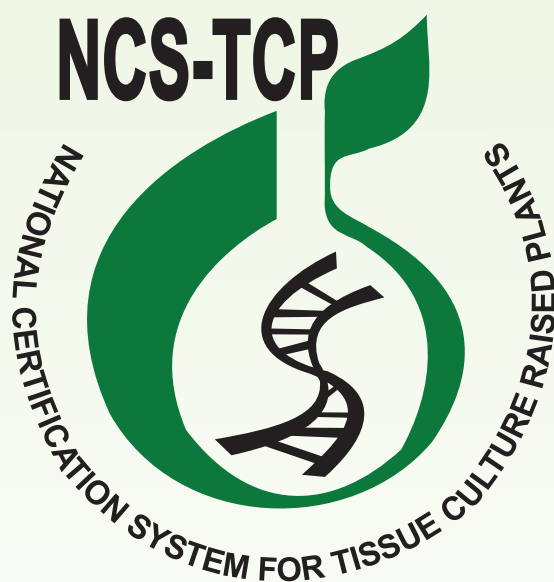


# **An Overview of National Certification System for Tissue Culture Raised Plants (NCS-TCP)**



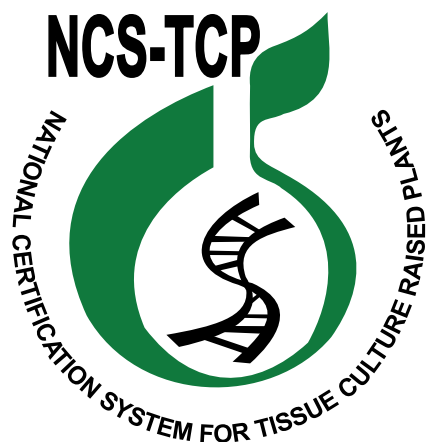
Department of Biotechnology  
Ministry of Science & Technology  
Government of India



Biotech Consortium India Limited  
5th Floor, Anuvrat Bhawan  
Deendayal Upadhaya Marg, New Delhi



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## Foreword

Plant Tissue Culture has been proven as the technology of choice for rapid multiplication of elite clone for production of tissue culture planting material. In India the tissue culture Industry is growing at a rate of 15% per annum. There is a growing export demand for tissue cultured ornamental plants. At present there are around 200 commercial tissue culture companies in India with gross installed production capacity of about 500 million plantlets per annum and an actual production of approximately 350 million plants. The plant tissue culture market in India is estimated at Rs 500 crores. Banana, Potato, Sugarcane, Apple, Pineapple, Strawberry, Gerbera, Anthurium, Lillium, Orchids, Bamboo, Date Palm, Teak and pomegranate are some of the major plants tissue cultured in India.

Realising the potential of plant tissue culture to revolutionize the growth of agriculture in India, Government of India established National Certification Systems for Tissue Culture Raised Plants (NCS-TCP) in 2006 and authorizing Department of Biotechnology, Ministry of Science & Technology as the Certification Agency vide the Gazette Notification dated 10<sup>th</sup> March 2006 under section 8 of the Seeds Act, 1966 with the objective of certifying the production and distribution of disease free and quality tissue culture plants.

Currently around 100 companies are recognized and 5 Test laboratories are accredited under this system. More than 70 million plants have been certified under NCS-TCP. Since the implementation of the system in year 2006, it has been instrumental in building capacities of Tissue Culture Companies for producing quality planting material. Incidence of virus infection has been significantly reduced and no major virus outbreak has been reported during last few years since implementation of certification programme.

A number of State Agriculture Departments have made certification of Quality Planting Material mandatory for their plantation programme. I am confident that this Certification system which is the first of its kind in the World will prove to be an important landmark and significantly contribute to the increased agriculture productivity

  
(Renu Swarup)



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# 1. Introduction

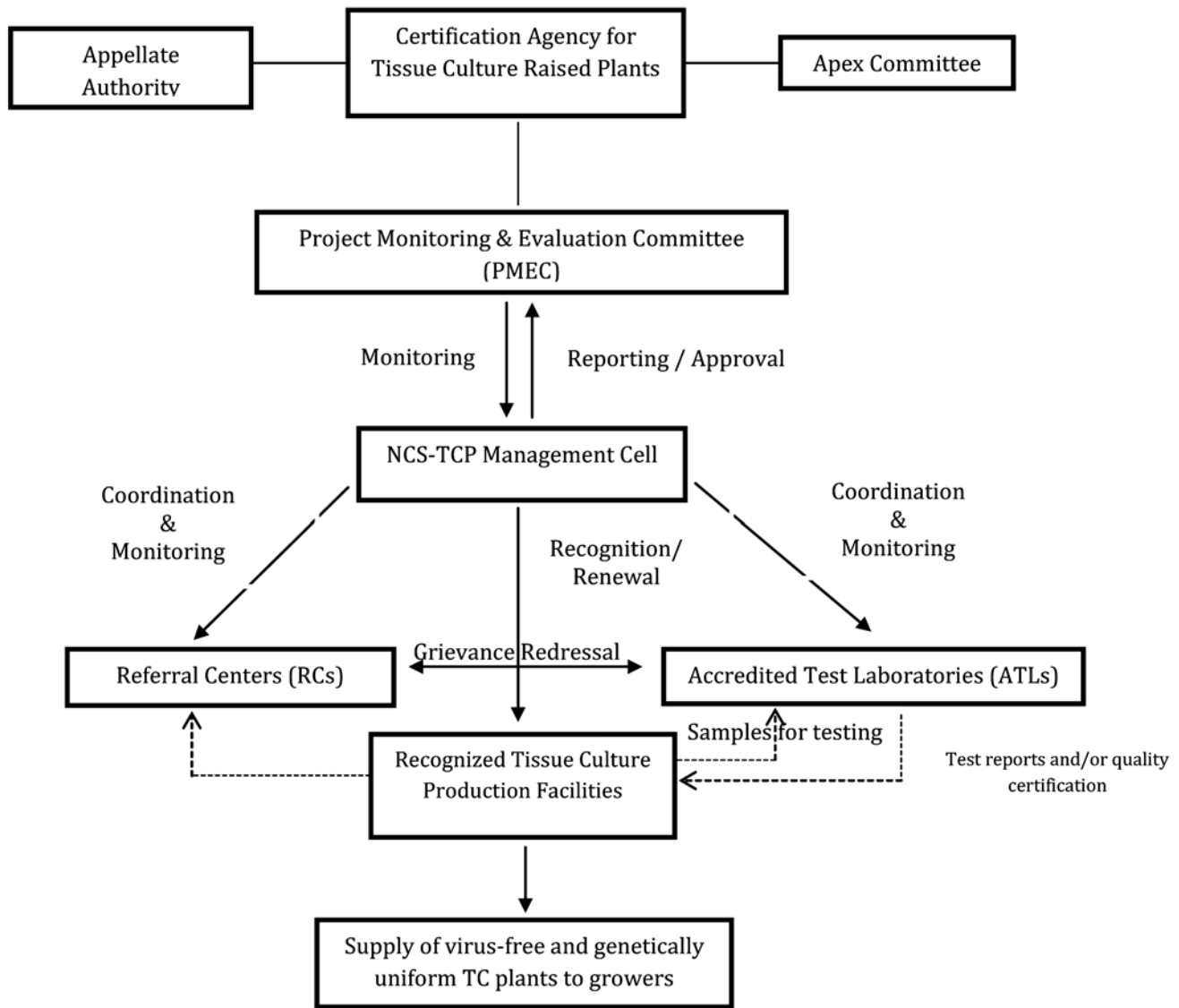
Plant tissue culture technology has played a pivotal role in revolutionizing the growth of agriculture worldwide by large scale clonal multiplication of various economically important plant species. Department of Biotechnology (DBT), Government of India has played a significant role in promoting research and development in the area of plant tissue culture since its inception and facilitated commercialization of plant tissue culture industry in India.

To promote the tissue culture industry in the country, in year 1999 DBT established a network project on National Facility for Virus Testing & Quality Control with the main coordination centre at IARI, New Delhi and three research centres for virus testing (IARI, New Delhi; IIHR, Bangalore and IHBT, Palampur) and three research centres for genetic uniformity testing (NCL, Pune, SPIC-SF, Chennai and TERI, New Delhi) with the goal of developing protocols for virus and quality testing. Subsequently in 2005, DBT evolved a **National Certification System for Tissue Culture Raised Plants (NCS-TCP)**, in consultation with Ministry of Agriculture, to provide support to the tissue culture industry for propagation and distribution of virus-free and quality tissue culture raised plants to growers/farmers. DBT was notified as the Certification Agency for certification of

tissue culture raised plants vide Gazette of India Notification No. F. No. 18-28/202-SD.IV dated March 10, 2006 under Section 8 of the Seeds Act, 1966 (54 of 1966) issued by the Ministry of Agriculture. Gradually, NCS-TCP has become National level mandated activity for tissue culture industry sector in India. Since the implementation of the system in year 2006, it has been instrumental in building capacities of the tissue culture companies for producing quality planting material and also enhancing their market reach through a certification process.

## 1.1 Organization Structure

For implementing the NCS-TCP, DBT has established a well-defined operational structure consisting of NCS-TCP Management Cell, Referral Centres, Accredited Test Laboratories, and an Appellate Authority at DBT to decide on appeal matters related to NCS-TCP. A high level Apex Committee has been constituted to provide technical advice and guidance on policy matters relevant to NCS-TCP and approval of guidelines/SOPs established under NCS-TCP and Project Monitoring & Evaluation Committee has been established for close monitoring and review of the activities related to NCS-TCP. For help in the accreditation and monitoring DBT has formed a panel of experts



## 1.2 Components of NCS-TCP

### 1.2.1 Tissue Culture Certification Agency (TCCA)

The Tissue Culture Certification Agency (DBT) is responsible for implementing the National Certification System for Tissue Culture raised Plants (NCS-TCP) in the Country. A NCS-TCP Management Cell (NMC) has been setup for managing the NCS-TCP and assisting DBT in its implementation in the country. Referral Laboratories have been identified

for carrying out confirmatory tests, if required, and also for developing standard protocols, validating protocol and diagnostic reagents, maintenance of referral material, training of technical personal working at accredited test laboratories (ATLs), providing diagnostic reagents to ATLs etc. The Certification Agency is overall responsible for developing standard tests, production protocols/guidelines and manuals.

### 1.2.2 NCS-TCP Management Cell (NMC)

NMC has been established at Biotech Consortium India Limited (BCIL), 5th Floor, Anuvrat Bhawan, 210 Deendayal Upadhyaya Marg, New Delhi-110002 for assisting DBT in implementation of NCS-TCP in country. NMC is responsible for coordinating the Accreditation of Test laboratories for virus diagnosis and genetic fidelity/ uniformity testing of tissue culture raised plants and Recognition of Tissue Culture Production Facilities and its renewal. NMC is also responsible for advisory services to DBT for new initiatives, updation of SOPs, guidelines and management of information.

### 1.2.3 Referral Centres

The DBT has designated Referral Centres for virus diagnosis and genetic fidelity testing of tissue cultures plants.

- Referral Center for Virus Diagnosis – Indian Agriculture Research Institute (IARI), New Delhi
- Referral Centers for Genetic Fidelity/ Uniformity – National Research Center on Plant Biotechnology (NRCPB), New Delhi

The Referral Laboratory is responsible for carrying out confirmatory tests in the event of dispute or nonconformity of test results, developing standard protocols, validating protocol and diagnostic reagents, maintenance of referral material, training of technical personal working at accredited test laboratories (ATLs), providing diagnostic reagents to ATLs. The Referral Laboratory will not involve in routine Virus diagnosis/Genetic fidelity/ uniformity testing of tissue culture raised plants, however as per the decision of the DBT, the Referral Laboratories will undertake random testing of samples at different Test Laboratories.

