महाराष्ट्र वन विभाग

दूरध्वनी क्र.022-69309286
Email Id:dfommcu@gmail.com

महाराष्ट्र शासन
वन विभाग

विभागीय वन अधिकारी, कांदळवन विभाग- उत्तर कोकण यांचे कार्यालय

अभिमान-२, ५ वा मजला, तीन हात नाका, नौपाडा, ठाणे पश्चिम.

पत्र/ईमेलद्वारे: कक्ष-०२/योजना/ 3061 / सन २०२६-२७. **दिनांक:** २४ /१०/२०२६.

प्रति,

१. मा. मुख्य वनसंरक्षक,
कांदळवन कक्ष, मुंबई.

२. माहिती व प्रसिद्धी अधिकारी (वने),
मा. प्रधान मुख्य वनसंरक्षक यांचे कार्यालय, नागपूर.
Email: - mahaforestpublicity@gmail.com

विषय: कांदळवन कक्षांतर्गत विविध पुनर्स्थापना (Restoration) कामांसाठी प्रस्तावित Hi-Tech Mangrove Nursery (अद्ययावत कांदळवन रोपवाटिका) करिता Smart lab Components चे सविस्तर प्रकल्प अहवाल (DPR) तयार करण्याकरिता सार्वजनिक बांधकाम विभागाच्या अनुसूची दरपत्रकात (State Schedule of Rates - SSR) समाविष्ट नसलेल्या अनुसूचीबाह्य (non-Schedule) बाबींसाठी दरपत्रके मागविण्याबाबत.

संदर्भ:- मे. टंडन अर्बन सोल्यूशन, प्रा.लि. मुंबई यांचे पत्र क्र. TUSPL/Various_Works/ ३२ दि.१७.१०.२०२६.

कांदळवन परिसंस्थेमध्ये राबविण्यात येणाऱ्या विविध विकासकामांमध्ये विविध शासकीय/निम शासकीय विभाग तसेच खाजगी संस्थांकडून कांदळवन पुन:स्थापन योजनेकरीता संबंधितांकडून वसूल करण्यात आलेल्या रक्कमेतून कांदळवन पुन:स्थापन योजनेचे अनुषंगाने राबविण्याच्या विविध उपक्रमांच्या अंमलबजावणीकरीता कांदळवन कक्ष / कांदळवन प्रतिष्ठान यांना तांत्रिक सहाय्य सेवा उपलब्ध करुन घेणेकामी सल्लागार नेमणूक करण्याचे दृष्टीने या कार्यालयामार्फ़त ई निविदा प्रसिद्ध करणेत आलेली होती.

सदर निविदा प्रक्रियेद्वारे मे. टंडन अर्बन सोल्यूशन प्रा. लि, मुंबई यांना सल्लागार म्हणून नियुक्त करणेत आलेले असून या कार्यालयाकडून कार्यारंभ आदेश देण्यात आलेले आहेत. प्रकरणी नियुक्त प्रकल्प सल्लागार हे सदर प्रकल्पातील प्रस्तावित Hi-tech Mangrove Nursery या कामासाठी सविस्तर प्रकल्प अहवाल (Detailed Project Report - DPR), अंदाजपत्रक तयार करीत असून त्यानुषंगाने प्रकल्पासाठी DPR तयार करण्याकरिता आवश्यक तंत्रज्ञान, कार्यपद्धती व तांत्रिक तपशील निश्चित करण्याची कार्यवाही सुरू आहे. DPR तयार करताना आवश्यक असलेल्या अनेक बाबी महाराष्ट्र सार्वजनिक बांधकाम विभागाच्या अनुसूची दरपत्रकात (State Schedule of Rates - SSR) समाविष्ट नसल्याचे निदर्शनास आले असून अशा अनुसूचीबाह्य (Non-Schedule) बाबींसाठी वास्तव बाजारभाव तसेच सविस्तर तांत्रिक तपशील प्राप्त करणे आवश्यक आहे, जेणेकरून DPR मधील अंदाजपत्रके अचूक व प्रमाणित स्वरूपात तयार करता येतील.

त्याअनुषंगाने, या कार्यालयामार्फत पात्र उत्पादक, पुरवठादार, विक्रेते, सेवा संबंधित संस्थांकडून DPR तयार करण्यासाठी आवश्यक असलेल्या अनुसूचीबाह्य बाबींसाठी दरपत्रके तसेच सविस्तर तांत्रिक तपशील मागविणेकामी संदर्भीय पत्रान्वये या कार्यालयास विनंती करण्यात आलेली आहे. त्यास अनुसरून सदर दरपत्रकांसोबत संबंधित बाबींचे संपूर्ण तपशील, तांत्रिक तपशिल (Technical Specifications), उत्पादकाचे नाव (Make), मॉडेल क्रमांक (Model No.) (लागू असल्यास), कामाचे स्वरूप (Scope of Work), स्थापनेचे तपशील व इतर आवश्यक तांत्रिक माहिती विहित नमुन्यामध्ये यासोबत जोडण्यात आलेला आहे.

तरी सदरची जाहिरात ही आपले कार्यालयाच्या संकेतस्थळावर आणि सुचना फलकावर प्रसिद्धी करण्यात यावी ही विनंती.

(दि.पो.खाडे)
विभागीय वन अधिकारी,
कांदळवन विभाग-उत्तर कोकण.

प्रतिलिपी :- सर्व वनक्षेत्रपाल यांना सुचना फलकावर प्रसिद्धी करणेकामी रवाना.
प्रत :- मे. टंडन अर्बन सोल्यूशन, प्रा.लि. मुंबई यांना माहिती व आवश्यक कार्यवाहीकरिता रवाना.

