

PESTICIDE MANAGEMENT DIVISION

Objectives & Goals of Training Programmes

1. Pesticide Formulation Analysis (PFA):

➤ *Aim :*

- ✓ To create a pool of qualified pesticide analysts to man Central and State Pesticide Testing Laboratories (as per requirement of Insecticide Act 1968 and Rules 1971)
- ✓ To impart skills in conventional & instrumental methods of analysis.

➤ *Course Outline:*

- ✓ Pesticide Management,
- ✓ Principles of volumetric analysis and different type of titrations.
- ✓ Conventional Analysis of pesticides and their formulations.
- ✓ The Physico- chemical properties and
- ✓ Instrumental methods of Analysis
- ✓ Basics of Spectroscopy (UV-Vis & FTIR) and Chromatography (GC & LC),
- ✓ Operation & maintenance the analytical instruments and trouble shooting
- ✓ Methodologies for analysis of Pesticides and their formulations for Quality Control.
- ✓ Laboratory Quality System Management and Internal Audit as per ISO/IEC 17025-2005

➤ *Duration of the Programme:* 66 days

➤ *Methodology adopted:*

- a) *Theory:* 40%
- b) *Case Studies/Exercises:* 10%
- c) *Practicals:* 50%

➤ *Hands on skills that will be acquired:*

- ✓ Operation of (a) Gas Liquid Chromatograph with flame ionization Detector (GLC-FID), (b) High performance Liquid Chromatograph with UV Detector (HPLC), (c) UV-Visible Spectrophotometer, (d) Fourier Transform Infra-Red Spectrophotometer (FTIR).
- ✓ Preparation of various standard and normal solutions along with their standardization.
- ✓ Analysis of Pesticides by volumetric, gravimetric methods of analysis.
- ✓ Analysis of Pesticides by GLC-FID, HPLC, UV-Visible Spectrophotometer and FTIR.

➤ *Utility of skills learnt/Training Programme:*

- ✓ Will become qualified Pesticide Analyst.
- ✓ Will be able to carry out analysis to test pesticide samples for Active Ingredient, Acidity, Alkalinity, Emulsion stability, Flash point, suspensibility, attrition test, particle size etc. by using different analytical techniques.
- ✓ Will be able maintain the standards and organise the Laboratory as per the requirement of ISO/IEC 17025-2005.

2. Pesticide Residue Analysis:

➤ *Aim of the Course:*

- ✓ To create a group of skilled Pesticide Residue Analysts to strengthen the Pesticide Residues Monitoring programme all over India.
- ✓ To impart skills on extractions and determination of pesticide residues on/in agricultural as well as environmental samples at micro levels as per the requirement of International Standards.

➤ **Course Outline:**

- ✓ Introduction to Pesticide Residues and their significance.
- ✓ Introduction to various residue terms including MRLs, ADI and NOEL and importance of analysis of pesticide residues
- ✓ Theory and principles of GLC, HPLC, GC-MS/MS and LC-MS/MS
- ✓ Different steps involved in analysis of pesticide residues – sample extraction, clean-up, identification and quantification of Pesticide and their metabolites using latest analytical Instruments like GLC, HPLC, GC-MS/MS and LC-MS/MS etc.
- ✓ Purification of reagents used in pesticide residue analysis
- ✓ Preparation and storage of Certified Reference Materials (CRMs)
- ✓ Method validation for pesticide residue analysis
- ✓ Identification, quantitation and confirmation of presence of pesticide residues in various agricultural commodities and environmental samples.
- ✓ Procedure for reporting analytical results on pesticide residues.
- ✓ Various clean-up procedures via solvent partition, Solid Phase Extraction and QUECHERS method.

➤ **Duration of the programme:** 30 days

➤ **Methodology adopted:**

- a) **Theory:** 30%
- b) **Case Studies/Exercises:** 10%
- c) **Practicals:** 60%

➤ **Hands on skills that will be acquired:**

- ✓ Extraction, clean-up of various materials to detect and quantify pesticide residues.
- ✓ Identification and quantification of pesticide residues.
- ✓ Skills on QUECHERS method.

➤ **Utility of skills learnt/Training Programme:**

- ✓ Will be able to Extract and clean-up of various materials to detect and quantify pesticide residues at a Limit of Quantitation (LOQ) levels which meet the International Regulations on pesticide residues.

