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SOP MANUAL FOR CENTRAL LABORATORY FACILITY

STANDARD OPERATING PROCEDURE (SOP) MANUAL FOR CENTRAL LABORATORY FACILITY

Analysis of Soil, Plant, Water, Milk, Animal
Tissue, Blood Samples, Fish, Feed and
Fodder



भाकृअनुप-महात्मा गाँधी समेकित कृषि अनुसंधान संस्थान

ICAR-MAHATMA GANDHI INTEGRATED
FARMING RESEARCH INSTITUTE

Piprakothi, Motihari, Bihar, India



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**ICAR- MAHATMA GANDHI INTEGRATED FARMING RESEARCH
INSTITUTE**

Piprakothi, Motihari (East Champaran) Bihar - 845 429

STANDARD OPERATING PROCEDURE (SOP) MANUAL FOR CENTRAL LABORATORY FACILITY (CLF)

Analysis of Soil, Plant, Water, Milk, Animal Tissue, Blood Samples, Fish, Feed and Fodder

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Preface

It gives me great pleasure to present the Standard Operating Procedure (SOP) Manual for the Central Laboratory Facility at ICAR–Mahatma Gandhi Integrated Farming Research Institute (ICAR-MGIFRI), Piprakothi, Motihari, Bihar. The Central Laboratory plays a vital role in supporting research, education, extension, and consultancy by providing reliable analytical services for soil, plant, water, fish, milk, feed, fodder, animal tissue, blood, and other agricultural and biological samples. The quality and credibility of these analytical services depend upon standardized procedures, competent personnel, calibrated equipment, and a strong commitment to quality and safety.



This SOP Manual has been developed to establish uniform procedures for all laboratory activities, including sample receipt and registration, analytical workflow, instrument operation and maintenance, quality assurance and quality control, laboratory safety, documentation, waste management, and reporting of analytical results. The manual has been prepared in accordance with the principles of Good Laboratory Practices (GLP) and incorporates practices consistent with the requirements of ISO/IEC 17025:2017, while also considering relevant national and international analytical standards. Its implementation will strengthen the reliability, traceability, and reproducibility of laboratory data and foster continual improvement in laboratory performance.

I encourage all scientists, technical officers, laboratory staff, research scholars and authorized users to familiarize themselves with the procedures described in this manual and to adhere to them diligently. Compliance with these SOPs is essential for maintaining the highest standards of analytical excellence, laboratory safety, environmental responsibility, and professional integrity. I congratulate all scientists, and staff members who contributed to the preparation of this manual. Their collective efforts have resulted in a valuable document that will support the efficient functioning of the Central Laboratory Facility and enhance the quality of services provided to farmers and other stakeholders. I am confident that this SOP Manual will serve as an effective guide for ensuring consistency, quality, and continual improvement in all laboratory activities and will contribute significantly to the Institute's mission of advancing sustainable agricultural research and development.

A handwritten signature in blue ink, likely belonging to the Director.

(Director)

ICAR–Mahatma Gandhi Integrated Farming Research Institute
Piprakothi, Motihari, Bihar

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1. INTRODUCTION

The Central Laboratory of ICAR–Mahatma Gandhi Integrated Farming Research Institute (ICAR-MGIFRI), Piprakothi, Motihari, Bihar, is a multidisciplinary analytical facility established to provide reliable, accurate, and timely analytical services in support of research, education, technology assessment, and extension activities. The laboratory serves scientists, research scholars, students, farmers, government organizations, private agencies, and other stakeholders by conducting qualitative and quantitative analyses of soil, plant, water, milk, animal tissues, blood, feed, fodder, and other agricultural and biological samples.

The laboratory plays a pivotal role in supporting the Institute's mandate of promoting sustainable and integrated farming systems through scientific evaluation of soil fertility, plant nutrition, water quality, fish health, fish life history, livestock nutrition, animal health, environmental quality, and agricultural resource management. Analytical data generated by the laboratory contribute to research projects, field experiments, livestock production studies, natural resource management, nutrient budgeting, environmental monitoring, quality evaluation, and evidence-based recommendations for improving agricultural productivity and sustainability.

This Standard Operating Procedure (SOP) manual has been developed to establish a uniform system for the operation, management, and utilization of the Central Laboratory Facilities of the institute. It prescribes standardized procedures for sample receipt, registration, coding, storage, preparation, analysis, quality assurance and quality control (QA/QC), instrument operation and maintenance, calibration, documentation, reporting of analytical results, laboratory safety, waste management, and record retention. Adoption of these standardized procedures ensures consistency, traceability, reproducibility, and technical competence in all laboratory operations. The laboratory is equipped with modern analytical instruments and facilities for physicochemical, biochemical, and nutritional analyses of agricultural, environmental, and biological samples using validated analytical methods. All analyses are carried out following nationally and internationally accepted standard methods.

This SOP Manual is intended for use by the Laboratory In-charge, Quality Manager, Scientists, Technical Officers, Laboratory Technicians, Research Scholars, Students, and all authorized laboratory users. Strict adherence to these procedures promotes Good Laboratory Practices (GLP), ensures laboratory safety, protects the integrity of samples and analytical data, minimizes operational errors, and facilitates continual improvement of laboratory performance. The SOP is designed to support implementation of a robust Quality Management System consistent with the principles of NABL, BIS, ISO/IEC 17025:2017 – General Requirements for the Competence of Testing and Calibration



Laboratories. The manual also serves as a reference document for laboratory management, internal quality assurance, personnel training, internal audits, and the continual enhancement of analytical services provided by the Central Laboratory of ICAR-MGIFRI.

2. SCOPE

This Standard Operating Procedure (SOP) Manual applies to the operation, management, and utilization of the Central Laboratory of ICAR–Mahatma Gandhi Integrated Farming Research Institute (ICAR-MGIFRI). It provides standardized procedures for all laboratory activities to ensure accuracy, consistency, safety, traceability, and quality in analytical services.

The scope of this manual includes:

1. Receipt, registration, coding, storage, preservation, processing, analysis, and disposal of soil, plant, water, milk, fish/ animal tissue, blood, feed, fodder, manure, compost, and other agricultural, environmental, and biological samples received by the laboratory.
2. Operation, calibration, verification, maintenance, and performance monitoring of laboratory instruments and analytical equipment.
3. Preparation, standardization, storage, labeling, and handling of chemicals, reagents, standards, and reference materials.
4. Implementation of standardized analytical methods for physicochemical, biochemical, nutritional, and environmental analyses.
5. Establishment and maintenance of Quality Assurance and Quality Control (QA/QC) procedures to ensure the reliability and reproducibility of analytical results.
6. Documentation of laboratory activities, including sample records, instrument logbooks, reagent registers, maintenance records, calibration records, quality control records, analytical worksheets, and test reports.
7. Laboratory safety, biosafety, chemical safety, emergency preparedness, waste segregation, treatment, and disposal in accordance with applicable regulations.
8. Training, competency assessment, and authorization of laboratory personnel and users.
9. Protection of laboratory property, confidential information, analytical records, and research data.
10. Compliance with the principles of Good Laboratory Practices (GLP), ISO/IEC 17025:2017, relevant ICAR guidelines, and applicable national and international analytical standards.



3. OBJECTIVES

Ensure reliable, traceable, safe and quality analytical services.