### 1.2.4 Accredited Test Laboratories

Test laboratories are accredited entities, responsible for testing the Tissue Culture material for Virus diagnosis and Genetic fidelity/ uniformity, for the purpose of certification. The Test laboratory prepares a Test Report based on tests conducted in conformity with the standards/protocols/guidelines. Based on the Test Report, each Accredited Test Laboratory (ATLs) is authorized to issue the Certificate of Quality for the Tissue Culture Plant (CQ-TCP) along with certification label on behalf of the Tissue Culture Certification Agency. ATLs are responsible for maintaining all diagnostic kits, primer, probes etc required for routine testing. Each ATL would perform both tests-for virus diagnosis and true-to-type.5 ATLs have been identified by DBT under NCS-TCP to cater to demand of testing and certification of Recognized TCPFs

- National Research Centre for Banana (NRCB), Trichy
- University of Agricultural Science (UAS), Bangalore
- Vasantdada Sugar Institute (VSI), Pune
- Indian Institute of Sugarcane Research (IISR), Lucknow
- Central Potato Research Institute (CPRI), Shimla

Contact detail of the above Accredited Test Laboratories is at **Annexure 1**.

### 1.2.5 Recognized Tissue Culture Production Facilities

Commercial Tissue Culture Production Facility with minimum production capacity of 0.5 million plants per annum may get Recognition based on their compliance with NCS-TCP guidelines which

is assessed by the Accreditation Panel (AP). All the activities of tissue culture production facility including hardening facility needs to be operational at the time of comprehensive assessment by the AP. Comprehensive assessment report prepared by AP includes observation on infrastructure, technical/scientific expertise and package of practices. Recognized Tissue Culture Production Facilities are eligible to get there planting

material certified from Accredited Test Laboratory. Recognized Tissue Culture Production Facility should adopt Standard Operating Procedure (SOP) and maintain all relevant records. Recognition of Tissue Culture Production Facility is granted for a period of TWO YEARS thereafter it would be re-assessed for "Renewal of Recognition." List of recognized tissue culture companies and their contact details are at **Annexure 2**.

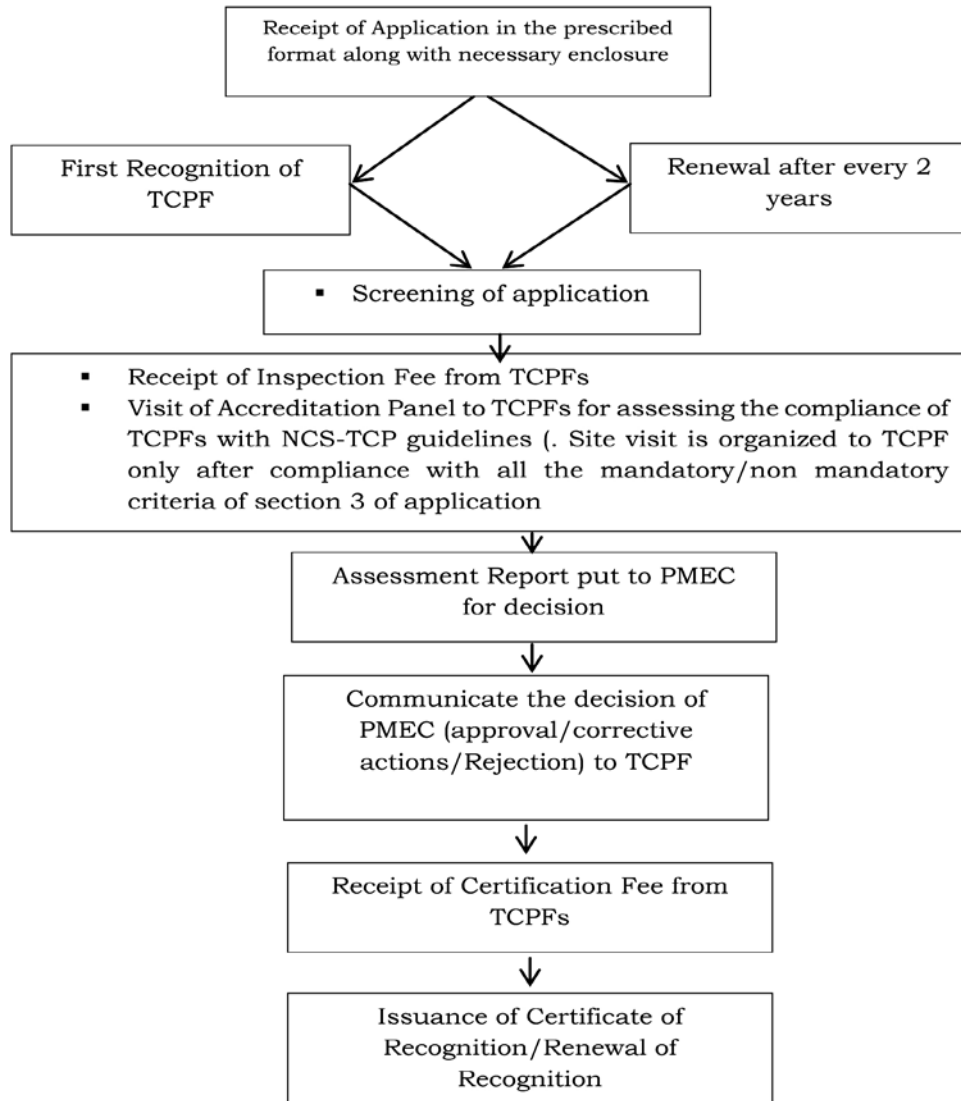
## 2. Recognition/Renewal of Recognition of Tissue Culture Production Facilities

### 2.1 Eligibility Criteria for Recognition of Tissue Culture Production Facilities

1. Any Tissue Culture Production Facility (Public sector, Private sector, NGO and others) engaged in production of Tissue Culture Plants with minimum production capacity of 0.5 million (5 Lakhs) plants per annum.

2. Tissue culture production facility should be fully operational (including all areas of laboratory and hardening facility) at the time of application and site visit.

Process of Recognition/Renewal of Recognition of Tissue Culture Production Facilities (TCPFs):



Application form for Recognition/Renewal of Recognition is available at [www.dbtncstcp.nic.in](http://www.dbtncstcp.nic.in). The NMC would adhere to time frame for site visit of Accreditation Panel for Recognition/ Renewal of Recognition of TCPFs i.e 30 working days from the time of complete application from TCPFs. In case of non-conformities, verification visit would be organized within 30 working days day after formal communication from TCPFs of their corrective actions and receipt of verification visit fee.

## **2.2 Renewal of Recognition: Noteworthy facts**

- i) Application for renewal of Recognition should ideally be submitted 3 months prior to the date of expiry of the "Certificate of Recognition". Renewal fee registration fee of Rs. 250/- (Rupees two hundred and fifty only) to be deposited in NCS-TCP centralized account

mentioned in the application form and particulars of transfer to be submitted along with application form

- ii) NMC will not be responsible for any delay in the renewal of Recognition, if complete application has not been submitted by TCPFs 3 months prior to expiry of Certificate
- iii) If the complete Application of Renewal (NCS-TCP Form- 2A) is not received 1 month prior to the expiry of their "Certificate of Recognition" the company will be asked apply for fresh Recognition in NCS-TCP Form-2.
- iv) Renewal of Recognition would be granted to those TCPFs who are undertaking Certification of every batch of tissue culture raised plants

### 3. Certification of Tissue Culture Plants

#### 3.1 Eligibility Criteria for Certification of Tissue Culture Raised Plants

- i. The Tissue Culture Production Facility (TCPF) must be Recognized under NCS-TCP. Accredited Test Laboratories (ATLs) would accept samples for certification only from Recognized TCPFs

#### 3.2 Requirements for Certification of Tissue Culture Raised Plants

- i. The mother plant tissue/stock culture must be tested for freedom from all known viruses from ATLs or any reputed Government institutions. List of ATLs established under NCS-TCP can be downloaded from <http://www.dbtncstcp.nic.in/html/content/ATLs.html>
- ii. The respective batch (lot) of tissue culture plants should be derived from tested stock culture as per above para
- iii. Recognized TCPFs should assign 4 digits **batch number** to the said batch of tissue culture plants. This above number should be provided to ATLs while sending samples for certification.
- iv. Tissue culture raised plants ready to dispatch to the farmers (ideally secondary hardened) will be tested for all known viruses and true to type in order to certify under NCS-TCP

#### 3.3 Procedures and relevant forms to be used for "Batch Certification of Tissue Culture Raised

Plants"

- ii. The Recognized TCPF should send an intimation form (Virus/ genetic fidelity) Testing for Batch Certification of Tissue Culture Raised Plants (Annexure-1B) to the ATL in a specified format given at <http://www.dbtncstcp.nic.in/html/content/ANNEXURE4.html>
- iii. The ATL would send an Acknowledgement to the TCPF providing details of requisite fee to send the Application form/samples.
- iv. On receipt of acknowledgement, sample would be drawn as per the sampling strategy given below (samples would be drawn either by representative of ATL or TCPF itself as per the mutual consent and coordination between TCPF and ATL)
- v. The requisite fee to be deposited at centralized NCS-TCP account mentioned in the application form.
- vi. Samples for certification would be sent to ATL along with the duly filled Application for Testing for Batch Certification of Tissue Culture Raised Plants (Annexure-2B) along with particulars of transfer. This application form can be downloaded from the link given below:

<http://www.dbtncstcp.nic.in/html/content/ANNEXURE4.html>

### 3.4 Sampling strategy for Certification

- i. Number of samples to be tested will vary based on the batch size. The sampling method is given below

Batch size	Number of tissue culture plants to be sampled (sample size)
Up to 1000 Nos	1% plants subject to a minimum of 10 Nos
1001 to 10000 Nos	0.5% of plants subject to a minimum of 10 Nos
10001 to 100000 Nos	0.1 % of plants subject to minimum of 50 Nos

### 3.5 Reporting by ATL towards certification

- i. ATL will test the samples and provide "Test Report" to the TCPF in the prescribed format within 7 working days
- ii. If the tissue culture plants are found free from all known viruses and are true to type. The TCPF will be provided "Certificate of Quality" and minimum 10 certification labels by ATL for the respective batch from which the samples were collected and tested. TCPF may request for additional labels, if required.

### 3.6 Approved fee structure towards testing/ certification of tissue culture plants under NCS-TCP

Test	Fee to be charged by ATLs*
Virus Indexing	A minimum fee of Rs. 1000 which would include testing upto 10 samples of the same plant species for a maximum of 5 viruses. Test for Additional virus would be charged @ Rs 100 per virus
Genetic Fidelity	Rs. 1500 per 10 plants

### 3.7 How to send samples to for Testing

#### Testing of Mother plant tissue/ stock culture

- i. Prior Intimation:
  - ❖ For sending samples of "Stock Culture/ Mother Plant Tissue" at the time of culture establishment "Tissue Culture Production Facility (TCPF)" need to send duly filled and signed "Intimation form for Virus Indexing of Plant Tissue/Stock Culture(s) **Annexure 1A**" [http://www.dbtncstcp.nic.in/downloads/Forms\\_TCPF/ANNEXURE\\_1A.doc](http://www.dbtncstcp.nic.in/downloads/Forms_TCPF/ANNEXURE_1A.doc) to Accredited Test Laboratory (ATL) at least 2 weeks prior to sending the sample(s).
- ii. Forwarding samples
  - ❖ On receipt of acknowledgement from ATL, TCPFs need to send samples along with required amount of demand draft along with "Application for Virus Indexing of Plant Tissue/Stock Culture (s) **Annexure 2A**" [http://www.dbtncstcp.nic.in/downloads/Forms\\_TCPF/ANNEXURE\\_2A.doc](http://www.dbtncstcp.nic.in/downloads/Forms_TCPF/ANNEXURE_2A.doc) for mother plant/ stock culture testing.
- iii. Sampling strategy
  - ❖ "Guidelines for testing of Mother Plants/ Stock Culture" describing the sampling size/strategy are available at NCS-TCP website [http://www.dbtncstcp.nic.in/downloads/Guidelines\\_for\\_mother\\_stock.pdf](http://www.dbtncstcp.nic.in/downloads/Guidelines_for_mother_stock.pdf)

### 3.8 Batch Certification of Tissue Culture Raised Plants

- i. Prior Intimation
  - ❖ For sending samples from "Tissue Culture"



Raised Plants” for batch certification “Recognized Tissue Culture Production Facilities (TCPFs)” need to send duly filled and signed “Intimation form for (Virus/ genetic fidelity) Testing for Batch Certification of Tissue Culture Raised Plants **Annexure 1B**” [http://www.dbtncstcp.nic.in/downloads/Forms\\_TCPF/ANNEXURE\\_1B.doc](http://www.dbtncstcp.nic.in/downloads/Forms_TCPF/ANNEXURE_1B.doc) to Accredited Test Laboratory (ATL) at least 2 weeks prior to sending the sample(s).

ii. Forwarding samples

- ❖ On receipt of acknowledgement from ATL TCPFs need to send sample along with required amount of demand draft along with “Application for (Virus/ genetic fidelity) Testing for Batch Certification of Tissue Culture Raised Plants **Annexure 2B**” [http://www.dbtncstcp.nic.in/downloads/Forms\\_TCPF/ANNEXURE\\_2B.doc](http://www.dbtncstcp.nic.in/downloads/Forms_TCPF/ANNEXURE_2B.doc) for Certification of Tissue Culture Raised Plants.

iii. Sampling strategy

- ❖ As defined at para 3.4

3.9 Quantity of Sample

1. Virus indexing: Each sample should have

at least 0.5 gm of tissue per virus per test for all known viruses to be tested.

