**Training in Recombinant DNA Technology Duration: 15 days**

**Molecular cloning:**

**Preparation of nucleic acids:**

* Plant Genomic DNA extraction
* Plasmid DNA extraction
* Purification of gDNA & plasmid DNA

**Qualitative analysis of gDNA & plasmid DNA**

* Agarose gel electrophoresis. Spectrophotometer, Dot spot

**Preparation of target gene fragment:**

* PCR techniques
* Agarose gel electrophoresis
* Gel elution

**Preparation of plasmid DNA & gene fragment for cloning:**

* Restriction digestion
* Dot spot quantification
* Ligation

**Competent cell preparation**

* Preparation of nutrient broth.
* Starter culture preparation.
* Preparation of competent cells
* Storage of competent cells

**Bacterial transformation**

* Preparation of LB agar plates
* Transformation of recombinant DNA into E.coli cell.
* Plating technique for transformed culture
* Transformation efficiency

**Screening of transformed colonies:**

* Alpha complementation
* Colony/Plasmid PCR

**Training in Plant tissue culture**  **Duration: 15 days**

**Sterilization techniques:**

* Dry heat sterilization
* Moist heat sterilization
* Filtration

**Preparation of media**

* Nutritional component of the media

**Invitro germination of seeds**

* Surface sterilization of seed

**Invitro Plant regeneration technique**

* Micropropagation
* Callus culture
* Embryo culture

**Agrobacterium mediated gene transformation into plant**

* Preparation of explants
* Starter culture preparation
* Co cultivation of explants with the bacteria
* Selection media transfer.

**Analysis of transgenic plants**

* Extraction of DNA
* Agarose gel electrophoresis
* PCR

**Training in Protein related works Duration: 15 days**

**SDS-Poly Acrylamide Gel Electrophoresis:**

**Estimation of protein:**

* Cell lysis and protein extraction

**Separation of protein molecules:**

* SDS-PAGE (Poly Acrylamide Gel Electrophoresis)

**Staining Techniques**

* Coomassie brilliant blue staining
* Silver staining

**Data Analysis**

* Estimation of molecular mass of protein of interest and relative abundance of unknown polypeptides in a complex mixture

**Training in Immunology Duration: 15 days**

**Western blotting:**

* Extraction of protein sample containing antigen
* SDS-PAGE (poly Acrylamide gel electrophoresis)
* Handling of nitrocellulose membrane
* Transfer of protein bands from gel to nitrocellulose membrane

**Immuno Assay:**

* Processing of nitrocellulose membrane for detection of antigen

**ELISA:**

* Extraction of protein samples
* Processing of the samples for the detection of viral antigen.

**Training in Plant pathology Duration: 7 days**

**Detection of pathogens:**

* Plant material
* Soil sample
* Peat

**Identification of pathogens:**

* Microscope
* Gram staining
* Motility

**Training in Microbiology Duration: 15 days**

**Sterilization techniques**

* Dry heat sterilization
* Moist heat sterilization
* Filtration

**Preparation of nutrient media**

* Solid media
* Liquid media

**Culture plating methods:**

* Spread plate method
* Pour plate method
* Streak plate method

**Bacterial growth kinetics:**

* Starter culture preparation
* Spectrophotometer

**Serial dilution techniques:**

* Preparation of sample material
* Preparation of nutrient media
* Plating the culture

**Training in DNA fingerprinting Technology**

**Duration: 45 days**

**Molecular markers:**

* RAPD
* SSR
* SCAR
* CAPS

**Preparation of nucleic acid:**

* Extraction of DNA
* Purification of DNA

**PCR Techniques:**

* Gene analysis
* Genetic purity {Homozygosity & homogeneity}
* Genetic diversity

**Gel Electrophoresis Technique:**

* Agarose gel electrophoresis
* Native PAGE
* SDS - PAGE

**Gel Staining Techniques:**

* Ethidium bromide staining (PAGE/Agarose)
* Silver staining

**Data Analysis:**

* Analysis of resistant & susceptible lines
* NTysis software

**Long duration projects**

**Duration: 2-6 months**

**Project areas**

1. **DNA finger printing**
2. **Marker assisted trait selection**
3. **Plant tissue culture**
4. **Plant pathology**
5. **Seed Quality Assurance**