

STANDARD OPERATING PROCEDURE (SOP)
Central Soil Analytical Laboratory (CSAL)
ICAR–Indian Institute of Farming Systems Research (ICAR-IIFSR)
Modipuram, Meerut – 250110, Uttar Pradesh

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Laboratory

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1. INTRODUCTION

The Central Soil Analytical Laboratory (CSAL) of ICAR-IIFSR, Modipuram provides reliable analytical services for soil, water, plant, organic manures, fertilizers and greenhouse gas (GHG) samples to support research, education, extension and farming systems development. The laboratory serves scientists, students, universities, government organizations, NGOs, private agencies and farmers through standardized analytical procedures. Further, the laboratory is equipped with sophisticated equipment i.e. Kjeldhal Auto Analyzer, KEL Plus semi-auto analyzer, digesters, flame photometer, UV-VIS spectrophotometer, CHNS analyzer, Gas chromatograph, Atomic Absorption Spectroscopy, laminar air flow system, Yoder apparatus etc. with round the clock working atmosphere in the laboratory.

2. OBJECTIVES

The objectives of CSAL are to:

- Provide accurate and reliable analytical services.
- Support research programmes of ICAR-IIFSR along with AICRP-IFS and AI-NPOF centres located in various Agro-ecology of the country.
- Facilitate external research organizations.
- Maintain quality analytical standards.
- Generate high-quality analytical data for scientific publications.
- Promote sustainable farming systems through analytical support.

3. SCOPE

This SOP applies to:

- Internal research projects
- External research projects
- ICAR institutes
- State Agricultural Universities
- Central Universities
- Private Universities
- Government Departments
- NGOs
- Industries
- Farmers
- Individual Researchers

- Students (MSc/PhD)

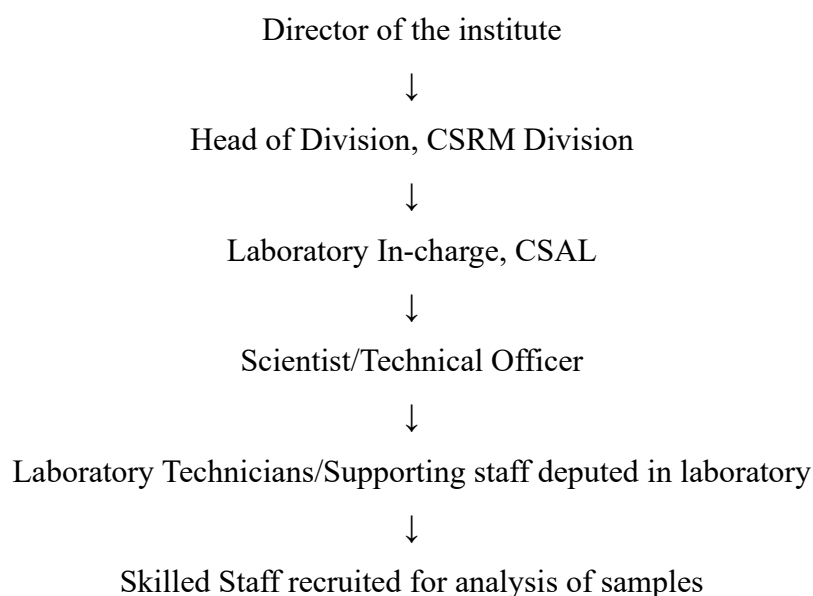
4. LABORATORY PROFILE

Name : Central Soil Analytical Laboratory (CSAL)
 Institute : ICAR–Indian Institute of Farming Systems Research
 Location : Modipuram, Meerut, Uttar Pradesh

Functions:

- Soil fertility evaluation
- Soil health assessment
- Water quality analysis
- Plant nutrient analysis
- Organic manure characterization
- Greenhouse gas analysis
- Soil biological analysis
- Carbon sequestration studies
- Nutrient management studies
- Long-term experimental sample analysis

5. ORGANIZATIONAL STRUCTURE



6. LABORATORY WORKING HOURS

Working Days : Monday to Friday (Need based open of Saturday)
 Working Time : 09:00 AM – 05:30 PM
 Sample Acceptance : 09:30 AM – 04:00 PM