2. Genetic fidelity testing: Each sample should contain minimum 1.0 gm of tissue for genetic fidelity testing.

3.10 Packaging and forwarding of samples

1. All the collected samples should be blotted dry to remove excess moisture before packing.
2. All samples will be placed in between paper towels, packed in self sealing/zip-lock polythene bags of appropriate size.
3. The sample will be affixed with a label and kept in a ventilated card board box and /or thermocool box for forwardal to ATL.
4. The packing box will be marked on top of the box with the address of ATL with appropriate instructions such as “Handle with care/Tissue Culture Plants/Rush Delivery” and either couriered or delivered in person to the concerned ATL within 24 hrs period.

## 4. Standard Operating Procedures (SOPs) and Operational Guidelines

### 4.1 Standard Operating Procedures (SOPs) for Tissue Culture Production Facility and Accredited Test Laboratory

Standard Operating Procedures (SOPs) has been developed for Tissue Culture Production facility and Accredited Test Laboratory for successful implementation of various quality management activities. This is a controlled document and is revised time to time based on experiences and updates in the area of plant tissue culture and virus indexing/genetic fidelity testing. Updated copy of SOPs for Tissue Culture Production Facility and Accredited Test Laboratory could be downloaded from [www.dbtncstcp.nic.in](http://www.dbtncstcp.nic.in)

### 4.2 Operational Guidelines of Accredited Test Laboratories (ATLs) under NCS-TCP

Guidelines for Accredited Test Laboratories for virus indexing & genetic fidelity/uniformity testing and certification of tissue culture raised plants have been developed under NCS-TCP. ATLs have been mandated to certify the tissue culture raised plants as per the specified guidelines and procedure laid down under NCS-TCP. ATLs will accept samples for certification only under NCS-TCP.

#### 4.2.1 Fee Structure

The prescribed fee to be charged by Accredited Test Laboratories (ATLs) is as follows.

ATLs would charge this fee until further revision

- (i) For genetic fidelity: Rs 1500.00 per 10 samples of same species

- (ii) For virus indexing: A minimum fee of Rs 1000.00, for 10 samples of the same species for a maximum of 5 viruses. (Tests for additional viruses will be charged @ Rs 100.00 per virus)

Note: Fee for virus testing of one pooled samples would be Rs 1000.00 (Rupees one thousand only): In case pooled sample contains either 10 samples of different plants from one batch/ 10 leaf sample of different mother plant or stock cultures

#### 4.2.2 Timelines

For virus indexing and/or genetic fidelity testing of tissue culture raised plants following time-lines would be followed by Accredited Test Laboratories (ATLs):

TEPS	PROCEDURE	TIME FRAME
1	Receipt of the sample/ Recording sample details storage and planning for conducting test	Day 1
2	Conducting virus and quality test	Day 2-3
3	Preparation of test report/ Review of procedure and report generation	Day 4
4	Repeat the tests if needed and prepare second test report/ Dispatch of test report and certificate to the company/ applicant	Day 5-6
	<b>TOTAL</b>	6 working days

Note: The date of receipt of samples by ATLs should be the date on which samples are received in good condition

#### **4.2.3 Responsibilities of Project Coordinator of ATLS**

The Project Coordinator of Accredited Test Laboratory is responsible for overall management of Accredited Test Laboratory and would duly sign the certificate of quality for tissue culture raised plants. The Director of the Institute where ATL is established may entrust this responsibility through proper written delegation of power to project coordinator.

#### **4.2.4 Responsibilities of Contract Scientist of ATLS**

Contract Scientist will be responsible for generating test report for virus testing/genetic fidelity testing and maintenance of all records related to virus indexing/genetic fidelity testing of tissue culture plants

#### **4.2.5 Procedural compliance**

- ❖ Registration of application, sampling, storage & handling of samples and reporting would be done in line with the SOPs for ATLS
- ❖ ATLS would follow the protocols and standard formats of reporting provided in the Standard Operating Procedures (SOPs). SOPs are subject to timely revisions and revised section would be circulated to ATLS by NMC of DBT
- ❖ In order to use the uniform set of primers/ diagnostic reagents by all ATL for testing genetic fidelity the diagnostic reagents will be provided by referral laboratories under NCS-TCP.
- ❖ ATLS would forward master report and a copy of test reports & certificates to the

NMC every month.

- ❖ Annual meeting of ATLS will be held to review the progress and to revise the SOPs based on experience of ATLS

#### **4.2.6 Testing of stock cultures and certification of tissue culture raised plants:**

- ❖ ATLS will entertain applications only from recognized tissue culture production facility for the purpose of issuance of Certificate of Quality under NCS-TCP. However, they may receive and entertain applications for testing of stock cultures from any plant tissue culture production facility whether recognized under NCS-TCP/non recognized.
- ❖ ATL would not accept the sample of tissue culture raised plants for certification if the mother plant/stock culture has not been indexed for respective batch of TC plants.
- ❖ ATLS must ensure receipt of complete information in the application for stock culture testing as well as certification of tissue culture raised plants such as batch number and batch size.
- ❖ If the test report issued for tissue culture raised plants indicates the plants are free from viruses and true to type/uniform, the certificates and labels are also to be generated accordingly and issued. However, genetic fidelity/uniformity testing may not be required in some plant species. In such cases only, "Certificate of Quality" may be issued without "Certification labels" clearly stating that this certificate is only for Quality with respect to freedom for

viruses. It may be noted that "Certificate of Quality" should clearly mention the nature of testing conducted.

- ❖ ATLs would follow the approved fee structure under NCS-TCP for recognized as well as non-recognized tissue culture production facilities.
- ❖ Samples are to be tested for all viruses listed in SOPs/NCS-TCP website.

#### 4.2.7 Issuance of labels

- ❖ Duly signed/stamped certification labels will be provided by the Accredited Test Laboratory (ATL) to the Tissue Culture Production Facility at the time of issue of certificate of quality of tissue culture raised plants for affixing on the packages. It is to be noted that "Certification Label" are to be issued if samples of tissue culture raised plants have been tested for both freedom from viruses and true to typeness/ genetic uniformity.
- ❖ Colour of the label shall be diagonally yellow No. 356 (IS 5-1978) and opaline green (IS No. 275)
- ❖ ATL will issue at least 10 labels with Certificate of Quality and additional labels would be issued as per the requirement of the company

#### 4.2.8 Actions to be taken in the case of samples found to be virus infected/ genetically variants

- ❖ If the test results for the viruses are positive and or the results of genetic fidelity/ uniformity testing exceeded

the tolerance limits, Head, Accredited Test Laboratory will issue a report "Tissue Culture Plants Not Approved for Certification"

- ❖ ATL will keep the record of action taken by the concerned tissue culture production facility for disposing of infected plants

#### 4.2.9 Logo of NCS-TCP:

- ❖ Accredited Test Laboratories would carry the prescribed logo of NCS-TCP on its certificates, stationary, written announcements.
- ❖ The logo shall be reproduced based on the master supplied to each of the Accredited Test Laboratories.
- ❖ In case of cancellation of the accreditation by the Certification Agency, the Accredited Test Laboratory shall immediately cease to use its stationary, certificates and other publicity material that has logo on it. The use can be restarted only after the cancellation is revoked by the Certification Agency.
- ❖ Upon termination of the Accreditation on account of non-renewable/ withdrawal of the accreditation, the Accredited Test Laboratory shall immediately cease to use logo in any form including use of stationary, certificates and other publicity material that has logo on it.

#### 4.2.10 Referral Testing

- ❖ In the event of an appeal made by aggrieved tissue culture companies and receipt of intimation from Appellate

Authority, Referral Centre will ask to the ATLs for sending the disputed samples within three working days.

- ❖ ATL will forward the sub-sample of disputed samples for referral testing to Advanced Centre for Plant Virology, Division of Plant Pathology, IARI, New Delhi and /or, as the case may be with the intimation to NCS-TCP Management Cell at BCIL.

#### **4.2.11 Technical Auditing**

- ❖ Technical auditing would be conducted annually which would compliance

with the criteria on the basis of which accreditation was given to the ATLs. Compliance with Standard Operating Procedures would also be assessed based on the available records and documents.

- ❖ Unscheduled audits may also be organized at short notice the concerned Accredited Test Laboratory to ensure compliance with the standard operating procedures as and when required.
- ❖ ATLs are expected to develop the system for its own internal auditing and inform the NCSTCP Management Cell

## 5. Certification Standards for Tissue Culture Plants

### 5.3 BANANA- TISSUE CULTURE – (BTC)- STANDARDS

#### I. Applications and Amplification of General seed Standards for BTC

- a. The General Seed Certification Standards are basic and, together with the following specific standards constitute the standards for approval of BTC. As the name implies, these standards are applicable to tissue culture multiplied under laboratory and greenhouse conditions as laid here.
- b. The General Standards are amplified as follows to apply specifically to the BTC.

#### 1. Eligibility requirements for BTC production:

- i. All micropropagation and greenhouse facilities must be approved as per standards/ guidelines set by the competent authority. These must have a changing area between double doors.
- ii. Laboratory and greenhouse facilities used for production of plantlets shall be maintained free of pests or vectors of banana pathogens. Failure to keep such pests under control may cause rejection of all lots maintained in the facility. All potting or growth media shall be sterile. Water sources used in the laboratory or greenhouse operation shall be treated or otherwise rendered free of all possible pathogens by the applicant.
- iii. Hygienic conditions shall be strictly observed during micropropagation, potting, planting, irrigating, movement and use of equipment and other laboratory and greenhouse practices to guard against the spread of diseases or pests in the facilities used for banana plant multiplication.
- iv. The greenhouse (protected environment) must be “insect proof” and be equipped with a double-door entrance, provision for footwear disinfection prior to entering the protected environment and insect proof ventilation screening on intakes and exhaust openings. The persons entering the protected environment should use Wellington boots (plastic boots) and change lab-coat in the changing area to reduce the chances of inadvertent introduction of vector insects clinging to clothes
- v. The material being initiated must be of a notified variety and confirmed identity. It must be duly documented with respect to origin.
- vi. All samples of banana varieties being initiated should be tested in an accredited laboratory and be free of viruses (Banana Bunchy Top Virus, Cucumber Mosaic Virus, Banana Bract Mosaic Virus, Banana Streak Virus) and other endophytic or epiphytic bacteria and fungi.

- vii. The basic material for sub-multiplication need to be obtained afresh from the nodal organization as soon as the maximum permitted number of passages (as confirmed by DNA fingerprinting) of shoot multiplication with old cultures has been completed.
- viii. On application for inspection, the mother cultures as developed above are eligible for certification. The micropropagation facility to be inspected must have been approved by the competent Authority. All stocks must have a valid variety identification and disease testing report at any time during multiplication process.