3. Refresher program on Analysis of New molecule of Pesticides (PFA):

➤ **Aim of the Course:**

- ✓ To improve the skills of Qualified Working Analysts in analysis of new molecules of Pesticides using latest analytical techniques.

➤ **Course Outline:**

- ✓ Analysis of new pesticide molecules.
- ✓ Instrumental methods of analysis.

➤ **Duration of the programme:** 10 days

➤ **Methodology adopted:**

- a) **Theory:** 30%
- b) **Case Studies/Exercises:**10%
- c) **Practicals:** 60%

➤ ***Hands on skills that will be acquired:***

- ✓ Operation of Gas Liquid Chromatograph with flame ionization Detector (GLC-FID) for new molecules of pesticides.
- ✓ Operation of High performance Liquid Chromatograph with UV Detector (HPLC) for new molecules of pesticides.
- ✓ Refreshing of spectroscopy and analysis of choice pesticides by the participants.

➤ ***Utility of skills learnt/Training Programme:***

- ✓ The participants will be able to analyse the new molecules of pesticides for various parameters in their laboratories.

4. Method validation in Pesticide Formulation Analysis and Measurement of Uncertainty:

➤ ***Aim of the Course:***

- ✓ To impart the skills in Method development and validation.
- ✓ To build the capacity in producing a reliable, reproducible test results with higher confidence levels.

➤ ***Course Outline:***

- ✓ Principles of method validation
- ✓ Steps/component of method validation
- ✓ Principles of measurement of uncertainty
- ✓ Terminologies used in the measurement of uncertainty

➤ ***Duration of the programme:*** 6 days.

➤ ***Methodology adopted:***

- Theory:*** 30%
- Case Studies / Exercises:*** 10%
- Practical:*** 60%

➤ ***Hands on skills that will be acquired:***

- ✓ Conduct method validation in Instrumental Analysis of pesticide samples.
- ✓ Calculation of Measurement of Uncertainty in pesticide sample analysis with proper identification of source of uncertainty.

➤ ***Utility of skills learnt/Training Programme:***

- ✓ Will be able to carry out method validation of any new or modified method.
- ✓ Will be able to generate reliable and reproducible analytical results with higher confidence levels.

5. Method validation in Pesticide Residue Analysis and Measurement of Uncertainty:

➤ ***Aim of the Course:***

- ✓ To impart the skills in Method development and validation.
- ✓ To build the capacity in producing a reliable, reproducible test results with higher confidence levels.

➤ ***Course Outline:***

- ✓ Principles of method validation
- ✓ Steps/component of method validation
- ✓ Principles of measurement of uncertainty
- ✓ Terminologies used in the measurement of uncertainty

➤ **Duration of the programme:** 6 days.

➤ **Methodology adopted:**

- a) **Theory:** 30%
- b) **Case Studies/Exercises:** 10%
- c) **Practical:** 60%.

➤ **Hands on skills that will be acquired:**

- ✓ Validation of methods for estimation of pesticide residues.
- ✓ Calculation of Measurement of Uncertainty in pesticide residue sample analysis with proper identification of source of uncertainty.

➤ **Utility of skills learnt/Training Programme:**

- ✓ Will be able to carry out method validation.
- ✓ Will be able to generate reliable and reproducible analysis results with higher confidence levels.

6. Analysis of Household Pesticides:

➤ **Aim of the Course:**

- ✓ To build the capacity of Insecticide Analysts in analysis of House hold pesticides for quality control under Insecticide Act.

➤ **Course Outline:**

- ✓ Introduction to domestic pesticides.
- ✓ Various formulations of House hold pesticides.
- ✓ Various techniques of Analysis.
- ✓ GLC and HPLC analytical techniques.
- ✓ Methodologies for analysis of different kinds of house hold formulations

➤ **Duration of the programme:** 5 days.

➤ **Methodology adopted:**

- a) **Theory:** 30%
- b) **Case Studies/Exercises:** 10%
- c) **Practicals:** 60%

➤ **Hands on skills that will be acquired:**

- ✓ Operation of equipment to analyse the house hold pesticides

➤ **Utility of skills learnt/Training Programme:**

- ✓ Participants will be able to analyse different house hold pesticide formulations including pesticide cakes, baits, aerosols etc.