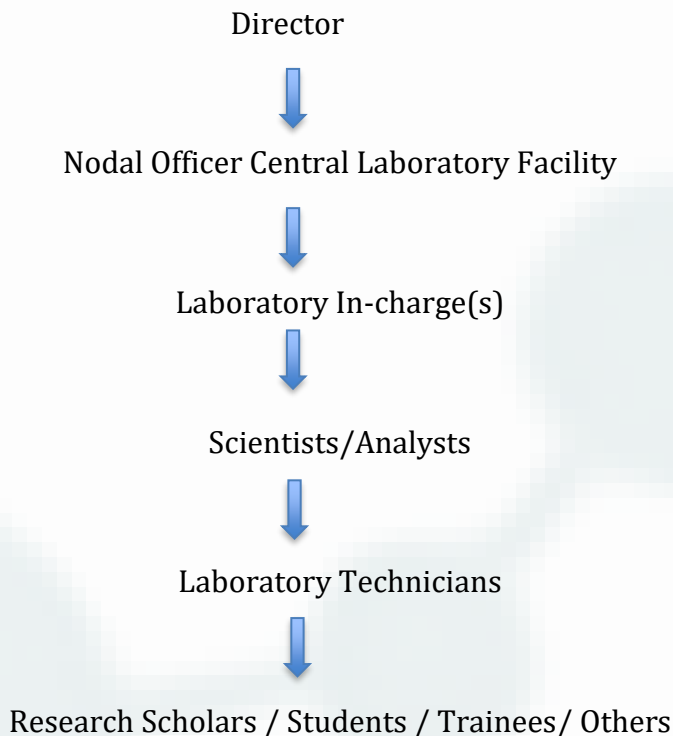
1. Establish a standardized system for the efficient and safe functioning of the Central Laboratory.
2. Ensure the generation of accurate, precise, reliable, and reproducible analytical results through validated methods and standardized operating procedures.
3. Define the roles, responsibilities, and accountability of laboratory personnel for effective laboratory management.
4. Standardize procedures for sample collection, receipt, registration, preservation, preparation, analysis, reporting, and record management.
5. Ensure proper operation, calibration, preventive maintenance, and performance verification of laboratory instruments and equipment.
6. Maintain laboratory safety by ensuring proper use of personal protective equipment (PPE), safe handling of chemicals and biological materials, and effective emergency response procedures.
7. Protect the health and safety of laboratory personnel while minimizing environmental impacts through proper waste management and pollution control practices.
8. Ensure complete traceability, integrity, confidentiality, and security of laboratory samples, analytical data, and reports.
9. Support research, education, extension, and consultancy activities by providing timely and scientifically sound analytical services.
10. Implement effective Quality Assurance and Quality Control (QA/QC) measures, including the use of blanks, duplicates, certified reference materials, control samples, and proficiency testing.
11. Promote Good Laboratory Practices (GLP) and maintain a quality management system consistent with the requirements of ISO/IEC 17025:2017.
12. Promote continual improvement through periodic review of laboratory procedures, internal audits, corrective and preventive actions, staff training, and adoption of emerging analytical technologies.

4. ORGANIZATIONAL STRUCTURE

The Central Laboratory of ICAR–Mahatma Gandhi Integrated Farming Research Institute (ICAR-MGIFRI), shall function under the administrative control of the Institute. The laboratory shall operate through a defined organizational structure to ensure effective management, technical competence, accountability, and compliance with Good Laboratory Practices (GLP) and the principles of ISO/IEC 17025:2017.



Organizational structure is as follows:



5. RESPONSIBILITIES

1. Director:

The Director shall:

- Provide administrative and financial support for laboratory operations.
- Approve laboratory policies, quality objectives, and major infrastructure development.
- Ensure availability of qualified personnel, instruments, and financial resources.
- Promote implementation of Good Laboratory Practices (GLP) and quality management systems.
- Review laboratory performance and facilitate continual improvement.

2. Nodal Officer, Central Laboratory

Nodal Officer, Central Laboratory shall:

- Provide overall technical, administrative, financial supervision of laboratory activities.



- Coordinate laboratory services with research, education, and extension programmes.
- Monitor utilization of laboratory facilities.
- Facilitate procurement of equipment, chemicals, consumables, and maintenance services.
- Review quality control data and analytical performance.
- Organize internal quality audits.
- Maintain document control and revision records.
- Ensure implementation of corrective and preventive actions.
- Monitor compliance with GLP and ISO/IEC 17025 requirements.
- Implement laboratory safety and biosafety programmes.
- Ensure availability and proper use of Personal Protective Equipment (PPE).
- Inspection and maintenance of emergency response equipment, including fire extinguishers, spill kits and first-aid kits.
- Organize safety training and mock drills.
- Investigate laboratory accidents and recommend preventive measures.
- Ensure compliance with chemical, biological, electrical, and fire safety requirements.

3. Laboratory In-charge

The Laboratory In-charge shall be responsible for the overall technical and operational management of the laboratory. Specific responsibilities include:

- Planning and supervising daily laboratory operations.
- Ensuring compliance with this SOP manual and approved analytical methods.
- Assigning analytical work to laboratory personnel.
- Reviewing analytical results before release.
- Ensuring proper calibration and maintenance of instruments.
- Approving procurement of laboratory consumables.
- Maintaining laboratory infrastructure and utilities.
- Investigating non-conformities and implementing corrective actions.
- Authorizing laboratory reports where applicable.
- Coordinating internal audits and management reviews.
- Ensuring proper maintenance of laboratory records and documentation.

4. Scientists/Analysts

Scientists and Analysts shall:

- Perform analyses using approved standard methods.
- Verify sample identity before analysis.
- Prepare reagents, standards, and calibration solutions.
- Operate instruments according to approved SOPs.
- Record observations and analytical data accurately.
- Review analytical calculations.



- Report abnormalities immediately to the Laboratory In-charge/ Nodal Officer.
- Participate in quality assurance activities and method validation.
- Ensure proper handling and preservation of samples.

5. Technical Officer/Laboratory Technician

Laboratory Technicians shall:

- Receive and register samples.
- Label and store samples appropriately.
- Prepare samples for analysis.
- Maintain laboratory cleanliness and housekeeping.
- Prepare reagents and standard solutions.
- Operate routine laboratory instruments after authorization.
- Maintain instrument logbooks and maintenance records.
- Monitor stock levels of chemicals and consumables.
- Segregate and dispose laboratory waste according to approved procedures.
- Report equipment malfunction immediately.

6. Others: Research Scholars, Students and Trainees

Research Scholars, Students, and Trainees will:

- Work only under the supervision of authorized personnel.
- Follow all laboratory safety rules and SOPs.
- Wear appropriate PPE while working.
- Maintain cleanliness of the work area.
- Record observations accurately in laboratory notebooks.
- Report accidents, spills, and equipment malfunction immediately.
- Use laboratory instruments only after receiving training and authorization.
- Maintain confidentiality of research data and laboratory records.

7. Responsibilities of All Laboratory Personnel

Every laboratory user will:

- Comply with this SOP Manual and applicable safety regulations.
- Maintain integrity, accuracy, and confidentiality of analytical data.
- Follow approved analytical methods and avoid unauthorized deviations.
- Ensure traceability of samples, reagents, and analytical records.
- Report non-conformities, accidents, and unsafe conditions promptly.
- Protect laboratory equipment, instruments, and facilities from misuse or damage.
- Participate in training, quality assurance, and competency assessments.
- Promote a safe, ethical, and professional laboratory environment.