C:\MDNK\17. 308_Mangrove Restoration\2. Hi-Tech Mangrove Nursary\General Letters.docx

Government of Maharashtra

Forest Department

Mangrove Division- North Konkan

Abhimaan II, 5th Floor, Teen Haat Naka, Naupada, Thane (W)-400 602.
Email- dfommcu@gmail.com.

PIM Notice No. DFO/MDNK/Hi-Tech Nursery/Lab/01/2026-27. **Date: -** 28 / 10 /2026.

REQUEST FOR QUOTATION (RFQ)

Subject: - RFQ invited for the technical and financial offers with intention of planning, estimation for the component of "Design, Supply, Installation, Testing, Commissioning, Operation and Maintenance of Four Laboratories for Five Years" at the Hi-Tech Mangrove Nursery, Kelwe, Palghar

1. Invitation

Techno-commercial quotations are invited from experienced laboratory suppliers, system integrators and laboratory operating agencies for design, supply, installation, testing and commissioning of four laboratories, followed by five years of operation and comprehensive maintenance from successful commissioning, at the Hi-Tech Mangrove Nursery, Kelwe, Taluka and District Palghar. The facilities shall support mangrove and non-mangrove nursery operations of Minimum 5 lacs seeding capacity per year.

The quote shall be considered on assumption of Civil works, laboratory furniture and workbenches shall be considered available. The Bidders shall submit the quote in considering the Required Instruments shall comply with minimum specification and makes/models are provided in the **Annexure I**.

2. Laboratories Covered

No.	Laboratory	Principal functions
1	Propagule & Seed Quality	Identity, purity, grading, maturity, moisture, viability, germination, rooting and storage assessment
2	Nursery Quality Control	Seedling growth, root development, grading, hardening, survival and establishment
3	Soil, Sediment & Water Quality	Physical and chemical testing of soil, sediment, growing media and nursery water
4	Plant Health & Plant Pathology	Health screening, microscopy, pest examination and preliminary disease investigation

Tissue Culture Laboratory is excluded from the present scope.

3. Turnkey Scope

- Assess the testing programme and prepare laboratory-wise equipment layouts, workflows and utility requirements.
- Verify available rooms, furniture, workbenches, electricity, water, drainage, ventilation and IT provisions.
- Supply new instruments, reusable apparatus, accessories, instrument software, initial consumables and reference materials.
- Provide transportation, unloading, installation, equipment-side connections, calibration, testing and commissioning.
- Demonstrate the specified tests and prepare species/sample-specific SOPs, quality-control procedures and reporting formats.
- Deploy competent operating personnel and provide comprehensive maintenance, calibration and repairs for 60 months.
- Supply and replenish consumables against the agreed workload; maintain stock, safety and waste records.

- Train departmental staff, coordinate instrument interfaces with the LIMS agency and complete final handover.

Preference shall be given to digital readings, automated calculations, data storage and export, without compromising validated preparation and testing methods. Sample handling, interpretation and quality assurance shall be performed by trained personnel.

4. Testing Requirements

Laboratory	Tests / assessments
Propagule & Seed Quality	Species/source verification; physical purity; maturity/condition; size and weight; moisture; viability; germination; rooting/establishment; vigour; seed-health screening; dormancy/pretreatment trials; storage viability.
Nursery Quality Control	Height; root collar diameter; height-to-diameter ratio; root development/deformity; shoot quality; health screening; root-plug integrity; root/shoot dry weights and ratio; uniformity/grading; hardening; transplant survival; mangrove salinity acclimatisation.
Soil, Sediment & Water Quality	Water pH, EC, salinity, temperature, calculated TDS, DO, turbidity, optical/reference TSS, nitrate, phosphate, ammonia, calcium, magnesium, hardness, alkalinity, chloride, sodium and SAR; soil/substrate pH, EC, moisture, available NPK, texture, carbon/organic matter, bulk density, water retention, porosity, permeability and redox potential.
Plant Health & Plant Pathology	Leaf/stem/root inspection; insect/mite examination; fungal microscopy; root/collar rot and damping-off investigation; preliminary fungal/bacterial culture screening; disease incidence/severity; nematode screening where indicated; validated targeted rapid tests; relative chlorophyll assessment.

Species-wise acceptance criteria and approved methods shall be agreed before routine operation. Screening results shall not be represented as definitive pathogen identification without adequate confirmation.

5. Minimum Instrument Schedule

5.1 Propagule & Seed Quality Laboratory

No.	Instrument/equipment	Minimum quantity	Purpose
1	Digital precision balance, approximately 0.001 g readability	1	Small-seed weighing, seed-weight and moisture tests
2	Digital bench balance, approximately 0.1 g readability	1	Weighing larger mangrove propagules and bulk samples
3	Digital vernier caliper and measuring scale	1 set	Seed/propagule length, diameter and grading
4	Illuminated magnifying lamp	1	Routine inspection, sorting, maturity and damage checks
5	Stereo microscope with camera/display	1	Examination of seed filling, cut sections, insects and visible fungal growth
6	Seed purity board, sorting trays, forceps, spatulas and hand sieves	1 set	Physical purity testing and separation of defective material

No.	Instrument/equipment	Minimum quantity	Purpose
7	Programmable seed germination chamber, with temperature and light control	1	Germination, pretreatment and early vigour trials
8	Thermostatically controlled laboratory hot-air oven, with timer	1	Reference moisture-content testing using the appropriate method
9	Desiccator and moisture-testing containers	1 set	Cooling and handling samples during moisture testing
10	Digital temperature–humidity data loggers	2	Monitoring laboratory and seed-storage conditions
11	Handheld salinity/EC meter	1	Checking water used in mangrove rooting and establishment trials
12	Computer with camera connectivity and simple batch-record software	1	Recording results, photographs, calculations and batch traceability

