



GREEN SKILL DEVELOPMENT PROGRAMME (GSDP)

Report on Course:

Certified Laboratory Assistants for
Eco Friendly Food Testing
Laboratory

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT,
FOREST AND CLIMATE CHANGE (MoEF&CC),
NEW DELHI



A Report on Laboratory Assistant for Food Testing Laboratory with Eco- friendly Practices

To meet with the growing needs of skilled manpower of industry as well as testing laboratories, Consumer Education and Research Centre (CERC), with the support of Ministry of Environment, Forests & Climate Change (MoEF&CC), launched a certificate course as Green Skill Development Programme (GSDP) titled “**Laboratory Assistant for Food Testing Laboratory with Eco-friendly Practices.**”

Training to food laboratory technicians is a pre-requisite for ensuring quality & safety in analytical environment. The ENVIS Resource partner Consumer Education and Research Centre designed and developed this course to ensure widespread and effective delivery of training to food businesses with emphasis on green laboratory practices. This training is aimed at certifying the laboratory personnel as it is envisaged to make this a regulatory requirement under the Green Skill Development Program of India.

This course has been designed for Science Graduates who have displayed a keen interest in technology and desire to gain the knowledge on global practices of food product testing laboratories and research institutes. The candidates were selected on the basis of qualifying a virtual screening followed by telephonic interview.

During the training, they are being given the basic introduction and provided hands-on training for various analytical techniques used in food laboratories. They are introduced to –nutritional aspects, food safety standards and laboratory accreditation system. They have been imparted knowledge regarding Good Laboratory Practices (GLP), sampling procedures, documentation; operation, calibration & maintenance of laboratory equipments. Information regarding eco-friendly laboratory waster management and laboratory safety measures is also given through the course. The expected outcomes of the program were:

- To create a Green Skill Personnel who can function in ecofriendly food testing system
- To be proficient in Good Laboratory Practices
- To be well versed with safe handling, operation & maintenance of laboratory equipments
- To gain basic knowledge of Food regulatory standards and Laboratory Accreditation
- To acquire knowledge about Laboratory waste disposal with as per sustainability criteria.

The aim of this course was to impart requisite knowledge and skills, through classroom activity as well as hands-on training in CERC’s laboratory, supported by relevant industry visits. The faculty consisted of CERC’s qualified and experienced laboratory personnel as well as a galaxy of visiting experts. The two-month course culminated in a joint certification by Ministry of Environment, Forests and Climate Change, and CERC.

Selection of Candidates

The process of selection started in the month of January’2021 through advertisements given in national and regional newspapers, social media and on websites. It was a completely online application system followed by telephonic interviews due to COVID restrictions.

We received over 100 applications which were sorted and short listed as per the eligibility criteria. Three rounds of interviews were conducted in the month of January’2021 each with around 25-30 candidates. Out of these 11 candidates were finalized for the training program. About two- thirds of the candidates were from outside Ahmedabad and three were local students.

Commencement of Training

The training program commenced on February 9th 2021, during which orientation was given and introductory sessions were held for the third batch of trainees. The formal inaugural ceremony was held at the Conference Hall, Blind People's Association, Ahmedabad. Presidential speech was delivered by CERC's trustee Shri Rakeshbhai Shah and welcome address by CEO & Board Secretary, Shri Uday Mawani. CERC's Chairman Shri Prafulbhai Amin encouraged youth with his inspirational speech. Ms. Anindita Mehta, Project Coordinator & CGM CERC briefed about the mandates and awareness activities of CERC ENVIS. Dr. Ashoka Ghosh, Member of Advisory Committee, CERC ENVIS addressed the audience about evolution of Green Skill development Programme. . The programme was attended by CERC's management, staff members, prominent industry & academic experts and consultants.

The training was conducted at CERC's in house Laboratory headed by Dr. Dolly A. Jani (Training In charge). The faculty was efficiently strengthened by Laboratory demonstrator- Ms. Kanaklatta Goswami. The two months training was supplemented with four field visits to-

- Food Research Laboratory, Gandhinagar
- Public Health Laboratory, Ahmedabad Municipal Corporation
- Revakant Gir Gaushala and Organic farms, Lilapur, SG Highway
- Central Effluent Treatment Plant, Naroda

Course Module

This course comprised of about seven weeks of classroom lectures and practical training. The concluding sessions entailed a week of assessment and related exercises. Thus a total of 225 hours course schedule was lined out. The main components of the training curriculum were as mentioned below:

1. Introduction of Food, Nutritional Aspects and Safety Standards.
2. Introduction of Laboratory Accreditation
3. Eco Friendly Maintenance of Laboratory Practice
4. Eco Friendly Laboratory Waste Management
5. Introduction of Basic Laboratory Equipments and their functions
6. Exercises and Assessment

Lectures and Practicals

The training was systematically carried out according to the topics lined out in the course module. Each student was provided with a training kit consisting of- Training Manual; general stationery items; Laboratory protection gear such as aprons, safety goggles, gloves and napkins etc. The lectures and practical sessions were continually held for nine weeks as per the descriptions in the Training Manual that was provided to the candidates. Various aspects of food testing and good laboratory practices were covered in details via this training such as: Sample collection and labeling: Fruit, Vegetable, Milk, Water, etc.; Basic analytical techniques: Test methods for common parameters in foods:-Moisture content; Ash; Acid insoluble ash; Acidity; Fat; Protein; Carbohydrate; minerals; Adulterants; etc.(Case study). The trainees were given hands on experience for operating basic laboratory equipment's& their applications in food analysis.

