GENETIC METHODS IN PLANT BREEDING (PBS 505)

COORDINATED BY PROF. D. K. OJO

WEEK 1 (LECTURE 1&2)

- Definition of Plant Breeding
- Sources of genetic variations
  * Gene Mutation
  * Gene Recombination
  * Gene transfer by direct gene manipulation
  * Somaclonal variation
  * Plant hybridization
- Significance of genetic variation
  * Individual plants with desirable genotypes can be selected
  * Best genotypes from developed families can be identified after recombination of genes
  * Recomposed plant families will develop into improved varieties

WEEK 2 (LECTURE 3)

- Selection methods and objectives
- Factors that dictate selection methods
  * Reproductive system of plant
  * Cytogenetic structure of plant
  * Heterosis
  * Qualitative versus Quantitative traits
  * Gene action of the traits
  * Heritability of the traits

WEEK 3 (LECTURE 4&5)

- Crossing (Hybridization) Methods
  * Divergent breeding Methods:
    - Single cross
    - Double cross
    - Three-way cross
    - Successive cross

- Diallel cross

* Convergent breeding methods:
  - Backcross method
  - Test cross method

- Inbreeding Versus Outcrossing

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WEEK 4 (LECTURE 6)

- Heterosis: types and examples
- Concept of Heritability and Genetic advance

WEEK 5 (LECTURE 7&8)

- Evaluation of Inbred Lines
  - As single crosses
  - Three-way cross
  - In Top crosses
  - In Diallel crosses
- Diallel analysis and examples
- Combining ability: General and specific combining abilities.

WEEK 6 (LECTURE 9)

- Phenotype and components of phenotypic variation
  * Estimation of variances in segregating populations
  * Additive and dominance variance
  * Broad-sense and narrow-sense heritability estimation

WEEK 7 (LECTURE 10)

- Genetic analysis of variation in plants
- Calculations involving heterosis, heritability, genetic advance and combining abilities with worked examples.

WEEKS 8 -10 (PRACTICAL AND FIELD WORKS)

- Field plot layout
- Examples of experimental design

- Crossing methodology
- Data analysis

SUGGESTED REFERENCES

1. Plant Breeding – Principles and Prospects. Edited by Hayward, M. D., Bosemark, N. O. & Romagos, A. T.

2. Principles and methods of Plant Breeding developments in Crop Science. Borojeviv, S .Elsevier Publishers.

3. Biometrical Genetics- K. Mather and J. L. Jinks, Chapman and Hall, Ltd., London.