CROP EVOLUTION AND TAXONOMY (PBS 503)

Coordinate BY

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LECTURE 1

- Definition of Evolution
  - * Is the scientific idea of the gradual development of the various types of plants, animals etc from fewer & simpler form
  - * Is the gradual change and development
  - * Is the modeling force, which is more specifically natural selection.
  - * If all the above definitions are applied to crop, it is called CROP EVOLUTION
- Theory of Evolution (Darwinian Concept)
  - * The basic tenets are:
    - ➢ The number of individuals in any population tends to increase geometrically when the condition permits the survival of all progenies
    - ➢ Potential for rapidly increase is seldomly realized in the case of every species
    - ➢ Competition of struggle for survival occurs in which many individuals are eliminated.
    - ➢ Variation in the form of individual differences exist in every species or population.
    - ➢ Evolution is a gradual change in the hereditary make-up of the species.
- Modern ideas of evolution
  - * Modern synthesis
  - * The Neo-Darwinism synthesis
  - * Neo-Darwinism
- Evolution can be seen as 2 – part processes
  - 1) The Origin of variation
  - 2) The modification of the variation of natural selection

LECTURE 2

- Mechanisms of Evolution
  * Evolution of crop plants
  * De-Candole thought about Agriculture
  * Contributions of N.I. Vavilov to crop plant origins
- Genetic basis for evolution of cultivated plants
  * Mendelian variation by mutation of genes
  * Interspecific hybridization
  * Polyploidy
  * Introgression
- Roles of hybridization
  * Definition of hybridization
  * High Crop yield
  * High crop quality
  * High nutritional levels and wide range of end users
  * Maintenance or extension of adaptation to soils and climate and as well as varieties for local specific environments
  * Pest and disease resistant crops
  * Produce varieties with improved resistance to various abiotic stress conditions.

LECTURE 3

- Selection in Crop Evolution
  * Natural selection (phyletic & speciation evolution)
  * Artificial selection
  * Aesthetic selection
- Origin of cultivated plants
  * Primary centre of diversity (definition and examples)
  * Secondary centre of diversity (definition and examples)
- Centre of recombination
- Features of centre of diversity
- Importance of plant genetic diversity
  * Enables farmer to grow crops under a range of varying conditions and ` adverse environment
  * Better management of uncertainties
  * Spread their risks of production

* Sustain livelihood in marginal production areas
* Help both farmers and breeders to select and breed for better crops and varieties
* Satisfy present and future demands in production and consumer preferences
* Satisfy the diverse demand by households and consumers in different cultural settings

LECTURE 4

- Definition of Plant taxonomy
- Importance of Plant taxonomy
- Aims of Plant taxonomy
- Scope of Taxonomy
  * Identification
  * Nomenclature
  * Classification

LECTURE 5

- Plant Nomenclature
  * Why do we need such difficult Latin names for plant
- Binomial system and Nomenclature
  * Generic name and specific epithet
  * Citation and Authority
- Taxonomic Hierarchy
  * Definition of Taxonomic hierarchy
  * Taxon and Description of a taxon
- Ranks of Taxon (12 categories in the hierarchy)

LECTURE 6

- Descriptive features of Plant Taxonomy
- Floral formula
  * Definition of floral formula
  * Features of floral formula
- Analyses of floral formula

LECTURE 7

- Practical
  * Survey of crop species and their relatives
  * Consideration of crop species and how they fit into a species
  * Collection of various species within a genus

LECTURE 8

- Revision classes

BOOKS FOR CONSULTATION

1. Evans, L. T. Crop Evolution, adaptation and yield. Cambridge University Press, 1993

2. Hawkes, J. G. The diversity of Crop Plants. Harvard University Press. 1983

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

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