*In vitro multiplication of an imported variety or a non-notified variety can be taken up by the industry exclusively for export purposes. Such varieties, however, should be introduced following the approved guidelines of Government of India.*

## **2. Source of Seed:**

- i. The facility should use recognized aseptic initiation and propagation procedures (i.e. follow procedures and use equipment, which will maintain sterile conditions as per standard tissue culture norms).
- ii. The initiating facility must maintain following information on each variety for review and audit by the competent authority at least once in a year: variety identification, date of initiation, origin and testing results from accredited laboratory.
- iii. Tests must be carried out on a minimum of 0.1% (at least ten) plantlets for each

- variety by an accredited laboratory. Such tests will be valid so long as cultures of that particular batch are under production (subject to a maximum of 8 passages). No plant should contain (Banana Bunchy Top Virus, Cucumber Mosaic Virus, Banana Bract Mosaic Virus, Banana Streak Virus) and other endophytic or epiphytic bacteria and fungi.
- iv. Valid pathogen testing results are required at the 2<sup>nd</sup>/3<sup>rd</sup> subculture stage prior to the bulking up of the cultures.
- v. The guidelines for production of tissue culture plant is at Appendix-I

## **Minimum Quality Standards for growing of plants inside greenhouses/polyhouses**

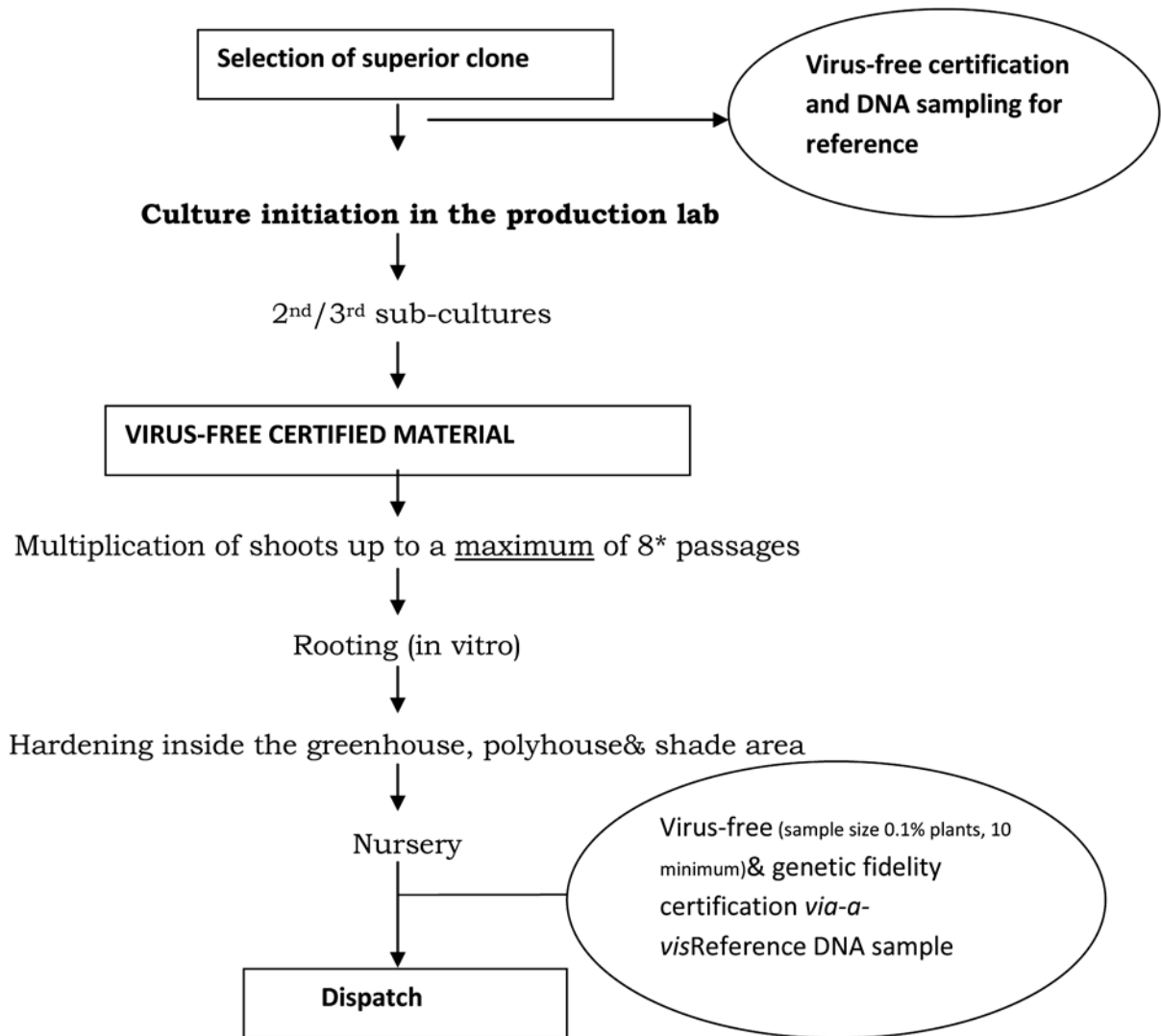
The following requirements must be met for production of plantlets:

- i. Effective sanitation practices including insect and disease monitoring and prevention must be adhered to.
- ii. No field-produced banana plants can be grown in the protected environment (greenhouse/polyhouse) along with tissue cultured plants.
- iii. Varieties must be separated by physical barriers (such as proper tagging), which will prevent varietal mixture.
- iv. Before dispatch to the farmers, the tissue-cultured plants growing in the nursery should be tested for the absence of the viruses (Banana Bunchy Top Virus, Cucumber Mosaic Virus, Banana Bract Mosaic Virus, Banana Streak Virus) and clonal uniformity. For establishing clonal

- fidelity, the sample size should be 0.1% of the batch size with a minimum of 10 plants.
- v. If testing performed by an accredited laboratory reveals the presence of banned viruses, fungus or bacteria the tissue-cultured plants should not be dispatched from the premises of the production lab and the entire material should be destroyed.
  - vi. The concerned laboratory/agency producing the tissue culture raised material should issue a certificate to the effect that BTC have been produced as per guidelines
  - vii. The agency producing BTC will follow the labelling procedures as given at Appendix-II



**Procedures and standard parameters for production of Banana by tissue culture**



\* There is a difference of opinion among researchers and production labs on the number of passages that could be regarded as "safe" for shoot multiplication in banana with respect to clonal uniformity of plants. In tissue culture it is well known that lesser the number of subcultures, lower will be the chances of somaclonal variation. However, it must also be realized that if the number of passages are far too small then the entire production process becomes economically unviable. Therefore, efforts should be made to optimise the shoot multiplication process and extend the number of passages only till the clonal uniformity of the progenies is maintained. This could be achieved through a) strict monitoring of shoot multiplication process ensuring that adventitious shoots are not multiplied and b) confirming the clonal fidelity of tissue cultured plants using molecular markers in different passages. However, in banana under no circumstances shoots should be subcultured for more than 8 passages

### Labelling Banana-Tissue Culture (BTC)

1. BTC shall be supplied in containers. A paper-lined label of 12cm x 6 cm containing following information shall be affixed on the container
2. Certified Tissue Culture Raised Quality Plants/Propagules

**NCS-TCP** Certified Tissue Culture Raised Quality Plants/Propagules

Certificate of Quality No.: .....

Label No. : .....

Name of Production Facility: .....

Botanical Name: .....

(Common Name): .....

Certification No. and validity: .....

of Certificate of Recognition: .....

Variety: .....

Batch No. & Batch Size: .....

Contact person and Designation: .....

Stage of Tissue Culture Plants:

In agar  Ex-agar  Hardened

Address with phone number: .....

Bar Coding :

Date of Issue: .....

Name/Sign/Stamp of ATL with date: .....

**‘The container should also have printed on it the kind, variety and name of Institution’**

3. The label shall be rubber stamped with signature, name and designation of the concerned Agency. Colour of the label shall be diagonally yellow No. 356 (IS 5-1978) and opaline green (IS No. 275)
4. BTC producing Agency shall maintain the account of labels printed and issued.

The above tissue culture standard is available at NCS-TCP official website ([www.dbtncstcp.nic.in](http://www.dbtncstcp.nic.in)) along with approved tissue culture standards for other 7 plant species i.e. bamboo, apple, black pepper, vanilla, citrus, potato and sugarcane

## 6. Frequently Asked Questions

### 6.1 Frequently Asked Questions (FAQ) on Plant Tissue Culture

#### 1. What is Plant Tissue Culture?

It is the process of producing plants from tissues of the desired plant in an artificial nutrient medium under controlled environment. The plants so produced would be exactly similar to the mother plant in all aspects.

#### 2. Why one should prefer tissue culture plants?

Tissue culture plants are qualitatively better as they are produced under aseptic condition and controlled environment. One should go for tissue culture plants for the following reasons.

- ✓ Tissue culture raised plants are vigorous and fast growing than conventional plants.
- ✓ High degree of uniformity than the conventionally produced plants.
- ✓ The tissue culture plantlets are free from diseases/pathogens.
- ✓ It is possible to multiply plants that are difficult to propagate by cuttings or other traditional methods.
- ✓ Tissue culture plants yield better as they are produced under optimum environment from selected mother plants.

#### 3. What are the crops being propagated by Plant Tissue Culture commercially?

Banana, Sugarcane, Potato, Bamboo, Ginger, Apple, Black Pepper, Citrus, Vanilla, Anthurium, Teak, Strawberry, Lillium, Cardamom, Mangium, Gerbera, Fig, Jatropha, Carnation, Grape, Turmeric, Orchids etc. are comely used for large scale production for domestic as well as export market.

#### 4. Whether tissue culture plants are more prone to pest and diseases than plants propagated conventionally?

The tissue culture raised plants are free from disease and pest, if the standard procedures are adopted for production. Tissue culture plants grow faster and better, yet they are as vulnerable as any other plants unless appropriate precautions are taken. However, tissue culture plants are free from soil borne diseases.

#### 5. Do tissue culture plants yield better than the conventional plants?

As tissue culture plants are uniform, vigorous and disease free, if proper cultivation practices are properly followed, the total yield is expected to be better compared to conventional plants.

#### 6. What is a mother plant?

Mother plant is the source of explants to be used for further multiplication. (\*Note: That the mother plant should be devoid of any bacterial/fungal infections before using for multiplication).

## 7. What are the various stages of micropropagation?

- Stage 0 – Selection and preparation of the mother plant  
Sterilization of the plant tissue takes place
- Stage I – Initiation of culture  
Explant placed into growth media
- Stage II – Multiplication  
Explant transferred to shoot media; shoots can be constantly divided
- Stage III – Rooting  
Explant transferred to root media
- Stage IV – Transfer to soil  
Explant returned to soil; hardened off

## 8. What is an artificial seed?

Artificial seeds are formed by encapsulating the somatic embryos in 0.2% solution of sodium alginate, this solution forms a gel at later stages and acts as seed coat, such type of somatic embryos are called artificial seeds. Such embryos (artificial seeds) are genetically identical and can be stored for long durations before use. This has not been commercialized so far.

## 9. What are the in vitro parameters affecting plant growth?

The in vitro parameters affecting plant growth are: photoperiods (light and dark cycles), temperature, carbon source, plant growth regulators, macro and micro nutrients, vitamins, water etc.

## 10. What are the parameters affecting ex vitro growth of plants?

Parameters affecting ex vitro growth of plants are: temperature, light (quality/quantity), relative

humidity, soil characteristic, soil nature etc. These biotic and abiotic factors in combination are responsible for overall growth and development of plant.

## 6.2 Frequently Asked Questions (FAQ) on Recognition of Tissue Culture Production facilities

### 1. Who can apply for recognition?

Any tissue culture production facility (Public sector, Private sector, NGO and others) engaged in production of Tissue Culture Plant with minimum production capacity of 0.5 million plants can apply. The commercial laboratory should be operational at the time of submission of application.