7. Calibration of Glassware and Laboratory Equipment -Pesticide Formulation Analysis / Quality Control:

➤ **Aim of the Course :**

- ✓ To impart knowledge and skills of calibration of Glassware & Laboratory Equipment for quality assurance in Pesticide Formulation Analysis.

➤ **Course Outline:**

- ✓ Calibration of measuring Glassware.
- ✓ Calibration of measuring equipment used in Pesticide Analysis Laboratories

- ✓ Calibration of UV-Vis spectrophotometer, FTIR spectrophotometer, Gas Liquid Chromatography (GC), High Performance Liquid Chromatograph (HPLC)

➤ **Duration of the programme:** 8 days.

➤ **Methodology adopted:**

- a) **Theory:** 20%
- b) **Case Studies/Exercises:** 20%
- c) **Practicals:** 60%

➤ **Hands on skills that will be acquired:**

- ✓ Calibration of different measuring glassware viz. Burette, Pipette, Volumetric flask and measuring cylinders.
- ✓ Calibration of electronic balance, UV-Visible Spectrophotometer, Fourier Transformed Infrared Spectrophotometer (FTIR), Gas Liquid Chromatograph with flame ionization detector and High Performance Liquid Chromatograph with UV Visible Spectrophotometer Detector.

➤ **Utility of skills learnt/Training Programme:**

- ✓ Participants will be able to calibrate their measuring glassware used in their laboratories.
- ✓ Participants will be able to calibrate their equipment like electronic balance, UV-Visible Spectrophotometer, Fourier Transformed Infrared Spectrophotometer (FTIR), Gas Liquid Chromatograph with Flame Ionization Detector and High Performance Liquid Chromatograph with UV Visible Detector before being put to use.
- ✓ Use of calibrated glassware and equipment result in reproducible analytical results which is one of the measures for quality assurance in the analysis of pesticides as per ISO/IEC 17025.

8. Documentation for NABL:

➤ **Aim of the Course:**

- ✓ To acquaint the procedures in preparing different kinds of documents to implement the quality system as per the requirement of ISO/IEC 17025-2005 so as to help the participants prepare for the accreditation of their laboratories.

➤ **Course Outline:**

- ✓ Organization and its structure
- ✓ Infra-structure, Environmental Condition, Housekeeping etc.
- ✓ Methods of Analysis and Standard Operating Procedures,
- ✓ Procurement Procedure, Store record etc.,
- ✓ Equipment, AMCs and calibration etc.,
- ✓ Flow of Work (Sample Receipt to disposal)
- ✓ Quality Control
- ✓ Internal Audit, Corrective Action, Management Review and others

➤ **Duration of the programme:** 4 days

➤ **Methodology adopted:**

- a) **Theory:** 40%
- b) **Case Studies/Exercises:** 60%

➤ ***Hands on skills that will be acquired:***

- ✓ Participants will learn the preparation of various documents required as per the requirement of ISO/IEC 17025-2005 and prepare a model set of documents to maintenance in their Laboratories.

➤ ***Utility of skills learnt/Training Programme:***

- ✓ Participants will be able to prepare various documents like Quality Manual, Quality System Procedure, Standard Operating Procedures, Work instructions, different forms and formats, Maintenance of various records in their Laboratories.

9. Inspection, sampling and prosecution procedure under Insecticides Act -1968:

➤ ***Aim of the Course:***

- ✓ To provide the thorough knowledge on the Insecticide Act, various sections and rules in it and the procedures of Inspection, Sampling and Prosecution Procedures for successful enforcement of the act to the Officers working in the Enforcement wing as Insecticide Inspectors.

➤ ***Course Outline:***

- ✓ Introduction to pesticides and their formulations
- ✓ The salient features of the Insecticide Act 1968 and Insecticide Rules 1971
- ✓ Implementation of the Insecticide Act 1968 and Insecticide Rules 1971 giving emphasis on the role, duties & responsibilities of Insecticide Inspectors.
- ✓ Registration of pesticides.
- ✓ Label and Leaflets and the significance of label claims.
- ✓ The procedures of pesticide sampling
- ✓ Procedures and methods of analysis of pesticides
- ✓ Procedures and methods of analysis of Bio products.
- ✓ Procedures for prosecution etc.