8. Delegation of Authority



In the absence of the Laboratory In-charge, a qualified Scientist or Technical Officer authorized by the competent authority shall perform routine supervisory responsibilities.

9. Responsibility Matrix

Activity	Director	Nodal Officer	Laboratory In-charge	Scientist	Technician
Laboratory policy and planning	A	R	C	I	I
Sample receipt and registration	I	I	I	R	R
Sample analysis	I	I	I	R	R
Instrument calibration	I	I	A	R	R
QA/QC implementation	I	A	S	R	R
Test report approval	I	S	A	R	I
Safety implementation	S	A	R	R	R
Waste management	I	I	I	R	R
Staff training	A	R	R	C	S
Key: A = Accountable, R = Responsible, C = Consulted, I = Informed, S = Support					

6. LABORATORY SAFETY

To establish standardized safety practices for the protection of laboratory personnel, scientists, technical officers, technicians, research scholars, students, trainees, housekeeping staff, maintenance personnel, authorized visitors, equipment, samples, and the environment during laboratory operations. This SOP aims to minimize risks associated with chemical, biological, electrical, mechanical, and fire hazards while ensuring compliance with Good Laboratory Practices (GLP), applicable statutory regulations, and the laboratory Quality Management System.

All laboratory personnel shall:

- Wear a laboratory coat, and appropriate PPE while working in laboratory.
- Tie back long hair and avoid loose clothing or dangling jewellery.
- Wash hands before and after handling chemicals or samples.
- Keep work benches clean and free from unnecessary materials.
- Do not eat, drink, smoke, chew gum, or apply cosmetics inside the laboratory.
- Never pipette by mouth; always use mechanical pipetting devices.
- Read the SOP and Safety Data Sheet (SDS) before using any chemical.



- Label all reagents, standards, and prepared solutions with name, concentration, date of preparation, expiry date, and preparer's initials.
- Immediately clean spills using approved procedures.
- Report all accidents, injuries, equipment failures, and unsafe conditions.
- Ensure that emergency exits and fire extinguishers remain unobstructed.
- Switch off electrical equipment after use unless continuous operation is required.
- Unauthorized persons shall not enter into analytical work areas.

Personal Protective Equipment (PPE)

The following PPE shall be used according to the nature of work:

Activity	Required PPE
Routine laboratory work	Laboratory coat, gloves, closed shoes
Acid digestion	Acid-resistant gloves, face shield, laboratory coat, safety goggles
Biological sample handling	Disposable gloves, laboratory coat, face mask, eye protection
High-temperature work	Heat-resistant gloves, laboratory coat, face shield
Chemical transfer	Chemical-resistant gloves, goggles, laboratory coat
Cleaning chemical spills	Appropriate gloves, goggles, apron, respiratory protection (if required)
NOTE: Damaged PPE shall be replaced immediately.	

1. Chemical Safety

Store chemicals according to compatibility groups (acids, bases, oxidizers, flammables, toxic chemicals, etc.).

- Maintain an updated chemical inventory.
- Ensure all containers are properly labelled.
- Use concentrated acids only in designated areas or fume hoods.
- Always add acid slowly to water; never add water to concentrated acid.
- Keep flammable chemicals away from ignition sources.
- Store volatile solvents in approved flammable-storage cabinets.
- Avoid inhalation of vapours by using fume hoods where necessary.
- Dispose of expired chemicals according to approved waste disposal procedures.

2. Biological Safety

Biological samples such as blood, milk, tissues, and animal-derived materials shall be treated as potentially infectious.

- Wear disposable gloves while handling biological samples.



- Avoid direct contact with blood and body fluids.
- Disinfect work surfaces before and after analysis.
- Use leak-proof containers for sample transport.
- Sterilize contaminated materials before disposal where applicable.
- Wash hands thoroughly after handling biological materials.

3. Electrical Safety

- Operate equipment only after receiving appropriate training.
- Inspect electrical cords and plugs regularly.
- Do not use damaged electrical equipment.
- Keep electrical equipment away from water sources.
- Do not overload electrical sockets.
- Switch off equipment before cleaning or maintenance.
- Report electrical faults immediately.

4. Fire Safety

- ABC fire extinguishers: a versatile, multi-purpose tool filled with ABC dry chemical (monoammonium phosphate). It is designed to suppress Class A (solids like wood and paper), Class B (flammable liquids), and Class C (electrical) fires by smothering the flames and preventing re-ignition.
- CO₂ fire extinguishers for electrical fires
- Fire blankets
- Smoke detectors and alarm systems
- Clearly marked emergency exits
- All laboratory personnel should be trained in the use of fire extinguishers and evacuation procedures.

5. Waste Management

Laboratory waste shall be segregated at the point of generation.

Waste Category	Disposal Method
General waste	Municipal waste collection container
Glass waste	Designated glass disposal container
Chemical waste	Labelled hazardous waste container
Biological waste	Biohazard container and approved treatment/disposal
Sharps	Puncture-resistant sharps container

6. Safety Records

- Safety inspection register
- Accident and incident register
- Chemical inventory register
- PPE issue register



- Fire extinguisher inspection log
- Emergency drill register
- Safety training register

7. Safety Signage

Appropriate safety signs shall be displayed prominently, including:

- Mandatory PPE signs
- Fire Extinguisher
- First Aid
- Emergency Exit
- Eye Wash Station
- Chemical Hazard
- Biohazard
- Electrical Hazard
- Flammable Materials
- Corrosive Chemicals
- Emergency Contact Information
- No Smoking
- No Eating or Drinking

Review and Compliance

Compliance with this SOP is mandatory for all laboratory personnel. Periodic safety inspections, internal audits, and management reviews shall be conducted to verify adherence to laboratory safety requirements. Non-compliance shall be documented and addressed through appropriate corrective and preventive actions (CAPA).

7. SAMPLE RECEIPT & REGISTRATION

To establish a standardized procedure for the receipt, verification, registration, coding, and acceptance of samples (soil, plant, water, milk, blood, animal tissues, feed, fodder, manure, compost, fertilizers, and other agricultural, and biological samples) received by the Central Laboratory to ensure proper identification, traceability, integrity, and timely processing.

Responsibilities

1. Laboratory In-charge

- Ensure implementation of this SOP.
- Resolve discrepancies related to sample receipt and acceptance.
- Approve acceptance or rejection of doubtful samples.

2. Receiving Officer/Laboratory Technician



- Receive and verify submitted samples.
- Check sample condition, quantity, packaging, and accompanying documents.
- Register accepted samples.
- Assign unique laboratory identification numbers.
- Label and transfer samples to the designated storage area.

3. Analyst/Scientist

- Verify sample identity before analysis.
- Sample analysis following standard protocols/ procedures.
- Report preparation, and issue advisories if required.
- Report any discrepancy observed during sample processing.

Sample Submission Requirements

Each sample shall be accompanied by a duly completed Sample Submission Form (SSF) containing, as applicable:

- Name and address of the submitting organization/person
- Contact details
- Sample type
- Number of samples submitted
- Purpose of analysis
- Sampling location/ Geo-location
- Date and time of sample collection
- Sample identification provided by the submitter
- Tests requested
- Preservation method (if applicable)
- Signature of the submitter

NOTE: Incomplete submission forms may delay acceptance and analysis of samples.