5.2 Nursery Quality Control Laboratory

No.	Instrument/equipment	Minimum quantity	Purpose
1	Digital vernier caliper	1	Root collar diameter measurement
2	Graduated measuring board, ruler and measuring tape	1 set	Seedling height, root length and shoot measurements
3	Digital precision balance, approximately 0.001 g readability	1	Root and shoot dry-weight measurement
4	Laboratory hot-air drying oven, with digital temperature control	1	Drying root and shoot samples to constant weight
5	Desiccator	1	Cooling dried samples before weighing
6	Illuminated magnifying lamp or handheld magnifier	1	Screening leaves, stems and roots for defects, pests and disease symptoms
7	Root-washing trays, sieves and gentle water-spray arrangement	1 set	Cleaning roots for branching and deformity assessment
8	Root assessment board with measurement grid	1	Standardized root inspection and photographic records
9	Handheld digital salinity/EC meter	1	Monitoring water salinity during mangrove acclimatization trials
10	Temperature–humidity data logger	1	Recording conditions during hardening and assessment trials
11	Digital camera or camera-enabled tablet	1	Photographing seedlings, defects and trial progress
12	Computer with spreadsheet and batch-record templates	1	Calculating ratios, grading, uniformity and survival percentages

5.3 Soil, Sediment & Water Quality Laboratory

No.	Tests to perform	Instrument required	Minimum quantity
1	Water pH, EC, salinity, temperature, calculated TDS and dissolved oxygen	Portable multiparameter water-quality meter with optical DO probe	1 set

No.	Tests to perform	Instrument required	Minimum quantity
2	Soil, sediment and potting-media pH and EC	Digital soil/substrate pH–EC meter, suitable for standardized extracts	1 set
3	Rapid soil/substrate moisture assessment	Digital moisture probe, calibrated for the media and salinity	1
4	Sample moisture content	Halogen moisture analyzer, with validated settings	1
5	Water turbidity	Digital turbidity meter	1
6	Estimated suspended-solids concentration	Optical TSS meter with probe, calibrated against gravimetric results	1
7	Water nitrate, phosphate, ammonia, calcium, magnesium, hardness, alkalinity and chloride	Multiparameter photometer with parameter-specific reagent kits; confirm each method's availability and range	1 set
8	Water sodium	Sodium ion-selective electrode meter	1
9	Sediment/substrate redox potential	ORP meter with sediment-compatible electrode	1
10	Soil available NPK	Instrument-based soil nutrient analyzer with validated extraction and reagent methods	1 set
11	Sodium Adsorption Ratio (SAR)	Computer/software calculation using sodium, calcium and magnesium results	1
12	Sample weighing and preparation	Digital precision balance, shaker and filtration accessories	1 set

Computers/tablets in these schedules shall be met through the separate LIMS/IT package where provided. Dedicated instrument-control computers essential to supplied equipment shall be included and identified. Each laboratory shall have dedicated instruments; sharing equipment across laboratories is not permitted. Submit a laboratory-wise consolidated quantity schedule.

5.4 Additional soil/sediment equipment

Test	Equipment	Minimum quantity
Soil/sediment texture	Laser diffraction particle-size analyzer, with suitable sample-dispersion equipment	1 set
Organic carbon	Solid-sample carbon analyzer, with provision to account for inorganic carbon	1 set
Organic matter by loss on ignition	Programmable muffle furnace, drying oven, balance and desiccator	1 set
Bulk density	Known-volume sampling cores, digital balance and programmable drying oven	1 set
Water-holding capacity and porosity	Substrate water-retention/porosity testing apparatus	1 set
Drainage/permeability	Laboratory permeameter	1 set
Reference TSS and gravimetric TDS	Filtration/evaporation apparatus, drying oven, analytical balance and desiccator	1 set

5.5 Plant Health & Plant Pathology Laboratory

No.	Equipment	Minimum quantity
1	Stereo microscope with digital camera/display	1 set
2	Compound microscope with digital camera	1 set

No.	Equipment	Minimum quantity
3	Illuminated magnifying lamp	1 set
4	Class II biological safety cabinet	1 set
5	Digital temperature-controlled incubator	1 set
6	Automatic laboratory autoclave	1 set
7	Laboratory refrigerator	1 set
8	Electronic balance	1 set
9	Hotplate with magnetic stirrer	1 set
10	Digital pH meter for media preparation	1 set
11	Micropipette set	1 set
12	Moist chambers and sterile dissection accessories	1 set
13	Camera/tablet with image records (coordinate with IT package)	1 set
14	Handheld chlorophyll meter	1 set
15	Nematode extraction apparatus and sieves	1 set
16	Validated target-specific rapid-test starter kits	1 set

5.6 Common support equipment

Equipment	Quantity
Purified-water system with storage/dispensing	1 set / lot
Ducted chemical fume hood	1 set / lot
Critical-instrument UPS and voltage protection	1 set / lot
Instrument software, interface cables and licenses.	1 set / lot
Equipment-side service connection accessories	1 set / lot
Chemical spill kit, eyewash and safety accessories	1 set / lot
Segregated chemical/biological waste containers.	1 set / lot

The biological safety cabinet and chemical fume hood are distinct provisions and shall not be substituted for one another. Specialist molecular tests and unresolved diagnoses shall be referred externally under a disclosed allowance.

