Training Course on Advanced Plant Pathology and Molecular Disease Diagnostics

Professional Development Training Course Outline

Category	Agriculture	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In an era marked by climate change, globalization, and evolving plant diseases, advanced plant pathology and molecular diagnostics have become critical for sustainable agriculture and global food security. Training Course on Advanced Plant Pathology and Molecular Disease Diagnostics is designed to equip professionals with cutting-edge knowledge and practical skills in diagnosing and managing plant diseases using molecular tools and advanced plant pathology principles. It will emphasize the integration of genomics, proteomics, and bioinformatics in disease surveillance, resistance breeding, and pathogen characterization to mitigate crop losses and improve yields.

Through hands-on training, case studies, and expert-led sessions, participants will delve into pathogen-host interactions, molecular assay development, and disease forecasting models. This course will also enhance capacities in rapid diagnostics, field-based detection systems, and the application of AI and machine learning in plant health management. Whether you're a plant scientist, agronomist, or policy-maker, this training will provide actionable insights and transferable skills aligned with global best practices.

Programme Curriculum

Training Course on Advanced Plant Pathology and Molecular Disease Diagnostics

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Course Objectives

1. Understand emerging plant diseases and their global impacts.
2. Analyze host-pathogen interactions at cellular and molecular levels.
3. Apply PCR, qPCR, and LAMP techniques in diagnostics.
4. Develop skills in genomic and proteomic data interpretation.
5. Master DNA/RNA extraction and purification methods.
6. Implement bioinformatics tools for disease diagnosis.
7. Learn disease surveillance and early warning systems.
8. Explore AI-powered diagnostics and machine learning in plant pathology.
9. Study disease resistance genes and molecular breeding tools.
10. Identify biological control agents and integrated disease management (IDM) strategies.
11. Examine the role of climate-smart agriculture in disease prevention.
12. Strengthen capacity in lab-to-field translation of diagnostic tools.
13. Conduct risk assessment and policy development for disease outbreaks.

Target Audiences

1. Agricultural research scientists
2. Plant pathologists and virologists
3. Agronomists and extension officers
4. Phytosanitary inspectors
5. Biotech company professionals
6. Graduate students in plant sciences
7. Policymakers and regulators in agriculture
8. Seed and crop protection industry experts

Course Duration: 5 days

Course Modules

Module 1: Fundamentals of Advanced Plant Pathology

- Overview of plant disease concepts
- Classification of plant pathogens
- Economic impacts of emerging plant diseases
- Introduction to molecular diagnostics
- Host-pathogen interaction case study
- **Case Study**: Panama Disease in Bananas

Module 2: Molecular Tools in Disease Diagnostics

- PCR, qPCR, and RT-PCR techniques
- LAMP and CRISPR-based detection
- DNA/RNA extraction protocols
- Gel electrophoresis and imaging
- Sensitivity and specificity evaluation
- **Case Study**: Rapid detection of Tomato Yellow Leaf Curl Virus

Module 3: Genomics and Proteomics Applications

- Introduction to plant genomics
- Pathogen genome sequencing
- Proteomic profiling of infected plants
- Use of molecular markers in diagnostics
- Integrative ‘omics’ approaches
- **Case Study**: Rice Blast Resistance Gene Discovery

Module 4: Bioinformatics in Plant Disease Diagnostics

- Genomic databases and tools
- Sequence alignment and BLAST analysis
- Phylogenetic tree construction
- Data interpretation from NGS
- Use of cloud platforms in diagnostics
- **Case Study**: Tracking Wheat Rust Strain Evolution

Module 5: Field-Based Disease Surveillance and Forecasting

- Digital surveillance tools
- Use of AI and IoT in monitoring
- Predictive modeling of outbreaks
- Geo-mapping and spatial analytics
- Data collection protocols and ethics
- **Case Study**: AI-based Early Detection of Maize Lethal Necrosis

Module 6: Integrated Disease Management (IDM) Strategies

- Cultural and biological control methods
- Chemical management and resistance issues
- Role of beneficial microbes
- Crop rotation and soil health
- IDM framework implementation
- **Case Study**: IDM Approach for Fusarium Wilt in Tomatoes

Module 7: Climate Change and Plant Disease Dynamics

- Effects of temperature and rainfall on pathogens
- Climate-resilient crops
- Adaptation strategies for farmers
- Policy implications for disease control
- Integration into extension services
- **Case Study**: Late Blight Management in Changing Climates

Module 8: Diagnostic Lab Management and Quality Assurance

- Lab safety protocols and biosafety levels
- Standard operating procedures (SOPs)
- QA/QC in molecular labs
- Equipment calibration and validation
- Accreditation and certification systems
- **Case Study**: Setting up a Regional Plant Disease Diagnostic Lab

Training Methodology

- Interactive lectures and real-world examples

- Practical lab sessions on molecular diagnostics
- Demonstrations of software and bioinformatics tools
- Group discussions and expert Q&A
- Hands-on case study analysis
- Fieldwork and simulation exercises

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com