➤ ***Duration of the programme:*** 6 days

➤ ***Methodology adopted:***

- Theory:*** 40%
- Case Studies/Exercises:*** 20%
- Practicals:*** 30%
- Field Visit:*** 10%

➤ ***Hands on skills that will be acquired:***

- ✓ Will be able to inspect Pesticide Manufacturing Unit and Pesticide Dealers.
- ✓ Will be able to draw the samples and submit to Government Pesticide Testing Laboratories as per the stipulated procedure under Insecticide Act 1968 and Rules 1971.
- ✓ Will be able to initiate the follow up action after the drawl of samples.
- ✓ Will be able to launch and coordinate with the Public Prosecutors in launching prosecutions.

➤ ***Utility of skills learnt:***

- ✓ Inspection of Pesticide Manufacturing unit, shops, drawl of samples and its submission to Pesticide Testing Laboratory.
- ✓ Initiate administrative and legal action against the Manufacturers, Distributors, Dealers and others who contravene the Insecticide Act and Rules.

10. Sampling of Fruits, Vegetables and other items for Pesticide Residue Analysis & calibration of Laboratory Equipment-PRA(1):

➤ *Aim of the Course:*

- ✓ To impart the knowledge of correct sampling procedure for drawl of true(representative) samples for analysis of pesticide residues as per international guidelines.
- ✓ To impart knowledge and the practical skills in calibration of Glassware & Laboratory Equipment.

➤ *Course Outline:*

- ✓ The sampling procedures and steps involved in collection of samples from the field.
- ✓ The procedures of preparing laboratory sample for analysis.
- ✓ Importance and principles of calibration of laboratory equipment used in Pesticide Residue Analysis
- ✓ Sampling of Fruits, Vegetables and other items.
- ✓ Calibration of Analytical Instruments such as GLC,HPLC,GC-MS/MS and LC-MS/MS

➤ *Duration of the programme:* 8 days

➤ *Methodology adopted:*

- Theory:* 20%
- Case Studies/Exercises:* 10%
- Practicals:* 70%

➤ *Hands on skills that will be acquired:*

- ✓ Drawl of representative samples of various commodities for estimation of Pesticide residues.
- ✓ Calibration of measuring glassware.
- ✓ Calibration of Equipment like Electronic Balance, GC-ECD, GC-MS/MS, LC-MS/MS.

➤ *Utility of skills learnt/training programme:*

- ✓ Will be able to draw representative samples for estimation of pesticide residues.
- ✓ Will be able to calibrate of Glassware, Electronic Balance, GC-ECD, GC-MS/MS, LC-MS/MS etc. in his/her laboratory.

11. Training to Pesticide Dealers:

➤ *Aim of the Course:*

- ✓ To acquaint the pesticide dealers the statutory norms as per the insecticide act 1968, the principles of plant protection and the significant role of plant doctors besides dos and do not's for a pesticide dealer for a safe and judicious use of pesticides with emphasis on the results of non-approved use of pesticides.

➤ *Course Outline:*

- ✓ Pest classification and application based on pest problem
- ✓ Pesticide chemistry
- ✓ Pesticide classification
- ✓ Pesticide formulations, compatibility, Toxicity
- ✓ Safe and Judicious use of Pesticides
- ✓ Dose calculation
- ✓ Spray/ Application techniques and related topics
- ✓ Insecticide Act 1968 and Insecticide Rules 1971 – significant features of it with respect to Pesticide Dealers.

- **Duration of the programme:** 3 days
- **Methodology adopted:**
 - a) **Theory:** 60%
 - b) **Case Studies/Exercises:** 10%
 - c) **Practicals:** 30%
- **Hands on skills that will be acquired:**
 - ✓ Participants will be trained on aspects of how to comply the requirement of Insecticide Act, 1968 and Rules, 1971.
- **Utility of skills learnt/ Training Programme:**

Participant pesticide dealers will seek the recommendation of extension workers and advise the farmer to consult for the correct pesticides, while doing their job of pesticide sale. They will comply the provision of Insecticide Act, 1968.