6. Initial Reusable Apparatus Package.

Apparatus	Minimum starter provision
Seed-purity boards / sorting trays	2 boards / 12 trays
Forceps, spatulas and dissection tools	4 sets
Seed and soil sieves	1 complete set each
Germination trays/boxes	40
Glass Petri dishes	50
Moisture-testing containers	30
Beakers / conical flasks	24 each, assorted sizes
Volumetric flasks	20, assorted sizes
Measuring cylinders	12, assorted sizes
Burettes and stands, where required	2 sets
Volumetric/graduated pipettes and fillers	1 assorted set
Test tubes / racks	100 tubes / 6 racks
Reusable sample bottles/containers	100, assorted sizes
Funnels	12
Crucibles / evaporation dishes	24 each
Wash bottles	12
Root-washing/sample trays	12
Soil/sediment sampling tools and rings	1 complete set
Slide boxes and microscopy accessories	1 lot
Cuvettes, sample holders and instrument accessories	Complete sets

Provide an itemized schedule. Use borosilicate glass and Class A volumetric ware where required. Select sizes/materials against test methods; include all additional apparatus essential to operation.

7. Initial Consumables — Lump-Sum Package

Quote a separate lump-sum amount for commissioning, training and the first three months of the declared workload, supported by quantities, unit replenishment rates and shelf lives. The purchaser has not prescribed an arbitrary monetary allowance.

- Germination/blotting paper and suitable substrates.
- Filter papers, glass-fiber filters and syringe filters.
- Disposable sample containers, sterile bags, tubes, Petri dishes and pipette tips.
- Gloves, masks, coats and routine PPE.
- Microscope slides, coverslips and suitable stains.
- Photometer reagent kits and soil-extraction/nutrient reagents for all offered methods.
- pH buffers, EC/salinity/turbidity/ion standards and certified carbon reference materials.
- Culture media, disinfectants, sterilization indicators and selected rapid diagnostic kits.
- Sample labels/tags, cleaning materials, waste bags, filters and desiccants.

Consumables shall have adequate remaining shelf life at delivery. Initial three-month provisions shall not be charged again in recurring operating consumables.

8. Five-Year Operation and Staffing

Operate all four laboratories for 60 months from commissioning: sample registration, preparation, testing, QC, review, reporting, inventory, storage monitoring, waste management and coordination with nursery management. Submit monthly reports on samples, tests, quality trends, calibration, stock, staffing, breakdowns and corrective actions.

Submit a qualified staffing plan comprising a laboratory in-charge, analytical personnel, plant-pathology expertise, trained technicians and support staff. Shared roles are acceptable only where competence and workload justify them. Include leave replacements and specialist support.

9. Workload and Consumable Pricing Basis

Declare included monthly seed/propagule batches, seedling assessments, soil/sediment/water samples and parameter determinations, and plant-health investigations. State fixed staffing charges, included consumable workload, additional per-test rates and external referral allowance. The workload shall be agreed before award; unlimited testing shall not be assumed.

10. Comprehensive Maintenance

Provide preventive maintenance, breakdown attendance, repairs, defective-part replacement, instrument software support and scheduled calibration throughout five years. State OEM warranties, response/repair times and prolonged-breakdown arrangements. Identify probes, electrodes, lamps, filters and limited-life components, their expected replacement cycles and included costs. Identify calibration scope and traceability; use competent accredited providers where applicable.

11. Installation and Service Boundaries

Civil works and laboratory furniture are excluded. Normal installation and connections from available service points are included. Before supply, submit drawings, electrical/UPS loads, water quality, drainage, gas, exhaust, room-conditioning requirements and infrastructure deficiencies. Major building/service upgrades shall be separately identified and priced before execution. Include required equipment gas supplies, regulators and safe installation where relevant.

12. Data and LIMS Coordination

Provide digital export wherever available and declare interface compatibility. Cooperate with the separate Smart LIMS agency. Do not duplicate the LIMS, three desktops and laptop under this quotation where already supplied through that package. Include dedicated instrument-control computers when essential. All project-specific results and records belong to the Client.

13. Acceptance and Handover

Acceptance requires inventory verification, installation/operational checks, calibration certificates, representative performance tests with suitable standards and samples, approved SOPs, safety/maintenance procedures, training, manuals, licenses and asset registers. At the end of five years hand over working equipment, complete records, accessible data and service histories.

14. Financial Quotation Format

No.	Description	Amount Excluding GST (INR)
1	Laboratory design, workflows and service assessment	
2	Propagule & Seed Quality instruments	
3	Nursery Quality Control instruments	
4	Soil, Sediment & Water Quality instruments	
5	Plant Health & Plant Pathology instruments	
6	Common equipment, safety and installation accessories	
7	Initial reusable apparatus/glassware — lump sum	
8	Initial three-month consumables/standards — lump sum	
9	Transport, installation, calibration and commissioning	
10	Training, SOPs and documentation	
11	Five-year staffing and laboratory operation	
12	Five-year comprehensive maintenance and calibration	
13	Operating consumables for Months 4–60 against declared workload	
14	External specialist-testing allowance	
	Total excluding GST	
	GST	
	Grand total for establishment and Five years O&M	

Provide equipment-wise costs, Year 1–5 operation/maintenance and consumable charges, taxes, escalation assumptions and unit rates for additional testing. Disclose all exclusions. No double charging of shared equipment or startup consumables is permitted.

15. Bidder Submission and General Conditions

This RFQ seeks technical and financial offers for planning, estimation and finalization of requirements and does not assure award. Clarifications, demonstrations or revised offers may be sought.

Terms and Conditions:

1. Interested vendors / agencies / suppliers, as per the specifications mentioned and in accordance with the Project Information Memorandum (PIM), are required to submit their sealed quotations on the firm's letterhead.
   The quotation shall be submitted either by hand delivery or by post, addressed to:
   The Divisional Forest Officer, Mangrove Division–North Konkan (MDNK),

5th Floor, Abhiman–II Building,
Teen Haat Naka, Naupada, Thane (West)
OR
sent by email to dfommcu@gmail.com in PDF format / scanned copy,
on or before the due date, i.e. 06 / 11 /2026 up to 18.00 Hrs.

