the results.

Vitamin D_2 estimation results from Interstellar Testing Centre Pvt. Ltd, Panchkula, Haryana.

<table><tr><th>Sample</th><th>Vitamin D_2 (µg/g)</th></tr><tr><td>Oven-dried</td><td>112.1</td></tr></table>
Vitamin D_2 estimation results from SGS India Pvt. Ltd. IMT Manesar, Gurgaon, Haryana.

<table><tr><th>Samples</th><th>Vitamin D_2 (µg/g)</th></tr><tr><td>Control</td><td>9.5</td></tr><tr><td>Sun-dried</td><td>14.6</td></tr><tr><td>Oven-dried</td><td>136.9</td></tr><tr><td>Freeze-dried</td><td>153.1</td></tr></table></td></tr>
<tr><td>18.</td><td>If it can be implemented at Family level or external manpower is required?</td><td>Yes, it can be implemented at the family level.</td></tr>
<tr><td></td><td colspan="2">Additional Information</td></tr>
<tr><td>19.</td><td>How many Manpower required?</td><td>For 50 kg batch cultivation two manpower is required</td></tr>
</table>

20.	What is the Status of Commercialization	Agreement signed for the transfer of the technology of Captive production of Shiitake mushroom with M/s Innotech AgroPustikam Pvt Ltd, Guwahati Biotech Park, IIT Guwahati, Assam; M/s Pravin Masalewale, Hadapsar Industrial Estate, Hadapsar, Pune, Maharashtra and, Mr. Satish Kumar, M/s Ray's Tech Hamirpur, Himachal Pradesh.M/s Innotech AgroPostikum Pvt Ltd. Guwahati, Assam, have also signed the agreement for setting up the Incubation Centre at CSIR-IHBT. Currently, they are utilizing our facilities and 20 kilograms' production of shiitake mushrooms are supplied per month to the stakeholders. External grant obtained on the technology developed under this project of Captive production of *Shiitake* mushroom has led us obtain an ECF of Rs 2.04 crore. The approval letter is obtained recently:  राष्ट्रीय लघु उद्योग निगम लिमिटेड THE NATIONAL SMALL INDUSTRIES CORPORATION LTD. (A GOVERNMENT OF INDIA ENTERPRISE) Dated: 27.05.2020 The Director, CSIR-Institute of Himalayan Bioresource Technology, Post Box No.6, Palampur-176061 (HP) Sir, Vide OM no. 19(8)/2019-SME dated 13.05.2020 (copy enclosed), the Ministry of MSME, GoI has communicated the approval for the project proposal of capacity building programmes for Shitake Mushroom production in CSIR-IHBT, Palampur under National SC-ST Hub with an outlay of Rs. 2.04 crore subject to:- (i) The purchase of machinery will be done through Store and Purchase Department of CSIR-IHBT. The purchase of Machineries will be done following the guidelines prescribed by CSIR (Ministry of Science and Technology, GoI) such as multiple bidding processes using Government e-Marketplace (GeM) portal, open tendering or quotation based purchasing. (ii) The costs of machineries were obtained from the GeM portal. The travel cost on airfare (required for immediate transportation of shitake culture and initial spawn to the SHG sites), train tickets, taxi fares, daily allowances and accommodation charges are as per the guidelines of CSIR. The proposed salary of Rs. 13.997 lakh for five manpower is in accordance to the rules and guidelines of CSIR. (iii) Hiring of manpower will be selected by a selection Committee. Thanking you, Yours sincerely, General Manager (NSSH) MoMSME has sanctioned three *Shiitake* production clusters at Sikkim worth Rs 2.449 crore each.
21.	Scale of Funding	

<table>
<tr><td></td><td>required all total?</td><td>A total budget of Rs 15 lakhs will be sufficient to start with a batch production of 50 Kg (Excluding the civil and land cost).</td></tr>
<tr><td>22.</td><td>Budget with breakage?</td><td>Budget breakup: Cost of equipment required for shiitake mushroom cultivation, value addition and processing.
<table>
<tr><th>S. No</th><th>Name of the equipment & Machineries</th><th>Nos.</th><th>Cost (in Rs.)</th></tr>
<tr><td>1</td><td>Autoclave</td><td>1</td><td>3,50,000</td></tr>
<tr><td>2</td><td>Laminar air flow</td><td>1</td><td>70,000</td></tr>
<tr><td>3</td><td>Air conditioners</td><td>2</td><td>1,00,000</td></tr>
<tr><td>4</td><td>Humidifier</td><td>1</td><td>20,000</td></tr>
<tr><td>5</td><td>Racks</td><td>-</td><td>80,000</td></tr>
<tr><td>6</td><td>Tray dryer</td><td>1</td><td>1,50,000</td></tr>
<tr><td>7</td><td>UV lamps</td><td>1</td><td>50,000</td></tr>
<tr><td>8</td><td>Boiling Pan 600 Litre capacity</td><td>1</td><td>13,000</td></tr>
<tr><td>9</td><td>Iron Grating for Furnace and mesh</td><td>1</td><td>6,000</td></tr>
<tr><td>10</td><td>Mushroom packaging Machine</td><td>1</td><td>2,50,000</td></tr>
<tr><td colspan="3">Total</td><td>Rs. 10,89,000</td></tr>
</table>
Technology transfer fee will be additionally charged</td></tr>
<tr><td>23.</td><td>What type of Certification Required for the product? (If required)</td><td>FSSAI</td></tr>
<tr><td>24.</td><td>Risk involved?</td><td>1. Availability of timber waste in the area
2. Dependence on skilled labour and proper monitoring
3. Availability of quality wheat grains for spawn production
4. Electrical power supply</td></tr>
</table>

Basic Information		
	Items	**Answers**
1.	Title of the technology	**Iron and zinc enriched spirulina based food products (Nut and chocolate bars, Instant soup mixes, Beverage mixes)**
2.	About technology (in short)	The products have been developed for combating micronutrient malnutrition, mainly iron and zinc. According to National Family and Health Survey 4 (2015-16) 53% of Indian women and 38% of Indian children are anaemic and deficient in micronutrients. The product offers a cost-effective platform for supplementation of micronutrients. The salient features of the products are • 100% Natural, preservative free • Up to 2g Spirulina per serving. • 25% RDA levels of Iron and Zinc per serving (25 g). • Beta-carotene content – 122 µg/serving (25g). • 4 g protein/serving (25 g). • Source of omega-6 Gamma Linolenic Acid • Shelf life 6 months
3.	What is the scientific approach to choose the particular technology)?	Microalgae, mainly Spirulina has been approved as nutraceutical and source of essential nutrients such as iron, beta-carotene and protein. Use of Spirulina has been approved by FSSAI under schedule VI of Food Safety Standards for Nutraceuticals, 2016. Research work at CSIR-IHBT revealed that supplementation of *Spirulina* to malnourished rats reversed conditions of iron deficient anaemia and protein malnutrition. Further repeated dose supplementation study indicated body weight gain, improved haematology and serum profile.
4.	After what duration the first output can be seen?	Within 1 month from date of commissioning of plant and installation of machinery
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Dehydrated Spirulina powder, Nuts (peanuts, almonds), Seeds (Sesame, flax sunflower, watermelon, pumpkin), Oats, cereals and millet flours, honey, jaggery, sugar, butter, cooking oil**
6.	What is the area foot print of the Process?	**Output** – 500 kg per day **Total land requirement** – 5000 sq. feet **Building area** – 3500 sq. feet required for raw material storage, pre- processing,

		production line, finished good storage etc.
7.	What kind of Climatic and Geographical location is required?	The technology can be executed anywhere in India with continuous electricity supply ease of logistics access
8.	Gestation period of the project?	6 months
9.	Minimum Economic Unit Size?	500 kg per day of any given product resulting in
10.	Indicative Investment	Rs. 35 lakhs
	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Raw materials such as nuts, seeds, sweeteners and food ingredients – Locally sourced Machinery – Indigenous and fabricated at local level
12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	The technology can enhance the value and demand for *Spirulina* production, effective utilization of jaggery and honey and nuts in finished products fetching better economic returns to small farmers
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	No
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	NA
16.	How many Training Days or months required for the technology to be learned properly?	1 month
17.	How to be implemented form the root to tip	The technology know how is readily available. The complete handholding will be provided which include machinery selection, raw material identification and processing and analytical services.
18.	If it can be implemented at Family level or external manpower is required?	External manpower is required.
	Additional Information	
19.	How many Manpower required?	**8 to 10 nos.**
20.	What is the Status of Commercialization	**Product is ready for commercialization**
21.	Scale of Funding required all total?	**35 lakhs**
22.	Budget with breakage?	• Capital expenses – 25 lakhs • Working capital – 7.5 lakhs • Technology transfer and licenses – 2.5 lakhs
23.	What type of Certification Required for the product? (If required)	FSSAI, New Delhi Additionally HACCP and ISO 22000
24.	Risk involved?	No environmental or industrial hazard or risk identified in the technology

