NSQF QUALIFICATION FILE

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Name and address of submitting body:
Ministry of Environment, Forest & Climate Change (MoEF&CC)
Indira Paryavaran Bhawan, Jor Bagh Road,
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List of documents submitted in support of the Qualification File
1. Curriculum with training plan (Annexure I)
2. Documentary Evidence of Need (Annexure II)

SUMMARY

1	**Qualification Title:**	**Certificate Course on Plant Tissue Culture Techniques and its Applications**
2	**Qualification Code, if any**	-
3	**NCO code and occupation**	-
4	**Nature and purpose of the qualification (Please specify whether qualification is short term or long term)**	**Nature of Qualification:** Certificate Course on Plant Tissue Culture Techniques and its Applications **Purpose of Qualification:** The purpose is to train manpower as tissue culture technicians. They are in demand in the horticulture, forest departments, commercial labs, Universities, Herbal Garden, Regional and National Plants Board. **Short Term**
5	**Body/bodies which will award the qualification**	MoEF&CC
6	**Body which will accredit providers to offer courses leading to the qualification**	MoEF&CC
7	**Whether accreditation/affiliation norms are already in place or not , if applicable (if yes, attach a copy)**	Training programmes would be undertaken as part of the Green Skill Development Programme (GSDP) under the ENVIS Scheme. The courses would be run by the ENVIS Hubs (hosted by the respective State Government /UT Administration) and ENVIS Resource Partners (RPs)- (hosted by environment-related governmental and non-governmental organizations/ institutes of professional excellence) and other institutes. The assessment of the training programmes would be a regular exercise as part of the Memorandum of Cooperation signed with ENVIS Hubs and RPs and Memorandum of Understanding (MoU) between the ENVIS Hubs/RPs and other GSDP Partners. The courses would also be run by the Autonomous Bodies/Institutes under the Ministry for which no MoC is required.
8	**Occupation(s) to which the qualification gives access**	Tissue Culture Technicians/ Assistants/ Support staff in horticulture, forest departments, commercial labs, Universities,

		Herbal Garden, Regional and National Plants Board.	
9	**Job description of the occupation**	Trainees would able to handle basic tissue culture techniques like selection of explants, media preparation, sterilisation, culture initiation and maintenance etc.	
10	**Licensing requirements**	NA	
11	**Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)**	NA	
12	**Level of the qualification in the NSQF**	**Level 6**	
13	**Anticipated volume of training/learning required to complete the qualification**	320 Hours Theory : 70 hrs Practical: 250 hrs	
14	**Indicative list of training tools required to deliver this qualification**	Mentioned in the curriculum attached.	
15	**Entry requirements and/or recommendations and minimum age**	Science Graduate Age Limit: above 21 Years	
16	**Progression from the qualification (Please show Professional and academic progression)**	Tissue Culture Expert/Master Trainer	
17	**Arrangements for the Recognition of Prior learning (RPL)**	There is no arrangement of RPL as of now	
18	**International comparability where known (research evidence to be provided)**	Not Known	
19	**Date of planned review of the qualification.**	March 2020	
20	Formal structure of the qualification Mandatory components		
	Title of component and identification code/NOSs/Learning outcomes	Estimated size (learning hours)	Level

(i)	1.Introduction to Plant Tissue Culture	20 hrs	6
	2.Media Preparation	20 hrs	6
	3.Instrumentation and Reagent Preparation	10 hrs	6
	4.Selection of Explants And Culture Procedures	10 hrs	6
	5. Management of Tissue Culture Laboratory	10 hrs	6
	6. Practical	250 hrs	6
	Sub Total (A)	320 hrs	
	Optional components		
	Title of component and identification code/NOSs/ Learning outcomes	**Estimated size (learning hours)**	**Level**
	Sub Total (B)		

Total (A+B)	**320 hrs**	

SECTION 1
ASSESSMENT

21	**Body/Bodies which will carry out assessment:** The assessment will be conducted by the evaluators of Kerala State Council for Science, Technology & Environment (KSCSTE), Thiruvananthapuram; Environment Protection Training and Research Institute (EPTRI), Hyderabad; Tropical Forest Research Institute (TFRI), Jabalpur; Department of Environmental Sciences, Kalyani University (DESKU), Nadia, West Bengal; and Botanical Survey of India (BSI), Dehradun, Shillong & Yercaud. These evaluators would be chosen from the panel of experts who are not part of the trainers. Based on the evaluation, certificates will be issued.
	How will RPL assessment be managed and who will carry it out? *No RPL in this programme.*
23	**Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.** The assessment will be done through theory, practical and viva exams at the end of the course. Moreover, students will be assessed regularly through questionnaires on every module in the classroom. For practical examination, the trainers as well as course supervisors will constantly keep a vigil on the trainees. Any errors committed by the trainees will be corrected then and there; a learning by doing technique will be adopted for practical assessment. In theory, a final examination will be conducted at the end of the course, in which 50% scoring will be considered to be as qualifying marks. The Assessments will be conducted through English/ vernacular language(s) Questionnaires. However, the invigilators (not trainers/ supervisors) will be empowered to explain/translate the question to the trainees in their regional language, if required. The trainers will not be involved in the assessment, whatsoever, at any point.