2. The rates quoted shall be inclusive of all taxes and duties and exclusive of GST, which shall be shown separately, if applicable.
3. Vendors / agencies / suppliers shall specifically mention the Item Number against which the quotation is being submitted.
4. The sealed quotation envelope shall clearly mention the Quotation Number and the Item Number(s) for which the quotation is being submitted.
5. Conditional quotations and/or quotations received after the due date and time shall not be considered and will be summarily rejected.
6. This Quotation Notice along with the Project Information Memorandum (PIM) has been uploaded on https://mahaforest.gov.in & https://mangroves.maharashtra.gov.in/ website for reference and viewing by interested vendors / agencies / suppliers.
7. Prior to submission of the Techno-Commercial Offer, interested vendors /agencies / suppliers may visit the project site at their own cost to assess site conditions.

Note:-

For Additional information, contact:

1. Mr. D. S. Patil
   M/s. Tandon Urban Solutions Pvt. Ltd. (TUSPL)
   Appointed Project Consultant,
   Mobile: 98927 31835.

2. Mr. Kunal Kasar.
   Department Engineer,
   Mangrove Division-North Konkan.
   Contact No.022-69309286.

(Deepak P. Khade)
Divisional Forest Officer,
Mangrove Division North Konkan.

Copy for Publishing at Notice Board of: All Range Forest Offices of MDNK.

ANNEXURE I

The quote shall be considering the model anticipated and companies make as per the

Ref.	Instrument	General specification	Model make companies
B1	Precision balance	≥200 g; 0.001 g readability; calibration; overload protection; data output preferred Additional tender technical requirements: Electronic top-pan laboratory balance; minimum 200 g capacity and 1 mg readability; repeatability and linearity stated by OEM; external/internal calibration as offered; stainless-steel pan, draft protection as appropriate, tare and overload protection. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	A&D FX-300i (RS232 standard); A&D FZ-300i (RS232 standard)
B2	Bench balance	≥5 kg; 0.1 g readability; corrosion-resistant pan; tare Additional tender technical requirements: Electronic bench scale, minimum 5 kg × 0.1 g, stable weighing indication, tare/zero, stainless-steel pan, overload protection and mains power. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	A&D FG-6KBM (RS232 option); OHAUS Ranger 3000 R31P6 (RS232)
B3	Digital caliper	0–150 mm minimum; 0.01 mm resolution; stainless steel Additional tender technical requirements: Stainless-steel digital vernier caliper, at least 0–150 mm measuring span, 0.01 mm display resolution; outside/inside/depth measurement; supplied with protective case and calibration certificate. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Mitutoyo 500-196-30; digital caliper with RS232/ RS485 output.
B4	Seedling board	Approximately 1 m; stable base; washable; millimeter graduations. Additional tender technical requirements: Rigid washable HDPE or stainless measurement board about 1 m long with mm-graded scale, contrasting markings and stable horizontal / vertical positioning.	HDPE graduated seedling measurement board; custom stainless graduated board
B5	Magnifying lamp	Adjustable LED lamp; approximately 3–5 diopter; stable mounting. Additional tender technical requirements: Bench-	Daylight Omega 5 LED magnifier; Waldmann illuminated magnifier

Ref.	Instrument	General specification	Model make companies
		mounted LED magnifier with adjustable articulated arm; approximately 3–5 diopter optical lens, glare-controlled task illumination and secure mounting.	
B6	Stereo microscope	Approximately 8×–35× or wider; reflected/ transmitted light; digital camera and measurement software. Additional tender technical requirements: Binocular stereo microscope with adjustable approximately 8×–35× or wider magnification, transmitted and incident LED illumination, focusing stand, eyepieces; matched digital camera and image measurement software. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Leica EZ4 W with imaging system; Evident SZ51 with camera
	Germination chamber	Approximately 150–250 L; approximately 10–45°C; programmable light/dark cycles; shelves, alarms and logging Additional tender technical requirements: Programmable germination chamber, approximately 150–250 L useful capacity, setpoint coverage roughly 10–45°C; day/night light programme, temperature controller, shelves, high/low alarms and safe recovery after power interruption. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	BINDER KBW series; programmable germination chamber with RS485/Modbus controller
B8	Drying oven	Approximately 100 L; forced air; timer/controller; over-temperature protection; stainless chamber Additional tender technical requirements: Forced-convection laboratory drying oven about 100 L, stainless-steel inner chamber, programmable temperature/time controller, setpoint/display, over-temperature safety cut-out and removable shelves. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Memmert UF110 (Ethernet); forced-air drying oven with RS485/Modbus RTU controller
B9	Temperature/RH logger	Downloadable data; proposed accuracy ±0.5°C and ±3% RH or better in declared range Additional tender technical requirements: Industrial	Industrial temperature/RH transmitter, RS485/Modbus RTU, with local display

Ref.	Instrument	General specification	Model make companies
		temperature/relative humidity measurement assembly, proposed ±0.5°C / ±3%RH or better over specified working range; continuous digital measurement, wall-mount sensor, local indication or central acquisition; no standalone logger necessary if centralized retention is provided. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	
B10	Salinity/EC meter	Temperature compensation; freshwater–seawater coverage; standards and case Additional tender technical requirements: Portable salinity/conductivity system with automatic temperature compensation, suitable measurement range from freshwater to seawater, calibration standards, rugged probe and carrying case. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Handheld salinity/EC meter with RS232/RS485 interface
B11	Root assessment setup	Grid board, scale, camera support, wash trays and gentle spray Additional tender technical requirements: Washable root assessment grid board with mm markings, measuring scale, fixed camera alignment support, root washing trays, sieves and low-pressure spray accessories.	Custom root-grid board, photo fixture, wash trays
B12	Seed storage	Species-specific controlled conditions; logging/alarm; separate ambient storage as needed Additional tender technical requirements: Species-specific seed-storage arrangement with suitable storage temperature and RH control where needed; racks/containers, monitored conditions and high/low environmental alarms; avoid universal refrigeration settings. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Species-appropriate storage system with RS485/Modbus controller where electronically controlled
C1	Water multiparameter	pH, EC, salinity, calculated TDS, temperature, optical DO; field protection; logging/export;	Hach sc200 with compatible pH, EC and LDO sensors and

