ICAR-Central Agroforestry Research Institute
Jhansi :: Uttar Pradesh

Scientific Equipment @ CAFRI Central Facility

S. No.	Instrument	Lab
1.	Microscope	TIR
2.	Bomb Calorimeter with Desktop	TIR
3.	PCR (Conventional PCR)	TIR
4.	UV Transilluminator	TIR
5.	Oil Extraction Unit	TIR
6.	Gel Documentation System	TIR
7.	RT-PCR (Applied Biosystems StepOnePlus)	TIR
8.	Nanodrop/Eppendorf	TIR
9.	Atomic Absorption Spectrophotometer	Soil Science
10	Automatic N Analyser	Soil Science
11	Flame Photometer	Soil Science
12	Line quantum sensor	Agronomy
13	UV/VIS Spectrophotometer (Parkin Elmer) Lambda-25	Tree Physiology
14	Refrigerated Centrifuge (Sigma 3-30K)	Tree Physiology
15	LI 6400XT Portable photosynthesis system (LI-COR)	Tree Physiology
16	Leaf area meter (CI-203)	Tree Physiology
17	Portable Water potential system (Psypro-Wescor)	Tree Physiology
18	Electrophoresis Unit (Atto-corporation)	Tree Physiology
19	Line Quantum Sensor (Licor) with data logger	Tree Physiology
20	Digital Plant Canopy Imager (CI-110)	Tree Physiology
21	Chlorophyll Content meter (CCM-200)	Tree Physiology
22	Deep Freezer (-20^{o}C) (Panasonic Model MDF U5312)	Tree Physiology
23	Muffle furnace (5-12L, 1000-1200 ^{0}C)	Agroforestry
24	Spiegel Relaskop	Agroforestry
25	Rotatory Microtome (Haven Labs)	Agroforestry
26	Grinder (Big size)	Agroforestry
27	Wood Working Machine	Agroforestry
28	Laminar flow	Plant Protection
29	Digital Vernier Calliper	Plant Protection
30	Cordless electric chain saw	Plant Protection
31	Stereo zoom microscope with 6MP Camera and Software	Plant Protection

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(https://cafri.res.in)

Standard Operating Procedure (SOP) for Use of Scientific Equipment @ CAFRI

1. Purpose

To establish a standardized procedure for the safe, effective, and responsible use of scientific equipment in research laboratories, ensuring data quality, equipment longevity, user safety, and compliance with institutional regulations.

2. Scope

This SOP applies to all scientific instruments and equipment used in research laboratories, including analytical, biological, chemical, physical, and environmental research facilities. It is applicable to faculty members, scientists, technical staff, students, research scholars, and visiting researchers.

3. Responsibility

Laboratory In-Charge

- Ensure availability and proper functioning of equipment.
- Approve authorized users based on the prior request.
- Ensure periodic maintenance and calibration.
- Monitor compliance with SOPs.

Equipment Custodian/Technical Officer

- Maintain equipment records and logbooks.
- Conduct user training in coordination with training calendar of the Institute.
- Schedule preventive maintenance and calibration.
- Report equipment malfunction promptly.

Users

- Provide necessary training to the users before operating equipment.
- Follow prescribed operating procedures, which can be shared with users.
- Record usage details in equipment logbooks.
- Report faults, accidents, or unusual observations immediately.

4. General Safety Requirements

Before operating any equipment, users shall:

- Read and understand the equipment manual as well as instructions from the incharge and SOP.
- Wear appropriate Personal Protective Equipment (PPE):
    - Laboratory coat
    - Safety goggles
    - Gloves
    - Closed-toe footwear
- Ensure familiarity with emergency procedures.
- Verify availability of fire extinguishers, first-aid kits, and emergency contacts.
- Avoid eating, drinking, or unauthorized activities in the laboratory.

5. Authorization and Access

- Only trained and authorized personnel may operate equipment.
- User authorization shall be documented.

- Access to specialized instruments shall be controlled by the laboratory in-charge.
- Visitors and trainees shall operate equipment only under supervision.