### 1. When to apply for recognition under NCS-TCP?

The applications are accepted round the year. However, tissue culture production facility should be operational at the time of applying for recognition

### 2. How to apply for recognition under NCS-TCP?

The duly filled application form (NCS-TCP Form 2) in 5 sets along to be sent to Biotech Consortium India Ltd. New Delhi by post. Registration fee of Rs. 2000 to be deposited in the NCS-TCP centralized account mentioned in the application form and the particulars of fee submission/deposit to be enclosed in the application

### 3. Where to get application form for recognition under NCS-TCP?

The application form can be downloaded from NCS-TCP website ([www.dbtncstcp.nic.in](http://www.dbtncstcp.nic.in))

**4. What are the minimum criteria for registration of application?**

Minimum criteria for registration of application under NCS-TCP are as follows:

- i. Total annual production capacity needs to be more than or equal to 0.5 million plants
- ii. All the activities of tissue culture production facility (including hardening facility) needs to be operational during the time of application
- iii. 5 sets of complete application along with enclosures (documents, photographs, layout, particulars of fee deposited) to be submitted
- iv. Clearly demarcated areas for Washing room, Media preparation room, Media storage, Inoculation, Growth room, Plant transfer area and Acclimatization (Primary and Secondary hardening area)
- v. Special entry to clean area consisting of Media store room(s), Inoculation room(s) and Growth room(s)

**5. What is the fee structure for recognition under NCS-TCP?**

Fee structure for recognition under NCS-TCP is given below

Particulars	Figures in Indian Rupees		
	Small-scale companies (production capacity upto 1 million plants per annum)	Medium-scale companies (production capacity 1-3 million plantlets/ annum)	Large-scale companies (production capacity more than 3 million plantlets/ annum)
Registration fee	2000	2000	2000
Inspection and report preparation	2000	6000	10000
Processing and Certification	5000	5000	5000

**6. Can we pay the prescribed fee by cash or Cheque also?**

No, all the prescribed fees need to be deposited in NCS-TCP centralized account. Particulars of deposit/ transfer should be sent to BCIL. The details of NCS-TCP centralized account is mentioned below:

Beneficiary Name : BCIL Ac NCSTCP  
 Account No. : 0158201031402  
 Type of account : Current Account  
 Bank : Canara Bank  
 Branch : Deendayal Marg New Delhi  
 Address : Community centre,  
 2 Mayapuri, Phase II, Delhi  
 IFSC code : CNRB0000158  
 Email : [ncstcp@biotech.co.in](mailto:ncstcp@biotech.co.in)

**7. What are the various steps involved in the processing of application for recognition?**

Schematic representation for the various steps involved in the application processing could be downloaded from [http://www.dbtncstcp.nic.in/downloads/Process\\_of\\_Recognition.pdf](http://www.dbtncstcp.nic.in/downloads/Process_of_Recognition.pdf)

**8. What are the criteria on which the tissue culture production facilities are evaluated during site visit?**

The tissue culture production facilities are evaluated with respect to prescribed standards. The standards are at below link: <http://www.dbtncstcp.nic.in/downloads/NCS-TCP%20guidelines.pdf>

**9. Is there any defined layout for tissue culture production facility in order to get recognition?**

There is no fixed layout for tissue culture production facility as it varies according to

production capacity, location and crop specific requirements. However, facility should meet the specified requirements namely availability of dedicated areas (washing, media preparation, media storage, inoculation, growth room, grading area, hardening and nursery), maintenance of sterility class 1,00,000 in sterile areas. The facility should also avoid criss-cross man and material movement between sterile and non-sterile zone, availability of emergency exit and double door in hardening area

**10. What are the various viruses which are covered under NCS-TCP?**

The list of viruses in various crops can be downloaded from the below link:

[http://www.dbtncstcp.nic.in/List of viruses covered under NCS-TCP](http://www.dbtncstcp.nic.in/List%20of%20viruses%20covered%20under%20NCS-TCP)

**11. What are the tissue culture standards for various plant tissue culture?**

The tissue culture standards for the TCP for various crops can be accessed in the following link:

[http://www.dbtncstcp.nic.in/html/tc\\_Standards/t\\_c\\_standards.html](http://www.dbtncstcp.nic.in/html/tc_Standards/t_c_standards.html)

**12. What is the duration of validity of Certificates of Recognition?**

The validity of Certificate of Recognition is **2 years** which is subject to renewal and continued compliance with NCS-TCP Guidelines

**13. What are the advantages of Recognition of Tissue Culture Production facility under NCS-TCP**

The Recognized Tissue Culture Production Facilities has the following advantages over non Recognized Tissue Culture Production Facility

- ❖ Recognized Tissue Culture Production facilities are eligible to get their plants certified from Test laboratories accredited under NCS-TCP
- ❖ Mission for Integrated Development of Horticulture (MIDH) also supports the Certificate of Recognition to avail subsidy under the scheme
- ❖ Increased national visibility as Recognized Tissue Culture Production facility under NCS-TCP and better market access.

**14. What are the responsibilities of Tissue Culture Production Facilities after getting Recognized under NCS-TCP?**

The responsibilities of Tissue Culture Production Facilities after getting Recognized under NCS-TCP are as follows:

- ❖ Recognized facility should follow the guidelines and adopt Standard Operating Procedures of NCS-TCP
- ❖ Virus indexing of mother plants/stock cultures as per the Guidelines for testing of Mother Plants/Stock Culture
- ❖ Certification of every batch of tissue culture raised plants as per the Guidelines for Testing and Certification of Tissue Culture Raised Plants

**15. Can I apply for Recognition of only hardening Centre?**

Recognition of only hardening centre is possible under NCS-TCP, in case the main tissue culture facility is already recognized. Hardening centre should have facility for primary and secondary hardening.

### **6.3 Frequently Asked Questions (FAQ) on Renewal of Recognition of Tissue Culture Production facilities**

#### **1. When do I apply for Renewal of Recognition of Tissue Culture Production facility?**

Recognized Tissue Culture Production facility should ideally apply for Renewal **3 months** prior to expiry of Certificate of Recognition

#### **2. What is the last date for applying for Renewal of Recognition of Tissue Culture Production facility?**

The last date for receipt of application for Renewal of Recognition of Tissue Culture Production Facility is one month prior to expiry of Certificate of Recognition. If the application for renewal of recognition is submitted after the last/due date, their application will not be considered for Renewal and the Tissue Culture Production Facility will be asked to apply for fresh recognition

#### **3. How to apply for Renewal of Recognition of Tissue Culture Production facility?**

Recognized Tissue Culture Production Facility should to submit 5 copies of duly filled Application for Renewal of Recognition (NCS-TCP Form 2 A) to Biotech Consortium India Ltd. New Delhi by post. Registration fee of Rs. 500 to be deposited in the NCS-TCP centralized account mentioned in the application form and the particulars of fee submission/deposit to be enclosed in the application.

#### **4. Where to get application form for renewal of recognition under NCS-TCP?**

The application form for Renewal of Recognition can be downloaded from NCS-TCP website ([www.dbtncstcp.nic.in](http://www.dbtncstcp.nic.in))

[dbtncstcp.nic.in](http://www.dbtncstcp.nic.in))

#### **5. What is the fee structure for renewal of recognition under NCS-TCP?**

The registration fee for renewal of Recognition is 25% of the Registration Fee for fresh application. Rest of the Fee Structure is similar to Fee Structure for Recognition of Tissue Culture Production Facilities

#### **6. What are the various steps involved in the processing of application for Renewal of Recognition?**

The steps involved in processing of application for Renewal of Recognition are similar to the steps for Recognition of Tissue Culture Production facilities available at [http://www.dbtncstcp.nic.in/downloads/Process\\_of\\_Recognition.pdf](http://www.dbtncstcp.nic.in/downloads/Process_of_Recognition.pdf) . However, site visit for renewal of recognition is organized only after the tissue culture production facility has certified tissue culture raised plants and received Certificate of Quality and certification labels from ATLS.

#### **7. Is certification of tissue culture raised plants mandatory for renewal of Recognition?**

Certification of every batch of tissue culture raised plants is mandatory for Renewal of Recognition

### **6.4 Frequently Asked Questions (FAQ) on Virus Indexing of Mother Plants/Stock Culture**

#### **1. Is virus indexing of Mother Plants or stock cultures mandatory for Recognition/ Renewal of Recognition under NCS-TCP?**

Virus indexing of mother plants or stock cultures as per the Guidelines for Testing of Mother Plants/

Stock culture is mandatory for Recognition/  
Renewal of Recognition of Tissue Culture  
Production Facilities.

**2. Where do I test the mother plants/stock culture for freedom from viruses?**

Tissue Culture Production facilities (TCPFs) should test their mother plants/stock culture for freedom from viruses from Accredited Test Laboratories (ATLs) under NCS-TCP. List of ATLs could be downloaded from [www.dbtncstcp.nic.in](http://www.dbtncstcp.nic.in). Tissue Culture Production Facilities who are not recognized under this system can also test their mother plants/stock culture from ATLs or any Government Institute or University having facilities and expertise for virus indexing.

**3. Which are the viruses for which mother plants/stock culture should be indexed?**

List of Viruses and Phytoplasmas reported to naturally infect plants currently covered under National Certification System for Tissue Culture Plants could be downloaded from following link [http://www.dbtncstcp.nic.in/downloads/List\\_of\\_Viruses\\_2014.pdf](http://www.dbtncstcp.nic.in/downloads/List_of_Viruses_2014.pdf)

**4. Whether virus indexing has to be done for stock cultures which are being imported or procured?**

It is mandatory to virus index the stock cultures after importing and procuring prior to mass multiplication by the Tissue Culture Production Facility in addition to the test conducted by the supplier

**5. What is the procedure to send samples to ATLs for virus indexing of mother plants/stock culture?**

The procedure to send samples to ATLs for virus

indexing of mother plants/stock cultures are as follows:

- ❖ The tissue culture production facility has to send duly filled and signed "Intimation form for Virus Indexing of Plant Tissue/ Stock Culture(s) Annexure 1A" to Accredited Test Laboratory (ATL) at least 2 weeks prior to sending the sample(s). The intimation form Annexure 1A could be downloaded from [http://www.dbtncstcp.nic.in/downloads/Forms\\_TCPF/ANNEXURE\\_1A.doc](http://www.dbtncstcp.nic.in/downloads/Forms_TCPF/ANNEXURE_1A.doc)
- ❖ On receipt of acknowledgement from ATL, TCPFs need to deposit the requisite fee for testing in the NCS-TCP centralized account mentioned in the application form.
- ❖ After deposit of requisite fee for testing, TCPFs needs to submit the samples along with the "Application for Virus Indexing of Plant Tissue/Stock Culture (s). The details of transfer to be intimated to ATL and BCIL. The application form Annexure 2A could be downloaded from [http://www.dbtncstcp.nic.in/downloads/Forms\\_TCPF/ANNEXURE\\_2A.doc](http://www.dbtncstcp.nic.in/downloads/Forms_TCPF/ANNEXURE_2A.doc)
- ❖ Ideally all mother plants/stock cultures should be virus indexed. However, if the number of mother plants/stock culture is large, the samples from batches consisting of a maximum of 10 mother plants/stock cultures may be pooled for testing. "Guidelines for testing of Mother Plants/Stock Culture" describing the sampling size/strategy are available at NCS-TCP website [http://www.dbtncstcp.nic.in/downloads/Guidelines\\_for\\_mother\\_stock.pdf](http://www.dbtncstcp.nic.in/downloads/Guidelines_for_mother_stock.pdf)
- ❖ Each sample should have at least 0.5 gm



of tissue per virusper test for all known viruses to be tested. List of viruses to be indexed species/crop wise could be downloaded from [http://www.dbtncstcp.nic.in/downloads/List\\_of\\_Viruses\\_2014.pdf](http://www.dbtncstcp.nic.in/downloads/List_of_Viruses_2014.pdf)

- ❖ All the collected samples should be blotted dry to remove excess moisture before packing
- ❖ All samples will be placed in between paper towels, packed in self sealing/ ziplockpolythene bags of appropriate size
- ❖ The sample will be affixed with a label and kept in a ventilated card board box and /or thermocool box for forwardal to ATL
- ❖ The packing box will be marked on top of the box with the address of ATL with appropriate instructions such as "Handle with care/Tissue Culture Plants/ Rush Delivery" and either couriered or delivered in person to the concerned ATL within 24 hrs period

#### **6. What is the fee for virus indexing of mother plants/stock culture?**

A minimum fee of Rs. 1000.00 for 10 samples of the same species for a maximum of 5 viruses to be deposited at NCS-TCP centralized account given in the application form. Tests for additional viruses will be charged @ Rs 100.00 per virus.