Ref.	Instrument	General specification	Model make companies
		complete probes Additional tender technical requirements: Field/laboratory multiparameter system with compatible pH, conductivity/salinity, temperature and optical dissolved oxygen sensors; calculated TDS, calibration kits, protective housing, display, sensor cleaning and exportable results. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Modbus RS232/RS485 module
C2	Soil-extract pH/EC	pH approximately 0–14, 0.01 resolution; temperature compensation; saline extracts; stand Additional tender technical requirements: Laboratory-ready pH / conductivity measurement arrangement for standardized soil/sediment extracts; pH 0–14 with 0.01 resolution, automatic temperature compensation, saline-compatible electrodes, bench stand and calibration standards. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Industrial pH/EC transmitter with RS485/ Modbus; Hach sc200 with suitable electrodes.
C3	Substrate moisture	Volumetric moisture; media calibration; declared saline limitations; reader/logger Additional tender technical requirements: Digital volumetric-water-content probe suitable for nursery substrate and soil; specified working range, site/media calibration procedure, salinity-interference limitations, replaceable sensor and temperature correction if available. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Substrate VWC probe/ transmitter with RS485/ Modbus RTU and media-specific calibration
C4	Halogen moisture	≥50 g; approximately 0.001 g readability; programmable drying/endpoints; data export Additional tender technical requirements: Halogen moisture balance of at least 50 g capacity, approximately 1 mg readability, configurable heating temperature and end-point criteria; moisture/dry mass % and run-history output; sample pans and calibration	Halogen moisture analyser, ≥50 g / 0.001 g, with RS232 output

Ref.	Instrument	General specification	Model make companies
		accessories. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	
C5	Turbidimeter	Approximately 0–1,000 NTU minimum; low-range suitability; standards and storage Additional tender technical requirements: Benchtop turbidimeter spanning at least 0–1,000 NTU with appropriate low-end sensitivity; standards, matched sample cells, calibration/verification process and digitally accessible test readings. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Laboratory turbidity meter, ≥1,000 NTU, with RS232/RS485 interface
C6	Optical TSS	Direct suspended-solids display; matrix-specific calibration; suitable range and cleaning kit Additional tender technical requirements: Submersible optical suspended-solids sensor with controller and suspended-solids display, calibration against gravimetric results for relevant water matrices, cleaning accessories, relevant immersion hardware and alarm/status outputs. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Hach SOLITAX sc with sc200 + Modbus RS232/485 module
C7	Photometer/spectrophotometer	Validated required parameter methods; QC; export; reagents, cuvettes and dilution kit; list uncovered tests Additional tender technical requirements: Laboratory visible or UV-visible spectrophotometer with validated methods for nitrate, phosphate, ammonia, calcium, magnesium, hardness, alkalinity and chloride as available; wavelength/photometric QC, calibration, cuvettes, reagent kits, dilution scheme and accessible results. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Hach DR6000 (Ethernet); RS232-equipped spectrophotometer

Ref.	Instrument	General specification	Model make companies
C8	Sodium ISE system	Compatible meter/electrode; standards: ionic-strength reagents; sample-preparation kit Additional tender technical requirements: Sodium ISE measurement kit with compatible pH/mV/ISE meter, sodium-specific electrode, suitable reference, ionic-strength-adjusting solution, sodium calibration standards and sample vessels. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Sodium ion-selective electrode with laboratory ISE meter and RS232 output
C9	ORP/redox	Approximately ±1,000 mV or wider; sediment electrode; verification solution; reference details Additional tender technical requirements: ORP/mV meter and sediment-compatible redox electrode; at least ±1,000 mV capability, suitable reference system, verified redox standards, electrode care and sample measurement stand. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Hach sc200 with ORP probe and Modbus RS232/RS485 module; industrial RS485/Modbus ORP system
C10	Available NPK	Identify extractable forms, extraction and analytical methods; standards/QC; no unvalidated generic direct NPK probe Additional tender technical requirements: Validated soil extractable N/P/K procedures with specified extraction solutions, QA standards and appropriate laboratory photometric/ion analysis, including a potassium-specific validated method; do not substitute generic unvalidated direct NPK probes. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Validated soil extract photometry using the laboratory-dedicated C7 instrument; RS232-capable potassium measurement system where required
C11	Shaker	Adjustable speed/timer; extraction-vessel clamps; corrosion-resistant platform Additional tender technical requirements: Variable-speed laboratory shaker for soil extraction, programmable operating time, suitable stroke/orbit and vessel clamps, corrosion-resistant platform and	IKA digital orbital shaker; orbital shaker with RS485/Modbus controller

Ref.	Instrument	General specification	Model make companies
		secure loading. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	
C12	Analytical balance	≥200 g; 0.0001 g readability; draft shield; calibration/output Additional tender technical requirements: Analytical balance of at least 200 g capacity and 0.1 mg readability, enclosed draft shield, automatic/manual calibration, stable zero/tare, balance level indicator and data output. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Shimadzu ATX224R (RS232C)
C13	Particle-size analyzer.	Wet dispersion; adequate clay/silt/sand coverage; pretreatment and coarse fraction handling; software Additional tender technical requirements: Laser diffraction particle-size instrument with wet dispersion and software reporting; range capable of capturing fine clay/silt and sand after proper pretreatment, documented sampling and coarse fraction methodology, certified calibration standards. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Malvern Mastersizer series with wet-dispersion accessory
C14	Solid carbon analyzer	Organic/inorganic differentiation or validated correction; autosampler preferred; standards; gas/consumables included Additional tender technical requirements: Solid-sample total/organic carbon analyzer with documented approach to inorganic-carbon subtraction or differential determination; traceable carbon standards, sample introduction system, required carrier gases and complete software. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Elementar soli TOC cube; equivalent solid-sample carbon analyser
C15	Muffle furnace	Working at ≥550°C; approximately 1,000–1,100°C maximum; programmable safety controller	Nabertherm programmable muffle furnace with