Basic Information		
	Items	**Answers**
1.	Title of the technology	PROTEIN AND FIBER ENRICHED CEREAL BARS (VARIANTS: GRANOLA BARS, PROTEIN BARS, LOW CALORIE BARS)
2.	About technology (in short)	The products have been developed for combating protein malnutrition. According to National Family and Health Survey 4 (2015-16) 38% of Indian women and 36% of Indian children are protein malnourished. The product offers a cost-effective platform for supplementation of proteins. Further, the market for protein enriched instant foods and functional foods is increasing and is valued at USD 3 billions with an annual growth of 7%. The salient features of the products are • 100% Natural, Preservative free • Multi grain- rich in millets and pulses • Natural fruit and honey based based • 4 to 5 g protein/ serving • 3 g complex dietary fiber per serving • Less than 6 g sugar/ serving • Saturated fat content less than 2.5g/ serving • Meets 15% of RDA for calcium. • Shelf life 6 months
3.	What is the scientific approach to choose the particular technology)?	Proteins in the form of convenient foods are easily accepted among consumers. Considering the increasing demand for protein rich foods, CSIR-IHBT has developed multigrain based protein and fiber enriched bars. The health benefits of lower calorie intake and dietary fibre is well understood and has tremendous impact in diabetic foods and market.
4.	After what duration the first output can be seen?	Within 1 month from date of commissioning of plant and installation of machinery
5.	What kind of Resources Required (Raw material, Energy, water, others)?	**Multigrain cereal products (puffs, flakes), Nuts (peanuts, almonds), Seeds (Sesame, flax sunflower, watermelon, pumpkin), Oats, cereals and millet flours, honey, jaggery, sugar, butter, cooking oil**
6.	What is the area foot print of the Process?	**Output** – 500 kg per day (About 10000 bars of 40 grams size) **Total land requirement** – 5000 sq. feet **Building area** – 3500 sq. feet required for raw material storage, pre- processing, production line, finished good storage etc.
7.	What kind of Climatic and Geographical location is required?	The technology can be executed anywhere in India with continuous electricity supply ease of logistics access
8.	Gestation period of the project?	6 months
9.	Minimum Economic Unit Size?	500 kg per day of any given product resulting in
10.	Indicative Investment	Rs. 45 lakhs

	Salient Feature of Process/Technology Information	
11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Raw materials such as nuts, seeds, sweeteners and food ingredients – Locally sourced Machinery – Indigenous and fabricated at local level
12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	The technology can enhance the value and demand effective utilization of jaggery and honey and nuts in finished products fetching better economic returns to small farmers
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	No
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	NA
16.	How many Training Days or months required for the technology to be learned properly?	1 month
17.	How to be implemented form the root to tip	The technology know how is readily available. The complete handholding will be provided which include machinery selection, raw material identification and processing and analytical services.
18.	If it can be implemented at Family level or external manpower is required?	External manpower is required.
	Additional Information	
19.	How many Manpower required?	**8 to 10 nos.**
20.	What is the Status of Commercialization	**Product is ready for commercialization**
21.	Scale of Funding required all total?	**45 lakhs**
22.	Budget with breakage?	• Capital expenses – 30 lakhs • Working capital – 12.50 lakhs • Technology transfer and licenses – 2.5 lakhs
23.	What type of Certification Required for the product? (If required)	FSSAI, New Delhi Additionally HACCP and ISO 22000
24.	Risk involved?	No environmental or industrial hazard or risk identified in the technology

Basic Information		
	Items	**Answers**
1.	Title of the technology	Multigrain High protein mixes
2.	About technology (in short)	The products have been developed for combating protein malnutrition. According to National Family and Health Survey 4 (2015-16) 38% of Indian women and 36% of Indian children are protein malnourished. The product offers a cost-effective platform for supplementation of proteins. Further, the market for protein enriched instant foods and functional foods is increasing and is valued at USD 3 billions with an annual growth of 7%. The salient features of the products are • 100% Natural high energy drink • No maltodextrins & malt powders • Multigrain based • High energy >100 Kcal/ serving. • 7g protein/serving • 4g dietary fiber/serving • Meets 15% RDA of Calcium and Iron Preservative free • Non-hygroscopic – easy to store. • Shelf life 1 year
3.	What is the scientific approach to choose the particular technology)?	Proteins in the form of convenient foods are easily accepted among consumers. Considering the increasing demand for protein rich foods, CSIR-IHBT has developed multigrain based high protein mixes that can be used as beverages, fortifying agents in other prepared foods Animal studies indicated the ability of the formulation to promote recovery from protein malnutrition and protein deficient anaemia.
4.	After what duration the first output can be seen?	Within 1 month from date of commissioning of plant and installation of machinery
5.	What kind of Resources Required (Raw material, Energy, water, others)?	Cereals, millets, pulses and jaggery, milk solids and spices
6.	What is the area foot print of the Process?	**Output** – 500 kg per day **Total land requirement** – 5000 sq. feet **Building area** – 3500 sq. feet required for raw material storage, pre- processing, production line, finished good storage etc.
7.	What kind of Climatic and Geographical location is required?	The technology can be executed anywhere in India with continuous electricity supply ease of logistics access
8.	Gestation period of the project?	6 months
9.	Minimum Economic Unit Size?	200 kg per day of any given product resulting in
10.	Indicative Investment	Rs. 25 lakhs
	Salient Feature of Process/Technology Information	

11.	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Raw materials such as cereals, pulses and millets, spices and sweeteners and other food ingredients – Locally sourced Machinery – Indigenous and fabricated at local level
12.	Can it be part of Circular economy?	Yes
13.	What will be the Chain of Value addition?	The technology can enhance the value and demand for effective utilization of underutilized millets an
14.	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	No
15.	How everything from top to bottom to be made in the village itself (Circular and local)?	NA
16.	How many Training Days or months required for the technology to be learned properly?	1 month
17.	How to be implemented form the root to tip	The technology know how is readily available. The complete handholding will be provided which include machinery selection, raw material identification and processing and analytical services.
18.	If it can be implemented at Family level or external manpower is required?	External manpower is required.
	Additional Information	
19.	How many Manpower required?	**8 to 10 nos.**
20.	What is the Status of Commercialization	**Product is ready for commercialization**
21.	Scale of Funding required all total?	**25 lakhs**
22.	Budget with breakage?	• Capital expenses – 18 lakhs • Working capital – 5 lakhs • Technology transfer and licenses – 2.0 lakhs
23.	What type of Certification Required for the product? (If required)	FSSAI, New Delhi Additionally HACCP and ISO 22000
24.	Risk involved?	No environmental or industrial hazard or risk identified in the technology

4. Technologies developed by CSIR- National Botanical Research Institute (NBRI), Lucknow

	Basic Information	
	Items	**Answers**
1	**Title of the technology**	Preparation of Herbal Gulals
2	**About technology (in short)**	Herbal gulal is a perfect blend of organic and natural extracts of fruits, leaves, and barks with a fusion of flowers and herbs that add up an excellent aroma in the air setting up the stage for the joyous festival that is just round the corner
3	**What is the scientific approach to choose the particular technology)?**	The powder provides a synergistic mixture of coloured dry powder which has good sticking capacity to skin and can be easily removed by soft mop. The dry colours have cosmetic effect on skin too as the make face feel a bit soft. It provides an option to replace synthetic dye based dry colour composition by natural ones, which is safe and eco-friendly
4	**After what duration the first output can be seen?**	One year
5	**What kind of Resources Required (Raw material, Energy, water, others)?**	Raw material: Flowers, leaves, seeds, fruits, barks etc. Machinery: Grinder, Extractor, Oven, Tray and Mixer, water and electricity connection
6	**What is the area foot print of the Process?**	All the resources available locally. Demand is at the national level
7	**What kind of Climatic and Geographical location is required?**	No specific requirement.
8	**Gestation period of the project?**	Six months
9	**Minimum Economic Unit Size?**	Rs 15 per 100 gram pkt
	Indicative Investment	3-5 lakh
	Salient Feature of Process/Technology Information	
10	**Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)**	Flowers, leaves, seeds, fruits, barks etc. Machines locally available. Market available at all the levels.
11	**Can it be part of Circular economy?**	Yes
12	**What will be the Chain of Value addition?**	Collected the Flowers, leaves, seeds, fruits, barks etc. Processed to prepare gulal at processing site. Packed and marketed.
13	**Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally**	Yes

14	**How everything from top to bottom to be made in the village itself (Circular and local)?**	Local, villages around a famous temple can be deployed for collection, sorting and primary processing. Small scale processing unit can be set us in the village or nearby town.
15	**How many Training Days or months required for the technology to be learned properly?**	Two weeks
16	**How to be implemented form the root to tip**	MSME with rural SHGs could be the model
17	**If it can be implemented at Family level or external manpower is required?**	External manpower will be required.
	Additional Information	
18	**How many Manpower required?**	5-10, depend upon the production capacity
19	**What is the Status of Commercialization**	The existing technology partners in colour industries such as M/s Sri Ganesh, Cock etc.
20	**Scale of Funding required all total?**	Rs. 3-5 lakh, depending upon capacity and scale of production
21	**Budget with breakage?**	Processing room, land (depend upon place), Grinder, Extractor, Oven, Tray and Mixer(3-5 lakh),Number of skilled and semiskilled manpower (depend upon the capacity of production)
22	**What type of Certification Required for the product? (If required)**	Can be started after licensing from CSIR-NBRI
23	**Risk involved?**	Competition from synthetic gulal makers.