Procedure for Sample Receipt

Upon receipt, the Receiving Officer shall:

- Verify that the sample container is intact and properly sealed.
- Check that the sample label matches the Sample Submission Form.
- Inspect the sample for leakage, contamination, damage, or deterioration.
- Verify that sufficient sample quantity has been provided.
- Confirm that appropriate preservation and transport conditions have been maintained, where applicable.
- Record the date and time of receipt.
- Assign a unique laboratory sample identification number.
- Affix the laboratory identification label to the sample container.
- Enter all details into the Sample Receipt Register or Laboratory Information Management System (LIMS).



- Transfer the sample to the designated place/ personnel for analysis.

Sample Registration & coding

Each accepted sample shall be assigned a Unique Laboratory Identification Number (ULIN).

A recommended coding format is: **MGIFRI/Year/Sample Type/Serial Number**

Example:

- MGIFRI/2026/SOIL/01 to n.
- MGIFRI/2026/WATER/01 to n.
- MGIFRI/2026/MILK/01 to n.
- MGIFRI/2026/BLOOD/01 to n.

The ULIN should appear on:

- Sample container
- Analytical worksheets
- Instrument data sheets
- Quality control records
- Test reports
- Sample storage records

Sample Acceptance Criteria

Samples shall be accepted when:

- Properly labelled.
- Accompanied by a completed Sample Submission Form.
- Quantity is adequate for the requested analyses.
- Container is clean, intact, and leak-proof.
- Preservation and transportation conditions are appropriate.
- No evidence of contamination or deterioration is observed.

Sample Rejection Criteria

A sample may be rejected if:

- The sample is unlabelled or incorrectly labelled.
- Submission form is incomplete or missing essential information.
- Quantity is insufficient for analysis.
- Container is damaged, leaking, or broken.
- Sample is contaminated or decomposed.
- Improper preservation or transport conditions have compromised sample integrity.
- Requested analysis is beyond the laboratory's scope or capability.
- Rejected samples shall be documented, and the submitter shall be informed promptly with the reason for rejection.



Sample Labelling

Each sample shall bear a durable label containing:

- Unique Laboratory Identification Number (ULIN)
- Sample type
- Date of receipt
- Analyst or section (if applicable)
- Labels shall be legible, waterproof, and securely affixed.

Sample Storage Prior to Analysis

After registration, samples shall be stored under appropriate conditions to preserve their integrity until analysis.

Sample Type	Recommended Storage
Soil	Clean, dry conditions at ambient temperature
Plant	Air-dried or refrigerated, depending on the analysis
Water	Refrigerated (2–8°C); avoid prolonged storage
Milk	Refrigerated (2–8°C); analyze promptly
Blood	Refrigerated (2–8°C) or frozen, depending on the test
Animal tissue	Refrigerated or frozen as required
Feed/ Fodder	Clean, dry, moisture-free conditions
NOTE: Samples requiring frozen storage shall be maintained at the specified temperature until analysis.	

8. CHAIN OF CUSTODY

The laboratory shall maintain complete traceability of every sample from receipt to disposal. Chain-of-custody records shall include:

- Date and time of receipt
- Name and signature of the receiving officer
- Sample identification number
- Storage location
- Transfers between personnel or laboratory sections
- Date of analysis
- Disposal or return of the sample

Documentation: The following records shall be maintained:

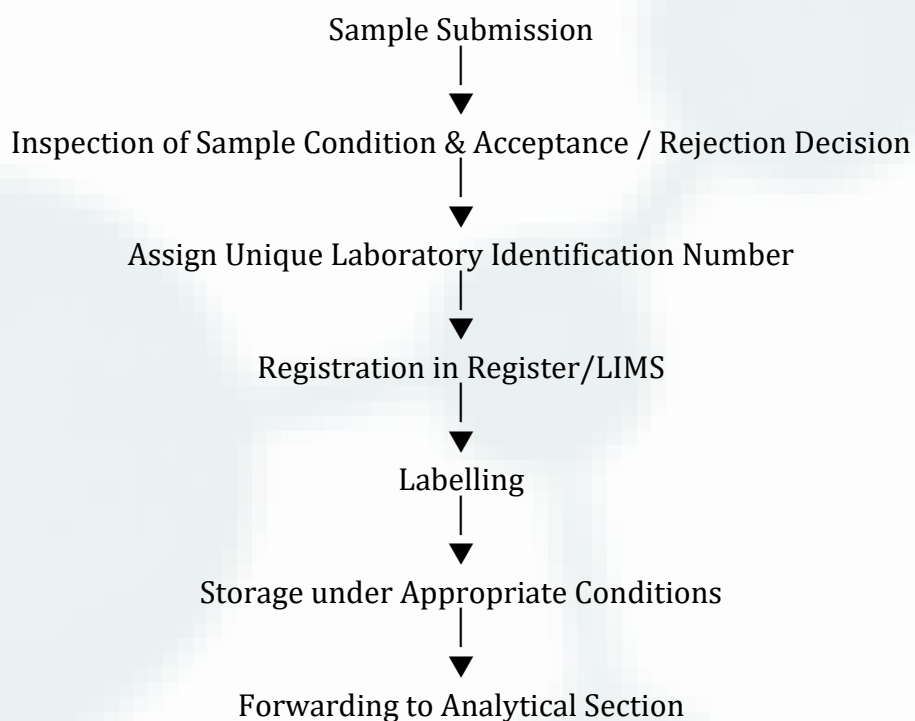
- Sample Submission Form
- Sample Receipt Register/LIMS
- Sample Rejection Register



- Chain-of-Custody Form
- Sample Storage Register
- Analytical Worksheet
- Test Report Register

NOTE: All entries shall be made in indelible ink or through authorized electronic systems. Corrections shall be made without obscuring the original entry and shall be dated and signed.

Flow Chart for Sample Processing:



Records and Forms

The following forms shall be maintained:

- Annexure I – Sample Submission Form
- Annexure II – Sample Receipt Register
- Annexure III – Sample Rejection Register
- Annexure IV – Chain-of-Custody Form
- Annexure V – Sample Storage Register
- Annexure VI – Analyzed Samples' Data log book



9. ANALYTICAL WORKFLOW

To establish a standardized analytical workflow for the processing of soil, plant, water, milk, feed, fodder, blood, animal tissue, manure, compost, fertilizers, and other agricultural and biological samples received by the Central Laboratory. The workflow ensures sample traceability, analytical accuracy, quality assurance, and timely reporting of results. This procedure applies to all analytical activities performed in the Central Laboratory from receipt of samples to issuance of the final analytical report.

Responsibilities

1. Laboratory In-charge

- Supervise the overall analytical workflow.
- Assign samples to appropriate analytical sections.
- Review and approve analytical reports.

2. Scientists/Analysts

- Perform sample preparation and analysis according to approved SOPs.
- Maintain complete analytical records.
- Verify calculations and analytical results.