Ref.	Instrument	General specification	Model make companies
		Additional tender technical requirements: Programmable laboratory muffle furnace with working capability at ≥550°C, maximum approximately 1,000–1,100°C, insulated chamber, programmable ramp/soak steps, thermal protection and temperature readout. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	RS485/Ethernet controller option
C16	Bulk density	Known-volume stainless rings and sampling tools; shared balance/oven Additional tender technical requirements: Known-volume stainless-steel soil bulk density rings, driving/sampling tools, ring volume certificate, spatulas and sample handling accessories; include dedicated laboratory weighing/drying arrangement.	Eijkelkamp known-volume steel ring set; SS sampling rings (local)
C17	Retention/porosity	Controlled saturation/drainage; defined volume; validated growing-media procedure Additional tender technical requirements: Substrate retention/porosity apparatus using calibrated container volume, controlled saturation and free drainage, supporting accessories and written validated reporting procedure.	Eijkelkamp sandbox/retention apparatus; validated saturation-drainage assembly
C18	Permeameter	Constant/falling head as applicable; holders, reservoirs, tubing and measurement Additional tender technical requirements: Laboratory permeameter with constant-head and/or falling-head modes to match soil type; specimen holders, water reservoir, tubes, calibrated head/volume measurement and operation procedure.	Eijkelkamp permeameter; calibrated constant/falling head rig
C19	Reference TSS/TDS	Vacuum filtration/evaporation; filters, dishes, drying and desiccation; analytical weighing Additional tender technical requirements: Vacuum filtration and evaporation setup for gravimetric TSS/TDS, compatible filter holder, glass-fiber filters, vacuum pump, evaporating dishes, desiccation and dedicated analytical weighing/drying facilities.	Sartorius vacuum filtration assembly; Merck Millipore filtration apparatus
D1	Stereo microscope	As B6; dedicated/shared only if workflow and contamination control permit Additional tender technical requirements: Dedicated binocular stereo microscope for pathology use, with 8×–35× or broader magnification, reflected/transmitted illumination, digital camera and	Leica EZ4 W; Evident SZ51 with suitable camera

Ref.	Instrument	General specification	Model make companies
		image capture/measurement software; no sharing with Seed Quality laboratory. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	
D2	Compound microscope	Approximately 40×–1,000×; mechanical stage; LED; camera and software Additional tender technical requirements: Compound brightfield microscope, 40×–1,000× including oil immersion, LED illuminator, mechanical XY stage, condenser, camera and image measurement software. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Leica DM500 + camera; Nikon ECLIPSE Ei + camera
D3	Class II cabinet	Approximately 1.2 m work width; HEPA; airflow alarm; operator/product/environment protection; installation certification Additional tender technical requirements: Class II Type A2 biological safety cabinet, work opening around 1.2 m, certified HEPA filtration, airflow monitoring/alarm, sash interlock as relevant, commissioning and performance testing to applicable standard.	Esco Airstream AC2-4S; Thermo Scientific Herasafe 2030i
D4	Incubator	Approximately 100 L; maintain intended 25–35°C; shelves, logging/alarm; cooling where ambient requires Additional tender technical requirements: Laboratory incubator approximately 100 L with stable 25–35°C operation, adjustable shelves, setpoint temperature display, high/low alarms and cooling function where local ambient makes it essential. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	BINDER KB 115; cooled incubator with RS485/Modbus controller
D5	Autoclave	Approximately 50–75 L; validated 121°C cycles; interlocks; pressure/temperature indication and cycle records Additional tender technical requirements: Automatic laboratory autoclave approximately 50–75 L,	Systec VX-75; Tuttnauer 3870ELV

Ref.	Instrument	General specification	Model make companies
		validated 121°C sterilization cycles, safe pressure relief/interlocks, cycle temperature/pressure recording, temperature probe and sterilization indicators. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	
D6	Refrigerator	Laboratory grade; approximately 200–300 L; 2–8°C; logger/display and alarm Additional tender technical requirements: Laboratory-grade refrigerator approximately 200–300 L, maintain 2–8°C with digital temperature display, adjustable alarm limits and adequate recovery from door opening; sample-safe shelving. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	PHCbi MPR-series laboratory refrigerator; 2–8°C laboratory refrigerator with RS485/Modbus controller
D7	Hotplate/stirrer	Digital controls; approximately 2 L stirring; probe; over-temperature protection Additional tender technical requirements: Digital hotplate and magnetic stirrer with approximately 2 L stirring capacity, adjustable speed, ceramic/stainless top as suitable, temperature probe and independent over-temperature protection. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	IKA digital hotplate/stirrer with RS232-equipped configuration
D8	Media pH meter	Approximately pH 0–14; 0.01 resolution; temperature compensation; suitable electrode Additional tender technical requirements: Benchtop pH instrument for culture media, approximately 0–14 pH range and 0.01 pH resolution, automatic temperature compensation, suitable electrode and 2/3-point buffer calibration. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Laboratory pH meter with RS232 interface, ATC and media-preparation electrode