	Basic Information	
	Items	**Answers**

1	**Title of the technology**	Dry Flower Crafts
2	**About technology (in short)**	CSIR-NBRI, Lucknow is the pioneer institution for development of dehydration technique of flowers and foliages, and making various distinctive and artistic decorative products from these. Dehydrated flowers and foliage are excellent due to their special beauty, long lasting value and can be enjoyed in any season. The technique has tremendous importance in social development in terms of employment generation and commercial potentiality, both for domestic and export market. Dehydration of flowers and foliage is done by different methods. CSIR-NBRI has standardised methods for different plant materials like air drying and embedding drying (for 3D structures through room drying, sun drying, oven drying, vacuum drying and microwave oven drying. Air drying is the most simple method under natural conditions whereas the embedding drying is to avoid shrinkage and other morphological changes in dehydrated materials. Press drying (for 2 D structures) is one of the most common methods for drying flowers and foliage. The original shape of the plant material cannot be maintained. This method is basically used for preparations of greeting cards, landscapes, wall hangings, herbarium, scenery, table mats, coasters and greeting envelopes etc. This technique is very ideal for making high quality herbarium specimen and for making different types of value added beautiful high quality products. Adopting this technology of value addition, the beneficiaries can earn money and it is a good source of employment generation in rural sector for farmers, rural women and unemployed youth. The value added floriculture is a simple field based technology which has easy adoptability by the rural people without much scientific and technological requirement.
3	**What is the scientific approach to choose the particular technology)?**	• Dehydration means to dry something under artificially produced heat and controlled temperature, humidity and air-flow. • Dehydration (removal of moisture) of flowers and foliage is done by different methods like Air flaying, Embedding and Drying, Room drying, Sun drying, and Oven drying. Borax, sand, corn meal and silica gel are the most commonly used drying materials. Time required to dry plant material depends and plant and the material used for drying. • Embedding is one of the most important processes for dehydration. Silica gel or sand is mostly used as drying

		material. In this method the plant material is preserved in its original shape, size and colour and used to develop 3 D products. • Press drying is another most common method for drying flowers and foliage. The original shape of the material cannot be maintained by this method but the original colour is retained. • Factors influencing dehydration are temperature, humidity and airflow. • Huge care after dehydration is required.
4	**After what duration the first output can be seen?**	3 months
5	**What kind of Resources Required (Raw material, Energy, water, others)?**	Water: For irrigation of plants only Electricity: 3-5 KW electricity connection Raw material: Flowers, leaves and stems from the plants, grown in the garden of the unit. Consumables: Blotting paper, scissors, forceps, adhesive, transparent glass/plastic containers, Glass discs, tray, Thermocol, Coloured / Velvet sheets of different colours; wax, Enamel paint, silica gel, Desiccators, Glass containers of assorted sizes. Minor equipment: Hot air oven, plant press, Lamination machine, Storage almirah, Work tables with storage.
6	**What is the area foot print of the Process?**	Only glass containers are to be brought from distant place.
7	**What kind of Climatic and Geographical location is required?**	Can be deployed in every climatic and geographical location of our country.
8	**Gestation period of the project?**	Three months
9	**Minimum Economic Unit Size?**	Not applicable
10	**Indicative Investment**	1-1.5 lakh rupees
	Salient Feature of Process/Technology Information	
11	**Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)**	Locally available plant material is to be grown in the garden. Glass containers are to be sourced from outside. Minor equipments are available locally.
12	**Can it be part of Circular economy?**	No
13	**What will be the Chain of Value addition?**	Design component can be improved by involving institutions like National Institute of Design while glass material can be improved by involving of institutions like CSIR-Central Glass & Ceramic Research Institute
14	**Can the complete value**	Yes

	chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	
15	**How everything from top to bottom to be made in the village itself (Circular and local)?**	Can be done locally in the village itself.
16	**How many Training Days or months required for the technology to be learned properly?**	One week.
17	**How to be implemented form the root to tip**	By setting of the facility in an area naturally rich with diverse flowers and foliages the gestation period can be reduced. Next major step is providing market linkage to make the venture successful.
18	**If it can be implemented at Family level or external manpower is required?**	Yes. At the small scale.
	Additional Information	
19	**How many Manpower required?**	Depends upon the production capacity. Four distinct activities: Cultivation, drying, product making and gardening.
20	**What is the Status of Commercialization**	Not done yet.
21	**Scale of Funding required all total?**	1-1.5 lakh rupees
22	**Budget with breakage?**	Minor equipment: 0.60 lakh Garden development: 0.20 lakh Consumables for 2-D product: 0.20 Glass containers: 0.50 lakh
23	**What type of Certification Required for the product? (If required)**	No However, a certificate of training from CSIR-NBRI would be beneficial.
24	**Risk involved?**	Nil

	Basic Information

	Items	Answers
1	Title of the technology	Plant tissue culture technology
2	About technology (in short)	Tissue culture can be defined as an *in vitro* aseptic culture of cells, tissues, organs or whole plant under controlled nutritional and environmental conditions, often to produce the clones of plants. The controlled conditions provide the culture an environment suitable for growth and multiplication of plant and include proper supply of nutrients, pH medium, adequate temperature and proper gaseous and liquid environment. A single explant can be multiplied into several thousand plants in relatively short time period and space under controlled conditions, irrespective of the season and weather on a year round basis.
3	What is the scientific approach to choose the particular technology)?	Totipotency is the genetic potential of a plant cell to produce the entire plant. Based on this characterstic plant tissue culture technology is being widely used for large scale plant multiplication. This technology has a major industrial importance in the area of plant propagation, disease elimination, plant improvement and production of secondary metabolites. Use of micropropagation for endangered, threatened and rare species, and to produce plants of superior quality yielding genotypes with better disease resistance and stress tolerance capacities. In addition, Plant tissue culture technology is used for crop improvement by the production of somaclonal and gametoclonal variants.
4	After what duration the first output can be seen?	Usually the time duration is 4-6 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	• Chosen plant (Medicinal, floriculture or orchids) • Autoclave machine • Laminar air flow • Media for plant growth such as Murashige Skoog (MS) medium, sucrose, agar • Flat-bottom culture tubes with closures • Spray bottle, alcohol, spray bottle, forceps or tweezers, gloves, cutting equipments (scalpel and razor blade), sterile petri dishes, beaker, container • Bleach sterilizing solution (1% sodium hypochlorite) • Beakers or containers of sterile water • A well-lit area away from direct sunlight or use tubelights • Plant growth hormones • Plant culture room
6	What is the area foot print of the Process?	

7	What kind of Climatic and Geographical location is required?	Moderate climatic condition and the place where availability of electricity and water is easy.
8	Gestation period of the project?	12 -36 months
9	Minimum Economic Unit Size?	
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes
15	How everything from top to bottom to be made in the village itself (Circular and local)?	It will be circular.
16	How many Training Days or months required for the technology to be learned properly?	It will require maximum 4-6 weeks.
17	How to be implemented form the root to tip	
18	If it can be implemented at Family level or external manpower is required?	No, there will be need of external manpower.
	Additional Information	
19	How many Manpower required?	Maximum seven manpower. Three skilled labours, two with highest qualification of post graduation and work experience of working in laboratory, one technician with maximum qualification of graduation and one non-skilled labour.
20	What is the Status of Commercialization	
21	Scale of Funding required all total?	
22	Budget with breakage?	**Items for one year** — **Cost (Rs)** Autoclave machine — 1lakhs

		Media and hormones	35k
		Fridge	30k
		Eqipments	1lakhs
		Table and shelving unit	5lakhs
		Workers salaries	8lakhs
		Miscellaneous	40k
		Total	16.05lakhs
23	**What type of Certification Required for the product? (If required)**	**Pathogen free material from any molecular biology lab**	
24	**Risk involved?**	**Contamination in tissue culture is one of the main problem. Apart from contamination, hardening in the green house and acclimatization to the field conditions is the final problem in the in vitro raised plants.**	

Above are applicable for:

1)*Gladiolus*

2) Gerbera

3) *Solanum khasianum*

4) Bannana

	Basic Information	
	Items	**Answers**

1	**Title of the technology**	Herbal Gulal from Floral Temple Waste
2	**About technology (in short)**	Flowers are used for variety of purposes. Since they are perishable items, they are usually discarded as waste after a day or two. To make use of waste flower colour has been extracted from them to make gulal. Dry colours are used worldwide in various festivals, dances and household decoration. In India, large amount of colours are used in traditional Holi festival.
3	**What is the scientific approach to choose the particular technology)?**	The colours extracted from waste flowers are mixed with natural ingredients. The powder provides a synergistic mixture of coloured dry powder which has good sticking capacity to skin and can be easily removed by soft mop. It is non-toxic to skin.
4	**After what duration the first output can be seen?**	One year
5	**What kind of Resources Required (Raw material, Energy, water, others)?**	Raw material: Floral waste from temples Machinery: Grinder, Extractor, Oven, Tray and Mixer Water and electricity connection
6	**What is the area foot print of the Process?**	All the resources available locally. Demand is at the national level.
7	**What kind of Climatic and Geographical location is required?**	No specific requirement.
8	**Gestation period of the project?**	Six months
9	**Minimum Economic Unit Size?**	100 gm per Rs.15
10	**Indicative Investment**	3-5 lakh
	Salient Feature of Process/Technology Information	
11	**Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)**	Waste flowers available locally. Machines locally available. Market available at all the levels.
12	**Can it be part of Circular economy?**	Yes
13	**What will be the Chain of Value addition?**	Floral waste is sorted at temple. Processed to prepare gulal at processing site. Packed and marketed.
14	**Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally**	yes
15	**How everything from top to bottom to be made in the village itself (Circular and local)?**	Local, villages around a famous temple can be deployed for collection, sorting and primary processing. Small scale processing unit can be set us in the village or nearby town.
16	**How many Training Days or months required for the technology to be learned**	Two weeks

	properly?	
17	**How to be implemented form the root to tip**	MSME with rural SHGs could be the model
18	**If it can be implemented at Family level or external manpower is required?**	External manpower will be required
		Additional Information
19	**How many Manpower required?**	5-10, depend upon the production capacity
20	**What is the Status of Commercialization**	Not transferred yet to any industry
21	**Scale of Funding required all total?**	Rs. 3-5 lakh, depending upon capacity and scale of production
22	**Budget with breakage?**	Processing room, land (depend upon place), Grinder, Extractor, Oven, Tray and Mixer(3-5 lakh),Number of skilled and semiskilled manpower (depend upon the capacity of production)
23	**What type of Certification Required for the product? (If required)**	Can be started after licensing from CSIR-NBRI
24	**Risk involved?**	Competition from synthetic gulal makers.