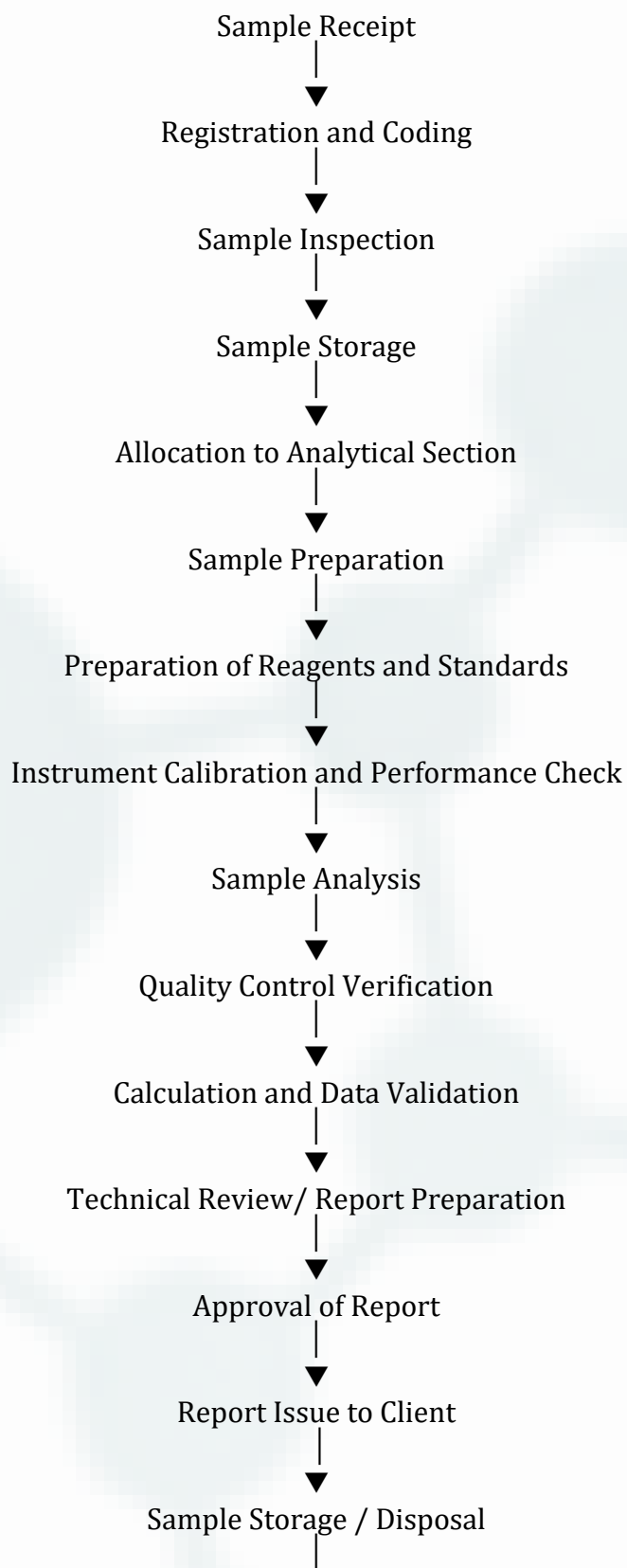
3. Laboratory Technicians

- Assist in sample preparation.
- Prepare reagents and standards.
- Operate laboratory equipment under supervision.
- Maintain laboratory records and housekeeping.

4. Nodal Officer/ Quality Manager

- Monitor compliance with QA/QC requirements.
- Verify quality control data before release of reports.
- Investigate analytical non-conformities.

The analytical process shall follow the sequence shown below:





▼
Record Archiving

10. ANALYTICAL SECTIONS

After registration, samples shall be forwarded to the appropriate analytical section.

Sample Type	Analytical Section	Section
Milk/ Feed/ Fodder/ Blood/ Animal Tissue etc.	Animal Science	A
Water/ Fish	Fisheries Science	B
Plant/Soil/Manure/Compost/ Fertilizers etc.	Soil-Plant-Water Analysis	C
Fruit/ Vegetable etc.	Post-harvest and Value Addition	D
Weather parameter	Weather Observatory	E
NOTE: The Laboratory In-charge shall prioritize samples requiring urgent analysis		

Sample Preparation

Sample preparation shall be carried out according to approved analytical SOPs.

Sample	Preparation
Soil	Air drying, grinding, sieving (2 mm or specified size)
Plant	Washing (if required), oven drying, grinding
Feed/Fodder	Drying, grinding, homogenization
Water	Filtration or preservation as required
Milk	Homogenization and temperature equilibration
Blood	Centrifugation or preservation according to the analytical requirement
Fish/ Animal Tissue	Homogenization, drying or digestion depending on the analysis
NOTE: Prepared samples shall be properly labelled and stored until analysis.	

Preparation of Reagents and Standards

Use analytical reagent (AR) grade chemicals or higher purity. Prepare reagents according to approved SOPs.

Label each reagent with:

- Name
- Concentration
- Date of preparation
- Expiry date
- Prepared by



- Standardize volumetric solutions where applicable.
- Maintain a Reagent Preparation Register.

Instrument Readiness

Before sample analysis, the analyst shall ensure that:

- Instrument calibration is valid.
- Preventive maintenance has been completed.
- Performance verification has been performed.
- Calibration standards meet acceptance criteria.
- Instrument logbook entries are updated.

Sample Analysis

Analyses shall be performed using approved standard methods such as ICAR, AOAC, BIS, APHA, ASTM, or other validated procedures, as applicable.

During analysis, the analyst shall:

- Verify sample identity.
- Follow the approved SOP without deviation.
- Record observations immediately.
- Analyze samples in batches where appropriate.
- Include quality control samples in each analytical batch.

11. QUALITY CONTROL

Each analytical batch shall include, as applicable:

- Reagent blank
- Method blank
- Duplicate sample
- Spike or recovery sample
- Certified Reference Material (CRM)
- Laboratory Control Sample (LCS)
- Calibration standards
- Continuing calibration verification standard

Data Recording and Calculations

All analytical observations shall be recorded in laboratory worksheets or electronic data systems.

Analysts shall:



- Record raw data immediately.
- Verify calculations independently.
- Apply appropriate correction factors.
- Maintain complete traceability of analytical data.
- Corrections shall be dated and initialled without obscuring the original entry.

12. TECHNICAL REVIEW

Before release of results, the Laboratory In-charge or designated reviewer shall verify:

- Sample identification
- Analytical method used
- Instrument calibration status
- QC performance
- Calculations
- Units of measurement
- Compliance with acceptance criteria
- Any discrepancies should be resolved before report approval.

13. REPORT PREPARATION

The analytical report should include:

- Laboratory name and address
- Report number
- Sample identification
- Date of receipt
- Date of analysis
- Analytical methods
- Results with units
- Remarks, where applicable
- Name and signature of the analyst
- Approval by the Laboratory In-charge or authorized signatory
- Reports shall be issued only after successful technical review.

After Analysis Sample Retention and Disposal

Samples shall be retained for the period specified in the laboratory retention policy or as requested by the client. Hazardous and biological samples shall be disposed of according to the laboratory waste management SOP. Disposal records shall be maintained.

14. DOCUMENTATION & RECORD RETENTION

The following records shall be maintained:

- Sample Receipt Register
- Sample Preparation Register
- Instrument Logbook



- Calibration Records
- Reagent Preparation Register
- Quality Control Register
- Analytical Worksheets
- Test Report Register
- Sample Disposal Register
- Maintain registers, raw data and reports as per institutional policy.