#### **7. What will be the fee if the samples are pooled from different mother plants/stock cultures?**

Fee for virus testing of 10 pooled samples would be Rs 1000.00 (Rupees one thousand only). Each

pooled sample (will be treated as one sample) should not consist more than 10 samples.

#### **8. What is the time taken by Accredited Test Laboratories for testing of samples?**

ATL should dispatch test report to tissue culture production facilities in **6 working days** from the date of receipt of samples in good condition

#### **9. What if the samples are found positive for viruses?**

If the samples are tested positive for viruses, then the tissue culture production facility should destroy/discard the mother plants/stock cultures

#### **6.5 Frequently Asked Questions (FAQ) on Certification of Tissue Culture Raised Plants**

##### **1. Is Certification of Tissue Culture Raised Plants mandatory for Renewal of Recognition under NCS-TCP?**

Certification of every batch of Tissue Culture Raised Plants is mandatory for renewal of Recognition.

##### **2. What is the volume of plants to be certified for Renewal of Recognition?**

Recognized Tissue Culture Production Facilities should certify every batch of tissue culture raised plants produced in their facility

##### **3. Whether tissue culture production facilities which are not Recognized under NCS-TCP can certify their plants?**

Tissue Culture Production Facilities which are not Recognized under this system cannot certify their plants.

#### 4. What are the eligibility criteria/ requirements for batch certification of tissue culture raised plants?

The eligibility criteria for batch certification of tissue culture raised plants are as follows:

- ❖ The tissue culture production facility should be Recognized under NCS-TCP
- ❖ The mother plant tissue/stock culture must be tested for freedom from all known viruses from ATLs or any reputed Government institutions. List of ATLs established under NCS-TCP can be downloaded from <http://www.dbtncstcp.nic.in/html/content/ATLs.html>
- ❖ The respective batch of tissue culture plants intended for certification should be derived from tested stock culture
- ❖ Recognized TCPFs should assign 4 digits batch number to the said batch of tissue culture plants. This above number should be provided to ATLs while sending samples for certification
- ❖ Tissue culture raised plants ready to dispatch to the farmers (ideally secondary hardened) will be tested for all known viruses and true to type in order to certify under NCS-TCP

#### 5. What is the procedure for Batch Certification of Tissue Culture Raised Plants?

The procedures for Batch Certification of Tissue Culture Raised Plants are as follows:

- ❖ The Recognized TCPF should send an intimation form (Virus/ genetic fidelity)

Testing for Batch Certification of Tissue Culture Raised Plants (Annexure-1B) to the ATL in a specified format given at <http://www.dbtncstcp.nic.in/html/content/ANNEXURE4.html>

- ❖ The ATL would send an Acknowledgement to the TCPF providing details of requisite fee to send the Application form/samples
- ❖ On receipt of acknowledgement, TCPF should deposit the requisite fee in the NCS-TCP centralized account given the application form. The sample would be drawn as per the sampling strategy mentioned in the application form (samples would be drawn either by representative of ATL or TCPF itself as per the mutual consent and coordination between TCPF and ATL)
- ❖ Samples for certification would be sent to ATL along with the duly filled Application for Testing for Batch Certification of Tissue Culture Raised Plants (Annexure-2B). The details of transfer of requisite fee for testing should be provided to ATL and BCIL. This application form can be downloaded from the link given below: <http://www.dbtncstcp.nic.in/html/content/ANNEXURE4.html>

#### 6. What is the sampling strategy for batch certification?

Number of samples to be tested will vary based on the batch size. The sampling method is given below:

Batch size	Number of tissue culture plants to be sampled (sample size)
Up to 1000 Nos	1% plants subject to a minimum of 10 Nos
1001 to 10000 Nos	0.5% of plants subject to a minimum of 10 Nos
10001 to 100000 Nos	0.1% of plants subject to a minimum of 50 Nos

**7. What is the fee for testing and certification of tissue culture plants under NCS-TCP?**

The approved fee structure towards certification of tissue culture plants under NCS-TCP is given below:

Test	Fee
Virus Indexing	A minimum fee of Rs. 1000 which would include testing upto 10 samples of the same plant species for a maximum of 5 viruses. Test for Additional virus would be charged @ Rs 100 per virus
Genetic Fidelity Testing	Rs. 1500 per 10 plants

**8. What will be the fee for certification of 1,00,000 banana plants, if the company is Recognized and the batch is derived from virus free stock cultures ?**

For certification of 1,00,000 banana plants, 0.1% of samples has to be sent randomly from 1,00,000 banana plants for virus indexing and genetic fidelity testing. Accordingly, 100 samples have to be sent to ATL for testing. As per NCS-TCP Guidelines 4 viruses have been reported in banana.

- ❖ Fee for virus indexing of 100 samples – Rs. 10,000
- ❖ Fee for Genetic Fidelity Testing of 100 samples – Rs. 15,000

Total fee for certification – Rs. 25,000.00

## 7. Abbreviations

AP	Accreditation Panel	NCS-TCP	National Certification System for Tissue Culture Raised Plants
ATL	Accredited Test Laboratory under National Certification System for Tissue Culture Raised Plants	NGO	Non-Governmental Organization
BCIL	Biotech Consortium India Limited, New Delhi	NMC	NCS-TCP Management Cell
BTC	Banana Tissue Culture	NRCB	National Research Centre for Banana, Trichy
CPRI	Central Potato Research Institute, Shimla	NRCPB	National Research Centre on Plant Biotechnology, New Delhi
CQ-TCP	Certificate of Quality for the Tissue Culture Plant	PMEC	Project Monitoring & Evaluation Committee
DBT	Department of Biotechnology, Ministry of Science and Technology, Government of India	RC	Referral Centre established under National Certification System for Tissue Culture Raised Plants
IARI	Indian Agricultural Research Institute, New Delhi	SOP	Standard Operating Procedure
IHBT	Institute of Himalayan Bioresource Technology, Palampur	SPIC	Southern Petrochemical Industries Corporation (SPIC) Limited, Chennai
IIHR	Indian Institute of Horticultural Research, Bangalore	TCCA	Tissue Culture Certification Agency
IISR	Indian Institute of Sugarcane Research, Lucknow	TCP	Tissue Culture Raised Plants
MoA	Ministry of Agriculture, Government of India	TCPFs	Tissue Culture Production Facilities
NCL	National Chemical Laboratory, Pune	TERI	The Energy and Resource Institute, New Delhi
		UAS	University of Agricultural Science, Bangalore
		VSI	Vasantdada Sugar Institute, Pune

**Accredited Test Laboratories (ATLs) under NCS-TCP**

<b>S.No.</b>	<b>Accredited Test Laboratories</b>	
<b>1</b>	<b>University of Agricultural Sciences, GKVK, Bangalore</b>	
i.	<b>Project Coordinator:</b> Prof. K.T. Rangaswamy Professor of Plant Pathology	Dept of Plant Pathology University of Agricultural Sciences, Agricultural College, GKVK, Bangalore-560065, Karnataka Email: ktr.ncstcp.blr@gmail.com Ktr_uasb@rediffmail.com Ph: 080-23330153 Mob: 9916063028
ii.	<b>Virus Indexing</b>	
	<b>PI:</b> Prof. K.T. Rangaswamy Professor	Dept of Plant Pathology University of Agricultural Sciences, Agricultural College, GKVK, Bangalore-560065, Karnataka Email: ktr.ncstcp.blr@gmail.com Ph: 080-23330153 Mob: 9916063028
iii.	<b>Genetic Fidelity</b>	
	<b>PI:</b> Dr. A. Mohan Rao, Assistant Professor, Dept. of Genetics & Plant Breeding	University of Agricultural Sciences, Agricultural College, GKVK, Bangalore-560065, Karnataka Email: amrao8@rediffmail.com Ph: 080-23330153 Mob: 9448101542
<b>2</b>	<b>Central Potato Research Institute, Shimla</b>	
i.	<b>Proj. Coordinator:</b> Dr. Sanjeev Sharma Head, Seed Technology	Central Potato Research Institute, Shimla-17001, Himachal Pradesh Email: sanjeevsharma.cpri@gmail.com Ph-0177-262507 Mob: 9418657678
ii.	<b>Virus Indexing</b>	
	<b>PI:</b> Dr. Jeevalatha A Scientist, Division of Plant Protection	Email: jeevalatha_a@yahoo.co.in Ph-0177-262507 Mob: 9816027052

	<b>Co PI:</b> Dr. Baswaraj Raigond, Scientist, Division of Plant Protection	Email: raigond@gmail.com Ph-0177-262507
	<b>Co PI:</b> Dr. Ravinder Kumar, Scientist, Division of Plant Protection	Email: chauhanravinder97@gmail.com Ph-0177-262507
iii.	<b>Genetic Fidelity</b>	
	<b>PI:</b> Dr. V.U. Patil, Scientist, Division of Crop Improvement	Central Potato Research Institute, Shimla-17001, Himachal Pradesh Ph-0177-262507 Email: veerubt@gmail.com
	<b>Co PI:</b> Dr.Sundaresha S, Scientist, Division of Crop Improvement	Email: sundareshas8@gmail.com Ph-0177-262507
3	<b>NRC for Banana ICAR, Tiruchirapally</b>	
i.	Dr. M.M. Mustaffa, Director	NRC for Banana ICAR, Thongamalai Road, Thayanur Post, Tiruchirapally-620120, Tamil Nadu Email: directornrcb@gmail.com Ph: 0431-2618104 Mob: 9442218281 Fax: 0431-2618115
ii.	<b>Virus Indexing</b>	
	<b>Proj. Coordinator and PI:</b> Dr. R. Selvarajan Principal Scientist, Department of Plant Virology	NRC for Banana ICAR, Thongamalai Road, Thayanur Post, Tiruchirapally-620120, Tamil Nadu Email: selvarajanr@gmail.com Ph-0431-2618106 Mob: 9843278364
iii.	<b>Genetic Fidelity</b>	
	Dr. M. S. Saraswathi, Senior Scientist (Hort.)	NRC for Banana ICAR, Thongamalai Road, Thayanur Post, Tiruchirapally-620120, Tamil Nadu Email: saraswathimse@rediffmail.com Ph-0431-2618104 Mob: 9443590188

4	<b>Institute of Sugarcane Research (IISR), Lucknow</b>	
i.	Dr A.D Pathak, Director (Officiating)	Institute of Sugarcane Research (IISR), Raibareli Road, P.O. Dilkusha, Lucknow-226002 Email: iisrlko@sancharnet.in Ph: 0522-2480726 Fax: 0522-2480738
	<b>Proj. Coordinator:</b> Dr. Sanjeev Kumar, Senior Scientist, Plant Biotechnology	Mob: 9415224064 Email: sanjeeviivr@gmail.com, sanjeev_iivr@yahoo.com
ii.	<b>Virus Indexing</b>	
	<b>PI:</b> Dr. S.K. Holkar Scientist	Institute of Sugarcane Research (IISR), Raibareli Road, P.O. Dilkusha, Lucknow-226002 M:8756439329 Email: somnathbhu@gmail.com
iii.	<b>Genetic Fidelity</b>	
	PI: Dr. Sanjeev Kumar, Senior Scientist, Plant Biotechnology	Institute of Sugarcane Research (IISR), Raibareli Road, P.O. Dilkusha, Lucknow-226002 Email: sanjeeviivr@gmail.com, sanjeev_iivr@yahoo.com Ph: 0522-2480726 Mob: 9415224064
5	<b>Vasantdada Sugar Institute (VSI), Pune</b>	
i.	<b>Project Coordinator:</b> Dr. R.M. Devarumath, Scientist	Vasantdada Sugar Institute (VSI) Manjari (Bk), Tal: Haveli Dist. Pune – 412307, Maharashtra Email: Ph: 020-26902235 Fax: 020-26902244 Mob:08605866842 rm.devarumath@vsisugar.org.in; rdevarumath@gmail.com;

ii.	<b>Virus Indexing</b>	
	<b>PI:</b> Dr. B.H. Pawar, Sr. Scientist	Vasantdada Sugar Institute (VSI) Manjari (Bk), Tal: Haveli Dist. Pune – 412307, Maharashtra Ph: 020-26902233 Fax: 020-26902244 Email: bh.pawar@vsisugar.org.in
	<b>Co PI:</b> Dr. S.G. Dalavi, Scientific Officer	Email: sg.dalavi@vsisugar.org.in
iii.	<b>Genetic Fidelity</b>	
	<b>PI:</b> Dr. K. Harinath Babu, Sr Scientist	Vasantdada Sugar Institute (VSI) Manjari (Bk), Tal: Haveli Dist. Pune – 412307, Maharashtra Email: khbabu_63@yahoo.com Ph: 020-26902233 Fax: 020-26902244 Mob:09604433424
	<b>Co PI:</b> Dr. A.A. Nikam, Scientific Officer	Email: aa.nikam@vsisugar.org.in