5. Technologies developed by CSIR- National Institute of Interdisciplinary and Technology (NIIST), Thiruvananthapuram

Basic Information		
	Items	**Answers**
1	Title of the technology	**Process for production of white pepper from black/green pepper.**
2	About technology (in short)	**"**White pepper", the skin-removed black or fresh pepper is the most valued form of pepper. Current demand of white pepper exceeds 150,000 metric tons per annum. White pepper value is almost double that of black pepper. Currently the main method for making white pepper is traditional retting, which affects the product quality significantly. The NIIST white pepper technology is an innovative clean bioprocess, which helps fast and bulk production of white pepper without losing its spicy principles. The process is designed to cleave the pectin molecular bonding between the skin and oil glands of the pepper kernel by the action of enzymes produced in-situ. This is facilitated in tanks by circulating liquid from a reservoir of microbial culture grown on degraded pepper skin medium. This bioprocess completes skin removal in 2 days for green and 4 days for black pepper under designed conditions. The clean bioprocess has been transferred to more than 25 entrepreneurs and few companies. The process enables to recover the by-products - methane gas and organic fertiliser that benefits process water reuse. The process continues to attract pepper industry inside and outside the country. The cost of implementation is low and the set up can be easily fabricated rurally, allowing value addition of the pepper and thereby increasing farmer income.
3	What is the scientific approach to choose the particular technology)?	The scientific principle is the degradation and removal of pectin in the pepper "skin" through enzymatic action. The enzymes are generated in situ by a mixed anaerobic consortium which used the pepper skin solids as the carbon source. Recirculation of the liquid medium from the culture reservoir allows enzymes to be in contact with pepper and efficiency removal of digested skin.
4	After what duration the first output can be seen?	First cycle of operation require about 14 days as the culture needs to gets established. Afterwards each cycle of white pepper production may take only 2-4 days. As far as plant

		commissioning to product output is concerned, the time duration is about 1-2 months.
5	What kind of Resources Required (Raw material, Energy, water, others)?	The plant for white pepper production can be easily scaled and it is also possible to operate in small scale suitable for individual farmer requirements. Fabrication can be done with multiple materials of construction ranging from HDPE tanks to Concrete and PVC pipes. Water requirement is minimal as it is recirculated. Energy requirement is only for operation of pump, that too intermittently. Raw material requirement are black/green pepper and water.
6	What is the area foot print of the Process?	Depends on scale of operation. A 2 ton /batch Plant would require approximately 20 m^2 area for accommodating all infrastructure and to have enough operation space
7	What kind of Climatic and Geographical location is required?	Climate should not be too cold. Warm and humid climate (The same as needed for pepper production) preferable.
8	Gestation period of the project?	The project is already implemented successfully at multiple locations.From commissioning to first produce , the maximum delay is only 1-2 month. Raw material to product duration is 2-4 days once the culture is established.
9	Minimum Economic Unit Size?	**100 kg/batch (once in 4 days)**
10	Indicative Investment	Low capacity systems without biogas production : 1-2 lakhs.
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Raw material (black pepper) source can be the farmer's own produce, or purchased in bulk from market. Most of the machinery can be procured locally /fabricated. Common motors/pumps and piping fittings and HDPE tanks can be used for construction of plant
12	Can it be part of Circular economy?	Yes, The process is sustainable utilizing local resources and there is a high value addition. Water and resource utilization is minimal and income goes to the local farmers. There is also possibility of energy generation through utilization of biogas, which is a by-product. The other by-product, waste solids has fertilizer value
13	What will be the Chain of Value addition?	White Pepper earns almost double the price of black pepper and there is a significant value addition
14	Can the complete value	Yes, raw materials (black pepper) can be sourced locally and

	chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	so are all materials for plant construction and operation. It can also provide employment to a minimum number of unskilled persons if operated at sufficient scale.
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Local fabricators can be provided with the design and drawings and can be educated on how the system works. Hand holding on design changes to suit the demand, fabrication etc can be provided by CSIR-NIIST
16	How many Training Days or months required for the technology to be learned properly?	One Month
17	How to be implemented form the root to tip	Turn key solutions and/or consultancy can be provided by CSIR-NIIST for installation and operation at multiple scales
18	If it can be implemented at Family level or external manpower is required?	Yes, Small scale operation require only minimal manpower and resources
	Additional Information	
19	How many Manpower required?	Depends on scale of operation. For small plants, upto 2 tons per batch, three persons – one semi-skilled and two unskilled would be sufficient. Manpower can be easily trained.
20	What is the Status of Commercialization	The clean bioprocess has been transferred to more than 25 entrepreneurs and few companies. Being operated at multiple places, enhancing farmer income
21	Scale of Funding required all total?	Depends on the scale of operation Low capacity systems without biogas production can be made with a funding of maximum about 1-2 lakhs. The amount can be reduced if using cheap local materials of construction.
22	Budget with breakage?	Details shall be made available by NIIST depending on the scale of operation and desired MOC.
23	What type of Certification Required for the product? (If required)	Depends on local regulations Fssai certification may be needed for final product
24	Risk involved?	Growth of unwanted microbes spoiling the fermentation and this can result in foul smell and reduced quality. Can be avoided by following proper hygienic practises

Basic Information		
	Items	**Answers**
1	Title of the technology	**Technology for agricultural waste (wheat bran, sugarcane bagasse and fruit peels) based biodegradable plates, cups and cutleries**
2	About technology (in short)	Scientists from Agro Processing and Technology Division of CSIR NIIST have successfully demonstrated the process for development of biodegradable cutleries in the form of plates and cutleries from various agro residues. The developed product is shelf stable up to the period of 10 to 12 months and heat resistant upto the temperature of 100^0C, produced plate and cutleries having good tensile strength, resist hot water and easily degradable
3	What is the scientific approach to choose the particular technology)?	Bench level process development, scale up in pilot plant, data collection, mechanical and quality properties studies, biodegradability studies,
4	After what duration the first output can be seen?	2 years
5	What kind of Resources Required (Raw material, Energy, water, others)?	Raw materials: wheat bran, Rice husk, sugarcane bagasse and fruit peels and natural binders
6	What is the area foot print of the Process?	Edible and biodegradable cutleries and plates and glasses
7	What kind of Climatic and Geographical location is required?	NA
8	Gestation period of the project?	For project implementation timeframe is 1 year
9	Minimum Economic Unit Size?	100kg
10	Indicative Investment	Raw materials availability
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	All over in India
12	Can it be part of Circular economy?	Beneficial for farmers ,Agri entrepreneurs, Plastic manufacturing industries and food packaging industries
13	What will be the Chain of Value addition?	Alternate to single user plastics, after degradation utilized as fertilizer, food animal feed and fish feed
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	yes, fabrication and product development distributed through food packaging industries and plastic manufacturing industries to replace the plastic

15	How everything from top to bottom to be made in the village itself (Circular and local)?	Farmers themselves they can manage to setup in hose hold scale processing where raw materials plenty available such as wheat bearn,rice husk, sugarcane bagasse and fruit peels
16	How many Training Days or months required for the technology to be learned properly?	2 Days
17	How to be implemented form the root to tip	Project implementation on consultancy basis through the help of a project engineering company
18	If it can be implemented at Family level or external manpower is required?	yes, family persons also manageable
	Additional Information	
19	How many Manpower required?	For setup of 500 to 1000kg processing raw materials two skilled persons required and two workers for supporting
20	What is the Status of Commercialization	Installed several
21	Scale of Funding required all total?	Project cost depends on the processing capacity and type of products
22	Budget with breakage?	For 100kg of raw material capacity per day with semiautomatic having 15lkhas initial investment
23	What type of Certification Required for the product? (If required)	Statutory licenses which are to be taken by the biodegradable manufacturing company for making the product
24	Risk involved?	Market survey is more important when high value products are targeted