Closed on : Government Holidays

7. FACILITIES AVAILABLE

The laboratory provides analysis of:

Soil Samples

- Physical properties
- Chemical properties
- Biological properties
- Soil health indicators

Water Samples

- Irrigation water quality
- Drinking water quality (agricultural parameters)

Plant Samples

- Macro nutrients
- Secondary nutrients
- Micronutrients

Organic Manures

- Compost
- Vermicompost
- FYM
- Poultry manure
- Biogas slurry
- Crop residues

Greenhouse Gas Analysis

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)

8. MAJOR EQUIPMENT AVAILABLE

The laboratory is equipped with modern analytical instruments, including:

- Elemental Analyzer (CHNS)
- Atomic Absorption Spectrophotometer (AAS)
- UV-Visible Spectrophotometer
- Flame Photometer

- Continuous Flow Analyzer
- Kjeldahl Digestion and Distillation Unit
- Soxhlet Extraction Unit
- pH Meter
- EC Meter
- Auto Titrator
- Soil Texture Analyzer
- Hydrometer Set
- Muffle Furnace
- Hot Air Oven
- Incubators
- Refrigerated Centrifuge
- Orbital Shaker
- Mechanical Shaker
- Analytical Balance
- Moisture Analyzer
- Water Purification System
- Gas Chromatograph (ECD/FID) for GHG analysis
- Refrigerators and Deep Freezers
- Laminar Air Flow
- Vacuum Pump
- Digestion Blocks

9. ANALYTICAL SERVICES

Soil

Physical

- Texture
- Bulk density
- Particle density
- Aggregate stability
- Water holding capacity
- Infiltration
- Hydraulic conductivity

Chemical

- pH
- EC
- Organic Carbon
- Available N
- Available P
- Available K
- Available S
- Exchangeable Ca
- Exchangeable Mg
- Micronutrients
- CEC
- ESP
- SAR

Biological

- Microbial Biomass Carbon
- Microbial Biomass Nitrogen
- Soil Respiration
- Enzyme Activities
- Earthworm population (if applicable)

Water

- pH
- EC
- TDS
- Carbonates
- Bicarbonates
- Chloride
- Sulphate
- Nitrate
- Sodium
- Potassium
- Calcium
- Magnesium
- SAR
- RSC

Plant

- Nitrogen
- Phosphorus
- Potassium
- Sulphur
- Calcium
- Magnesium
- Zinc
- Iron
- Copper
- Manganese
- Boron

Organic Manures

- Moisture
- Organic Carbon
- Total Nitrogen
- C:N Ratio
- Phosphorus
- Potassium
- Sulphur
- Micronutrients
- Bulk Density
- Electrical Conductivity
- pH

Greenhouse Gases

- CO₂ Flux
- CH₄ Flux
- N₂O Flux

10. SAMPLE SUBMISSION GUIDELINES

An application by the applicant shall submit in the name of Director ICAR-IIFSR, Modipuram with:

- Filled sample submission form
- Purpose of analysis

- Sample details
- Number of samples
- Contact details

Sample Quantity

Sample	Quantity
Soil	500 g–1 kg
Water	1/2 - 1 litre
Plant	300–500 g
Organic manure	500 g
Gas sample	As per protocol

Samples must be:

- Properly labelled
- Air dried (soil)
- Free from contamination
- Packed in clean containers

11. SAMPLE ACCEPTANCE

Samples will be rejected if:

- Improper labelling
- Leakage
- Insufficient quantity
- Wet soil without instruction
- Contaminated samples

12. PROCEDURE FOR EXTERNAL SAMPLE ANALYSIS

Step 1

Applicant can contact to ICAR-IIFSR, Modipuram through:

- Email
- Telephone
- Institute website
- Physical visit

Step 2

Write an application in the name of Director, ICAR-IIFSR, Modipuram.

Step 3

Submit:

- Sample
- Application Form

Step 4

Laboratory scrutinizes samples.

Step 5

Unique Sample ID generated through entry in the sample register.

Step 6

Sample processing.

Step 7

Laboratory analysis as per the need of the applicant.