**List of Recognized Tissue Culture Production Facilities**

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
1	A.G. Bioteck Laboratories (India) Limited	Mr. Punnam Veera Reddy, Managing Director	# 101, Raaga Central Court, Brundavan estates, Nizampet Road, Kukatpally, Hyderabad, Andhra Pradesh	Ph: 040-23318731 Fax: 040-23306097
2	ABC Agrobiotechnology Pvt. Ltd.	Mr. Ghanshyam Patel (General Manager)	347-744, Sardarnagar Industrial Co-Op. Society Estate, Village-Chhapara, Ta.Mahmedabad, Dist. Kheda, Gujarat	
3	ACE Agro Technologies	Mr. A. Biju Managing Partner	Plot no 12, Angels Colony, Besides Nanda Reddy Gardens, Kompally Village, Secunderabad-500014, Andhra Pradesh	Ph: 040-65443099
4	Adithya Biotech Lab & Research Pvt. Ltd.	Dr. Sanket Thakur Chief Scientist	<b><u>New Address (communication):</u></b> RITEE-Head Office, Near Bal Ashram, Kutchery Chowk, Jail Road, Raipur-492001, Chhattisgarh <b><u>Old Address:</u></b> C-15, Opp. Bank of Baroda ATM, Near Tagore Nagar Chowk, Shailendra Nagar, Raipur, Pin: 492001, Chhattisgarh	Ph: 0771-3290850
5	Agri Vitro Tech Laboratories	Mr. R. Haridas Managing Partner	Survey No 807 Part, IDA Medchal, Ranga Reddy Dist., Hyderabad, Telangana	Ph:040-30626632
6	Ajeet Seeds Pvt. Ltd. (Aurangabad)	Mr. Anand Vithalrao Jadhav, Sr. Manager- Tissue Culture Production Facility	Gut. No. 233, At. Post Chitegaon-431105, Tq. Paithan, Aurangabad, Maharashtra	Ph: 02431-251444/5 Fax: 02431-251833

S. No.	Companies Name	Name of Incharge	Address	Contact No. (Phone and Fax)
7	Anantha Biotechnologies	Mr. K. Radhakrishna Reddy Partner	1-792A, Ram Nagar Extension, Rudrampeta, Ananthapur, Andra Pradesh	08554-238166
8	Annai Meenashi	Mr. A. Murugan Marketing Director	No. 2/253, B1, NB Agaraharam, Hosur-635109, Tamil Nadu	
9	Arcadia Agro	Mr. Firoz A Chikkale Lab Manager	B/H GEB sub-station, Mogar-Vadod Road, A/P Mogar, Dist. Anand, Gujarat-388340	9227401131
10	ATGC Biotech	Mr. Ashish Purena (Proprietor)	<b>Lab Address:</b> Street No.7, Sector-2, Near Kadam Chowk, Professor Colony, Raipur, Chhattisgarh-492001 <b>Mailing Address:</b> Plot No.112-115, Road No.7, Birkoni Industrial Area, Mahasanund, Chhattisgarh	
11	Atharva Biotech	Ms. Alka Suresh Khade Head of Organization	A/P. Pargaon, Tal.-Daund, Pune-412203	
12	Atul Rajasthan	Mr. B.N. Mohanan Managing Director	Rajkiya Paudhshala, Chopasni, Nandanvan P.O, Jodhpur-3842008	02632-230217/ 0291-2752167/ 0291-2752168
13	Bhanu Agri Bio Sciences	Mr. B. Devender Managing Director	Survey No. 481, Village-Gundla Pochampally, Medchal, Dist. Ranga Reddy, Telangana State-500100, Hyderabad	741659999
14	Bhoomiputra Biotech	Mr. Suresh Ramdas Patil Proprietor	MIDC Area, Plot No.18/19, Chopda, Maharashtra	
15	Biotech Park, Lucknow	Prof. Pramod Tandon Chief Executive Officer	Sector-G, Jankipuram, Kursi Road, Lucknow, Uttar Pradesh	0522-4053004

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
16	Biotechnology Centre, Department of Horticulture	Smt. K.A. Pavithra Deputy Director of Horticulture	Department of Horticulture Biotechnology Centre, P.O. Box No.7648,Hulimavu, Bannerghatta Road, Bangalore-76	080-26582775/ 080-26584906/ 080-26582784
17	Blossom Tissue Culture Nurseries	Mrs. R. Usha Rani Managing Partner	2/8-2, Senthil Nagar, Onnal Vadi-Post, Hosur-635109, Tamil Nadu	
18	Cadila Pharmaceuticals Ltd. (Agro Division)	Dr. Namita Oza	Tissue Culture Lab, 755 Prakurtifarm, Tal:Dascori, Vill:Hirapur, Ahmedabad-382435, Gujarat	Ph: 02718-245260 Fax: 02718-245495
19	Devleela Biotech	Mr. Rajendra Surana Proprietor	Anand Vihar, Opposite Energy Park, VIP Road, Raipur, Chhatisgarh	Ph: 0771-6534051, 6534051
20	Dr. MC Saxena Group of Colleges	Mr. Deepak Kumar Verma Manager	Tissue Culture Production Facility Dr. MC Saxena Group of Colleges, 171, Barawankala, IIM-Dubaggh Bypass, Lucknow- 226101, Uttar Pradesh	Ph: 0522-4095731/ 4095747
21	Ecofriendly Biotech & Bio Plants Pvt. Ltd.	Mr. Sajid Shamshuddin Bagwan Head of Organization	Survey No.333/2, Lonand-Nira Road-415521, Satara	Ph:02169-225241, Fax:02169-225241
22	Elegant Flower Company Pvt. Ltd.	Mr. Manas Basu Managing Director	Ganti, P.O. Ganganagar, North 24 Parganas, Kolkata-700132, West Bengal	Ph: 033-65686140
23	Enrich Fertilisers	Mrs. Smita P. Patil Director	A-13/14, MIDC, Malkapur, Dist. Buldana-443010, Maharashtra	07267-262350

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
24	Excel Plant Link Pvt. Ltd.	Mr. Priyajit Mondal Production Manager	C/o National Seed Corporation Ltd., 150, Industrial Estate, Mancheswar, Bhubaneswar-751010, Orissa	Ph: 0674-2580989
25	Futura Bioplants Pvt. Ltd.	Mr. Kishore Rajhans Vice-President, Operations	S.No. 129/1, to 3C, Manjari (BK), Tal. Haveli, Pune-412307, Maharashtra	Ph: 020-26994467
26	Geeta Agro Biotech	Mrs. U.B. Gadekar Prop	Gat No.10, A/P Rajpuri, Tal-Maval, Dist-Pune, Talegaon, Maharashtra	
27	Genewin Biotech	Prof. (Dr.) V. Palani Managing Director	Next to Bimetal Bearings Ltd., NH-7, Bangalore Highway, Perandapalli, Hosur, Tamil Nadu-635109	Ph: 04344-260805
28	Global Biotech	Mr. Ramakant V Bhaganagare C.E.O	Bhaganagare Complex, Behind L.I.C Office, Krununda Corner, Basmathnagar, Maharashtra-431512	9860966275
29	Greenfield Biotech	Dr. Vishal P Oza	A/142, First Floor, Infocity, Supermall-1, Infocity, Gandhinagar-382423	
30	Greeno Agrotech India Pvt. Ltd.	Mr. S. Raghavendra Managing Director	6-5-765-4, ADCC Bank Colony, Ramnagar, Anantapur-515001, Andhra Pradesh	
31	Growmore Biotech Ltd.	Dr. N. Barathi (Managing Director)	41-B, Sipcot-II, Hosur-635109, Tamil Nadu	Ph: 04344-260564 Fax: 04344-260560
32	H.U. Gugle Agro Biotech Co.	Mr. Vijay G. Patole Production Head	Karmala Road, At. Post. Jamkhed, Ahmednagar-413201, Maharashtra	Ph: 02421-221766 Fax: 02421-222053
33	Harinagar Sugar Mills Ltd.	Shri S.N. Poddar Chief General Manager	Po. Harinagar-845103, Dist. W. Champaran, Bihar	06256-224244

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
34	Hindustan Bioenergy Limited	Mr. Sanjeev Choudhury Director	Biotech Park, Sec-G, Jankipuram, Kursi Road, Lucknow – 226 021, Uttar Pradesh	Ph: 0522-4053022
35	Hindustan Paper Corporation Ltd.	Mr. Diganta Sharma Dy. Manager (FDP)	Nagaon Paper Mill, Kagajnagar-782413, Assam	Ph: 0368-245900-10
36	Hosur Hortitech	Mr. V. Prabhudas (General Manager)	Plot No.31, Thanigai Nagar, Phase-I, Santhapuram Road, Chinna Elasagiri, Hosur- 635109, Tamil Nadu	
37	HU Gogle Biotech Pvt. Ltd.	Mr. Shailesh Kathariya (Director)/ Mr. S. Balasubramanya (Chief Technical Manager)	S.No.23, P.O. Box No.14, Binnamangala Village, Devanahalli (Taluk), Bangalore Rural District- 562110, Karnataka	
38	Indus Tissue Technologies	Mr. Austin Edwin Director	At: Vanzava via Rankuwa, Tal: Chikhli, Dist. Navsari' Gujarat-396560	
39	ITI Biotech Tissue Culture Lab	Mr. Subhash Mohan Pandey (Director)	Plot No.115/2, Subhash Ward-01, Hamlapur, Betul, Dist.Betul, Madhya Pradesh-460001	Ph: 07141-230385
40	Jain Irrigation Systems Ltd.	Dr. Anil B. Patil Head Tissue Culture Lab	Agripark, Jain Hills, P.O.Box 72, Shirsoli Road-425001, Jalgaon, Maharashtra	0257-220011/22
41	Jayasree Biotech	Mr. V.P. Senthil Kumar Director Marketing	S. No. 63/1, 64/2A/2B & 66/1, Thorapally Road, Onnalvadi, Dist. Krishnagiri, Hosur 635109	

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
42	K.F. Bioplants Pvt. Ltd.	Mr. Kishore Rajhans, Vice-President, Operations	S.No.178, Kirtane Baug, Mundhawa Road, Magarpatta, Mundhawa Road, Magarpatta, Hadapsar, Pune-411036, Maharashtra	Ph: 020-26890422 Fax: 020-26890681
43	K.F. Biotech Pvt. Ltd.	Dr. S. Chauhan Vice-President	Theniyur Village, Sulibel Hubli, Hoskote Taluk, Bangalore Rural, Karnataka-562129	Ph: 080-27957391
44	Kala Biotech Pvt. Ltd.	Mr. U.D. Patil General Manager	Plot No.5, Floriculture Park, MIDC Talegaon Dhabade, Pune-410507, Maharashtra	
45	Kimya Biotech Pvt. Ltd.	Mrs. Suvarna Vinay Nikam Director	Gat No. 1381, Palus, Tal- Palus, Dist. Sangli, Maharashtra	02346-226475
46	Kisan Agri Biotech	Mr. Srinivasulu D. Managing Partner	Plot No.7, Gowdavelly (Village), Medchal (Mandal), Ranga Reddy District, Hyderabad, Telangana	
47	Kshitij Biotech Corporation	Mr. Tushar Anandrao Shinde (Proprietor)	1480/1, Wing, Near Shindewadi Phata, Karad-Dhebewadi Road, Tal.Karad, Dist. Satara, Maharashtra-415110	
48	Kutch Crop Services Ltd.	Mr. Sunil N Vaishnav DGM	C/o RARDS, Opp. Mahesh Nagar, Mundra Gandhidham Road, Mundra-Kutch, Gujarat- 370421	Ph: 02838-223258
49	La Chandra Tissue Culture Laboratory	Mr. Priyvrat Gadhvi (Director)	Banas Farm, Survey No.64/1/1, Village- Vaghrol, Ta-Dantiwada, Dist. Banaskantha, Gujarat	