Basic Information		
	Items	**Answers**
1	Title of the technology	Dehumidified drier for food and agri products
2	About technology (in short)	CSIR NIIST had developed and commercialized dehumidification drying for dehydration of food & agri products. This technology involves drying the material under controlled temperature and uniform distribution of air to retain the functional properties and micronutrients &flavour. The multipurpose application of the model involves the processing of heat sensitive exotic spices, fruits & vegetables, flowers etc for drying under adverse climatic conditions when it is harvested
3	What is the scientific approach to choose the particular technology)?	Bench level process development, scale up in pilot plant, data collection and QC studies, tech transfer & commercialization
4	After what duration the first output can be seen?	2 years
5	What kind of Resources Required (Raw material, Energy, water, others)?	Fresh raw materials such as vegetables, spices, fruits, herbs, leaves etc,
6	What is the area foot print of the Process?	Low temperature dehydration at modified atmosphere
7	What kind of Climatic and Geographical location is required?	**NA**
8	Gestation period of the project?	For project implementation timeframe is 1 year
9	Minimum Economic Unit Size?	**100Kg**
10	Indicative Investment	**Raw material availability**
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	All over in India
12	Can it be part of Circular economy?	Beneficial for farmers as well as agri entrepreneurs
13	What will be the Chain of Value addition?	Scope for value addition, shelf life enhancement and export market for a variety of dehydrated produces from fruits & vegetables, spices & herbs, onion, mushroom, flowers and leaves with superior quality
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**Yes,** to be fabricated through engineering companies engaged in manufacture of food/ agri processing equipment's
15	How everything from top to bottom to be made in the village	Farmers groups can take part in setting up a

	itself (Circular and local)?	processing unit at clusters where ginger is available at lower price
16	How many Training Days or months required for the technology to be learned properly?	2 days
17	How to be implemented form the root to tip	Project implementation on consultancy basis through the help of a project engineering company
18	If it can be implemented at Family level or external manpower is required?	No
		Additional Information
19	How many Manpower required?	For a 1 TPD processing plant about 10 -12 workers requires : 2 supervisory, 4 skilled workers and 5 unskilled workers
20	What is the Status of Commercialization	**Installed units several places in all over India**
21	Scale of Funding required all total?	Project cost depends on the processing capacity and type of products.
22	Budget with breakage?	For setting up a 1 TPD processing plant the cost of dryer alone will be about Rs 35 Lakhs
23	What type of Certification Required for the product? (If required)	Statuatory licenses which are to be taken by the food manufacturing company for making the product
24	Risk involved?	Market survey is more important when high value products are targeted.

Basic Information		
	Items	**Answers**
1	Title of the technology	Fresh ginger processing technology
2	About technology (in short)	CSIR - National Institute for Interdisciplinary Science & Technology, Trivandrum have developed and commercialized Fresh Ginger Processing Technology since 2000 for producing value added products such as ginger oil, dry ginger powder etc. The institute has set up three processing units in the north east and has transferred this technology to many other industries. CSIR NIIST provides the knowhow, technical assistance in sourcing of the machinery, engineering consultancy, training the operating staff, assist in erection &commissioning and troubleshooting. Same technology can be adopted for post-harvest operations of other spices like turmeric, cardamom etc. Considering the climatic conditions of North east, cost effective mechanical drying of the various agri crops can also looked into for value addition and shelf life enhancement
3	What is the scientific approach to choose the particular technology)?	Bench level process development, scale up in pilot plant, data collection and QC studies, tech transfer & commercialization
4	After what duration the first output can be seen?	2 years
5	What kind of Resources Required (Raw material, Energy, water, others)?	Raw ginger, water, steam for making value added products such as oil, powder, flakes etc
6	What is the area foot print of the Process?	Post harvest value addition of fresh ginger by making clean / waxed ginger, ginger flakes, ginger powder & ginger oil
7	What kind of Climatic and Geographical location is required?	NA
8	Gestation period of the project?	For project implementation timeframe is 1 year
9	Minimum Economic Unit Size?	**100kg**
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Raw material from North east, Kerala, Karnataka etc. machineries all over in India
12	Can it be part of Circular economy?	Beneficial for farmers as well as high value export market
13	What will be the Chain of Value	Primary processing products such as ginger flakes,

	addition?	dry ginger powder etc in local markets and ginger oil as high value product market
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, to be fabricated through engineering companies engaged in manufacture of food/ agri processing equipments
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Farmers groups can take part in setting up a processing unit at clusters where ginger is available at lower price
16	How many Training Days or months required for the technology to be learned properly?	**1 week**
17	How to be implemented form the root to tip	Tech transfer and project implementation on consultancy basis through the help of a project engineering company
18	If it can be implemented at Family level or external manpower is required?	**No**
		Additional Information
19	How many Manpower required?	For a 2 TPD processing plant about 25 workers requires : 3 supervisory, 8 skilled workers and 14 unskilled workers
20	What is the Status of Commercialization	**Installed units several places in all over India**
21	Scale of Funding required all total?	Project cost depends on the processing capacity and type of products.
22	Budget with breakage?	For setting up a 5 TPD processing plant & machineries alone the approx budget is Rs. 2.5 Crores with essential oil distillation facility. If the plant is for primary processing without oil distillation machinery cost will be Rs.1.5 Crores.
23	What type of Certification Required for the product? (If required)	Statutory licenses which are to be taken by the food manufacturing company for making the product
24	Risk involved?	Market survey is more important when high value products are targeted. Severe competition exists in the essential oil market from the large scale companies

Basic Information		
	Items	**Answers**
1	Title of the technology	**Gel bonding process for bricks and composite pre-fab walls**
2	About technology (in short)	**Ceramic-polymer hybrid gel treated under specific reaction conditions is used as a water compatible binder system for manufacturing bricks and composite pre-fab walls products.**
3	What is the scientific approach to choose the particular technology)?	**Currently bricks are made from earthern clays which required firing at 980oC. Fire wood firing as well as gas/oil fired furnaces are used to make the bricks. The conventional bricks manufacturing process release CO2 in air and extensively consume the natural raw material causing ecology problems. Hence a new idea of cold-bonded process using gel binders are proposed. Inorganic silicate gels stabilized with polymeric agents have good bonding strength and the cured bricks shows strength as high as 100 N/cm2. In this case gypsum, lime and sand are normally used. It is a RURAL technology and a simple casting process only involved.**
4	After what duration the first output can be seen?	**Six months**
5	What kind of Resources Required (Raw material, Energy, water, others)?	**Gypsum, Fly ash, lime, sand [preferably industry wastes from mining and casting industries], inorganic silicate precursors [sodium silicate/calcium silicate/potassium silicate], polymeric bonding agents [polyacrylic/ SBR/ PU/ PVA / EVA etc.,] and glass fibres**
6	What is the area foot print of the Process?	**AFFORDABLE BUILDING MATERIALS**
7	What kind of Climatic and Geographical location is required?	**Process involves Sun light curing. Warm climate is preferred**
8	Gestation period of the project?	**12 months**
9	Minimum Economic Unit Size?	**1000 bricks /day.**
10	Indicative Investment	**8.00 lakhs**
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	**Gypsum, Fly ash, lime, sand, silicate binder and polymeric bonding agents, glass fibres etc are indigenously available. No heavy machinery is involved. Only wooden moulds are required.**
12	Can it be part of Circular economy?	**YES**
13	What will be the Chain of Value addition?	**Gypsum is a by-product produced by SPIC, and TTP and FACT units. Foundry sand, silica sand, rock dust etc., are produced from the mining/metallurgy and M-sand**

		processing units. All these industrial by products are effectively used for making value added products.
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	**YES. The moulds as well as machines can be made within the country**
15	How everything from top to bottom to be made in the village itself (Circular and local)?	**Raw materials should be procured from the near by industrial units.**
16	How many Training Days or months required for the technology to be learned properly?	**One month**
17	How to be implemented from the root to tip	**Project mode**
18	If it can be implemented at Family level or external manpower is required?	**Family level is possible if any graduate is there. Otherwise, External /skilled labour are required**
		Additional Information
19	How many Manpower required?	**7**
20	What is the Status of Commercialization	**Demonstrated to the industries [MSMEs]**
21	Scale of Funding required all total?	**8 lakh**
22	Budget with breakage?	**Raw materials : 25,000/- per year** **Moulds : 20,000/- [wooded or rubber]** **Industry shed: 2,00,000/-[Permamnent]** **Water: 3000/- [per year]** **Labour: 2** **Supervisor 1** **Man power salary; 3,00,000/- [per year]** **Recurring : 1,00,000/- [per year]** **Approximately 8.00 lakhs**
23	What type of Certification Required for the product? (If required)	**ISO certification for PWD approval**
24	Risk involved?	**No Risk is involved**

Name of the Lab: CSIR-National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram

	Items	
1.	Title of the technology	**Process for production of weather resistant coir geotextiles.**
2.	Brief introduction of technology	Geotextile based on natural fibres especially coir is used for protection of river banks, seashores as well as in road construction replacing synthetic geotextiles which are not eco-friendly. The main draw back is the early degradation of this mat within 6 months under natural weathering. In the current process a semi-permanent grafting with natural materials and post curing made it weather resistant which can stay for 4-5 years. This process and materials are non-toxic as well.
3.	Scientific approach behind the development of technology	Normal coatings can wash off easily, but a reactive grafting with water resistant natural molecules can give a permanent coating.
4.	Time duration for first output produced using the technology to become visible	3-4 days
5.	Resources required (Raw material, Energy, water, others) to deploy the technology for production	Spray guns, chemicals, drying or UV curing ovens.
6.	Chain of Value addition	Only 10% increase in cost of treatment but frequent replacement can be avoided earning more revenue by savings and ecoprotection.
7.	Are all the components required from raw material/machinery to final packaged product available locally or made locally, like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Preparation of the production set up/plant can be accomplished easily through local fabrication and the requirements can all be sourced locally.
8.	Tentative Supply Chain (Source of Raw material, Machinery toPossible Market)	Raw material is produced locally, chemicals and achinery can also be sourced locally
9.	Can technology be part of Circular economy?	Yes, The process is sustainable utilizing local resources and there is a high value addition. Water and resource utilization is minimal and income goes to the local farmers. There is also possibility of energy generation through utilization of biogas, which is a by-prmoduct. The

		other by-product, waste solids has fertilizer value
10.	Gestation period of the project	The project is already scaled up and field trials are completed.
11.	Certification Required to undertake production and launch the product sales in the market	Not needed
12.	Manpower required(please specify number, and qualification/skill required)	4 persons per day is minimum requirement for a batch operation. Manpower can be easily trained.
13.	Can the required manpower be sourced from local resources i.e. available locally?	Yes, Operation require only minimal skills which can be imparted easily.
14.	Can technology be implemented at family level or external manpower is required	Yes, Small scale operation require only minimal manpower and resources
15.	What is the area foot print of the Process	Depends on scale of operation. A 25kg /batch Plant would require aapproximately 20 m^2area for accommodating all infrastructure and to have enough operation space
16.	Kind of Climatic and Geographical location required to deploy technology	Climate should not be too cold. Warm and humid climate preferable.
17.	How many Training Days or months required for the technology to be learned properly?	7 days
18.	How technology can be implemented from the root to tip	Turn key solutions and/or consultancy can be provided by CSIR-NIIST for installation and operation at multiple scales
19.	How everything from top to bottom to be made in the village itself (Circular and local)?	Local fabricators can be provided with the design and drawings and can be educated on how the system works. Hand holding on design changes to suit the demand, fabrication etc can be provided by CSIR-NIIST
20.	Scale of Funding required	Depends on the scale of operation Low capacity systems can be made with a funding of maximum about 1.0 lakh.
21.	Budget with breakage	Details shall be made available by NIIST depending on the scale of operation and desired MOC.
22.	Type of Risk involved, if any	Absence of sufficient open space or ventilation can create some odour.

Basic Information		
	Items	**Answers**
1	Title of the technology	Process Know-How for the Development of Bio-degradable Lignocellulosic Fibre-based Mulching Mats and Sheets for Modern Farming
2	About technology (in short)	Mulching is a covering, usually made of petroleum-based plastics, spread on the ground around plants to prevent excessive evaporation or erosion, inhibit weed growth, enrich soil conditions, support drip-irrigation, etc. for better crop growth. Currently used plastic mulches are made of polypropylene or polyethylene that provide many positive advantages such as light weight and low cost. However, removal and disposal of these plastic mulch is a serious environmental concern as it deteriorates upon sun exposure. Additionally, since it is not porous, plant roots may suffocate and rot. Mulching mats produced from biodegradable materials like coir/jute has several distinct advantages over conventional polymeric mulches. For example, they are eco-friendly due to their biodegradability, suppress weeds, prevent direct sunlight exposure protecting the plant from excess water loss due to evaporation and hence control humidity. Currently, natural rubber latex is used as binder for coir mulching mats. However, the price of natural rubber latex is volatile depending on the season. Further, it has processing issues to achieve preferable thickness, poor bonding with fibers, etc. Thus, we have developed a process know-how for the fabrication of biodegradable mulching mats using any lignocellulosic fibres (e.g. coir, jute, etc.) and bio-based polymer binder. A semi-automatic pilot-scale facility for the demonstration and fabrication of biodegradable mulching mats and sheets is available. • These mulching mats are biodegradable and eco-friendly substitute to single-use plastic mulching films. • Thinner, flexible rollable and low water absorption, compared to latex-based mulching mats. • Longer life, breathability and support drip-irrigation, add value to soil upon degradation.
3	What is the scientific approach to choose the particular technology)?	Green synthesis, polymerization
4	After what duration the first output can be seen?	Production cycle of single mat of size, 1x1 m^2 can be completed in 20 mins
5	What kind of Resources Required (Raw material,	Plant fibers (coir/jute), non-edible oils, solvents, electricity, manpower

	Energy, water, others)?	
6	What is the area foot print of the Process?	Total areafor accommodating all infrastructure would require approximately 4x10 m^2.
7	What kind of Climatic and Geographical location is required?	Tropical and sub-tropical locations with dry climatic condition is desirable. Process can be designed for both wet and humid conditions as well.
8	Gestation period of the project?	• 3 - 6 months for fabrication of facility • From commissioning to first production of mulching mat, the maximum delay is only 1 day.
9	Minimum Economic Unit Size?	Approx. 4x10 m^2.
10	Indicative Investment	Rs. 50 lakhs for setting up the facility (excluding building, electrical connection, etc.)
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Raw materials are Plant fibers (coir/jute), non-edible oils, solvents which is produced locally. Machinery can also be sourced locally fabricated by MSME. Market is both local and international.
12	Can it be part of Circular economy?	Yes, The process is sustainable utilizing local resources and there is a high value addition to coir or any plant fibers. Even waste fibers or baby fibers can be utilized. Therefore, farmers or coir industries will get the benefits of waste valorisation. These mulching mats are biodegradable and add value to soil upon degradation because of its high fertilizer value. Also support drip-irrigation.
13	What will be the Chain of Value addition?	Value addition to coir or any plant fibers. About 55 -60% of raw coir is exported without any value addition and the same being imported as various value-added products.Further, coir industries find difficult to utilize waste fibers or baby fibers. In this connection, our technology can innovate the MSMEs in coir sector and topopularize Make-in-India products thatwill be the mantra for 'Atmanirbhar Bharat' to rise to the occasion.
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Establishment of the production facility/plant can be accomplished easily through local fabrication and all the raw material requirements can be sourced and fabricated locallyby MSMEs.
15	How everything from top to bottom to be made in the village itself (Circular and local)?	MSMEs can be provided with the design and drawings and can be educated on how the system works. Hand holding on design changes to suit the demand, fabrication etc can be provided by CSIR-NIIST, Thiruvananthapuram.
16	How many Training Days or months required for the technology to be learned properly?	One month
17	How to be implemented form the root to tip	Consultancy can be provided by CSIR-NIIST for installation and operation of mulching mat/sheet fabrication facility at

		multiple scales.
18	If it can be implemented at Family level or external manpower is required?	It can be implemented at the family level, provided one should have technical skills for the operations and maintenance of the facility.
	Additional Information	
19	How many Manpower required?	• Facility operation requires minimum two manpowerand resources. • One technician for the operations and maintenance of the facility. • One helper.
20	What is the Status of Commercialization	• Commercialization of the process development is in the pipeline in collaboration with National Coir Research and Management Institute (NCRMI, Kerala) and COIRFED Industry (8 - 12 months). • Patent is under preparation.
21	Scale of Funding required all total?	• A semi-automatic demonstration facility is established at CSIR-NIIST, Thiruvananthapuram. • A fully automated pilot-scale production facility requires Rs. 75 lakhs(excluding building, electrical connection, etc.)
22	Budget with breakage?	Details shall be made available by CSIR-NIIST depending on the scale of operation and desired MOC.
23	What type of Certification Required for the product? (If required)	Final product may require certifications depends on local regulations Biodegradability test certificate from Pollution Control Board Termite and fungal resistant test certificates (IPIRTI, Bangalore)
24	Risk involved?	NA

6. Technologies developed by CSIR- Central Institute of Medicinal and Aromatic Plants (CIMAP), Sultanpur, Lucknow

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and processing of of Vetiver CIM-Vridhi (Khus)
2	About technology (in short)	A short duration variety, matures in 10-12 months suitable for drought/marginal lands/water logged area Dry root yield: 20-25 q/ha Oil Yield: 20-25 kg/ha
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in water logged areas and having better yield and quality which is acceptable in national and international market
4	After what duration the first output can be seen?	12 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & distillation unit
6	What is the area foot print of the Process?	Primary processing for extraction of essential oil from roots
7	What kind of Climatic and Geographical location is required?	Tropical/Subtropical areas
8	Gestation period of the project?	12 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	Rs. 5-7 lakh
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, agricultural land, cultivation, distillation, essential oil to market
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Extraction of essential oil from the roots, fractionation, product development
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Distillation unit may be fabricated locally based on CSIR-CIMAP design. All the value chain completed through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hands on training based on rural technologies Yes, circular

16	How many Training Days or months required for the technology to be learned properly?	5 days
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, quality planting material, varieties, package of practices, distillation unit and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	80 mandays/Acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	9.75 lakhs for 5 acre (Rs. 75,000/Acre/Year)
22	Budget with breakage?	Rs. 3.75 Lakh for cost of cultivation including planting material, labour and cost of distillation and Rs. 6.00 Lakh for establishment of distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and processing of Menthol mint var.-CIM-Kranti
2	About technology (in short)	Cold tolerant, suitable for commercial cultivation to generate extra income without any additional input and extra land use for cultivation during both winter as well as summer season, Oil Yield: 50 kg/ha in winter and 150-200 kg/ha in summer, Menthol content : 68-75 %
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in subtropical climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	04 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & distillation unit
6	What is the area foot print of the Process?	Primary processing for extraction of essential oil
7	What kind of Climatic and Geographical location is required?	Tropical/Subtropical climate
8	Gestation period of the project?	06 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Extraction of essential oil from the herbs/leaves, fractionation, product development
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Distillation may be fabricated locally based on CSIR-CIMAP design. All the value chain may be completed through technical support from CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hands-on-training Yes, circular
16	How many Training Days or months required for the technology to be learned properly?	5 days