15. TURNAROUND TIME (TAT)

The laboratory shall establish target turnaround times for different sample types based on the complexity of analysis. Priority or emergency samples may be processed on an expedited basis with approval from the Laboratory In-charge. Any delays shall be documented and communicated to the client.

16. REVIEW AND CONTINUOUS IMPROVEMENT

The analytical workflow shall be reviewed periodically through internal audits, management reviews, proficiency testing, customer feedback, and quality performance indicators. Necessary revisions shall be incorporated to improve efficiency, reliability, and compliance with GLP and NABL, ISO/IEC 17025 requirements.

17. DETAILS OF THE INSTRUMENTS AVAILABLE AT CENTRAL LABORATORY FACILITY OF ICAR-MGIFRI, MOTIHARI, BIHAR

Central Laboratory Facility of MGIFRI having five major section as follows:

1. Section A: Animal Science
2. Section B: Fisheries Science
3. Section C: Soil-Plant-Water Analysis
4. Section D: Post-Harvest & Value Addition
5. Section E: Weather Observatory

Section-wise list of available equipment is mentioned hereunder.

Section A: Animal Science			
SN	Name of the instrument	Model No	Use of the instrument
1.	Refrigerator (Whirlpool, 300-liter cap.)	FF2D305D	Storage of samples, media, and reagents at low temperature.
2.	IR Thermometer (Fluke)	-	Non-contact temperature measurement.
3.	Colony Counter-Digital (Hi media)	LA660/621/0923	Counting microbial colonies on agar plates.



4.	Handheld Digital colony counter	LA663/533/05580	Manual counting of bacterial colonies.
5.	Digital SPINOT (Tarson)	Model MC02	Micro-centrifuge for sample separation.
6.	Spinwin (Tarson)	MC 01 CAT1020	Centrifugation of laboratory samples.
7.	Loop sterilizer (Hi media)	LA001/631/2306	Sterilization of inoculating loops.
8.	Digital HOTOP (Tarson)	MC02 CAT No: 5040 S.N. D1601108	Heating and mixing of samples.
9.	Quartz distillation Unit	CAT No: 3365	Preparation of distilled/pure water.
10.	Hotplate (Genexy)	S.N. 03201579 CAT No: 1110/10	Heating laboratory solutions and samples.
11.	Spinix (Tarson)-Vortex Shaker	CAT No: 3020 Sl.No. 1801948	Rapid mixing of liquid samples.
12.	Deep freezer (Voltas) 500 lit cap.	CVFHT500	Long-term storage of samples at very low temperatures.
13.	Trinocular Microscope	S.N. 10125465 iox- NE-620	Microscopic examination and image capture.
14.	Electronic Milk Analyzer	S.N. HT22110541	Analysis of milk composition and quality.
15.	Biochemistry Analyzer	EM 200 S.N. V2002468	Estimation of biochemical parameters in samples.
16.	Laminar Flow	MAC-HLAF-4x2x2- JGJ	Aseptic handling of cultures and samples.
17.	Elisa Reader	BL 580 S.N. CE12403001	Measurement of ELISA assay absorbance values.
18.	Egg Incubator	-	Controlled incubation of eggs and microbial cultures.
19.	Automatic Fat Analyzer	Sox-6	Estimation of fat content in feed, fodder, food samples
20.	Automatic Fiber Analyzer	FRB 6	Estimation of crude fiber, acid detergent fiber, neutral detergent fiber of feed, fodder, food samples

Section B: Fisheries Science

21.	Samsung 324 lit. double door refrigerator	RT34M5538S8	To preserve and store samples and chemicals
22.	Water multi-parameter analyser	HANNA - 98194	To analyze water pH, temperature, dissolved oxygen, TDS, EC, salinity etc.



23.	Hot air oven	ESTO-110	Drying of samples, moisture content analysis
24.	Deep freezer (-20°C)	Blue star CHFDD300D	Long term storage of fish, tissues samples etc.
25.	Precision weighing balance (0.1 mg - 220g)	ACZET- CY204C & SHIMADZU – ATX224	Precision weighing of samples and chemicals etc.
26.	Spectrophotometer	Shimadzu UV VIS-1900	Analysis of water/ waste water/ food/ beverage/ chemicals/ biological samples etc. (quantitative determination of NO ₃ , NO ₂ , NH ₃ & PO ₄ etc.)
27.	Refrigerated centrifuge	WT-70BL	To separate/ extract fluids, liquids based on density, settling suspended solids from liquid solutions and extracting soil or wastewater components for analysis
28.	BOD incubator	ET- B08	To maintain a stable, fixed-temperature environment for water pollution testing and microbial culturing, etc.
29.	Trinocular microscope	Carl Zeiss, Primostar-3, 415500-0057-000	Microscopic examination of microorganisms, plankton, gut contents, tissues etc.
30.	Water parameter analyzer	HANNA HI- 9829	For the analysis of chlorides, ammonium combinations, pH, temperature, etc., of water/ wastewater samples.
31.	Kjeldahl digestion cum distillation unit with fumehood	Borosil: BLFADI04KSC01OKB D061	For the analysis of nitrogen, crude protein in various samples (plants/ fish/ soil/ food grains etc.)
32.	Double-stage water distillation unit single phase	Borosil: DDU4000	Making reagent-grade distilled water
33.	Chemical Oxygen Demand (COD) digester	Borosil COD082	For the continuous & uniform heat to chemically break down organic matter in water or wastewater, soil
34.	Gel documentation system	Image Innolab Gel.PRIME	To image and analyze nucleic acids (DNA/ RNA) and proteins suspended in



			polyacrylamide or agarose gels
Section C: Soil-Plant-Water Analysis			
35.	Double-distillation unit	GLASSCO GLDD50AQ	To produce ultra-pure, pyrogen free water
36.	Single distillation unit	GLASSCO GLSD50AQ	to produce high-purity distilled water
37.	Digital burette	Microlit E-burette TI-50	precise liquid dispensing and manual titration
38.	Hot Air Oven	DS-HAO-224	dry heat sterilization and thermal processing of soil samples
39.	BOD Incubator	SDSI BOD Incubator	to maintain a constant cool temperature (typically 20°C) required for environmental water testing and biological cultures
40.	Digital Hot Water Bath	Water Bath SE133	to indirectly warm samples at a constant, uniform temperature
41.	pH Meter	NM-PH12	Measuring pH of soil and water samples
42.	EC Meter	TDS meter LMCM20	Measuring EC of soil and water samples
43.	Orbital Shaker		To mix, blend, or agitate chemical and biological samples inside vessels
44.	Desiccator with vacuum pump set	Pump- Value VE115N	Fumigation of samples for estimation of MBC, MBN, MBP etc
45.	Yoder Apparatus / Wet-sieve shaker	YODER-8Y	Soil aggregate analysis
46.	Mechanical Stirrer	KSI LS3258	Mixing high-viscosity liquids, large volumes, and thick suspensions
47.	Digital Cone-penetrometer	DIK-5532	Measurement of penetration resistance of soil in-situ
48.	Bouyoucos Hydrometer	ST-152H	Soil texture analysis
49.	Refrigerated Centrifuge	BI-HSC-16K	Separate heterogeneous mixtures based on density while maintaining a strict, low temperature.
50.	Kjeldahl distillation set	KES 20L +KEL VAC	Measurement of N content in



	with digestion unit	(4) + CLASSIC DX VA TS (B) + DB	soil and plant samples
51.	LINE QUANTUM Sensor	MQ-301X AND SQ- 301X	Measuring spatial average of PAR
52.	GeoNDVI Sensor- Greenseekr	Make: Trimble	Used for measuring crop vigor in terms of greenness