6. Pre-Operation Procedure

Before using any instrument:

6.1 Equipment Inspection

- Check physical condition of the equipment.
- Verify cleanliness and absence of visible damage.
- Inspect electrical connections and cables.
- Confirm availability of consumables and reagents.

6.2 Calibration Verification

- Verify calibration status.
- Ensure calibration certificates are current.
- Perform routine performance checks where applicable.

6.3 Environmental Conditions

- Confirm appropriate temperature and humidity.
- Ensure uninterrupted power supply where required.
- Verify adequate ventilation.

6.4 Documentation

- Sign the equipment logbook.
- Record:
    - Date and time
    - User name
    - Purpose of use
    - Sample identification
    - Initial instrument status

7. Equipment Operation

During operation:

- Follow manufacturer instructions and approved protocols.
- Use only approved reagents, accessories, and consumables.
- Do not exceed operational limits.
- Monitor equipment performance continuously.
- Never leave critical experiments unattended unless permitted by protocol.
- Avoid unauthorized modifications to instrument settings.

Data Management

- Save data using designated file naming conventions.
- Maintain backups of raw and processed data.
- Record observations in laboratory notebooks.

8. Post-Operation Procedure

After completion of work:

8.1 Shutdown

- Follow manufacturer-recommended shutdown procedures.
- Switch off power supply where applicable.
- Secure instrument against unauthorized use.

8.2 Cleaning

- Remove samples and consumables.
- Clean instrument surfaces and accessories.
- Dispose of waste according to laboratory waste management guidelines.

8.3 Documentation

Record:

- Log books must be updated with regard to usage
- Instrument performance observations
- Any maintenance performed
- Problems encountered
- Signature of user

9. Equipment Maintenance

Routine Maintenance

- Conduct maintenance according to manufacturer schedules.
- Maintain maintenance records.
- Replace worn components promptly.

Preventive Maintenance

- Schedule periodic servicing.
- Verify performance after maintenance.
- Document all service activities.

Calibration

- Calibrate instruments at prescribed intervals.
- Maintain calibration certificates.
- Label equipment with calibration due dates.

10. Equipment Malfunction

In case of malfunction:

1. Stop operation immediately.
2. Switch off equipment safely.
3. Label equipment as "OUT OF SERVICE."
4. Inform the laboratory in-charge.
5. Record details in the equipment logbook.
6. Do not attempt repairs unless authorized by the competent authority.

11. Emergency Procedures

Electrical Hazard

- Disconnect power if safe to do so.
- Inform laboratory personnel.
- Seek technical assistance.

Chemical Spill

- Follow laboratory chemical spill response procedures.
- Use spill kits where appropriate.
- Report incident immediately.

Fire

- Activate fire alarm.
- Use suitable fire extinguisher if trained.
- Evacuate if necessary.

Injury

- Provide first aid.
- Notify supervisor.
- Complete incident reporting documentation.

12. Record Keeping

The following records shall be maintained:

- Equipment inventory register

- User authorization records
- Equipment logbooks
- Maintenance records
- Calibration certificates
- Service reports
- Incident and accident reports

Records shall be retained according to institutional policies.

13. Quality Assurance

To ensure reliability of research data:

- Use calibrated instruments.
- Conduct routine performance verification.
- Participate in inter-laboratory comparisons where applicable.
- Follow Good Laboratory Practices (GLP).
- Maintain traceability of measurements and data.

14. Compliance

Failure to comply with this SOP may result in:

- Suspension of equipment access.
- Corrective training requirements.
- Disciplinary action as per institutional regulations.

This SOP is adapted into equipment-specific SOPs for instruments such as Atomic Absorption Spectrophotometer, GC-MS, spectrophotometers, microscopes, PCR systems, elemental analyzers, soil and plant analysis equipment, remote sensing instruments, and agroforestry research laboratory facilities.

Interested ICAR scientists to access the facilities from other institutes may write to director.cafri@icar.org.in for necessary permissions.