17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, quality planting material, varieties, package of practices, distillation unit and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	60 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	7.25 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 2.25 lakh for cost of cultivation including planting material and Rs. 5.00 Lakhs for distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and processing of Geranium (*Pelargonium graveolens*) Bio G-171
2	About technology (in short)	Oil Yield: 40-50 kg/ha, Oil content: 0.24%, Geraniol Content: 18-21%
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in subtropical climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	06 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & distillation unit
6	What is the area foot print of the Process?	Primary processing for extraction of essential oil
7	What kind of Climatic and Geographical location is required?	Tropical/sub-tropical cold and dry climate 25-30^0 C and humidity of 60% is best for it, UP, MP, Bihar, Haryana, Punjab, Uttarakhand
8	Gestation period of the project?	12 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Extraction of essential oil from the herbs, fractionation, product development
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Distillation may be fabricated locally based on CSIR-CIMAP design. All the value chain may be completed through technical support from CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hands on training Circular
16	How many Training Days or months required for the technology to be learned properly?	5 days
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, quality planting material, varieties, package of practices, distillation unit and support

		in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	70 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	8.50 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 2.50 lakh for cost of cultivation including planting material and Rs. 6.00 Lakhs for distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and processing of Lemongrass Vr.-Krishna
2	About technology (in short)	Herb yield : 20-25 t/ha/yr Oil yield : 200-225 kg/ha/yr Citral content : 75-80%
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in warm and humid climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	06 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & distillation unit
6	What is the area foot print of the Process?	Primary processing for extraction of essential oil
7	What kind of Climatic and Geographical location is required?	Warm and humid climate is best for cultivation of lemongrass, the north Indian sub-tropical conditions are best
8	Gestation period of the project?	60 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Extraction of essential oil from the herbs, fractionation, product development
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Distillation unit may be fabricated locally based on CSIR-CIMAP design. All the value chain may be completed through technical support from CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hand on training Yes, circular
16	How many Training Days or months required for the technology to be learned properly?	5 days

17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, quality planting material, varieties, package of practices, distillation unit and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	65 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	7.00 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 2.00 lakh for cost of cultivation including planting material and Rs. 5.00 Lakhs for distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and processing of Palmarosa *(Cymbopogon martini* var. motia*)Var.*- CIM-Harsh
2	About technology (in short)	Medium tall, dark green leaves, long inflorescence, Drought resistant , Herb Yield: 450 q/ha, Oil Yield: 150-175 kg/ha, Geraniol content: 80-90%
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in clear warm weather with low relative humid climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	06 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & distillation unit
6	What is the area foot print of the Process?	Primary processing for extraction of essential oil
7	What kind of Climatic and Geographical location is required?	Clear warm weather with low relative humidity is necessary for optimum growth in north Indian climate
8	Gestation period of the project?	60 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Extraction of essential oil from the herbs, fractionation, product development
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Distillation may be fabricated locally based on CSIR-CIMAP design. All the value chain may be completed through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hands on training Yes, circular
16	How many Training Days or	5 days

	months required for the technology to be learned properly?	
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, quality planting material, varieties, package of practices, distillation unit and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	50 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	7.70 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 2.00 lakh for cost of cultivation including planting material and Rs. 5.00 Lakhs for distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and processing of CIM-SAUMYA *(Ocimum basilicum)*
2	About technology (in short)	Developed through half sib selection, Short duration, dwarf, early flowering, Growth habit: Semi closed, Herb yield : 290q/ha Oil yield : 100-150 kg/ha, Oil content : 0.68 %, Oil quality : methyl chavicol 62.54%, linalool 24.61%
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in rainy season with 22-28^0 C humidity climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	04 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & distillation unit
6	What is the area foot print of the Process?	Primary processing for extraction of essential oil
7	What kind of Climatic and Geographical location is required?	Tropical, Sub-tropical and rainy season with 22-28^0 C and humidity 75-80 is best for cultivation
8	Gestation period of the project?	04 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Extraction of essential oil from the herbs, fractionation, product development
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Distillation may be fabricated locally based on CSIR-CIMAP design. All the value chain may complete through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hand on training Yes, circular
16	How many Training Days or	5 days

	months required for the technology to be learned properly?	
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, quality planting material, varieties, package of practices, distillation unit and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	40 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	7.25 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 25,000 for cost of cultivation including planting material and Rs. 6.00 Lakhs for distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and Processing of *Chamomila recutita* Va-CIM-Sammohak
2	About technology (in short)	Developed through mutation breeding Tall variety with green stem High number of flowers per plant Dry flower yield : 5-8 q/ha Oil yield : 5-6 Kg/ha Chemuzuline content : 10-12%
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in temperate and sub-temperate climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	04 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & distillation unit
6	What is the area foot print of the Process?	Primary processing for extraction of essential oil
7	What kind of Climatic and Geographical location is required?	Temperate and sub-temperate climate best
8	Gestation period of the project?	04 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Extraction of essential oil from the dried flowers, fractionation, product development
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	Yes, Distillation may be fabricated locally based on CSIR-CIMAP design. All the value chain may complete through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hand on training Yes, circular

16	How many Training Days or months required for the technology to be learned properly?	5 days
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, varieties, package of practices, distillation unit and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	80 mandays
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	9.00 Lakh (for 5 acres)
22	Budget with breakage?	Rs. 2.00 lakh for cost of cultivation including planting material and Rs. 7.00 Lakh for distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation and Processing of Yellow Satawar (*Asparagus adscendens* Roxb.) CIM-Sunahari
2	About technology (in short)	CIM-Sunahari is the first variety of Yellow Satawar which is developed in CSIR-CIMAP. The saponins extracted from dry roots from this strain are also high (10-11%).
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in tropical and sub-tropical climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	12-18 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs & boiling and dryer unit
6	What is the area foot print of the Process?	Primary processing
7	What kind of Climatic and Geographical location is required?	Tropical and sub-tropical climate with 50 to 100 cm rainfall and 40^0 C is best for this crop, well drainage, sandy loam, soil is suitable
8	Gestation period of the project?	12-18 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, grading, boiling, drying and packing
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Digging of roots, wash properly and boil it for 1 hour. After peeling the boiled roots are dried in sun light and pack for marketing
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	All the value chain may complete through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Yes, hand on training Yes, circular
16	How many Training Days or months required for the	5 days

	technology to be learned properly?	
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, varieties, package of practices and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	85 mandays
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	5.00 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 1,00,000 per acre for cost of cultivation including planting material
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation Ashwagandha (*Withania somnifera*.) CIM-Pratap
2	About technology (in short)	Developed through half sib selection Long tape root with less fibre Suitable for cultivation in drought prone areas Herb yield : 4-5 q/ha Dry root yield : 10-15 q/ha. Withanolide content : 0.31% Withaferin A content : 0.720 %
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in semi-tropical and rainfed climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	6 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs
6	What is the area foot print of the Process?	Primary processing
7	What kind of Climatic and Geographical location is required?	Semi-tropical areas receiving 660-750 mm rain fall are suitable for its cultivation as rainfed
8	Gestation period of the project?	6-8 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, grading, drying and packing
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Powder and tablets from roots
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	All the value chain may be completed through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	By providing training/demonstration

16	How many Training Days or months required for the technology to be learned properly?	5 days
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, varieties, package of practices and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	50 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	2.00 Lakh (for 5 acres)
22	Budget with breakage?	Rs. 40,000 per acres for cost of cultivation including planting material
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Cultivation of Kalmegh (*Andrographis paniculata*) CIM-Megha
2	About technology (in short)	Developed as seed progeny selection High yield of dry biomass : 30-35 q /h Andrographolide content :1.90 % Plant height : 58-69 cm Leaf length : 5.0-5.9 cm Leaf width : 1.48-1.64 cm Plant spread : 48.3-50.0 cm Canopy shape : Open Leaf colour : Dark green
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in tropical/subtropical climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	3-4 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs
6	What is the area foot print of the Process?	Proper collection, grading and storage
7	What kind of Climatic and Geographical location is required?	Tropical/subtropical and sensitive to winter season
8	Gestation period of the project?	3-4 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Grading, pulverization and making of tablets
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	All the value chain complete through technical support by CSIR-CIMAP