24. Assessment evidences

Title of Component: Plant Tissue Culture Techniques and its Applications

Outcomes to be assessed/NOSs to be assesed	Assessment criteria for the outcome
Introduction to Plant Tissue Culture Laboratory, History of plant tissue culture, Application of plant tissue culture, Introduction to aseptic techniques, Maintenance of aseptic conditions, Handling of equipment and maintenance (Analytical Balance, Autoclave, Laminar Air Flow, Hot air oven), Selection, cleaning and preparation of glass wares for the process, Nutritional components of Tissue Culture Media, Sterilization process for glass wares, media and other basic tools.	By conducting Theory and Practical Evaluation
Formulation of culture media (MS,B5, White's, WPM, etc.) for the designed pathway of tissue culture by varying macro, micro, plant growth regulators (Auxins and Cytokinins), organic compounds, vitamins, complex organic compounds, carbohydrate sources, gelling agents, etc.	By conducting Theory and Practical Evaluation
Preparation of stock solutions, Plant growth regulators, Calculation for correct concentration of ingredients and mixing, pH adjustments, autoclaving, Storage of media	By conducting Theory and Practical Evaluation
Introduction to different types of explants and selection of explants, Sterilization of explants, Culture initiation and maintenance, Multiplication / proliferation of cultures, Cell suspension cultures, Organogenesis, Axillary branching, Somatic Embryogenesis, Elongation growth, Rooting of culture, Checking of cultures, Primary hardening of cultured plants, Secondary hardening of plant, Weaning and hardening of plantlets for establishment in the soil.	By conducting Theory and Practical Evaluation
A critical evaluation of the technology and significant period between the build-up of culture and targeted delivery, Analysis of risk factors, Steps to overcome the risk, Quality assurance and Quality Control, Cost benefit analysis and profit.	By conducting Theory and Practical Evaluation
Means of assessment 1 Theory and Practical exam on field and through Viva-voce	
Means of assessment 2 Set up of relevant and qualitative questions, Multiple Choice Questions (MCQ) for theory assessment. Conducting practical exams on selective Modules.	
Pass/Fail The pass mark for Theory exam (Multiple Choice Questionnaire/Short or one word answers) will be 50 out of 100. In Practical, 75 marks for Practical exam and 25 marks	

for viva-voce. Pass mark will be 50 marks but in Practical exam Trainee should score at least 40 marks out of 75.

SECTION 2
25. EVIDENCE OF LEVEL

OPTION A

Title/Name of qualification/component: Certificate Course on Plant Tissue Culture Techniques and its Applications			Level: 6
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relates to the NSQF level descriptors**	**NSQF Level**
Process	Trainees would get an overall idea about plant tissue culture techniques and management of tissue culture laboratory.	The trained manpower may work as tissue culture technicians or technical assistants in horticulture, forest departments, commercial labs, Universities, Herbal Garden, Regional and National Plants Board with the specialized knowledge of Plant Tissue culture techniques and their practical application.	6
Professional knowledge	Trainees would address the history of plant tissue culture, Application of plant tissue culture, Introduction to aseptic techniques, Maintenance of aseptic conditions, Handling of equipment and maintenance (Analytical Balance, Autoclave, Laminar Air Flow, Hot air oven) and other basic tools. Also get experience of media preparation, selection of explants and management of tissue culture laboratory.	The trained manpower would have enough knowledge of plant tissue culture techniques, handling of equipment and maintenance (Analytical Balance, Autoclave, Laminar Air Flow, Hot air oven) and other basic tools. They would also gain knowledge of management of tissue culture laboratory including the analysis of risk factors, quality assurance and quality control, cost benefit analysis.	6
Professional skill	Trainees would address basic principles of plant tissue culture and to expose them to its applications and they will be provided hands-on experience of the most common of these	The trained manpower would be able to handle equipments, formulation of culture media for application of plant tissue culture. This would enable them to work as plant tissue culture	6