Step 8

Analytical report issued after receiving the payment from the applicant

13. ANALYTICAL METHODS

The laboratory follows:

- BIS Standards
- ICAR Methods
- FAI Methods
- APHA Methods
- ASTM Methods
- ISO Methods
- Standard Soil Analysis Manuals

14. QUALITY ASSURANCE

QA/QC measures include:

- Standard Reference Materials
- Calibration
- Duplicate samples
- Blank samples
- Certified chemicals
- Instrument maintenance
- Internal quality checks
- Inter-laboratory comparison (where applicable)

15. REPORTING OF RESULTS

Reports shall include:

- Sample ID
- Date received
- Date analyzed
- Parameters analyzed
- Units
- Analytical methods
- Signature of Analyst
- Approval of Laboratory In-charge

Turnaround Time:

Routine analysis:

10–20 working days

Specialized analysis:

20–45 working days

Depending upon workload.

18. PROPOSED ANALYTICAL CHARGES

Sample	Charges (₹/sample)
Soil (Basic Fertility Package) pH, EC, SOC, NPK	500
Soil (Complete Analysis) pH, EC, SOC, N, P, K, S, Ca, Cu, Fe, Zn, Mn	1500
Soil Biological Analysis (Total microbial population, DHA, FDA, phosphatases, Glomalin, Urease)	2,500
Soil Physical Analysis (BD, PD, Texture analysis, Aggregate stability)	1,000
Water Quality Analysis	1500
Plant Nutrient Analysis	1,200
Organic Manure Analysis	1,500
Micronutrient Package	900
Heavy Metals	1200
Available NPK	300
GHG Analysis (CO ₂ , CH ₄ , N ₂ O)	1800

16. PAYMENT PROCEDURE

Payment may be made through:

- Online Transfer
- Institute-approved payment gateway

17. SAMPLE DISPOSAL

Samples will be preserved for three months after issue of report. Thereafter, samples will be disposed of as per laboratory procedures unless otherwise requested in writing.

18. LABORATORY SAFETY

All users shall comply with laboratory safety requirements.

Personal Protective Equipment (PPE)

- Laboratory coat
- Safety goggles
- Gloves
- Closed footwear
- Face mask (where necessary)

Chemical Safety

- Follow Material Safety Data Sheets (MSDS)
- Proper labelling of chemicals
- Safe storage of acids, alkalis and solvents
- Use fume hoods for hazardous chemicals

Instrument Safety

- Operate only after training
- Follow manufacturer guidelines
- Record usage in instrument logbooks

Emergency Preparedness

- Fire extinguishers
- First-aid kit
- Eye wash station
- Emergency exits
- Spill management procedures

19. WASTE DISPOSAL

- Segregate chemical waste
- Neutralize acids/alkalis where appropriate
- Dispose of hazardous waste through authorized agencies
- Do not discharge untreated chemicals into drains

20. CONFIDENTIALITY

All analytical results are confidential and shall be released only to the submitting client or an authorized representative unless disclosure is required by law or approved by the competent authority.

21. RESPONSIBILITIES

Laboratory In-charge

- Overall management
- Quality assurance
- Approval of reports
- Instrument maintenance oversight

Analysts

- Sample preparation
- Analysis
- Documentation
- Data recording

Technical Staff

- Instrument operation
- Chemical preparation
- Sample storage
- Waste management

Clients

- Correct sample collection
- Proper labelling
- Timely payment
- Compliance with submission guidelines

22. GRIEVANCE REDRESSAL

Queries regarding analytical reports, delays, or laboratory services may be submitted to the Laboratory In-charge through Director, ICAR-IIFSR, Modipuram. Complaints will be acknowledged promptly and resolved following institute procedures.

23. ANNEXURES

- Annexure I: Sample Submission Form
- Annexure II: Sample Collection Guidelines (Soil, Water, Plant, Organic Manure, GHG)

- Annexure III: Analytical Request Form
- Annexure IV: Schedule of Charges
- Annexure V: Payment Details
- Annexure VI: Instrument Logbook Format
- Annexure VII: Sample Receipt Register
- Annexure VIII: Chain of Custody Form
- Annexure IX: Laboratory Safety Checklist
- Annexure X: Analytical Report Format