Section D: Post-Harvest & Value Addition

53.	Double-Beam UV-Visible Spectrophotometer	Thermo Scientific, Genesys 180	Used for estimation of phosphorus (P), sulphur (S), enzyme activities, and other analytical parameters.
54.	Micro Weighing Balance	Apolo Scales, WENSAR MAB-220T	Used for precise weighing of soil, plant, and chemical samples for laboratory analysis.
55.	Flame Photometer	Gentek India, FPM 128	Used for estimation of potassium (K), sodium (Na), and other alkali metals in samples.
56.	Hot Air Oven	Jiotech ON4-105	Used for drying, thermal processing, moisture determination, and sterilization of laboratory samples and equipment.
57.	Multiparameter Bench Meter	Thermo Scientific Eutech, ECPC70043S	Used for measuring pH, electrical conductivity (EC), total dissolved solids (TDS), and related parameters in soil and water samples.
58.	Rotary Shaker	Scitron, IS/SCI/RS/455×455 /BDA/2/0011	Used for mixing, blending, and agitation of chemical and biological samples in flasks and containers.
59.	Magnetic Stirrer cum Hot Plate	Borosil, HLS200P	Used for simultaneous heating and stirring of solutions, including high-viscosity liquids and suspensions.
60.	Conductivity/ TDS Meter	Toshniwal, Toshcon TCM 15+	Measuring EC and TDS in soil and water samples.
61.	Bench Refractometer	Hanna Instruments, HI96801	Used for measuring Total Soluble Solids (TSS) in fruit juice and other liquid samples.



Section E: Weather Observatory			
62.	Standard Weather Observatory	IS standard instrument, approved by IMD-Stevenson screens, USWB Pan evaporimeter, CS sun shine recorder, 3 depth soil thermometers, ordinary and self-recording rain gauge, Anemometer, Windvane,	For measuring weather parameters
63.	ArcGIS	V 10.8.2	For spatial analysis of data



BOD INCUBATOR



DEEP FREEZER (-20°C)



REFRIGERATED CENTRIFUGE



UV VIS SPECTROPHOTOMETER



MICRO-PIPETTES



KELDAHL DIGESTION UNIT



KELDAHL DISTILLATION UNIT



WATER DISTILLATION UNIT



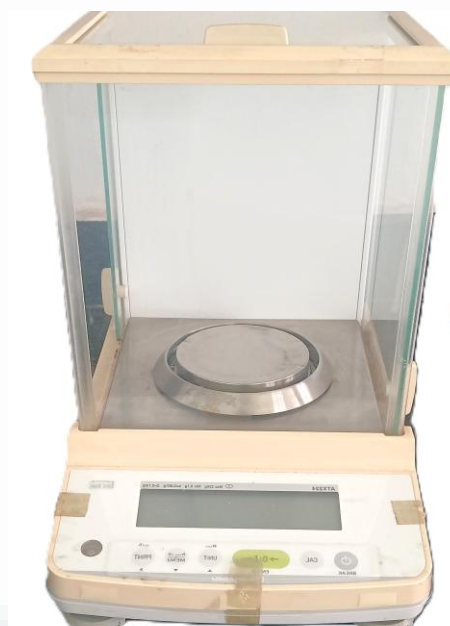
COD DIGESTION UNIT



CENTRIFUGE MACHINE



HOTPLATE-CUM- MAGNETIC STIRRER



PRECISION WEIGHING BALANCE



GLASSWARE DRIER



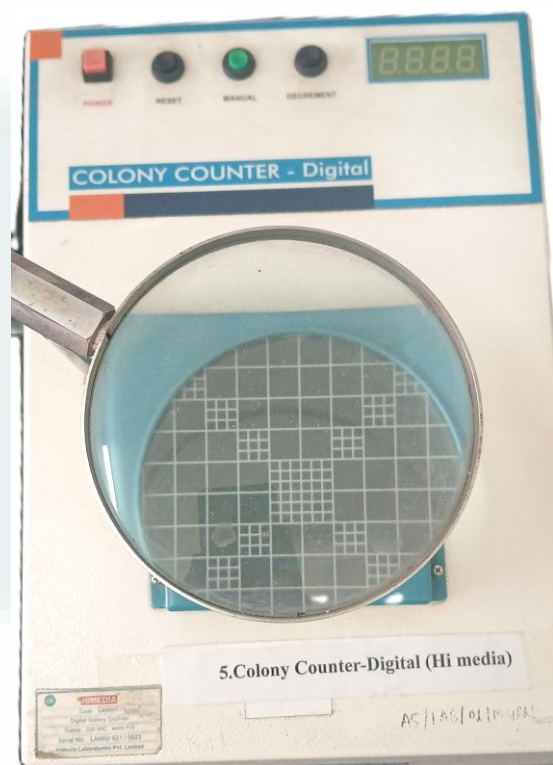
DIGITAL ULTRASONIC STIRRER



ELISA READER



BIO-CHEMISTRY ANALYZER



DIGITAL COLONY COUNTER



MILK ANALYZER



TRINOCULAR MICROSCOPE



REFERIGERATOR



HOT-AIR OVEN



DIGITAL ORBITAL SHAKER



KJELDAHL APPARATUS



FLAME PHOTOMETER



UV VIS SPECTROPHOTOMETER



HOT AIR OVEN



HOT PLATE CUM MAGNETIC STIRRER



ICE FLAKE MAKING MACHINE



SPECTROPHOTOMETER



Fat Analyzer



Fiber Analyzer



BATERIOLOGICAL INCUBATOR



VERTICAL AUTOCLAVE MACHINE



LAMINAR AIR FLOW



PCR WORKSTATION



18. DETAILS OF THE SAMPLES TESTING/ ANALYSIS BEING PERFORMED AT MGIFRI CENTRAL LABORATORY FACILITY

Following test(s)/ analysis of various samples are currently being performed in different sections of Central Laboratory Facility at MGIFRI.

1. Section A: Animal Science
2. Section B: Fisheries Science
3. Section C: Soil-Plant-Water Analysis
4. Section D: Post-Harvest & Value Addition
5. Section E: Weather Observatory

SN	Sample	Test/ Analysis	Section	Charge(s) in Rs. Per unit sample
1	Water Samples	pH	B	5.0
		Temperature	B	5.0
		Total Dissolved Solids (TDS)	B	5.0
		Electrical Conductivity (EC)	B	5.0
		Salinity	B	5.0
		Dissolved Oxygen (DO)	B	20.0
		Alkalinity	B	20.0
		Hardness	B	20.0
		Free Carbon dioxide (CO ₂)	B	10.0
		Nitrogen (N)	B	25.0
		Ammonia (NH ₃)	B	25.0
		Nitrate (NO ₃)	B	25.0
		Nitrite (NO ₂)	B	25.0
		Phosphorus (PO ₄)	B	25.0
		Biochemical Oxygen Demand (BOD)	B	25.0
		Chemical Oxygen Demand (COD)	B	20.0
2	Soil Samples	pH	C	5.0
		EC	C	5.0
		Organic Carbon (OC)	C	10.0
		Available and Total Nitrogen (N); Ammoniacal and nitrate N	C	25.0
		Available and Total Phosphorus (P)	C	15.0
		Available Potassium (K)	C	20.0
		Available Sulphur (S)	C	20.0
		Microbial Biomass Carbon	C	25.0