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Title/Name of qualification/component: Certificate Course on Plant Tissue Culture Techniques and its Applications Level: 6			
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relates to the NSQF level descriptors**	**NSQF Level**
	techniques in labs and demonstrations of more advanced or uncommon techniques.	technicians or technical assistants in various fields and also the trainees would have the capability to function independently with these acquired the state of the art knowledge of plant tissue culture techniques.	
Core skill	Sensible professional with the ability to communicate, skills in tissue culture techniques.	The core skill enhanced under this training is effective communication, basic understanding of plant tissue culture techniques like selection of explants, media preparation, sterilisation, culture initiation and maintenance, etc.	6
Responsibility	The trainees would be able to independently handle the tissue culture techniques.	The trainees would be responsible for their own work and also would be able to skill others on the subject.	6

SECTION 3
EVIDENCE OF NEED

26 **What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?**

Basis	In case of other Awarding Bodies (Institutes under Central Ministries and states departments)
Need of the qualification	Plant tissue culture has direct commercial application as well as value in basic research into cell biology, genetics and biochemistry. There is a great need to conserve the biodiversity through Micropropagation, so that the aim of conservation could be achieved. According to the paper published form KSCSTE-Jawaharlal Nehru Tropical Botanic Garden and Research Institute, plant tissue culture methods have been widely used for the regeneration of medicinal and endangered plant species.
Industry Relevance	The curriculum/course syllabus has been jointly prepared by the Scientists/Experts in the institutions/Govt. Departments viz. KSCSTE, Thiruvananthapuram; EPTRI, Hyderabad; TFRI, Jabalpur; DESKU Nadia, West Bengal; and BSI, Dehradun, Shillong & Yercaud, undertaking the course in their respective locations.
Usage of the qualification	This course has been designed under GSDP for the first time.
Estimated uptake	An uptake of 15 students per batch is envisaged initially.

27 **Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences**

NA

28 **What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification**

National Qualifications Register was searched to assess if there was any similar qualification and no overlap was found with the existing qualifications.

29	**What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? Specify the review process here** Feedback would be taken from independent experts, students and teachers regarding the course content, structure and timeline of the programme. Feedback will also be taken from the Centres conducting the course. Changes suggested will be assessed by the Ministry before incorporating them in the curriculum. Next review will be done in March 2020.

SECTION 4
EVIDENCE OF PROGRESSION

30	**What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?** ***Show the career map here to reflect the clear progression*** Tissue culture Assistant/technicians/support staff ---- Tissue Culture Expert/Master Trainer

Annexure I

Curriculum with training plan

GSDP: Certificate course on Plant Tissue Culture Techniques and its Applications

S. No.	Topics	Estimated Size (Learning Hours)
1	**Introduction to Plant Tissue Culture:** Introduction to Plant Tissue Culture Laboratory, History of plant tissue culture, Application of plant tissue culture, Introduction to aseptic techniques, Maintenance of aseptic conditions, Handling of equipment and maintenance (Analytical Balance, Autoclave, Laminar Air Flow, Hot air oven), Selection, cleaning and preparation of glass wares for the process, Nutritional components of Tissue Culture Media, Sterilization process for glass wares, media and other basic tools.	**20 hrs**
2	**Media preparation:** Formulation of culture media (MS,B5, White's, WPM, etc.) for the designed pathway of tissue culture by varying macro, micro, plant growth regulators (Auxins and Cytokinins), organic compounds, vitamins, complex organic compounds, carbohydrate sources, gelling agents, etc.	**20 hrs**
3	**Instrument and Reagent Preparation:** Preparation of stock solutions, Plant growth regulators, Calculation for correct concentration of ingredients and mixing, pH adjustments, autoclaving, Storage of media.	**10 hrs**

4	**Selection of explants and culture procedures:** Introduction to different types of explants and selection of explants, Sterilization of explants, Culture initiation and maintenance, Multiplication / proliferation of cultures, Cell suspension cultures, Organogenesis, Axillary branching, Somatic Embryogenesis, Elongation growth, Rooting of culture, Checking of cultures, Primary hardening of cultured plants, Secondary hardening of plant, Weaning and hardening of plantlets for establishment in the soil**.**	**10 hrs**
5	**Management of tissue culture laboratory:** A critical evaluation of the technology and significant period between the build-up of culture and targeted delivery, Analysis of risk factors, Steps to overcome the risk, Quality assurance and Quality Control, Costs benefit analysis and profit.	**10 hrs**
6	**Hands on training (Practical) on all components**	**250 hrs**
Total		**320 hrs**