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
50	Lakshmi Biotech	Mr. T.K. Reddy Managing Partner	D-9/139, SFS 407, 4th Phase, New Town, Yelahanka, Bangalore Karnatka-560064	Ph: 080-28479032/44 Fax: 080-28479033
51	Lokmangal Organics Research and Deveopment Ltd.	Mr. Manish S Deshmukh Managing Director	Gat No. 324, A/P, Wadala, Tal. North Solapur,Dist. Solapur-413222	0271-2246571
52	Mahaveer Iron and Steel Ltd.	Mr. A.K. Goenka Proprietor	Ring Road No.2, Gondwara (in front of Reliance Petrol Pump), Raipur-492001, Chhattisgarh	
53	Mauli Hitech Nursery	Mr. Pramod Subhash Bhingare HOD Plant Tissue Culture Department	Gat no. 42, At/Post- Solu, Alandi-Markal Road, Tq. Khed, Dist. Pune-412105, Maharashtra	
54	Meghana Biotech Tissue Culture Nursery	Sri Umapathi	Eshwari Farms and Nurseries, Belavanuru (p), Davangere (Dist.), Karnataka	
55	Micropropagation Technology Park (TERI)	Dr. Abhishek B Amin	RETREAT, Gual Pahari, Gurgaon, Haryana	PH: 0124-2579320-326
56	Microsun Bioplants (India) Pvt. Ltd.	Mr. Harikrishna Pothina (Managing Director)	Sy. No.496/B, Ravalkole (vill), Medchal (Md), Ranga Reddy Dist., Secunderabad-501401, Andhra Pradesh	
57	Musa Plant Gene Tech	Dr. M. Muralidhar Rao CEO	Door No.5-36 (1), Kallamundkur Village, Near Kudripadavu Cross, Mangalore TQ	
58	Mysore Organic Farms Pvt. Ltd.	Dr. Maruthi B.N. Director	Tissue Culture Laboratory S.No. 87/4, Lingambudipalya Srirampura Post, Mysore-570008 Karnataka	

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
59	Navsarjan Biotech, Bhuj, Kutch	Ms. Smita Harish Nagda (Proprietor)	Jyoti-Park, Near SOS SchoolE Kalayaneswar Mahadev Mandir, Bhuj-Aujar Highway, Near Gada VilageTal. Bhuj-Kutch, Gujarat	Ph: 02832-293150
60	Nishant Biotech	Mr. Satish Kapil Managing Director	Village-Padyalag, P.O. Dadhol, Tehsil: ghumarwin, Dist:Bilaspur, Himachal Pradesh-174021	Fax:01978256183
61	Novel Biotech	Dr. Geetha Suresh (Scientist & Proprietor)	Sy. No.12/4 & 12/5, Thattaguppe Village and Post, Uttarhalli Hobli, Bangalore South, Bangalore, Karnataka	
62	Palaj Agrotech	Mr. Amrapali S Vyas Head of the Organization	Palaj Chiloda Road, Nr. ONGC, Village-Palaj, Ta/D. Gandhinagar-382355	079-65727234
63	Pallishree Ltd.	Mr. Sujoy Mukherjee Manager	Arambagh, Post-Arambagh, Dist. Hooghly, West Bengal-712601	033-23210626/ 23219193
64	Palm Grove Nurseries	Mr. Radheyshyam K.H. Unit Head	14th Mile, Kanakapura Main Road, Vaderahalli, Thatthguni Post, Bangalore-560062, Karnataka	080-22956571, 22956572, 22956573
65	PepsiCo India Holdings Pvt. Ltd.	Dr. Santosh Kumar Tiwari	Global Business Park, Tower-A, 4th Floor, Mehrauli – Gurgaon Road,Gurgaon – 122 002, Haryana	Ph: 0124-4153200 Fax: 0124-2803165
66	Ramrich Biotech Pvt. Ltd.	Mr. Ghawate Rajeem Prabhu	Gat No.779, Tardobachi Wadi, Shirur Bypass, Shirur, Dist. Pune, Maharashtra-412210	



S. No.	Companies Name	Name of Incharge	Address	Contact No. (Phone and Fax)
67	Ram Biotech	Mr. S.L. Chaudhari Partner	Nashirabad Sunasgaon Road, Near Waki River Bridge, Nashirabad, Jalgaon, Maharashtra	
68	Rise N Shine Biotech Pvt. Ltd.	Mrs. B.P. Patil Mr. Umakant Hoval General Manager	Dattaprabha, Ganeshwadi, Theur, Pune-411000, Maharashtra	Ph: 020-66785770
69	Rodasy Biotechnologies	Mr. S.V. Ramanareddy Proprietor	H.No. : 7-17 (2-59/36/10), Plot No. 439, Sy No. 240, First Floor, Subhash nagar-1, Jeedimetla (vil) Quthbullapur (MDL) Rangareddy(Dist) Hyderabad-500055, Telangana State	
70	S & S Biotech	Mr. Lakshmi Tapas	Sy No. 20,21,22, Gundlapochampally Village, Via.Hakimpet, Kompally, Hyderabad-500014, Telangana	
71	Sachdev Nursery	Mr. Abhay Sachdev Proprietor	<b>Mailing Address:</b> H.No. HIG-15, S.P.M. Nagar H.I.G-15 Nr. St. John School, Jabalpur Road, Damoh-470661/ <b>Laboratory Address:</b> Pipariya nayak sagar road, damoh (M.P)	
72	Sagar Agrisciences Pvt. Ltd., Barabanki	Ms. Madhu Agarwal (Managing Director)	6th K.M. Stone, Sagar Campus, Faizabad Road, Barabanki, Uttar Pradesh	Ph: 05248-320002,
73	Sai Lara Biotechnologies	Ms. M. Vyjayanthi Managing Director	D-62/A, IInd Floor, Phase-I, IDA Jeedimatla, Hyderabad, Andhra Pradesh	Ph: 040-23090844

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
74	Sarjan Biotech Pvt. Ltd.	Mr. Harish P. Nagda Director	66/B-2, Tulsishyam Bungalow, Lotus Colony, Oppo. District Hospital, Bhuj-Kutch, Gujarat	Ph: 02832-293150
75	Shaili Biotech (P) Ltd., Ahmedabad	Dr. S. Mangalan Vice President	Survey No. 291/1, Moje Kalol Mehsana Highway, Opp. Decent Lamination, Nandasana Mehsana (Dist.), Gujarat	079-26852181
76	Sheel Biotech Ltd.	Mr. Sanjay Chandak (President)	RZ-2705/30, Sheel House, Main Jagdamba Road, Tughlakabad Extension, New Delhi- 110019	011-29994440
77	Shivashakti Biotechnologies Ltd.	Dr. K. Sri Rama Murthy Principal Scientist	7-1-621/98, S.R. Nagar, Main Road, Opp. Axis Bank, Hyderabad – 500038, Andhra Pradesh	040-66821339/ 66687275-7/
78	Shree Biotech	Mrs. Arundhati Rajaram Kesarkar (Partner)	49/4, Rajgad Colony, Rhatani, Pune-411017, Maharashtra	
79	Shree Ganesh Biotech (India) Ltd.	Mr. Shankar Chaudhary	Village-Lakhipur, Post- Dwaronda, Illambazar, West Bengal	033-23990577/ 23988213
80	Siddhi Plantek		Village-Hathipura, Tal. Anklav, Dist. Anand- 388510, Gujarat	
81	SPIC Agro Biotech Centre	Mr. K. Venkatramani Asst. General Manager- Agri Business	SPIC Agro Biotech Centre, Chitraichavadi, Puluvapatty Post, Siruvani Road, Coimbatore- 641101, Tamil Nadu	Ph: 0422-2650192 Fax: 0422-2650296
82	Sri Soma Biotech	Mr. P. Seetharamaiah Managing Director	Door No.11-571, Annapurna Nagar West, 5/2, Amaravathi Road, Gorantla, Guntur-522034	Ph: 0863-2255535

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
83	Sri Venkateshwara Agro Technologies	Mr. D. Madhu Sudhana Reddy (Managing Director)	#07-023/C/1/A, First Floor, Bhagya Lakshmi Colony, Near Sai Baba Temple, Subhash Nagar, Quthbullapur Mandal, Ranga Reddy District-500055, Andhra Pradesh	
84	Sristi Agro Biotech Pvt. Ltd.	Mr. Snehasis Koley Technical Director	Dhulagori Chowrasta, NH-6, P.O.Dhulagori, Howrah-711302, West Bengal	
85	Surya Plant Sciences	Mr. G. Rajanikanth Production-Manager	Surya Plant Sciences Near Main Bypass, Vijayawada Road, Vatluru, Eluru, West Godavari Dist. Andhra Pradesh	
86	Sun Fruits Limited	Ms. Sangeeta Kulkarni C.O.O	11, Hanuman Co-op Society, Opp. Sai Vihar Resi. Complex, Pashan-Sus Toad, Pune 411 021	020-25870624
87	Synergy Agri Products Pvt. Ltd.	Mr. Vinod Kumar Kurup Chief Operating Officer	3/4, Central Park, City Centre, Durgapur, West Bengal-713216	Ph: 0343-2548606/07 (Telefax)
88	Technico Agri Sciences Ltd.	Dr. Sumit Manjkhola, Manager-Facility	SCO 835, 1st & 2nd Floor, NAC Manimajra, Chandigarh-160101	Ph: 0172-2744890
89	Thopte Biotech Pvt. Ltd.	Dr. O.S. Thopte (Director)	At: Hartali Tal- Khandala, Dist. Satara, Near Bhatghar Dam	Ph: 02024220815
90	Thulasi Bio-tech	Mr. J.S. Arul	No. 3/16. M.K. Vattam, Ealagiri Village Post, Pakkirithakka (Via), Jolarpettai-635853, Vellore, Tamil Nadu	

<b>S. No.</b>	<b>Companies Name</b>	<b>Name of Incharge</b>	<b>Address</b>	<b>Contact No. (Phone and Fax)</b>
91	Turlapati Biotech Pvt. Ltd.	Ms. S. Vijaya Lakshmi (Laboratory Manager)	2-75, Nagpur Road (NH-7), Kompally, Secunderabad-500014, Andhra Pradesh	
92	Vasant Tissue Culture Laboratory	Dr. U.G. Kulkarni Advisor	Education Society, Naigaon, Dist. Nanded, Maharashtra	Ph: 02465- 262401/262800
93	Vasantdada Sugar Institute	Mr. P.N. Tawar Head, Tissue Culture	Manjari Bk, Pune-412307, Pune, Maharashtra	Ph: 020-26902291
94	Vitrigold Biotech Pvt. Ltd.	Mr. Manharsinh R. Parmar Director	At & Po. Zakhariya, Ta & Dist. Anand-388110	
95	Vitroplant	Mr. V. Madhu Proprietor	Plot No.56, Survey No.238/2, Bhagyalakshmi Colony, Jeedimetla, Hyderabad-54, Andhra Pradesh	Ph: 040-20000650
96	Yash Biotech	Mr. Chitranjan Kumar Thakur, Lab In-charge	H. No. 508-B, 5th Floor, Ravi Bhavan, Jaistambh Chowk, Raipur, Chhattisgarh-492001	0771-4052686

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Compiled and Edited by  
Dr. Shiv Kant Shukla, Assistant General Manager  
Biotech Consortium India Limited

Assisted by

Syed Md. Mashfuqulla, Assistant Manager  
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Published 2016