Arrangements were made for the demonstration of sophisticated instrument like Gas- Chromatograph- Mass Spectrophotometer (GC-MS) by Thermo Scientific Company engineer.. Analytical series webinars were arranged for the trainees on these topics –

- 1) Testing of Antibiotics and Mycotoxins by Sciex Inc.

2) Realize-A Winning Culture of Food Safety by SGS Inst

Innovative videos on laboratory safety and test methods were also shared with the trainees for impactful learning. During the course of the training, Guest/ expert lectures were also arranged for specific topics and subject matter.



Training Manual

The training manual details the requirements on safety & quality control to be followed by personnel engaged in the food laboratory. It is based on the requirements of Food Safety Standards Regulations, 2011 along with the industry best practices. It has been designed according to the flow of operation in the food industry for ease of understanding of the laboratory staff. This comprehensive manual is supplemented with Standard Operating Procedures specific to the food laboratory for facilitating the trainers.

The training manual is structured to provide essential information in a standardized, logical and systematic manner while adhering to effective teaching and learning strategies. It is composed of three sections. Initial Chapters-(1-14) elaborate on principles and methods Good Food Laboratory Practices; Chapter-15 introduces and elucidates the Safety Requirements in a Chemical Laboratory; and Chapter-16 explains the environment friendly practices for laboratories and its criteria. Each section has specific a training module which is customized to meet the specific needs of the trainees. The manual provides for the standard operating procedures for general laboratory equipments as well as test methods as per IS specifications. The annexure at the end list the methods of analysis of common adulterants found in various food products.

Field Visit I: February 22nd2021.

A study tour was arranged to Forensic Science Laboratory's state of the art -Food Research Laboratory (FRL) at Gandhinagar. The students were benefitted from getting a closer look and hands on experience of the world class food testing facility. FRL tested approx 20k samples in the last three years and achieved 90-95% accuracy in terms of results. FRL ensures the quality of the grains and other edible food items, which are supplied to the population. Their analysis is based on the both physical and chemical quality parameters.

FRL was awarded with SCOTCH Award by the state government. The laboratory is equipped with advanced scientific instruments and essential supplementary facilities that would help all stakeholders in analysis of wide range of food samples. The integral part of FRL consists of analyzing food for the [PDS] public distribution system at the state level and they have recently started working for the national food security system which consists of all types of pulses like moong dal, toor dal etc. And also other essential commodities like Sugar, Groundnut oil, Refined Iodized Salt, Double Fortified Salt, Refined Cottonseed Oil and Fortified Rice. The various Laboratory Divisions working as follows- Wet testing Laboratory, Dry test Lab, Microscopy, Fume hoods, General food testing & Grading Lab



and Instrumentation section:

- Gas Chromatography with Head Space(GC-HS)
- Inductively Coupled Plasma with Mass Spectroscopy(ICP-MS)
- Microwave Digester
- UV- Visible Spectrophotometer
- Refractometer
- Lovibond Tintometer
- 3D – Stereomicroscope
- Solid Phase Extraction(SPE)
- Auto Titrator -ThermoScientific
- Micro NIR.



Field Visit II: March 5th 2021

A study trip was arranged to Ahmedabad Municipal Corporation's Public Health Laboratory with state of the art food testing facilities. This is an NABL accredited laboratory in Chemical scope of activities. It is presently headed by Dr. Hiren Mandlia of the Central Laboratory and supported by Technical Officer Mr. Vimal Shah and qualified Food Analyst Ms. Isha Desai respectively. The trainees were shown around the instrumentation section with sophisticated equipments like:

- Gas Chromatograph with Mass Spectrophotometer(GC-MS)
- High Performance Liquid Chromatography(HPLC)
- UV-Vis Spectrophotometer
- Abbes digital Refractometer
- Kjeldahl Nitrogen Apparatus
- Soxhlet Extraction Apparatus
- Digital Microscope
- Atomic Absorption Spectrophotometer



The training at AMC Laboratory included hands on training for test parameters to check purity & quality of oils and fats. The trainees were explained the sample collection and handling procedure to be followed as per FSSAI laws and regulations. They were explained the process of sample receipt, coding, testing and reporting procedures in the laboratory as per NABL guidelines. The students were also given a demonstration of the tests for adulteration in common food items such as namkeens, spices, sweets etc.