12. Laboratory Quality System Management and Internal Audit as per ISO/IEC 17025-2005:

- **Aim of the Course:**
 - ✓ To introduce and train the participants on concepts of Laboratory Quality System Management and Internal Audit as per ISO/IEC 17025-2005 so as to help them to prepare for the accreditation of their laboratories.
- **Course Outline:**
 - ✓ The management requirements
 - ✓ The technical requirements
 - ✓ quality management
 - ✓ guidelines,
 - ✓ internal audit
 - ✓ and maintenance of records
 - ✓ Management review
- **Duration of the programme:** 6 days
- **Methodology adopted:**
 - a) **Theory:** 50%
 - b) **Case Studies/Exercises:** 20%
 - c) **Practicals & Internal Audit:** 30%
- **Hands on skills that will be acquired:**
 - ✓ Preparation of Quality Manual, Quality System Procedure, Working instructions, different registers, execution of laboratory activities as per the requirement of ISO 17025, Conductance of Internal Audit, Management review of Pesticide Testing Laboratories.
- **Utility of skills learnt/Training Programme:**
 - ✓ The capacity of the participants is built up to prepare their laboratory ready for NABL accreditation as per ISO 17025-2005.
 - ✓ The Managers and Laboratory in charges and the analysts require to undergo this training program for implementation of the quality systems in their laboratories as per the NABL requirement for maintaining and obtaining the accreditation of their Laboratory.

13. Orientation on Inspection and drawl of pesticide sample as per IA 1968 (Off Campus):

➤ *Aim of the Course:*

To provide the thorough knowledge on the Insecticide Act, various sections and rules in it and the procedures of Inspection, Sampling and Prosecution Procedures for successful enforcement of the act to the Officers working in the Enforcement wing as Insecticide Inspectors.

➤ *Course Outline:*

- ✓ Insecticides Act 1968:
- ✓ Insecticide Inspectors
- ✓ Inspection
- ✓ Drawl of pesticide samples – Procedures
- ✓ Procedures involved in launching prosecution
- ✓ Involvement of Evidence Act

➤ *Duration of the programme:* 3 days

➤ *Methodology adopted:*

- a) *Theory:* 50%
- b) *Case Studies/Exercises:* 20%
- c) *Practicals:* 30%

➤ *Hands on skills that will be acquired:*

- ✓ Inspection of Pesticide sale points.
- ✓ Drawl of Pesticide samples at pesticide godowns and shops.

➤ *Utility of skills learnt/Training Programme:*

- ✓ Participants will conduct effective inspection of pesticide manufacturing units and shops
- ✓ Error free drawls of pesticide samples and its submission to Pesticide Testing Laboratories and follow up action.

14. Quality Control of Microbial Bio-pesticides:

➤ *Aim of the Course:*

- ✓ To train the Insecticide Analyst and officers of State Pesticide Testing Laboratories in testing the Microbial Bio-pesticide samples for their quality control as per the requirement of Insecticide Act, 1968.

➤ *Course Outline:* This course covers the followings:

- ✓ Introduction to Bio-agents and Bio-pesticides.
- ✓ Media preparation for bacterial & fungal bio-agents and sterilization techniques.
- ✓ Culturing and sub-culturing preparation of mother cultures for Bio-pesticides, maintenance of reference culture.
- ✓ Quality Control of Btk:
 - i) Heat Resistant Viable Spore Count
- ✓ Quality control of NPV:
 - i) LC_{50} by Bioassay Method using *Helicoverpa*
- ✓ Quality control of *Trichoderma* & *Pseudomonas*:
 - i) Antagonistic Ability By Dual Culture Technique
 - ii) CFU/Viable Spore Count
- ✓ Observations on LC_{50} of NPV (72 Hrs.) & Btk (48 Hrs.):
 - i) Observation C.F.U Count and Antagonistic Ability of *Trichoderma* & Observation on LC_{50} of Btk and NPV
- ✓ Determination of pH & Moisture Content:

- ***Duration of the Programme:*** 10 days
- ***Methodology adopted:***
 - a) ***Theory:*** 30%
 - b) ***Practicals:*** 70%
- ***Hands on skills that will be acquired:***
 - ✓ Testing of microbial bio-pesticides pesticides in the laboratory.
 - ✓ Maintenance of pure culture, isolation and culturing of various microbes from samples.
- ***Utility of skills learnt / Training Programme:***
 - ✓ /Participants will establish the microbiology laboratory and start analyse the microbial bio-pesticides without any errors.