15	How everything from top to bottom to be made in the village itself (Circular and local)?	By providing hands on training
16	How many Training Days or months required for the technology to be learned properly?	3 days
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, varieties, package of practices and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	45 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	1.50 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 30,000/acre for cost of cultivation including planting material and post harvesting
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	*Cultivation of Rauvolfia serpentina* variety CIM-Sheel
2	About technology (in short)	⍰ Developed through mutation breeding ⍰ Grow luxuriantly with dark green leaves and an erect growth habit ⍰ Dry root yield: 15-20 q/ha ⍰ Reserpine content: 0.030-0.035 % in dry root
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in tropical/subtropical climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	18 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs
6	What is the area foot print of the Process?	Primary processing
7	What kind of Climatic and Geographical location is required?	Tropical/subtropical and sensitive to winter season
8	Gestation period of the project?	18 months
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation,
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Digging of roots, grading and making of powder/tablets
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	All the value chain complete through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	By providing training/demonstration
16	How many Training Days or months required for the technology to be learned	5 days

	properly?	
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, varieties, package of practices and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	80 mandays
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	2.50 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 50,000/acre for cost of cultivation including planting material and post harvest technologies
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	*Pogestemon patchouli* variety CIM-Samarth
2	About technology (in short)	Developed through selection Faster regeneration capabilities, performs well both under open and shaded conditions Tolerant to diseases Fresh herb yield : 20-21 t/ha Oil yield: 50-55 kg/ha Oil content : 1.55-2.50%
3	What is the scientific approach to choose the particular technology)?	The variety may be cultivated in tropical/subtropical climate area and having better aided and quality which is acceptable in international market
4	After what duration the first output can be seen?	4-5 months
5	What kind of Resources Required (Raw material, Energy, water, others)?	Agricultural inputs
6	What is the area foot print of the Process?	Drying of leaves and extraction of essential oils
7	What kind of Climatic and Geographical location is required?	Tropical/subtropical climate 22-28^0 C temperatures and 75-80% humidity. Suitable of cultivation in shades or orchards
8	Gestation period of the project?	2-3 years
9	Minimum Economic Unit Size?	One hectare
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Planting material, cultivation, distillation, essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Primary processing for extraction of essential oil
14	Can the complete value chain be made local like if bee keeping is the activity what is the possibility of making bee boxes locally	All the value chain completed through technical support by CSIR-CIMAP
15	How everything from top to bottom to be made in the village itself (Circular and local)?	By providing training/demonstration
16	How many Training Days or months required for the technology to be	5 days

	learned properly?	
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right soil, varieties, package of practices, distillation unit and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	70 mandays/acre
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	8.50 Lakhs (for 5 acres)
22	Budget with breakage?	Rs. 50,000 for cost of cultivation including planting material and Rs. 6.00 Lakhs for distillation unit
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

Basic Information		
	Items	Answers
1	Title of the technology	Making of incense sticks and fragrant cones from offered flowers
2	About technology (in short)/USP of the technology	• There is no use of charcoal • A woman can earn Rs. 5000-10000/- p.m. as additional income. • Flower powder and jiget combination (5:1) reduces Jiget by about 9% as against coal powder and jiget combination (3:1). • Produces about 25% higher number of agarbattis with 30-40% more burning time. • Being devoid of charcoal powder, artisans found CSIR-CIMAP combination as 'skin friendly' which also keeps work place clean and pollution free.
3	What is the scientific approach to choose the particular technology)?	Environmental friendly approach
4	After what duration the first output can be seen?	Three month
5	What kind of Resources Required (Raw material, Energy, water, others)?	Used flower/Bio-resources, Jigat powder, water, energy, manpower
6	What is the area foot print of the Process?	Locally the process standardize for making incense sticks and utilize offered flowers
7	What kind of Climatic and Geographical location is required?	Not required specific climatic
8	Gestation period of the project?	3-6 months
9	Minimum Economic Unit Size?	
10	Indicative Investment	
	Salient Feature of Process/Technology Information	
11	Tentative Supply Chain (Source of Raw material, Machinery to Possible Market)	Machinery, offered/waste flowers, sticks, jigat power or any adhesive material essential oil
12	Can it be part of Circular economy?	Yes
13	What will be the Chain of Value addition?	Making of incense sticks from offered flower
14	Can the complete value chain be made local like if bee keeping is the	All the material available locally

	activity what is the possibility of making bee boxes locally	
15	How everything from top to bottom to be made in the village itself (Circular and local)?	Circular
16	How many Training Days or months required for the technology to be learned properly?	2 days
17	How to be implemented form the root to tip	Scientific intervention of CSIR-CIMAP for selection of right package of practices and support in marketing
18	If it can be implemented at Family level or external manpower is required?	Both Family/external labour required
	Additional Information	
19	How many Manpower required?	25 mandays for process 100 kg offered flowers
20	What is the Status of Commercialization	Commercialized
21	Scale of Funding required all total?	2.00 Lakhs for process of 100 kg of offered flowers
22	Budget with breakage?	Rs. 50,000 Pulveriser, Raw material Rs. 1,00,000, Working capital Rs. 50,000
23	What type of Certification Required for the product? (If required)	BIS/ISO
24	Risk involved?	Market fluctuation

7. **Technologies developed by CSIR- Central Food Technological Research Institute (CFTRI), Mysore, Karnataka**

Rural based Technologies:

Sl. No	Name of technology	
	Bakery	
1.	Bread: production (brown, plain, sweet, milk, whole wheat, fruit, high fiber, ragi, bajra)	
2.	Instant payasam mix	
3.	Bar cake	
4.	Instant cake mix	
5.	Vermicelli (wheat & whole wheat flour)	
6.	Fortified protein rich vermicelli	
7.	Sugar free bread	
8.	Egg less cake premix	
9.	Fortified whole wheat pasta	
	Beverage	
10.	Pomegranate juice & products	
11.	Fruit syrups & squashes	
12.	RTS fruit juice & beverage	
13.	Litchi products - canned; squash	
	Cereal products	
14.	Instant traditional foods: bisi bele bhath, sambar, rasam, pongal, urd bhath, imli poha	
15.	Composite vermicelli based on ragi flour	
16.	Ready to eat low fat snack chakli and tengolal	
17.	Ragi based papads	
18.	Pulse based papads	
19.	Composite lentil chips	
20.	Processed besan (bengal gram flour) for sev and boondi preparation	
21.	Flaked jowar RTE sweet & savoury snacks	
22.	Finger millet (ragi) based murukku mix	
23.	Multigrain based fortified snack	
24.	Moth bean dal puff	
25.	Protein enriched ragi vermicelli	
26.	Shelf stable roti from cereal & millet (rice/ ragi/ maize/ jowar/	

	bajra)	
27.	Multigrain instant semolina	
28.	Millet based cookie	
29.	Cereal flakes : Jowar	
	Fruits & Vegetables	
30.	Fruit jams & jellies: preparation	
31.	Tutti-fruity (papaya/carrot)	
32.	Pickles & chutneys: preparation	
33.	Osmo-air dried :fruits (amla, jackfruit, pineapple & mango)	
34.	Potato flour	
35.	Tomato products (juice, ketchup, sauce etc.)	
36.	Jamun fruit products: (squash, RTS beverage, syrup)	
37.	Fruits & vegetables dehydration : Grapes, Banana, Onion, Potato, Peas, Green chillies (all 6)	
38.	Dehydrated drumstick powder	
39.	Amla spread	
40.	Modified atmosphere packaging of minimally processed vegetables	
41.	Value added products from figs (ficus carica L)	
42.	Amla paste	
43.	Date syrup concentrate	
44.	Preparation of Mangosteen fruit products	
45.	Value added products from custard apple (pulp, micro-filtered beverage &jelly)	
46.	Fruit jam slices	
	Meat & Marine	
47.	Instant gravy mixes(dehydrated)	
48.	Sausage preparation: Chicken	
49.	Shelf stable kabab mix with chicken meat	
50.	Deep fat fried egg cubes	
51.	Dehydrated egg cubes	
52.	Low fat meat kofta	
53.	Preparation of Shelf stable biriyani paste	
54.	Shelf stable egg albumin & egg yolk cubes	
	Plantation	
55.	Dehydrated green pepper	
56.	Garlic Paste	

57.	Garlic powder	
58.	Ginger paste	
59.	Desiccated coconut	
60.	Instant Ginger Beverage (Ginger Tea)	
61.	Instant gravy mixes (dehydrated)	
62.	Green tamarind spice mix - paste & powder	
63.	Preparation of cashew apple candy	
64.	Preparation of dehydrated green pepper without chemicals	
65.	Production of coconut spread from Mature coconut water concentrate & coconut dietary fibre	
66.	Ready spice mixes : Sambar & Rasam	
	Protein	
67.	Low fat high protein snack foods	
68.	Malted weaning food	
69.	Paushtik atta	
70.	Preparation of Beta Carotene and mineral fortified bun	
71.	Rural based biotechnological production of spirulina	
72.	Chikki /Nutra chikki (3 formulations)	
73.	Nutra chikki with added spirulina	
74.	Spirulina-choco bar and spirulina-cereal bar	
	Machinery	
75.	Mini Dhal Mill	
76.	Versatile Mini Dhal mill	
77.	Leaf cup machine	
78.	Lemon cutting machine	
79.	Table top continuous wet and dry grinder	
80.	Integrated rubber roll sheller huller rice mill	
	Free Technologies	
81.	Amla Candy	
82.	Composite ragi bread	
83.	Fruit spreads	
84.	Ginger dehydration and bleaching	
85.	Green chilli sauce	
86.	Protein enriched buns	
87.	Ready-to-use dosa batter	

88.	Ready-to-use idli batter	
89.	Turmeric curing and polishing	
90.	Cereal Flakes Rice	
91.	Refining of Millets	
92.	Rice Milk Mix	
	Free Technologies (Machinery)	
93.	Hand operated papad press	
94.	Leg operated papad press	
95.	Pedal Operated Millet Dehuller	