Ref.	Instrument	General specification	Model make companies
D9	Micropipettes	Suitable individual ranges together covering approximately 0.5–1,000 µL; tips and calibration Additional tender technical requirements: Adjustable-volume micropipette set collectively covering approximately 0.5–1,000 µL; appropriate sizes, sterile tips, stands and calibration certificates.	Eppendorf Research plus; Gilson PIPETMAN
D10	Moist chamber/sampling	Sealed washable chambers, sterile tools, slides and containment Additional tender technical requirements: Washable sealed moist chambers, disinfectable trays, sterile cutting tools, forceps, sample bags, specimen slides and suitable containment accessories.	Sterile moist chamber set; Tarsons glassware/ accessory package
D11	Nematode extraction	Baermann-type assembly, sieves and counting dishes Additional tender technical requirements: Complete Baermann-type nematode extraction kit with stand, funnels, tubing/clamps, mesh/sieves and counting dishes; operating instructions and sample handling accessories.	Baermann funnel apparatus with sieves; suitable counting dishes
D12	Chlorophyll meter	Non-destructive relative chlorophyll; repeatable clamping; stored readings Additional tender technical requirements: Non-destructive handheld relative chlorophyll meter, repeatable leaf clamping, optical measurement suitable for target leaf types, internal result storage and export facility. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Konica Minolta SPAD-502Plus; Apogee MC-100
D13	Rapid kits	Target-specific validated kits, controls, expiry/storage and instructions Additional tender technical requirements: Validated target-specific plant pathogen rapid test strips/kits with corresponding controls, stated sensitivity/limitations, expiry dates, storage conditions and manufacturer instructions.	Agdia ImmunoStrip target-specific kits; BIOREBA rapid kits
E1	Purified water	Approximately 10 L/hour or justified capacity; method-suitable quality; storage/monitoring Additional tender technical requirements: Laboratory RO/DI or equivalent purified-water system, nominal approximately 10 L/h or demand-justified, defined output conductivity/quality, storage/dispensing, cartridge replacement indication and water-quality monitoring.	RO/DI laboratory water system with RS485/Modbus water-quality transmitter; ELGA PURELAB range

Ref.	Instrument	General specification	Model make companies
		Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	
E2	Fume hood	Approximately 1.2 m; chemical-resistant surface; ducted exhaust; airflow alarm; performance check Additional tender technical requirements: Approximately 1.2 m ducted chemical fume hood with chemical-resistant work surface, safe sash design, adequate exhaust, airflow display/low-flow alarm, performance verification and exhaust connection details. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Esco Frontier Acela; 1.2 m ducted chemical fume hood with RS485/Modbus airflow monitor
E3	UPS/protection	Sized to loads and defined backup/shutdown needs Additional tender technical requirements: Online/line-interactive UPS and voltage protection sized by actual connected critical equipment loads; automatic voltage regulation, appropriate battery hold-up, bypass/shutdown provisions and serviceable battery design. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	APC Smart-UPS with network management option; Vertiv GXT with Modbus option
E4	Desiccators	Suitable volume, seal and desiccant Additional tender technical requirements: Sealable borosilicate glass or compatible polymer desiccators with appropriate internal tray volume and replaceable silica gel or equivalent desiccant.	Borosil glass desiccator; Tarsons PP desiccator
E5	Glassware	Borosilicate; Class A volumetric ware where required; chemical compatibility Additional tender technical requirements: Borosilicate laboratory glassware with Class A-certified volumetric flasks, burettes and pipettes as required; compatible beakers, cylinders and dishes in stated sizes.	Borosil Class A; DWK DURAN Class A glassware

Ref.	Instrument	General specification	Model make companies
E6	Sampling tools/trays	Corrosion-resistant; washable; suitable for saline samples Additional tender technical requirements: Corrosion-resistant sampling scoops, stainless tools and washable HDPE/stainless sample trays suited for saline sediment, nursery water and root handling.	Tarsons HDPE trays + SS scoops; Eijkelkamp sampling tools
E7	Camera/tablet	Clear sample images; timestamp/export; coordinate with IT scope Additional tender technical requirements: Digital camera/tablet with adequate close-focus specimen photography, date/time metadata and secure image transfer; coordinate procurement with separate IT package to prevent duplication. Must Have at least One industry standard communication interface like RS232, RS485, Ethernet PI capable of providing data to any third Party application via standard protocols like Modbus RTU/TCP or via API.	Digital camera/tablet as provided through the separate IT package
E8	Safety/waste	Spill kit, eyewash, PPE, segregated labelled waste containers and containment Additional tender technical requirements: Chemical spill materials, compatible eyewash, PPE, spill containment and clearly segregated chemical/biological waste containers with signage and appropriate disposal accessories.	Justrite safety kit; certified eyewash/waste containment package

Model/interface note: Named makes/models are indicative candidates, not pre-approved compliant products. Quotation supplier shall supply OEM datasheets, exact ordered configurations and native protocol/register documentation for instruments designated for digital integration. Allowed interfaces: Modbus RTU/TCP, EtherNet/IP, CANbus, RS232 or RS485. USB-only/cloud-only shall not substitute. Manual/passive apparatus does not require fieldbus connectivity. No laboratory equipment shall be shared across laboratories.

Annexure I -- Configuration and Method Notes

- Photometer coverage shall be verified parameter by parameter. Calcium/magnesium methods may report hardness equivalents; specify conversions and dilution/interference controls. Sodium requires its separate supported method.
- Optical TSS is an estimate requiring matrix calibration and gravimetric verification. Calculated TDS is not gravimetric TDS.

- Laser diffraction texture results require a defined interpretation and shall not be assumed identical to sedimentation-method texture.
- Organic matter by loss on ignition is method-dependent and is not interchangeable with directly measured organic carbon.
- Seed storage shall follow species-specific protocols; do not apply a universal refrigeration temperature.
- Chemical fume hood exhaust and biological safety cabinet certification shall be included. Additional room ventilation or building alterations must be disclosed.