Field Visit III: March 12th 2021

The Revakant Gir Gaushala is located at Lilapur farms, S.G.Highway, Ahmedabad and has been running successfully for over 7-8 years. The Gir cows gaushala is built in a warli hut style traditionally used by native Western farm workers , it has walls that are constructed of bamboo and reeds, plastered with a binding mixture of cow dung and mud and the same mixture is used for flooring and the hut is roofed with either dried leaves or straw or half portioned tiles or metal roofs in case of cowshed .The gaushala also duals as an organic farm and provides other farm products in the most natural form that can be made available , which is being made possible through generation of various other animal (cow) based by products



for which specifically a small scale laboratory at gaushala has been developed which mainly has a distillation and condensation units ; furthermore they have a semi traditional oil extraction plant located in the same grounds where various oil seeds like ground nut, sesame, black sesame, mustard, castor, and coconut are used and their unrefined virgin oil also locally known as kachi ghani tel is packaged and sold subsequently according to norms and needs. Various aspects learnt through the visit were-

- Process and benefits of organic farming- fodder, wheat, pulses, fruits and vegetables;
- Manufacturing of animal (cow) sourced food and medicinal products
- Mechanical and instrumental extraction of food products- cold pressed edible oils

Field Visit IV: March 15th 2021: Naroda Environment Project Limited (NEPL): It is established in 1962. NEPL is first E-State in Gujarat. Common effluent treatment concept as introduced in this Naroda Enviro Projects Limited on 19th October 1995. It is a Private Sector Company involved in treatment of effluent received from member companies of all four phases of GIDC. The trainees were explained about various types of effluent treatment practices followed as a part of Greener and Cleaner production. There are generally four types of treatment of effluent:

- Preliminary Treatment
- Primary Treatment
- Secondary Treatment
- Tertiary Treatment

The three types of mechanisms used for waste management include-Physical, Chemical, Biological modes of treatment. Further NETP has a state of art Environment Sample Laboratory. Some of the Physico chemical parameters analyzed in laboratory are -BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), TSS (Total Suspended Solid), pH etc. Around 200 samples are analyzed in single day.

The trainees were required to submit their field visit reports after each study tour.

Seminar/presentations: As per the requirements of the course module, external faculty/ experts were invited to take up sessions on –

- (1) Introduction to NABL–significance and requirements;
- (2) Criteria for Laboratory Accreditation and Clauses for testing & calibration laboratories.
- (3) Bureau of Indian Standards (BIS) - Understanding documents for product/ test requirements and specifications.
- (4) Certified Reference Materials and Standards and Elemental analysis in Food products.
- (5) Food safety issues and analysis from a regulatory perspectives.
- (6) Entrepreneurship and small business start ups.
- (7) Finance and banking for entrepreneurs.
- (8) Cleaner Production, Waste minimization & Greener Production.
- (9) World Consumer Right Day celebrations (15th March 2021) – Legal Aspects of Plastic pollution and Consumer protection.
- (10) Detection of common food adulterants through spot testing and mobile test vans by Gujarat state FDCA.



Evaluation and Assessment

The candidates were assessed and evaluated on the basis of a written test and performance in practicals. They were also graded for their respective field reports, Journals and the classroom presentations. The final assessment exam was conducted online for the trainees. The entire exercise was completed between 26th March and 31st March 2021.

Valedictory Function

To conclude the two- month training program a virtual valedictory function was organized. Concluding speech was delivered by CERC's Dr. Dolly A Jani and vote of thanks was given by Ms. Divya Namboodari, Project Officer- CERC- ENVIS-RP. Eleven of the trainees were awarded certificates upon successful completion of the training program.

Placement Activity

A placement brochure was prepared with the CV's of all the trainees and it was circulated to prospective employers such as Testing Laboratories, Food Industries and Research Institutions etc.

Feedback:



I am Pundalik and I am from Karnataka. I have completed my course on "Laboratory Assistant for Eco-Friendly Food Testing Laboratory" under GSDP at CERC ENVIS. I have gained theoretical as well as practical knowledge from the course Incharge & the facilities provided were very good. The guest lectures and field visit arranged is very beneficial for me. I have learned a lot from this course. I want to thank the team.



I am Nancy Singh and I am from Kanpur. I have joined the course on "Laboratory Assistant for Eco-Friendly Food Testing Laboratory". I am glad I joined this course and I have learned a lot here. Accommodation and food facilities provided were very good. We have visited many Laboratories where we have learned about the new instruments. We have attended many guest lectures arranged by the team. I have gained knowledge from regular lectures & practical which were new to me.



I Ranjan Kumar Mishra and I am from Bihar. I got enrolled in the course on "Laboratory Assistant for Eco-Friendly Food Testing Laboratory" via GSDP Portal at CERC Ahemdabad. I have learned about food testing through the practical. During theory lectures by course In charge and guest faculties, I have learned about food adulterations, food act etc. I want to thank coordinators and the other team members who have selected me for this course which has benefited me in various ways for better future. I have learned more than I expected.



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