		Dehydrogenase Activity	C	30.0
		Phosphatase Activity	C	30.0
		Soil texture	C	10.0
		Mean weight diameter and Aggregate stability	C	20.0
		Penetration Resistance	C	20.0
		Gravimetric Moisture Content	C	5.0
3	Plant Samples	N, P, K	C	50.0
		Organic Carbon	C	10.0
4	Animal Blood/ Tissue Samples	Biochemical parameters i.e. Glucose, total protein, albumin, globulin, urea, uric acid, total cholesterol, triglyceride, bilirubin, lipase, LDH, alkaline phosphatase, ALT, Ca, P, Mg etc.	A	3000.0
5	Milk	Protein, lactose, fat, SNP, TS, freezing point	A	50.0
6	Animal Tissue / Fish Tissue/ Feed/ Fodder Samples	Crude Protein	A, B	100.0
		Crude Fat (EE)	A	100.0
		Crude Fiber	A	100.0
		Ash & insoluble ash	A	50.0
		Moisture	A	20.0
		Nitrogen (N)	B, C	50.0
		Phosphorus (P)	B, C	50.0
		Potassium (K)	C	50.0
7	Fruit/ vegetable samples	Organic Carbon	B, C	20
		Acidity	D	5.0
		Ascorbic Acid (Vit. C)	D	20.0
		Total Soluble Solids (TSS)	D	5.0
8	Daily Weather Data	Daily weather data; rainfall (automatic and manual), temperature, E pan, Sunshine hours, Soil temperature, wind speed etc. (charges applicable for one year data)	E	1000.0



19. Payment Policy for Analytical Services

To establish a standardized procedure for the collection, recording, verification, and accounting of analytical service charges for samples received by the Central Laboratory. This procedure applies to all external organizations, industries, NGOs, farmers, entrepreneurs, students, and individual clients submitting samples for analysis. Internal institute research samples may be exempted or charged according to institutional policies.

Responsibility

Laboratory In-charge

- Verify the analytical charges applicable to the requested analysis.
- Ensure that samples are processed only after compliance with the payment policy.
- Authorize fee exemptions, if permitted by the Institute.

Accounts Section

- Receive payments.
- Issue official receipts.
- Maintain financial records.

Sample Receiving Officer

- Inform clients about the applicable analytical charges.
- Verify proof of payment before registering chargeable samples.
- Record the receipt number in the Sample Receipt Register.

Analytical Charges

The laboratory shall maintain an **approved Schedule of Analytical Charges**, duly approved by the Competent Authority. The schedule shall specify charges for each type of analysis, for example:

Sample Category	Examples of Analysis	Charges (₹)
Soil	pH, EC, Organic Carbon, Available NPK, Micronutrients	As per approved rate
Water	pH, EC, TDS, Hardness, Alkalinity, Nutrients	As per approved rate
Plant	Nitrogen, Phosphorus, Potassium, Micronutrients	As per approved rate
Feed/Fodder	Moisture, Ash, Crude Protein, Fibre, Fat	As per approved rate
Milk	Fat, SNF, Protein, Lactose, Quality Parameters	As per approved rate
Blood	Biochemical Analysis	As per approved rate
Animal Tissue	Nutrient Analysis	As per approved rate
Note: Charges shall be revised periodically with the approval of the Competent Authority.		



Modes of Payment

The laboratory may accept payment through the following modes:

1. **Online Bank Transfer (NEFT/RTGS/IMPS)** to the Institute's designated bank account.
2. **UPI Payment** using the Institute's official UPI ID or QR code.
3. **Online Payment Portal** (if available through the Institute website).
4. **Cash Payment**, not allowed.

Payment Procedure

1. The client submits the Sample Submission Form.
2. The Receiving Officer estimates the applicable analytical charges.
3. The client is informed of the payable amount.
4. Payment is made through an approved mode.
5. The Accounts Section issues an official receipt.
6. The payment details are recorded in the Sample Receipt Register.
7. The sample is assigned a Laboratory Identification Number and accepted for analysis.
8. The sample is forwarded for analysis.

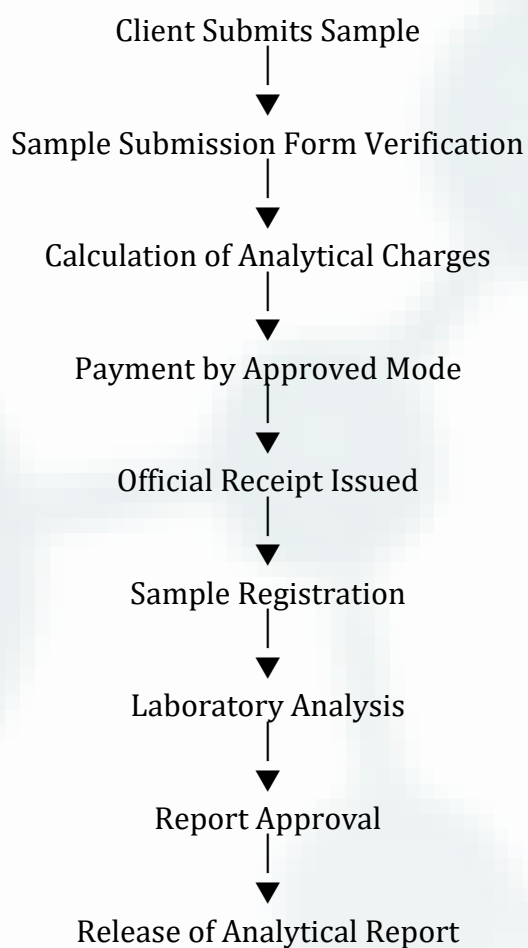
Fee Exemption

Fee exemption may be granted only with written approval from the Competent Authority for:

1. Institute-funded research projects.
2. Student research approved by the Institute.
3. Collaborative research under sanctioned projects.
4. Special cases approved by the Director.



Flowchart: Payment Procedure





20. Annexure(s)

Annexure - 1: Sample Submission Form

Annexure - 2: Analytical Test Report Form

Annexure-1

SAMPLE SUBMISSION FORM

Central Laboratory Facility, ICAR–MGIFRI, Piprakothi, Motihari (Bihar)

Submission No.	
Date	
Client/Organization	
Contact Person	
Address	
Phone	
Email	
Sample Type	
No. of Samples	
Client Sample ID	
Sampling Location	
Sampling Date	
Purpose of Analysis	
Parameters Requested	
Payment Status	
Remarks	

Declaration

I certify that the above information is true and the submitted sample(s) are representative.

Submitter Signature

Receiving Officer Signature



Annexure-2

ANALYTICAL TEST REPORT

Central Laboratory Facility, ICAR–MGIFRI, Piprakothi, Motihari (Bihar)

Report No.	
Issue Date	
Client Name	
Address	
Sample ID (Lab)	
Client Sample ID	
Sample Type	
Date Received	
Date of Analysis	
Analyst	
Test Method/Reference	

Analytical Results

SN	Parameter	Method	Result	Unit
1				
2				
3				
4				
5				

Remarks:

Analyst/ Scientist

Authorized Signatory
In-charge/ Nodal